wollongong
city of innovation

BUSINESS PAPER

ORDINARY MEETING OF COUNCIL

To be held at 6.00 pm on

Monday 22 July 2019

Council Chambers, Level 10,
Council Administration Building, 41 Burelli Street, Wollongong

Order of Business

1 Opening meeting
2 Acknowledgement of traditional owners
3 Civic prayer
4 Apologies and applications for leave of absence by Councillors
5 Confirmation of minutes of ordinary Council meeting
6 Confirmation of minutes of extraordinary Council meeting
7 Disclosures of interests
8 Petitions and presentations
9 Confirmation of minutes of Council committee meeting
10 Public access forum
11 Call of the agenda
12 Lord Mayoral minute
13 Urgent items
14 Reports to Council
15 Reports of committees
16 Items laid on the table
17 Notices of motion(s)/Questions with notice
18 Notice of Rescission motion
19 Confidential Business
20 Conclusion of meeting

Members

Lord Mayor – Councillor Gordon Bradbery AM (Chair)
Deputy Lord Mayor – Councillor David Brown
Councillor Ann Martin
Councillor Cameron Walters
Councillor Cath Blakey
Councillor Dom Figliomeni
Councillor Janice Kershaw
Councillor Jenelle Rimmer
Councillor John Dorahy
Councillor Leigh Colacino
Councillor Mithra Cox
Councillor Tania Brown
Councillor Vicky King

QUORUM – 7 MEMBERS TO BE PRESENT

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MINUTES

ORDINARY MEETING OF COUNCIL

at 6.00 pm

Monday 24 June 2019

Present

Lord Mayor (Acting) – Councillor D Brown (in the Chair), Councillors A Martin, C Walters, C Blakey, D Figliomeni, J Kershaw, J Rimmer, J Dorahy, L Colacino and T Brown.

In Attendance

General Manager – G Doyle, Director Infrastructure and Works, Connectivity Assets and Liveable City – A Carfield, Director Planning and Environment (Acting), Future City and Neighbourhoods – M Riordan, Director Corporate Services, Connected and Engaged City – R Campbell, Director Community Services, Creative and Innovative City – K Hunt, Manager Information and Improvement (Acting) – Paul Marskell, Manager Governance and Customer Service –T Hopwood, Chief Financial Officer – B Jenkins, Manager Property and Recreation (Acting) – J Towers, Manager City Strategy – C Stewart, Manager City Works – M Roebuck, Manager Project Delivery (Acting) – R Ryan, Manager Infrastructure Strategy and Planning – M Dowd, Manager Open Space and Environmental Services – J Page, Manager Community Cultural and Economic Development – S Savage and Manager Strategic Projects - Peter Coyte.

Apologies

Min No.

244 COUNCIL'S RESOLUTION – RESOLVED on the motion of Councillor Dorahy seconded Councillor T Brown that the apologies tendered on behalf of the Lord Mayor, Councillor G Bradbery (AM), Councillors Cox and King be accepted.

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PAGE NO.

CLOSED SESSION

Reason for Confidentiality

This report recommends that this item be considered in Closed Session to the exclusion of the press and public in accordance with Section 10A(2)(c) of the Local Government Act, 1993, as the report contains information that would, if disclosed, confer a commercial advantage on a person with whom the Council is conducting (or proposes to conduct) business.

DISCLOSURE OF INTERESTS

Councillor Martin tabled a copy of a general notice made to the General Manager in accordance with the Code of Conduct in relation to their employment with the NSW Department of Planning in the Southern Region Office, located in Wollongong.

Councillor T Brown tabled a copy of a General Notice made to the General Manager in relation to their employment with the University of Wollongong, SMART Infrastructure Facility.

Councillor Dorahy tabled a copy of a General Notice made to the General Manager in relation to their membership as Director of the Aster Group comprising Wests Illawarra and Port Kembla Golf Club and as Chairperson and Director of CareSouth. Councillor Dorahy added that has not in the past and will not in the future be present in the Chamber during matters concerning the Aster Group.

Councillor Rimmer tabled a copy of a General Notice made to the General Manager in relation to their employment with the Legislative Assembly in the Office of Ryan Park MP, State Member for Keira as a Senior Electorate Officer.

RESOLVED on the MOTION of Councillor T Brown seconded Councillor Colacino that the tabling of the General Notices be noted.

PETITION – PROPOSED TIMED LOADING ZONE IN CUL-DE-SAC - FIRST STREET, WOLLONGONG

Councillor D Brown tabled a petition containing 51 signatures from residents in First Street, Wollongong requesting changes to a proposed time and day limited loading zone in order to allow trucks to collect waste bins on Tuesdays from 7:00 am to 10:00 am.

AWARDS

The Lord Mayor (Acting) advised of two awards won by Wollongong City Council in two of a possible ten categories at this year's National Awards for Local Government in Canberra.

Prevention and Community Safety Award for its community safety project 'I Belong in the Gong'. This Program is a community development project created to reduce harassment and threatening behaviour at night in Wollongong's CBD and is funded by the New South Wales Department of Justice.

Workforce Planning and Development – Attracting and Retaining Tomorrow's Workforce Award for its 'Eyes on the Future School Based Traineeship Program'. This Program involves students undertaking a school-based traineeship while completing their Higher School Certificate, working in Wollongong City Libraries and undertaking a Certificate II or Certificate III qualification.

CONFIRMATION OF MINUTES OF ORDINARY MEETING OF COUNCIL HELD ON MONDAY, 27 MAY 2019

245 COUNCIL'S RESOLUTION – RESOLVED on the motion of Councillor Kershaw seconded Councillor Colacino that the Minutes of the Ordinary Meeting of Council held on Monday, 27 May 2019 (a copy having been circulated to Councillors) be taken as read and confirmed.

PUBLIC ACCESS FORUM		
ITEM	**TITLE**	**NAME OF SPEAKER**
Not an Agenda Item	Address the demands of the Youth Environmental Alliance in regards to Council's Divestment from fossil fuels and action on climate change.	Darcy Turner on behalf of Youth Environmental Alliance (YEA)
Not an Agenda Item	Address the demands of the Youth Environmental Alliance in regards to Council's Divestment from fossil fuels and action on climate change.	Nicholas Ritchie (Environmental Representative) on behalf of Youth Environmental Alliance (YEA)

246 COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor Martin seconded Councillor D Brown that all speakers be thanked for their presentation and invited to table their notes.

CALL OF THE AGENDA

247 COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillo D Brown seconded Councillor Rimmer that the staff recommendations for Items 2 to 5, 8 to 9, and 11 to 15 be adopted as a block.

A PROCEDURAL MOTION was MOVED by Councillor Colacino seconded Councillor D Brown that an Urgency Item in relation to the NSW Health's intention to demolish a range of buildings within the Garrawarra Hospital Centre be considered prior to the Closed Session.

ITEM 1 - DRAFT DELIVERY PROGRAM 2018-2021 AND OPERATIONAL PLAN 2019-2020 - OUR WOLLONGONG 2028 - FEEDBACK FOLLOWING SUBMISSIONS

248 COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor T Brown seconded Councillor Kershaw that -

1 Council incorporate the changes recommended in this report for the following documents, and these documents be adopted -

a Delivery Program 2018-2021 and Operational Plan 2019-2020.

b Operational and Capital Budget 2019-2022.

c Revenue Policy, Fees and Charges 2019-2020.

1.1 That $250,000 be transferred from Strategic Projects (Unallocated) [p66 of this business paper] to projects as determined through the Wollongong City Council Sports Infrastructure Grants for 2019/20 Sports Reference Group's process for 2019-20.

1.2 That the sum of $300,000 in 2019/20, $500,000 in 2020/21 and $300,000 in 2021/22 be transferred from Strategic Projects (Unallocated) [p66 of this business paper] to projects in the Infrastructure Delivery Program 2019-2023, Parks and Sportsfields section, 'Sportsfields Projects' [page 70, 71 of that document] to expedite delivery of lighting projects to be endorsed by Council.

1.3 That the Draft 2019/20 Operational and Capital Budget (Attachment 1 to the report) Supporting Documents - Planning Studies and Investigations – Parks and Sportsfields section [page 37 of that document, page 22 of the business paper] the 'Cringila Hills Site Assessment' line item be redesigned as 'Cringila Park playground equipment project' to include consultation and design of playground equipment near the baseball field.

That any residual funds from the project be reserved for construction of the equipment. That any additional funds needed, or surplus, be incorporated in a quarterly review along with any rephrasing of the Cringila Hills Site Assessment project.

2 Council makes the rates and charges for the period 1 July 2019 to 30 June 2020, outlined in the draft Revenue Policy 2019-2020 as amended in this report, including the general rate increase of 2.7% as determined by the Independent Pricing and Regulatory Tribunal [IPART].

3 The General Manager be authorised to make the changes to the endorsed draft Delivery Program 2018-2021 and Operational Plan 2019-2020, including attachments.

Variation The variations moved by –

- Councillor Rimmer (the addition of Point 1.1)
- Councillor D Brown (the addition of Point 1.2)
- Councillor Martin (the addition of Point 1.3)
- Councillor Kershaw (the addition of the words 'to be endorsed by Council' to Point 1.2)

were accepted by the mover and seconder.

ITEM 2 - BEACH AND FORESHORE ACCESS STRATEGY 2019-2028

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that -

1 The Beach and Foreshore Access Strategy 2019-2028 be adopted.

2 Council note the Engagement Report, summary of submissions and the Beach and Foreshore Access Strategy 2019-2028 Implementation Plan.

ITEM 3 - DRAFT WEST DAPTO DEVELOPMENT CONTRIBUTIONS PLAN 2020 FOR EXHIBITION

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that -

1 The advice from the NSW Department of Planning and Environment dated 17 January 2019 (Attachment 3) of the report be noted.

2 The Draft West Dapto Development Contributions Plan 2020 (Attachment 1) of the report be endorsed for exhibition for a minimum period of 28 days.

3 Following exhibition and consideration of any submissions, the Draft 2020 Plan be updated to incorporate any relevant post exhibition amendments and submitted to the Independent Pricing and Regulatory Tribunal (IPART) for review, noting that the outcome of this review will be in the form of recommendations to the NSW Minister for Planning.

4 That a report be presented back to Council with the IPART recommendations and NSW Minister for Planning's advice in relation to the adoption of the 2020 Plan.

ITEM 4 - DUCK CREEK FLOOD STUDY (2019)

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that the Duck Creek Flood Study (2019) be adopted.

ITEM 5 - DRAFT NEIGHBOURHOOD PLAN FOR PART OF 464 BONG BONG ROAD HUNTLEY

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that -

1 A draft Neighbourhood Plan for Lot 1 DP 1228329, (No. 464) Bong Bong Road, Huntley be progressed to public exhibition for a minimum period of 28 days (Attachment 2) of the report.

2 Consultation with relevant State Government agencies and other stakeholders occur as part of the exhibition period.

DEPARTURE OF COUNCILLORS

During debate and prior to voting on Item 6 –

- Councillor Colacino departed and returned to the meeting, the time being from 7:14 pm to 7:15 pm.
- Councillor Blakey departed and returned to the meeting, the time being from 7:18 pm to 7:19 pm.

ITEM 6 - DRAFT WOLLONGONG HARBOUR MASTER PLAN

249 COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Walters that -

1 Council note and thank the NSW Department of Industry for the development of the Draft Wollongong Harbour Master Plan – May 2019 and supporting documents, in consultation with Council, Roads & Maritime Services and the Wollongong community.

2 Council endorse the Draft Wollongong Harbour Master Plan – May 2019 and write to the NSW Department of Industry to this effect, thus enabling them to seek its final adoption by The Hon. Melinda Pavey MP - Minister for Water, Property and Housing.

3 Council write to The Hon. Melinda Pavey MP - Minister for Water, Property and Housing seeking advice on the proposed funding model for implementation of the Draft Master Plan noting that Council would welcome the opportunity to have a delegation meet with the relevant Ministers to further discuss and identify potential funding sources for implementation of the Master Plan.

ITEM 7 - DRAFT WOLLONGONG HERITAGE STRATEGY 2019-2022

250 COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor Martin seconded Councillor T Brown that the draft Wollongong Heritage Strategy and Implementation Plan 2019-2022 (Attachment 2) of the report be endorsed as a draft Council Policy and placed on public exhibition for a minimum period of 28 days.

ITEM 8 - LEAVE OF ABSENCE - COUNCILLORS BRADBERY AND COX - JUNE 2019

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that Leave of Absence be granted to –

1 The Lord Mayor, Councillor Bradbery due to his attendance at the ALARM Risk Management and Insurance Conference in Manchester and post-conference meetings in England from 21 June to 5 July 2019.

2 Councillor Cox for the period of 1 June to mid July 2019 which includes a Council Meeting on 24 June 2019 and a Councillor Briefing on 11 June 2019.

ITEM 9 - FINANCIAL ASSISTANCE POLICY - 2019/2020 RECIPIENTS REPORT

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that Council note this report.

ITEM 10 - TENDER T18/38 SPORTSFIELD LIGHTS AND SUPPLY POLE AUDIT

A MOTION was MOVED by Councillor Figliomeni seconded Councillor Dorahy that the report be deferred to a future meeting to allow Councillors to be briefed on the tender assessment process.

A PROCEDURAL MOTION was MOVED by Councillor Kershaw seconded Councillor Dorahy that Item 10 be deferred and considered in Closed Session prior to Item C1.

ITEM 11 - TENDER T19/11 BLACKMAN PARADE, UNANDERRA CULVERT REFURBISHMENT

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that –

1 In accordance with clause 178(1)(a) of the Local Government (General) Regulation 2005, Council accept the tender of Donnelley Civil Pty Ltd for the Blackman Parade, Unanderra Culvert Refurbishment, in the sum of $289,272.75, excluding GST.

2 Council delegate to the General Manager the authority to finalise and execute the contract and any other documentation required to give effect to this resolution.

3 Council grant authority for the use of the Common Seal of Council on the contract and any other documentation, should it be required, to give effect to this resolution.

ITEM 12 - MAY 2019 FINANCIALS

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that –

1 The financials be received and noted.

2 Council approve an increase in the capital budget of $0.1M that is fully offset by a corresponding level of funding from restricted assets.

ITEM 13 - STATEMENT OF INVESTMENT - APRIL AND MAY 2019

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that Council receive the Statement of Investment for April and May 2019.

ITEM 14 - CITY OF WOLLONGONG TRAFFIC COMMITTEE - MINUTES OF MEETING HELD ON 22 MAY 2019

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that in accordance with the powers delegated to Council, the Minutes and Recommendations of the City of Wollongong Traffic Committee held on 22 May 2019 in relation to Regulation of Traffic be adopted.

ITEM 15 - BI-MONTHLY RETURNS OF DISCLOSURES OF INTERESTS AND OTHER MATTERS - JUNE 2019

The following staff recommendation was adopted as part of the Block Adoption of Items (refer Minute Number 247).

COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown seconded Councillor Rimmer that Council note the tabling of the Returns of Disclosures of Interest as required by Part 4 of the Model Code of Conduct.

DEPARTURE OF COUNCILLOR

During debate and prior to voting on the Urgency Item, Councillor Walters departed and returned to the meeting, the time being from 7:45 pm to 7:46 pm.

URGENCY ITEM – INTENTION OF NSW HEALTH TO DEMOLISH BUILDINGS AT GARRAWARRA HOSPITAL CENTRE

251 COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor Colacino seconded Councillor Kershaw that Council notes -

1 The heritage assessment reports prepared on behalf of NSW Health relating to buildings and landscape features within the Garrawarra Hospital Centre.

2 With extreme concern, NSW Health's stated intention to demolish a range of buildings and features within the centre that have been variously assessed as enjoying moderate, high and indeed even exceptional heritage significance.

3 NSW Health's most recent representation to Council that there will be no demolition of buildings at the centre without an appropriate approval in place, and directs the General Manager to monitor compliance with that representation, with a view to ensuring that all steps are taken to prevent any actual or apprehended breach of planning law.

4 Urgent representations be made to the State Members for Heathcote, Keira and Wollongong to lobby the Minister for Health and that the Minister be advised of the potential demolition and Council's opposition to any proposed demolitions within the significant heritage precinct.

Variation *The variation moved by Councillor Martin (the addition of Point 4) was accepted by the mover and seconder.*

CLOSED COUNCIL SESSION

The Lord Mayor (Acting) called for a motion to close the meeting for consideration of -

- Item 10 Tender T18/38 Sportsfield Lights and Supply Pole Audit in accordance with Section 10A(2)(d)(i) of the Local Government Act 1993.

- Item C1 Partial Road Closure – Part of Buttenshaw Drive Road Reserve, Austinmer in accordance with Section 10A(2)(c) of the Local Government Act 1993.

A PROCEDURAL MOTION was MOVED by Councillor D Brown seconded Councillor Colacino that Item 10 be laid on the Table.

252 COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor Dorahy seconded Councillor T Brown that -

1 Item 10 be considered in Closed Session under Section 10A 2(d)(i) of the Local Government Act 1993 as the report contains information that would, if disclosed, prejudice the commercial position of the person who supplied it.

2 Item C1 be considered in Closed Session under Section 10A 2(c) of the Local Government Act 1993 as the report contains information that would, if disclosed, confer a commercial advantage on a person with whom the Council is conducting (or proposes to conduct) business.

3 On balance, the public interest in preserving the confidentiality of the information supplied outweighs the public interest in openness and transparency in Council decision-making by discussing the matter in open meeting.

Prior to moving into Closed Session, the Lord Mayor advised members of the gallery that -

1 The report relating to Tender T18/38 Sportsfield Lights and Supply Pole Audit is classified as Confidential in accordance with Section 10A2(d)(i) of the Local Government Act 1993, which permits the meeting to be closed to the public, as the reports relate to information that would, if disclosed, prejudice the commercial position of the person who supplied it.

2 The report relating to the Partial Road Closure – Part of Buttenshaw Drive Road Reserve, Austinmer is classified as Confidential in accordance with Section 10A 2(a) of the Local Government Act 1993, which permits the meeting to be closed to the public, as the reports relate to information that would, if disclosed, confer a commercial advantage on a person with whom the Council is conducting proposes to conduct business.

3 In accordance with Section 10A (4) of the Local Government Act, the Lord Mayor invited members of the gallery to make representations to the Council meeting as to whether this part of the meeting should be closed.

No submissions were received from the press or members of the gallery.

The MOTION on being PUT to the VOTE was CARRIED UNANIMOUSLY.

At this stage, the time being 8:00 pm, members of the press and gallery departed the Council Chambers.

A PROCEDURAL MOTION was MOVED by Councillor D Brown seconded Councillor Colacino that Item 10 be laid on the Table.

ITEM C1 - CONFIDENTIAL: PARTIAL ROAD CLOSURE - PART OF BUTTENSHAW DRIVE ROAD RESERVE, AUSTINMER

253 COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor Dorahy seconded T Brown that –

1 Council close part of Buttenshaw Drive road reserve and sell the closed portion, as divided up, to the adjoining owners, being the owners of 14, 16, 18 and 20 Asquith Street, Austinmer, and 1 Foothills Road, Austinmer (see Attachments 1 and 2 of the report) .

2 The amount of compensation to be paid to Council for the purchase of the closed portion of road reserve, must be within 20% of the market valuation for the closed portion, as apportioned to each owner based on the size of the portion of land they are purchasing.

3 The owners of 14, 16, 18 and 20 Asquith Street and 1 Foothills Road, Austinmer, are responsible for all costs in association with the road closure and sale.

4 Council grant authority for the use of the Common Seal of Council on all documents relevant to this matter, should it be required to give effect to this resolution.

5 The General Manager be authorised to finalise the negotiations with the four land owners with whom agreement has not yet been reached.

254 COUNCIL'S RESOLUTION – RESOLVED UNANIMOUSLY on the motion of Councillor D Brown that the meeting move out of Closed Session and into Open Council.

Council resumed into Open Session at 8:28 pm and members of the gallery were invited back into the Council Chambers.

RESOLUTIONS FROM THE CLOSED SESSION OF COUNCIL

The Lord Mayor advised the meeting of Council's resolution whilst in Closed Session (refer to Minute Number 253).

A PROCEDURAL MOTION was MOVED by Councillor D Brown seconded Councillor Dorahy that Item 10 be taken off the table.

ITEM 10 - TENDER T18/38 SPORTSFIELD LIGHTS AND SUPPLY POLE AUDIT

The MOTION moved by Councillor Figliomeni seconded Councillor Dorahy to defer the matter was withdrawn with the consent of the Meeting.

255 COUNCIL'S RESOLUTION – RESOLVED on the motion of Councillor T Brown seconded Councillor Figliomeni that -

1 In accordance with clause 178(1)(a) of the Local Government (General) Regulation 2005, Council accept the tender of Stowe Pty Ltd for Pole Inspection Services, in the sum of $203,037.50 excluding GST.

2 Council delegate to the General Manager the authority to finalise and execute the contract and any other documentation required to give effect to this resolution.

3 Council grant authority for the use of the Common Seal of Council on the contract and any other documentation, should it be required, to give effect to this resolution.

In favour Councillors D Brown, Kershaw, Rimmer, T Brown, Martin, Blakey, Colacino, Walters

Against Councillors Dorahy and Figliomeni

THE MEETING CONCLUDED AT 8:31 PM

Confirmed as a correct record of proceedings at the Ordinary Meeting of the Council of the City of Wollongong held on Monday 22 July 2019.

Chairperson

File: LM-914.002 Doc: IC19/416

ITEM A LORD MAYORAL MINUTE - RECOGNISING CONTRIBUTIONS THAT PROMOTE SOCIAL INCLUSION, ACCEPTANCE AND UNDERSTANDING OF DIVERSITY IN WOLLONGONG

The Australia Day Awards are the City of Wollongong's primary mechanism for recognising outstanding community contributions and achievements.

The Awards are presented each year in the week prior to Australia Day and includes the categories of, but not limited to, Citizen of the Year, Senior Citizen of the Year, Young Citizen of the Year, Arts and Cultural Award, Sports Award, Innovation Achievement and Community Group of the Year.

Nominations are received each year and judged by the City of Wollongong Australia Day Committee.

Wollongong is home to people with diverse experiences of life, which adds to the vibrancy and culture of our City. To strengthen community harmony and ensure people feel included, respected and safe, it is important to promote an understanding of gender, religion, cultural background, sexual identity and orientation, and multiculturalism.

Creating a specific Australia Day Award category would provide an opportunity to recognise an outstanding contribution in this area and reinforce Wollongong's reputation as a diverse and inclusive City.

RECOMMENDATIONS

1 A new category in the City of Wollongong Australia Day Awards be created which recognises outstanding and innovative contributions to the promotion of social inclusion, acceptance and understanding of human diversity in the City of Wollongong.

2 The category be eligible for nominations of either an individual or group that meets the aforementioned criteria.

ATTACHMENTS

There are no attachments for this report.

File: CST-100.02.074 Doc: IC19/364

ITEM 1 WEST DAPTO VISION IMPLEMENTATION: PLANNING CONTROLS REVIEW

The West Dapto Vision 2018 was endorsed by Council at its meeting of 10 December 2018.

The Vision sets the framework for a review of those provisions in Wollongong Development Control Plan 2009 (DCP) relevant to the urban release area and subdivisions in general.

The review has resulted in proposed amendments to Chapter D16 West Dapto Release Area and Chapter B2 Residential Subdivision. It is also proposed to introduce the draft West Dapto Open Space Design Manual and draft West Dapto Open Space Technical Manual. This report recommends Council endorse these documents for public exhibition.

RECOMMENDATION

1 Council endorse the draft DCP Chapter D16: West Dapto Urban Release Area, draft DCP Chapter B2: Residential Subdivisions, draft Open Space Design Manual and draft Open Space Design Technical Manual for public exhibition for a minimum 28 days.

2 A further report outlining the submissions received from the public exhibition process with recommendations regarding progression of the draft DCP amendments be prepared for Council's consideration.

REPORT AUTHORISATIONS

Report of: Chris Stewart, Manager City Strategy
Authorised by: Mark Riordan, Director Planning and Environment - Future City and Neighbourhoods (Acting)

ATTACHMENTS

1 Draft Chapter D16: West Dapto Release Area
2 Draft Chapter B2: Residential Subdivision
3 Draft West Dapto Open Space Design Manual
4 Draft West Dapto Open Space Technical Manual

BACKGROUND

West Dapto is the Illawarra region's largest urban release area with a development timeframe of 50 years. A framework of planning controls is in place to guide development across the urban release area.

In December 2018, Council adopted a revised West Dapto Vision. The revised document includes eight key vision statements including principles relating to transport, water management, conservation, open space, community facilities, town centres, housing and employment. A detailed review of the DCP provisions was identified as part of the next step in implementing the principles in the West Dapto Vision. The DCP review process has highlighted the following issues:

Chapter D16 West Dapto Urban Release Area

Part D of the DCP relates specifically to localities within the local government area. Chapter D16: West Dapto Urban Release Area commenced on 17 December 2010. A key element of the Chapter is the requirement for Neighbourhood Plans to guide the assessment of future applications for land release.

The Chapter has been modified several times since its commencement to include Neighbourhood Plans as they have been developed and adopted by Council. There are currently 11 Neighbourhood Plans with the last one adopted on 20 December 2018 with other amendments made to the Chapter.

Based on a working knowledge and stakeholder feedback gained over the past 10 years, there are a number of improvements and efficiencies that can be made through the D16 Chapter to better meet the intended outcomes adopted in the West Dapto Vision.

There is opportunity to improve the Neighbourhood Planning process to address the varied scale and quality, which would allow for improvements in achieving strategic planning outcomes and efficient infrastructure delivery, and better align with infrastructure planning such as the West Dapto Development Contributions Plan. Consideration of larger scale neighbourhood planning aligned with water catchments has tangible benefits.

Council staff working knowledge has also identified opportunity to improve efficiency in the development assessment processes via contemporary DCP provisions with clear and consistent guidance for land development.

Chapter B2 Residential Subdivisions

Part B of the DCP relates specifically to land use requirements. Chapter B2 Residential Subdivisions commenced on 1 March 2010. A key element of the Chapter is the requirement for the subdivision of land not restricted to the West Dapto area.

A number of inconsistencies have been identified when Chapter B2 is compared to other sections of the DCP including the subdivision provisions contained in Chapter D16 for West Dapto. As it stands, the content in Chapter B2 relating to road network and design differs from the guidance provided in the section of the DCP relating specifically to West Dapto.

A consolidated and updated set of requirements would better serve the development industry in terms of understanding Council's land release guidelines.

Draft West Dapto Open Space Design and Technical Manuals

The West Dapto Vision 2018 contemplates a review of the DCP to include "*more focused and detailed network planning for open space*".

The Open Space Design Manual will provide guidance at subdivision planning stage and detail the requirements and scale of each of the park categories on the open space hierarchy (ie Sports Parks, Neighbourhood Parks and Local Parks).

The Open Space Technical Manual is a companion reference document to provide the needed technical specifications for proposed open space infrastructure, detailing model types, materials and finishes to guide the detailed design and costing of subdivision open space provision appropriate to the category of park being provided.

PROPOSAL

Chapter D16 and B2 of the DCP have been amended to align with strategic principles in the West Dapto Vision 2018. The Open Space Manuals have also been introduced to implement the adopted Vision. The draft documents are attached to this report.

The key changes to the DCP are detailed as follows:

Document Structure and mapping

- Restructure Chapter D16 of the DCP around principles established in the West Dapto Vision 2018.
- Strengthen connection and consistency of Chapter D16 and B2 with other Chapters of the Wollongong DCP.
- Include new maps in Chapter D16 reflecting the West Dapto Vision Structure Plan 2018 and additional information informing road networks, stormwater and open spaces

Precinct Planning

- Remove Neighbourhood Planning process and introduce Precinct Planning to improve the guidance of strategic planning outcomes.
- Precincts boundaries to align with water sub-catchments.
- Provide clear information requirements to guide precinct plan applications.

Water Management

- Align water management requirements with contemporary Coastal Management Program outcomes.

Town centres

- Guiding provisions for Town Centre master planning, including walkability modelling and plans that demonstrate public and employment access to active and public transport.

Conservation

- Provide clarification of Heritage Study requirements.

Community Facilities

- Promote the planning of community hubs at precinct planning stage and provide guidance in terms of desired location and alignment with open space and supporting services.

Subdivision and Road design

- Minor updates and changes to Chapter B2 to improve guidance in subdivision planning and development assessment including updated references to legislation and policy to reflect the current planning setting. Revision to the contents layout to simplify navigation for the end users.
- Updated road cross sections, objectives and details relating to each type is increased.
- Bring the subdivision chapter in line with preferred subdivision requirements for cut and fill, pedestrian and cycleways, open space (including update to planning hierarchy), traffic, bushfire and servicing.

Open Space

- Introduce specific open space requirements in the West Dapto Open Space Design Manual (OSDM) and West Dapto Open Space Technical Manual (OSTM).
- The manuals clearly set Council's design expectations for natural and riparian areas, stormwater management and open space, equal access, and maintenance within each park category.
- The OSDM details the requirements and scale of each of the park categories on the open space hierarchy – Sports Parks, Neighbourhood Parks, and Local Parks when the subdivision open space is first being conceived, laid out, and costed.
- Specific design guidelines are provided for open space functions such as play spaces, car parking, public art, furniture, pathways, off road cycling trails, waste collection, and signage.
- The OSTM is a companion reference document which will guide developers and provides technical specifications for open space infrastructure, equipment required materials and finishes, etc. This guides the design and costing of subdivision open space appropriate to the category of park being provided.

- The focus of the OSDM and OSTM is primarily the West Dapto Urban Release Area and is referenced by the draft Chapter D16: West Dapto Urban Release Area.

CONSULTATION AND COMMUNICATION

If the draft amendment to the DCP is endorsed by Council for public exhibition the process will entail:

- Notification in local newspapers of the exhibition dates (minimum 28 days)
- Exhibition website with the draft material for viewing, downloading and comments
- Physical copies made available in the Wollongong Library and Dapto Library
- Collating comments and feedback provided from the community and summarising

Following the exhibition period, submissions will be reviewed and reported to Council with further recommendations regarding progression of the guiding documents.

PLANNING AND POLICY IMPACT

Aligning policy and planning to deliver the desirable outcomes for the West Dapto contributes to the delivery of Our Wollongong 2028 goals *"1. We value and protect our environment", "2. We have an innovative and sustainable economy", "6. We have affordable and accessible transport."* It specifically delivers on the following:

Community Strategic Plan		Delivery Program 2018-2021		Annual Plan 2018-19
Strategy		3 Year Action		Annual Deliverables
1.3	The sustainability of our urban environments is improved	1.3.1.2	Develop planning controls and Town Centre and Neighbourhood Plans with regard to the economic, social and environmental impacts	Continue the review of the West Dapto Land Release area including the Vision, Structure Plans and Local Infrastructure Plans
2.1.5	West Dapto urban growth is effectively managed to balance employment and population growth	2.1.5.1	In collaboration with key agencies, facilitate the West Dapto Taskforce to deliver the first stages of the West Dapto Urban Release Area	Continue to implement the Infrastructure Delivery Program to support the West Dapto Urban Release Area
6.3	Provide connected and accessible places and spaces	6.3.1.1	Plan and implement projects to improve connectivity	Develop a Community focused Active Transport Program

Ecological Sustainability

The Wollongong DCP 2009 already includes Chapter A2 Ecologically Sustainable Development (ESD) which is applicable to the whole LGA. Amendments to Chapter D16: West Dapto Release Area, includes a section of conservation principles including environmental conservation, heritage conservation and riparian corridors.

RISK ASSESSMENT AND FINANCIAL IMPLICATIONS

The introduction of Precinct Planning is expected to improve efficiencies in the development assessment phase by providing more informed guidance to the development approval process.

The Open Space Manuals will provide important guidelines and specifications for developers when designing and costing subdivision proposals. Developers will be able to price open space provision more accurately, and ensure that the features and infrastructure proposed are appropriate to the relevant park category, and reduce the likelihood of unnecessary maintenance burdens being passed on to Council.

CONCLUSION

The West Dapto Vision 2018 sets the framework to update the DCP as it relates to the release area, and to bring planning policy documents into alignment. The draft Chapter D16 West Dapto Release Area, draft Chapter B2 Residential Subdivision, draft West Dapto Open Space Design Manual and draft West Dapto Open Space Technical Manual will facilitate implementation of West Dapto Vision 2018. This report recommends Council endorsement of the documents for public exhibition. Following the exhibition period, submissions will be reviewed and reported to Council with further recommendations regarding progression of the guiding documents.

Contents

FIGURES

Document Control

Document ID: Wollongong DCP 2009 – D16 West Dapto Release Area

Rev No	Adoption Date	In force date	Revision Details
1	14/12/10	17/12/12	Adopted
2	27/7/11	3/8/11	Incorporate Shone Ave Neighbourhood Plan
3	26/11/12	8/12/12	Update Wongawilli North Neighbourhood Plan
4	27/5/13	1/6/13	Incorporate Sheaffes Rd Neighbourhood Plan
5	9/12/13	14/12/13	Incorporate Reddalls Rd Industrial Neighbourhood Plan
6	24/3/14	2/4/14	Incorporate Darkes Rd South West Neighbourhood Plan and updated road network diagrams
7	3/8/15	12/8/15	Incorporate Avondale Road North, Huntley Neighbourhood Plan
8	24/8/15	9/9/15	Incorporate Shone Avenue / West Dapto Road Neighbourhood Plan
9	19/10/15	24/10/15	Incorporate West Dapto Rd / Sheaffes Rd (south) Neighbourhood Plan
10			Draft May 2018
11	19/11/18	20/12/2018	Incorporate Bong Bong South Neighbourhood Plan
12	10/12/18	20/12/2018	Incorporate the West Dapto Vision, Structure Plan 2018 and planning principles
13			**Whole document review and new precinct process**

1 INTRODUCTION

This chapter of the Wollongong Development Control Plan 2009 (DCP) is intended to implement the development structure of the West Dapto Release Area as outlined in the West Dapto Structure Plan (**Figure 2**) and to provide guidance on the future development of the land at West Dapto. It is aimed at achieving the vision for West Dapto which is:

> *West Dapto will grow and develop as a series of integrated and connected communities. Set against the spectacular Illawarra Escarpment and a landscape of riparian valleys, these communities will integrate the natural and cultural heritage of the area with the new urban form.*
>
> *The communities will be healthy, sustainable and resilient with active and passive open space accessible by walkways, cycleways and public transport. To support these new communities, local centres will provide shopping services, community services and jobs while employment lands will facilitate further opportunities for the region.*
>
> *West Dapto will be supported by a long-term strategy to oversee the timely implementation of infrastructure to deliver sustainable and high-quality suburbs with diverse housing choices.*

Other parts of this DCP continue to apply to the West Dapto Release Area in conjunction with this chapter. Part A of the DCP contains the Introduction and Part B Land Use Based Planning Controls. Part C provides Specific Land Use Controls and Part E General (City Wide) Controls.

2 LAND TO WHICH CHAPTER APPLIES

This chapter applies to all land within the West Dapto Release Area (**Figure 1**).

Figure 1. West Dapto Urban Release Area

3 OBJECTIVES

The principles are designed to set out expectations around elements for consideration while planning for development of the West Dapto Release Area. The principles, objectives and any applicable controls will guide the growth of new suburbs and neighbourhoods, protect the environment and integrate with existing communities.

The objectives of this chapter are to:

(a) enable the development of the West Dapto Release Area for residential, employment, industrial and environmental conservation areas in a manner consistent with the Wollongong LEP 2009 the West Dapto Vision 2018 and the West Dapto Structure Plan (Figure 2).

(b) ensure the development of the West Dapto Release Area is carried out following the principles of Ecologically Sustainable Development, promoting retention and enhancement of the release areas unique environmental features to shape desired future urban setting outcomes.

(c) support the provision of safe and efficient road networks that promotes long term sustainability and active transport, with public transport services which link the surrounding areas to and throughout the release area.

(d) implement Water Sensitive Urban Design (WSUD) for effective water management and protect development in the area from flooding.

(e) recognise existing environmental and landscape qualities and establish future urban characteristics desired for and shaping the ongoing development of the release area.

(f) protect, conserve and enhance riparian and environmentally sensitive areas and only allow for development compatible with the conservation values of these areas.

(g) protect areas of high scenic value, notably the Illawarra Escarpment and Lake Illawarra with developments that contribute and promote the areas visual and aesthetic values.

(h) conserve and enhance the environmental, cultural and built heritage of West Dapto.

(i) guide the development of open space to meet future community needs and facilitate a network of open space connected by off road cycleways and shared paths throughout the release area.

(j) ensure that development in the Darkes Road, Bong Bong and Marshall Mount town centres contributes to the creation of retail, business, commercial and community hubs and provides significant local employment and community service opportunities.

(k) provide village centres with localised businesses and higher density residential opportunities at key places / intersections were bus stops, community facilities and open space come together as local urban focal points.

(l) ensure the community social and cultural needs are met through the provision of a range of community facilities across the release area (co-located with other facilities in 'hubs', creating urban focal points).

(m) guide planning and development of well-located schools, childcare centres, and adult education facilities to support the communities educational needs.

(n) stimulate diversity in development types and styles to provide a range of different dwellings to increase housing choice and design quality in the Illawarra region.

(o) ensure the creation of safe, secure, liveable and resilient urban environments are established considering future climate and other potential environmental vulnerabilities.

(p) improve employment opportunities and economic growth in the Illawarra region whilst ensuring that commercial and industrial development is of a high design standard, ecologically sustainable and energy efficient.

4 STRUCTURE PLAN

The West Dapto Structure Plan (**Figure 2**) shows the landuse setting which will house the future urban structure and guide the development of the release area.

It is characterised by a series of residential precincts estimated to generate around 19,500 dwellings. The precincts come together to form five distinct stages, separated by riparian corridors connecting through the release area from the Illawarra Escarpment framing the western extent to Lake Illawarra in the east. The release area will also include protection and integration of heritage landscapes and items into the urban structure.

The Structure Plan identifies the following features:

- Town and village centres
- Conservation land
- Heritage items and potential curtilages
- Transition land (environmental constraints exist but may be appropriate for some appropriate developments)
- Development land
- Employment land
- Large open space facilities (neighbourhood parks 2-5 ha, and district 5-8 ha)
- Structural road network
- Creeklines and flood extents (1% AEP)

The Wollongong LEP 2009 has Stages 1 & 2, a portion of Stage 3 and all of Stage 5 of the release area zoned for existing and potential residential development (see Figure 3). There is also 175 hectares of employment land zoned at Kembla Grange (in Stage 1, see Figure 3).

STAGE 1 and 2

Stages 1 & 2 are located in the northern extent of the release area. There are a number of unique features to these stages of the release area including:

- Potential development of around 6700 dwellings.
- Employment land (industrial zones) located within close proximity to Unanderra light industrial area and well connected to Dapto Regional Centre along the Princes Highway, the Port of Port Kembla and the M6 Motorway.
- South of the employment lands will be home to Darkes Town Centre with approximately 7500m2 of commercial/retail floor space providing for a range of shops and services as well as community facilities and active open space for community recreation.
- Protection and rehabilitation of riparian corridors and conservation areas (vegetation and heritage conservation depending on site features and opportunities) to improve water quality, recreational opportunities and connectivity of remnant vegetation along these structural spurs through the release area.
- Structural road network that will connect from outside the release area, through stages 1 and 2 and into the southern reaches of the release area.
- Active transport facilities (cycleways/shared paths) connecting residential areas with open space provisions via riparian corridors and along the structural road network.
- Two village centres (Wongawilli and Jersey Farm) that will provide local convenience shops and urban focal points within the residential areas of stage 2.
- Two primary schools, one located close to the Darkes Town Centre and one located in the Wongawilli/Jersey Farm Road area to service the future residential families.
- Bong Bong Town Centre, at the southern extent of stage 2 on the south side of Bong Bong Road will provide retail needs, local services and community facilities with employment

opportunities in the local context. It will be the urban focal point supporting opportunity for denser housing products located convenient to public and active transport links.

Stage 5

Yallah-Marshall Mount precinct is characterised by:

- Potential development of around 4,000 new dwellings.
- Marshall Mount Town Centre comprising approximately 3,500 sqm floor space in a traditional main street format to provide for retail shops, local convenience needs, local services, community facilities and the like.
- Connection of the precinct into Avondale and Cleveland, with access via an extension of Yallah Road (Road No. 8) as part of the overall West Dapto road network.
- Protection of significant vegetation and unique landscape features of the area.
- Utilisation of Duck Creek as a focal feature of the community.
- A primary school located near Marshall Mount Town Centre to meet the educational needs of the future residential families.

The Yallah-Marshall Mount precinct will utilise traditional urban design principles, with relatively high densities around the town centre and concentrated along the main access roads. The precinct will have a diverse range of housing types and densities.

Stages 3 & 4

Stages 3 and 4 are located in the existing rural suburbs of Cleveland and Avondale, in the middle of the release area south of Horsley and well connected to Dapto Regional Centre to the East via Fowlers Road into Cleveland Road. Part of Stage 3 has been rezoned and combined with the remainder of Stage 3 and 4 will ultimately include:

- Potential development of approximately 8,800 new dwellings.
- Community facilities including a district level recreational centre and youth services facility.
- Two primary schools meet the educational needs of the future residential families.
- Three well connected village centres (Fowlers, Huntley and Avondale) that will provide local convenience shops and urban focal points within the residential areas
- Unique Mullet Creek Catchment environmental features providing the riparian corridor spur supporting and defining the surrounding urban form
- Structural road network that will connect from the southern extent of Stage 2 at Bong Bong Town Centre down to the southern extent of Stage 4 and into Stage 5 of the release area. There will also be road connections spanning from Dapto Regional Centre into the release area along the east, branching into the village centres supporting surrounding residential development.
- Active transport facilities (cycleways/shared paths) connecting residential areas with open space provisions via riparian corridors and along the structural road network.
- High School and primary school facilities for the future population of the stages. Ideally the School will be located near Bong Bong Town Centre (in either Stage 2 or 3) to create a relationship with the town centre to provide education services for the future children and youth population residing between stage 1, 2 and 3 of the release area.

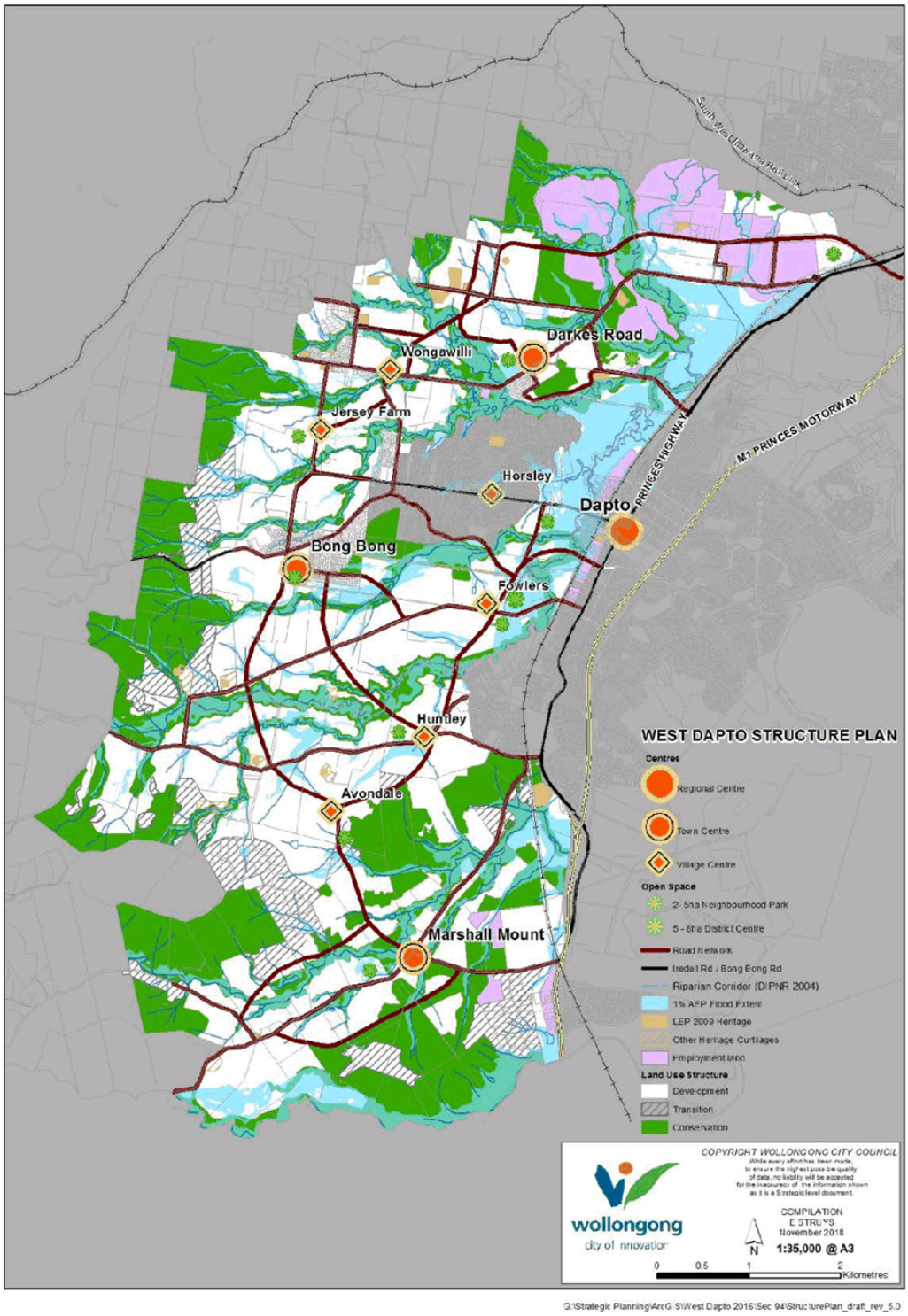

Figure 2. West Dapto Structure Plan 2018

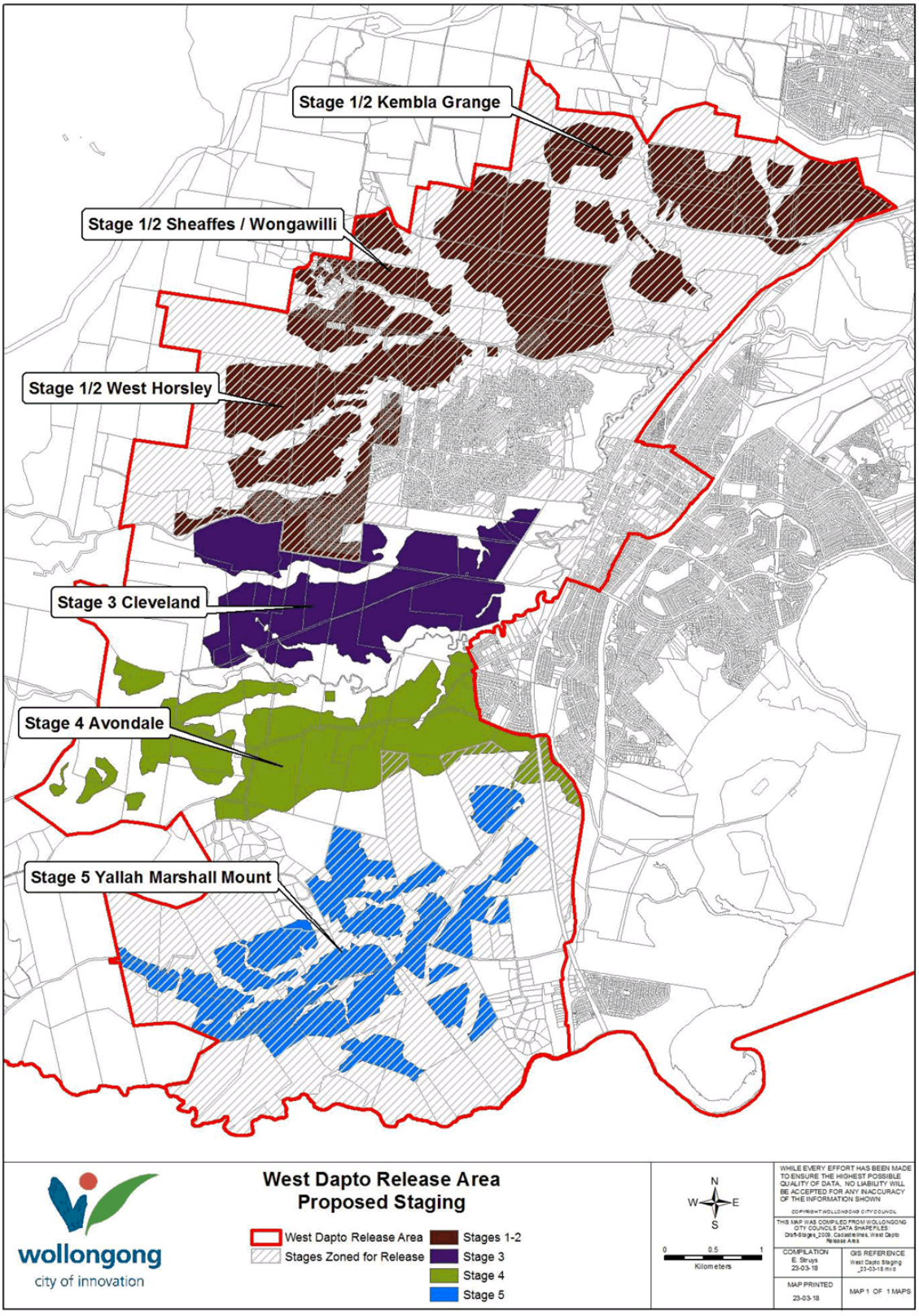

Figure 3. Stages of West Dapto Urban Release Area

5 PLANNING PRINCIPLES

The West Dapto Planning Principles are intended to guide landuse planning decision associated with the release area. They provide a statement of a desirable outcome for the development of the release areas and provide a basis of reasoning to support making planning decisions. Principles are important considerations when there may be more than one interpretation or contradictions between any qualitative requirements or development controls defined in other chapters of the DCP.

There are eight groups of principles originally outlined in the West Dapto Vision document 2018. This chapter is structured in a similar way building on principles with some additional requirement details. **Figure 4** outlines the key components and how they relate to Council planning policies.

The group of principles include:

- Transport
- Water management
- Conservation
- Open space
- Community and education
- Town centres
- Employment
- Housing

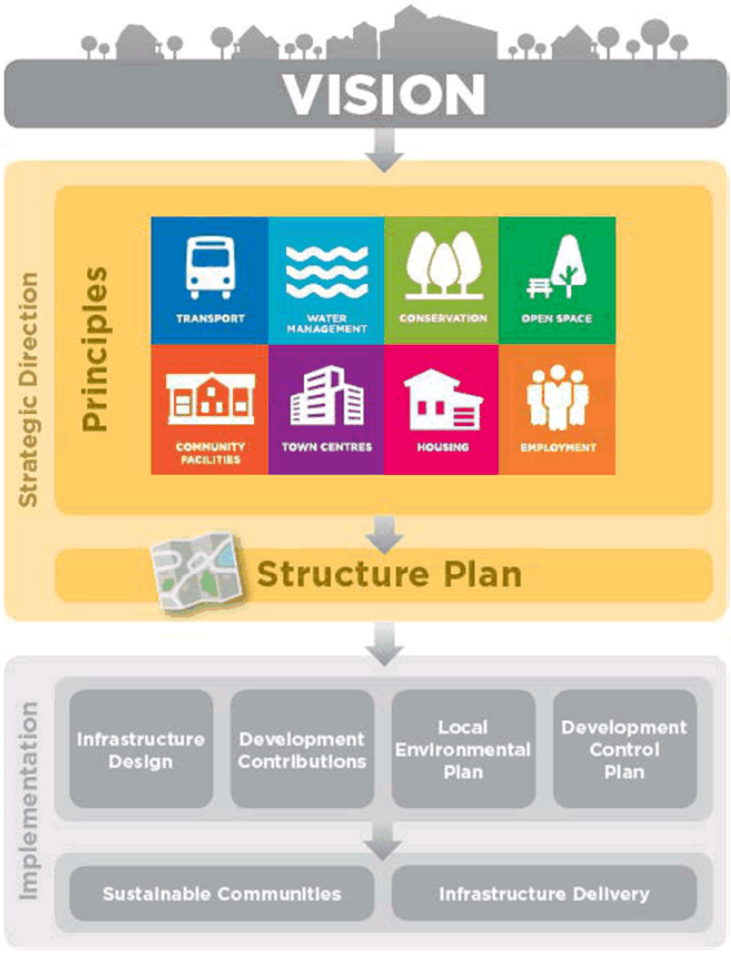

Figure 4. Structure and relationships of principles to planning tools

6 TRANSPORT

6.1 The road network

The future road network for West Dapto will be the 'backbone' of the community, providing for all types of access and movement through the release area. The road network form and provision contribute significantly to achieving the vision of long-term sustainability.

An integrated transport system is proposed that caters for the private car, freight, public transport, pedestrians and cyclists. Road types have been developed based on a functional hierarchy, where the road designs support the transport modes in various ways. The road network has been developed to cater for future urban land uses and deliver a safe, connected and legible transport framework that compliments the natural environment and facilitates sustainable transport outcomes.

The Structure Plan (**Figure 2**) outlines the structural road network through the release area. The Road network structure was modelled in TRACKS to understand the demand and supply requirements to service the release area. The modelling informed road typology requirements for the structural road network as shown in **Figure 5** and **Figure 6**. The road typology for the release area is informed by road hierarchy and cross sections which detail how the roads are configured for designs. Road Hierarchy and cross sections are covered in DCP Chapter B2 Residential Subdivision.

In accordance with the following road network principles (specifically 2 and 3), the release area needs to be accessible in emergency situations. Flooding events present a specific challenge to urban development in a flood plain area and specific design response is needed provide safe and connected residential areas. **Figure 7** illustrates which structural roads or sections of road within the release area are required to provide some flood immunity and designed to account for 1% Annual Exceedance Probability (1% AEP).

Principle 1 - Supportive land use patterns

1.1 Plan higher residential densities and mixed land use in & adjacent to town and village centres and major public transport nodes, to reduce reliance on the private car and reduce overall road network requirements and costs.

1.2 Plan the co-location of compatible land uses to reduce reliance on the private car and reduce overall road network requirements and costs.

Principle 2 - A safe, connected and legible road network for all users

2.1 Provide a road network based on the modified grid layout to maximise accessibility and efficiency.

2.2 Implement a clear hierarchy of road types (see **DCP Chapter B2 Residential Subdivision**) that responds to relevant transport requirements and road function, creating a highly legible road network for all users (**Figure 5** Road Typology and **Figure 7** Flood access roads of the structural road network).

2.3 Implement intersection designs appropriate to the road types (**Figure 5**), surrounding land uses and environments.

2.4 Ensure the structural road network supports the town and village centres hierarchy within West Dapto.

2.5 Ensure the integrated road system, caters for all road users including private cars, freight, public transport (buses), pedestrians and cyclists.

2.6 Implement driveway access restrictions and manage on-road parking on the higher-order roads (access-denied roads) to improve traffic efficiency and pedestrian/cyclist safety and amenity.

2.7 Ensure built form controls on adjacent properties to roads deliver active frontages to maximise passive surveillance and personal safety in the road environment. For example, road layouts that include lanes, service roads and so on to ensure houses front the primary road.

2.8 Ensure roads and intersections are designed to meet requirements of the Wollongong DCP 2009 B2: Residential Subdivision, AustRoads and Australian Standards.

Principle 3 - Design roads to compliment the environment

3.1 Ensure roads fit with the landform (topography), compliment local character/land use and

minimise visual, ecological & noise impacts.

3.2 Ensure road alignments take advantage of views and visual stimuli for the motorist to enhance legibility, sense of place & create a positive experience in movement.

3.3 Consider the role of road networks in structuring precincts, including both transport and community needs to maximise liveability and quality urban outcomes.

3.4 Incorporate Water Sensitive Urban Design (WSUD) into transport infrastructure design and consider options to increase permeability of hard surfaces.

Principle 4 - Quality infrastructure

4.1 Use robust and durable materials, quality finishes and ancillary infrastructure, with neat, uncomplicated designs that minimise maintenance requirements and discourage vandalism.

4.2 Consider the use of innovative technologies in road & transport infrastructure design, construction and operation.

Principle 5 - Road network to support sustainable transport outcomes

5.1 Staging of additional car based infrastructure to encourage public/active transport and maximise use of existing infrastructure.

5.2 Use an established 15% transport mode shift target when planning for road network requirements within West Dapto, to encourage a shift towards reduced car dependence.

5.3 Ensure that roads are designed to provide a high level of safety, access and amenity for pedestrians, cyclists and public transport (bus services).

6.2 Bridge and culvert design

Bridges and culverts form important structural components supporting the road network as it traverses the flood plain landscape. While there are design limits and prefabrication conditions the infrastructure are built to, it is also important that design decisions on materials, placements, modification to standards and any other specifics take into account desired outcomes for the areas they are in and who they will cater to.

Principle 1 – Good design is context sensitive design

Design that is sensitive to context is valued by communities. Bridges/culverts that are functional and fit the landscape are good for community pride and local identity.

1.1 Consider influence of locational context and functional requirements in the design process. For example, if the crossing is traversing land that is zoned E2 or E3 and there are known ecological communities or fauna groups recorded there, fauna crossings should be a component of design and construction must be done sensitive to these outcomes.

1.2 Bridge/culvert alignment should integrate with environmental features.

1.3 Construction over or within waterways should have regard to the Fish Passage Guidelines developed by NSW Fisheries.

1.4 Ensure storm immunity standards are met and design/construction provides longevity and minimises maintenance requirements.

1.5 Design and finishes and overall appearance should respond to and incorporate character of the area.

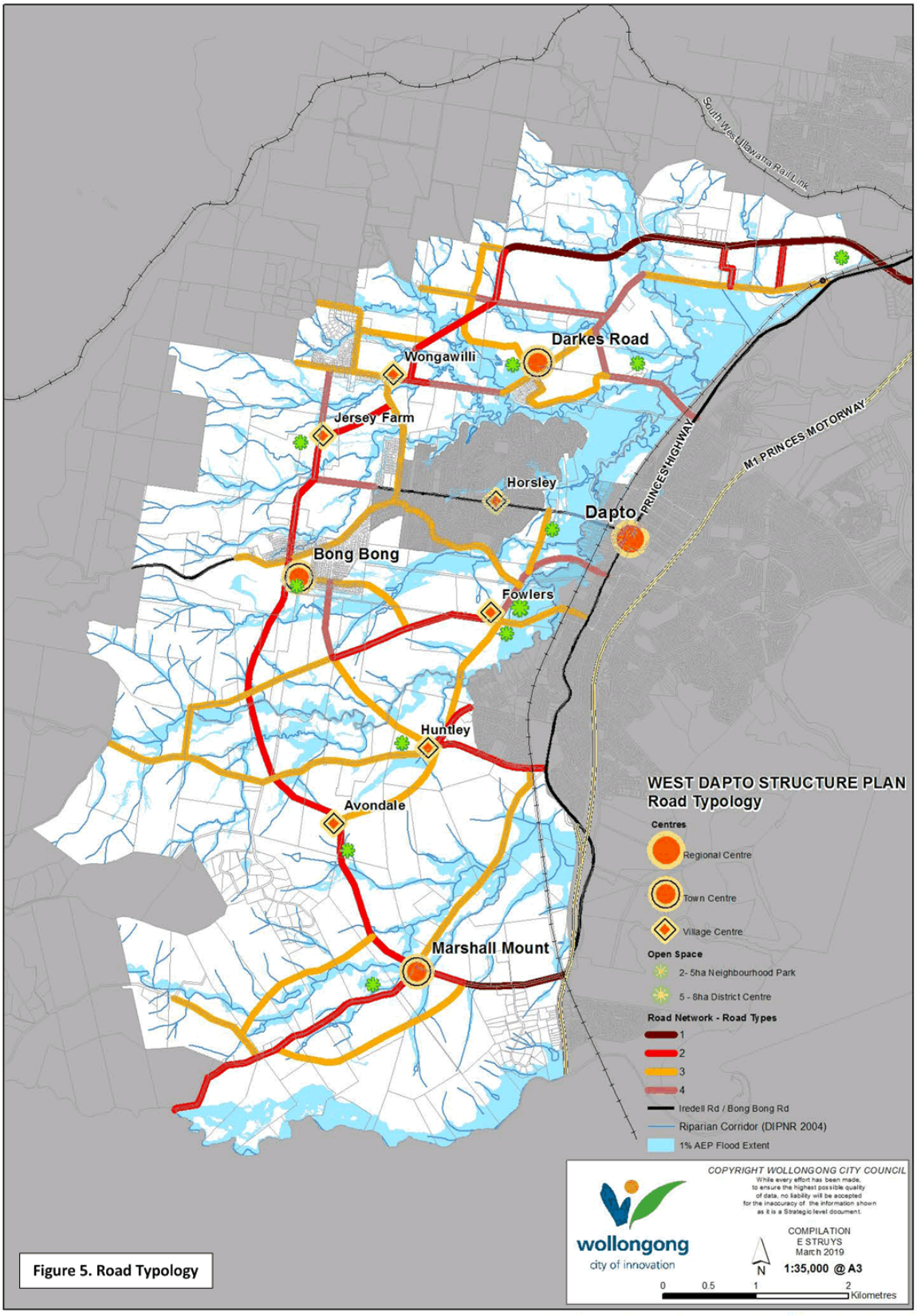

Figure 5. Road Typology

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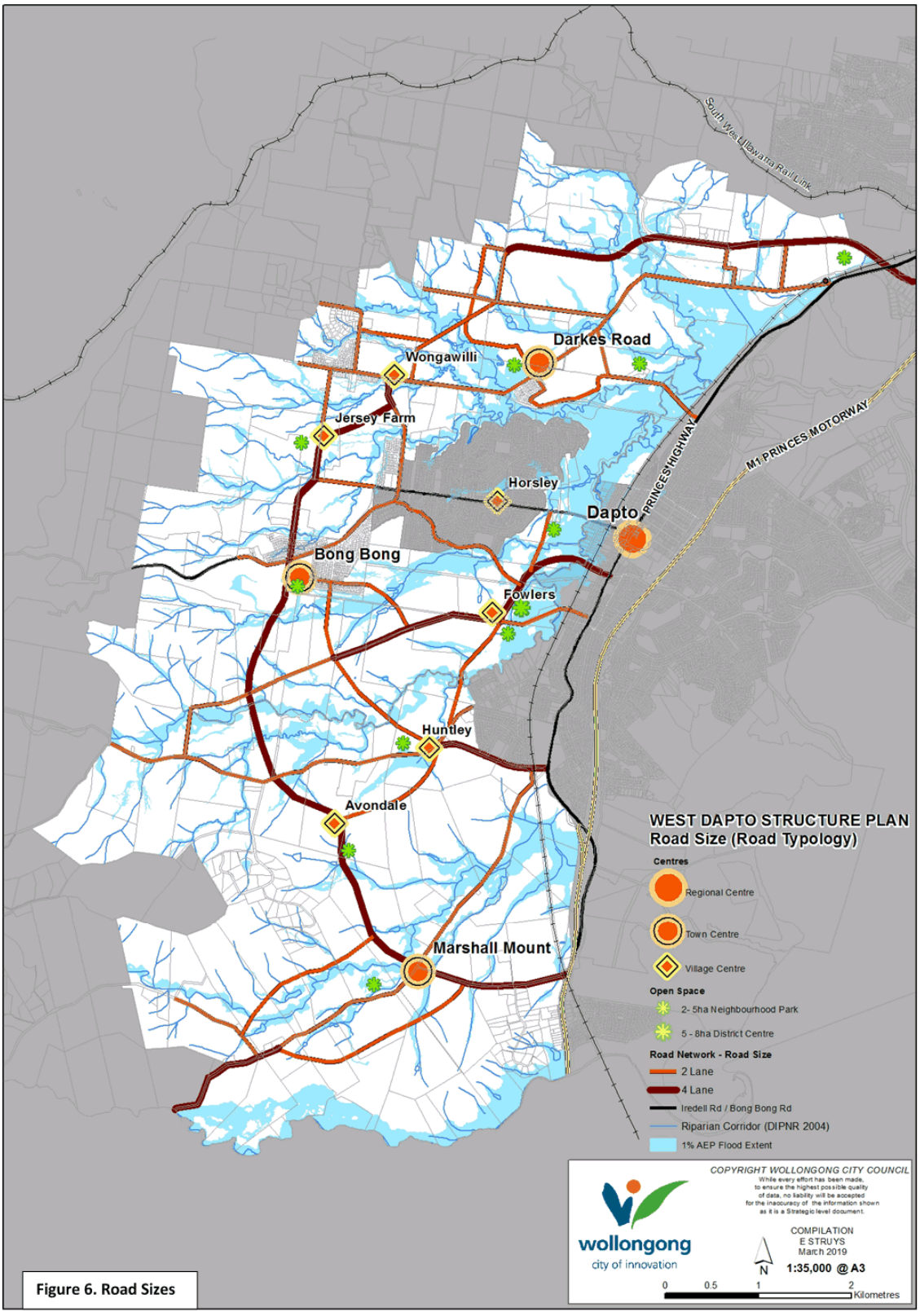

Figure 6. Road Sizes

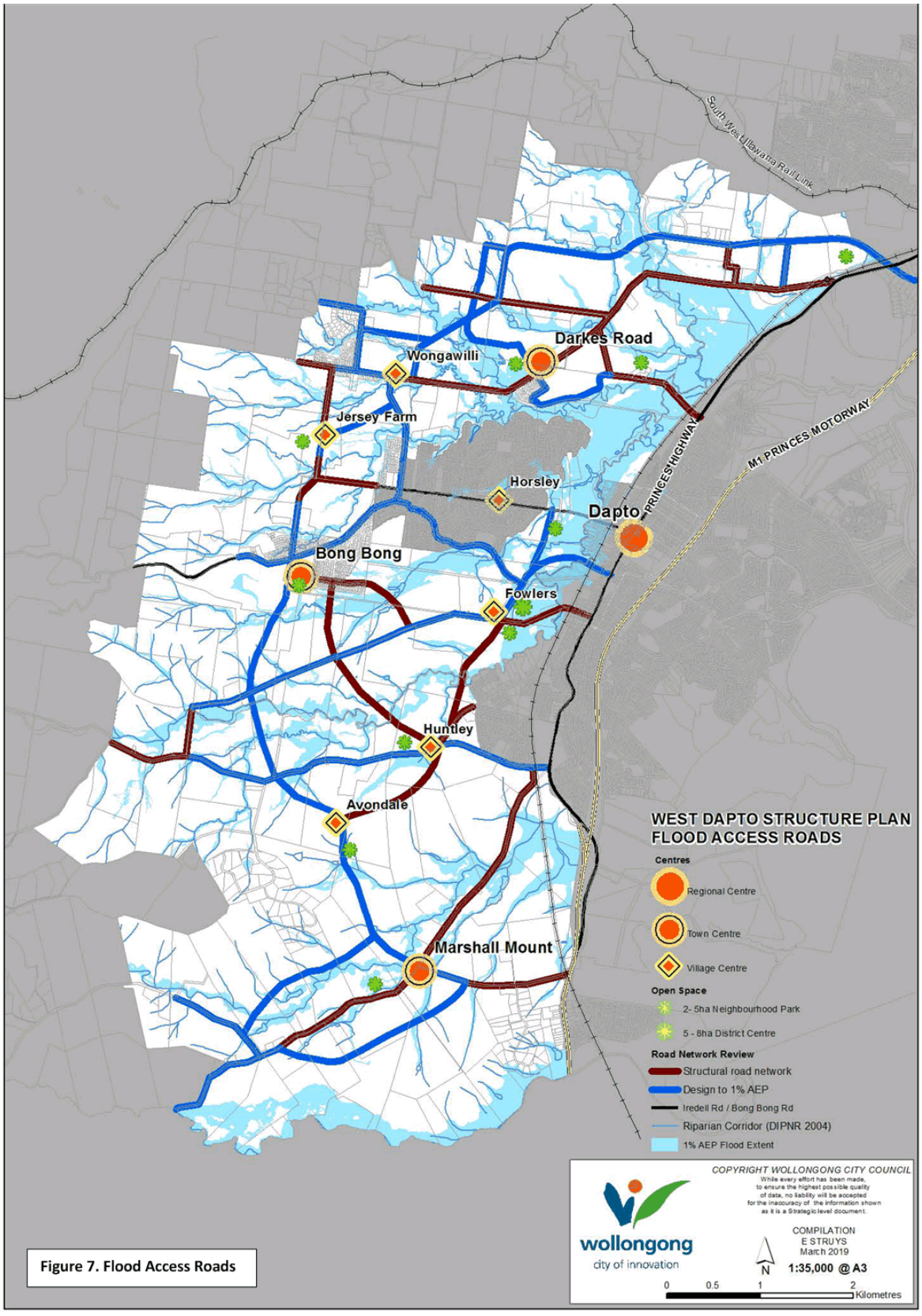

Figure 7. Flood Access Roads

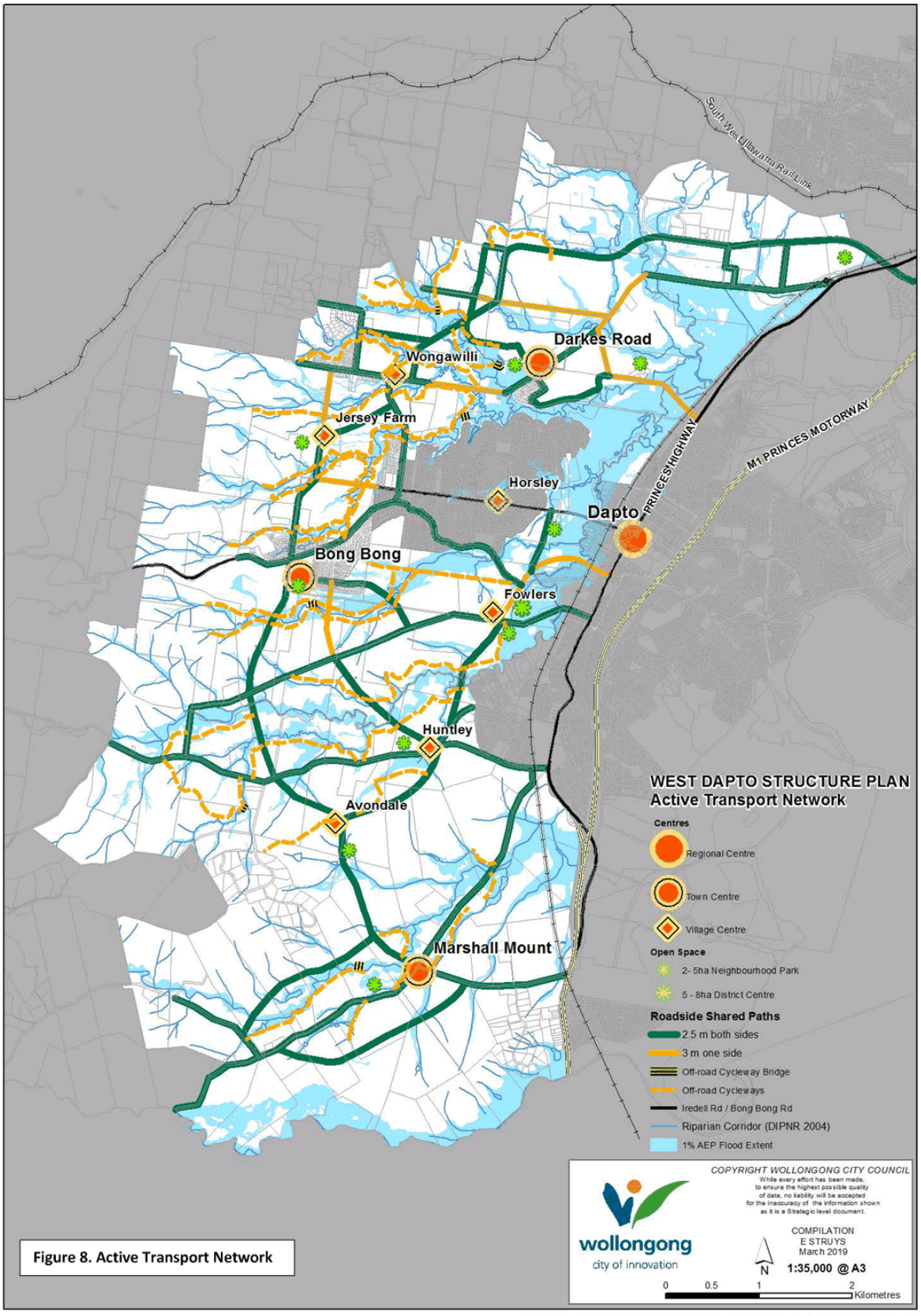

Figure 8. Active Transport Network

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6.3 Active transport

Walking and cycling (referred to as Active Transport) will be an important component of the future West Dapto transport system, contributing significantly to achieving the vision of a 'sustainable' community. An emphasis on the design and planning for West Dapto has been the notion of walkable communities which enable sustainable living to occur. Walking is also an important factor in the success of public transport.

Active transport at the local level will deliver convenient and attractive travel options especially for short trips, which will not only assist in reducing the reliance on, and impacts of private car use, but will contribute to the health and resilience of the community.

The riparian corridors will be structural open space areas, as a 'spine' to convey water and connect ecology, to promote walking and cycling with a series of pathway systems clearly linking key destinations such as schools from residential areas to promote walkability.

Map shown in **Figure 8** identifies routes for off-road cycleways, as well as links for active travel on shared paths as part of the road network (road cross sections include roads with shared paths as part of their cross section in DCP B2 Residential Subdivision) connecting neighbourhoods and residential areas to parks and town centres. The shared paths and cycleways should be located outside of the 'core' riparian areas with selected cycleway bridges spanning riparian core land connecting key destinations through an open space network (see active transport map **Figure 8**).

Principle 1 – Supportive land use patterns

2.1 Plan residential land use close to town and village centres and major public transport nodes, with higher residential densities adjacent to these locations to maximise walking and cycling catchments

2.2 Promote shared parking across uses in town/village centres to encourage walk trips when undertaking multiple activities in these centres. Avoiding fragmented parking will also improve utilisation of spaces and improve walkability through more compact town centre layouts and fewer driveway crossings.

Principle 2 – Connected, functional pedestrian & cycle network

2.1 Provide a convenient and legible movement network for pedestrians (including those with disabilities) and cyclists, ensuring excellent connectivity and directness between residences and attractors such as schools, shops, public transport nodes, sports ovals and employment centres.

2.2 Include footpaths/shared paths on all roads in the road types hierarchy except laneways and minor access streets (refer to Road Network Principles and DCP Chapter B2: Residential Subdivision)

2.3 Take advantage of easements, riparian areas and open space areas to create convenient pedestrian and cycle links (or "short-cuts") that maximise accessibility between different precincts /land uses.

2.4 Implement a wayfinding strategy to provide clear and coordinated information for access to facilities and services within the West Dapto land release area and surrounding areas.

2.5 Provide safe and secure bicycle parking or storage facilities at key destinations in town & village centres, sports ovals, community facilities, transport interchanges and key open space areas.

2.6 Include bicycle parking and end-of-trip facilities as part of the development of employment sites, business and commercial sites particularly those in town and village centres.

2.7 Ensure that the West Dapto cycleway network integrates with the wider surrounding regional cycle routes.

Principle 3 – Attractive and safe environment

3.1 Design streets to provide a high level of pedestrian and cyclist amenity and safety, creating public space where people want to be.

3.2 Provide convenient and safe road crossing points, traffic calming (where appropriate) and tree planting to enhance the pedestrian and cycle environment.

3.3 In high pedestrian demand areas such as town and village centres, further increase

pedestrian amenity and safety through path widening, driveway access controls and other site specific actions to improve pedestrian priority.

3.4 Incorporate Crime Prevention Through Environmental Design (CPTED) principles in the planning of walking and cycling facilities.

3.5 Consider innovative technologies for lighting key off-road paths, including solar lighting and luminescent pathway materials etc.

3.6 Construct pedestrian and cycle infrastructure according to AustRoads and Australian Standards, with attractive & durable materials and well-designed landscaping treatments.

3.7 Incorporate supporting infrastructure such as seats, bike rails, shade structures, bubblers and viewing/rest areas into the active transport network where appropriate.

As part of Council's commitment to the transport principles and active transport outcomes, additional initiatives will be explored that will help promote and encourage the take up of active transport in our community.

6.4 Public transport

The establishment of efficient and attractive public transport options for West Dapto is imperative to achieve sustainable growth outcomes. West Dapto Release Area presents an opportunity to promote 'best practice' in public transport and non-motorised modes, reducing reliance on the private car, contributing to a mode shift target and creating a more resilient, interesting and liveable community.

These high level principles inform & guide public transport planning for the new growth area, to ultimately ensure that the vision for sustainable transport in West Dapto is achieved. This will also require partnerships beyond council, with public transport providers and Transport for NSW.

Precinct Plans, Neighbourhood Plans and Development applications must demonstrate they have planned to facilitate public transport by responding to these principles at each level of development planning.

Principle 1 – Accessible public transport

1.1 Major public transport nodes located in town and village centres where the greater residential densities and employment opportunities are centred.

1.2 Ensure that major generators of travel are well serviced by public transport.

1.3 Promote co-location of different destination assets around public transport nodes and in centres, to enable multiple trip purposes.

Principle 2 – Effective bus network, service provision & integration

2.1 Provide coordinated, frequent & reliable bus services to destinations within and surrounding West Dapto.

2.2 Create an efficient, seamless travel experience through integrated ticketing, minimising transfer times, and intuitive and easily accessible service information.

2.3 Ensure street networks are interconnected and allow permeability for buses.

2.4 Ensure the bus network is highly accessible and services the majority of residences (with bus stops every 400m, see DCP B2 Residential Subdivision), town and village centres, employment areas, sporting facilities and Dapto Station.

2.5 Incorporate bus priority measures as necessary to ensure highly efficient, prioritised bus transport.

Principle 3 – Quality infrastructure

3.1 Provide comfortable, attractive, safe and secure buses and bus related infrastructure with clear timetable/service information and cater for all users including disabled/elderly.

3.2 Ensure pedestrian and cycle links to bus stops are of a high standard (refer also Active Transport Principles).

3.3 Encourage the use of innovative and efficient public transport technology.

7 WATER MANAGEMENT

This section outlines the guiding principles, objectives, outcomes and development controls relating to Water Management across the entire West Dapto Urban Release Area.

The approach behind 'water management' is to consider both floodplain and stormwater principles in an integrated way in order to achieve a better overall 'water management' strategy for the West Dapto Urban Release Area.

West Dapto is bisected by a series of watercourses that form part of the Mullet Creek and Duck Creek catchments. During heavy rain they can experience intense floods of short duration (rapid rise & fall of the creek levels). The residential areas of West Dapto will be designed to be above the 1% Annual Exceedance Probability (1% AEP) flood level.

Principle 1 - Integrate floodplain and stormwater management into the urban development process.

Objectives

- Adopt a 'water management' approach by integrating floodplain and stormwater management, which meets the needs for hydraulic capacity, managing floods and maintaining water quality.
- Develop an overall 'water management' strategy for the urban release area by integrating both stormwater and floodplain management strategies, to guide progressive development within West Dapto without causing adverse impacts to downstream areas by way of flooding or reduction in water quality.
- Manage stormwater runoff such that flood damage and adverse effects on both development and the natural environment is minimised.

Outcomes

- The creation of a water management strategy for West Dapto with consideration of but not limited to existing and new urban development, flooding, stormwater runoff, minimising impact of flooding and stormwater, water sensitive urban design, the environment, and water quality in receiving waters including Lake Illawarra.
- The successful implementation of a water management strategy for West Dapto.

Principle 2 - Improve the management of water quantity relating to urban development inclusive of stormwater, wastewater, water supply and recycled water.

Objectives

- Maintain or minimise changes to natural hydrology of catchments which drain to waterways or neighbouring catchments.
- Manage stormwater runoff at the source rather than using end-of-line treatment.
- Minimise stormwater run-off volumes.
- Incorporate Water Sensitive Urban Design principles in managing stormwater quantity.
- Mitigate potential stormwater impacts from future urban development.
- Reduce the probability and impact of downstream flooding to a level acceptable to the community.
- Manage stormwater discharge in a manner that minimises impacts on downstream receiving waters.
- Ensure that stormwater runoff is treated as a valuable resource and that its use for non-potable purposes is encouraged.
- Encourage stormwater reuse and harvesting.
- Reduce potable water consumption.

Outcomes

- Any retention/detention basins, if required, are strategically located within the neighbourhood, precinct and/or regional scale to attenuate flows to pre-development conditions for events between the 1 year and 100 year storm events.
- Developments which use re-use water, infiltration, retention and/or detention strategies to limit the increase in runoff volume.
- Limiting the increase in stormwater runoff volume from urban development through the use of water sensitive urban design measures.
- Minimised impervious areas on individual lots to promote infiltration and reduce peak flows downstream.
- Grassed swales incorporated at the subdivision scale to promote infiltration and reduce peak flows downstream.
- Rainwater tanks utilised on a large scale on individual lots for house and garden reuse to reduce runoff volume and reliance on potable water supplies.
- The use of buffers such as landscaping, detention and retention structures between impervious surfaces and receiving waters.
- The use of landscaped features to direct runoff from impervious areas into vegetated areas.

Principle 3 – develop the floodplain and surrounding areas in a sustainable way.

Objectives

- Develop strategies that will cater for progressive development within West Dapto without causing adverse impacts to downstream areas by way of flooding or reduction in water quality.
- Identify the extent of the floodplain based on post flooding conditions to enable key planning for sustainable urban development.
- Prevent the intensification of the use of floodways, watercourses and overland flow paths for residential/commercial/industrial development use.
- Promote multifunctional and appropriate land use of the floodplain.
- Address the potential impacts of climate change.
- Increase the public awareness of flooding within the West Dapto Urban Release Area and existing urban catchment of Dapto.
- Ensure that flood fringe areas are sustainably managed.

Outcomes

- Urban developments which are located in the release area and are resilient to flooding in both the short and long term.
- Developable areas that are located outside and above the post 1% Annual Exceedance Probability (AEP) extents plus 500mm freeboard based on detailed catchment wide flood investigations for the ultimate development scenarios.
- Urban developments which are designed with minimal disturbance to the natural land form.
- Recreational open space areas which are located adjacent to riparian areas and/or within the natural floodplain storage areas.
- Development which has been controlled by specific guidelines to ensure sustainable development in the floodplain.
- Increased public awareness of the hazard and extent of land affected by all potential floods, including floods greater than the 1% AEP event and to ensure essential services and land uses are planned appropriately in recognition of all potential floods.
- No adverse impacts to downstream areas from either flooding or reduction in water quality.

Principle 4 - Preserve the natural function of the floodplain, natural waterways and riparian corridors.

Objectives

- Ensure that the natural function of the floodplain to convey and store floodwaters during flood events is preserved and enhanced where possible along with any associated flood dependant ecosystem.
- Prevent any filling and/or development within high hydraulic hazard areas.
- Ensure no net loss of floodplain storage capacity within West Dapto.
- Protect key creeks and riparian corridors from degradation and improve their environmental function where possible.
- Ensure that rehabilitation of key riparian corridors is consistent with the adopted 'water management' strategy for West Dapto and the Riparian land management chapter in the Wollongong DCP.

Outcomes

- All residential/commercial/industrial development is located outside of the identified flood conveyance and flood storage areas.
- The revegetation of riparian corridors does not increase flood risk to the surrounding urban areas.
- Natural drainage paths and infiltration basins utilised as much as possible.
- Revegetation of key riparian areas is undertaken in accordance with the Riparian land management chapter in the Wollongong DCP.
- Waterways are protected by providing a vegetation buffer to urban development.
- Potential increase in developable land within the shallow floodplain (< 0.5m depth in a 1% AEP event and of low hydraulic hazard) by way of implementing a local cut/fill strategy only where compliance with all relevant floodplain management controls can be demonstrated.
- The natural functions of flood dependant ecosystems are preserved where possible.

Principle 5 - Protect people and property from flooding in a strategic way.

Objectives

- Minimise the risk to human life and property damage caused by flooding through appropriately locating urban development.
- Ensure flood risk and flood impacts to both existing and future development within West Dapto and surrounding catchment areas are minimised.
- Minimise the risk to human life by ensuring the provision of safe vehicular access/egress for residents and emergency services in times of flood.
- Develop practical floodplain and stormwater management guidelines for future urban development and associated infrastructure within West Dapto.
- Urban development areas are located outside and above the post 1% Annual Exceedance Probability (AEP) extents plus 500mm freeboard based on the ultimate development scenarios.
- Ensure new development does not increase the flood risk to existing development areas.

Outcomes

- Specific guidelines which have been created to locate development within West Dapto without putting people and property at flood risk.
- Urban development is located outside of the 1% AEP floodplain extents based on the ultimate development scenarios.
- Floor levels for all buildings are set at or above the flood planning level corresponding to the 1% AEP flood level plus 0.5 metre freeboard plus a pre-determined factor for climate change.

- Specific roads (identified on the map in **Figure 7**) are designed to connect urban development and provide safe vehicular flood access to higher ground in times of flood up to and including the 1% AEP event, or where feasible the Probable Maximum Flood (PMF) event;
- Identification of potential flood risks to people and property in West Dapto through the undertaking of a detailed Floodplain Risk Management Study.
- Sheltered refuge areas are incorporated into dwelling designs, with the floor level of the refuge set above the PMF where applicable to protect residents from extreme floods.

Principle 6 - Protect water quality of surface and groundwater from urban development and avoid any adverse effects on water quality to downstream watercourses and Lake Illawarra.

Objectives

- Enhance the long term environmental protection of the receiving waters and Lake Illawarra.
- Manage stormwater quality at the source, where possible, rather than using end-of-line treatment.
- Incorporate best practice Water Sensitive Urban Design (WSUD) and proven innovative solutions to ensure there is no adverse impact on water quality discharging from the site or to natural streams.
- Utilise higher stormwater quality targets through best practice stormwater treatment systems, as proposed by the stormwater risk management framework being developed for the Lake Illawarra catchment.
- Prioritise stormwater quality management strategies to meet load reduction targets for nitrogen, the limiting nutrient for water quality issues in the receiving waters.
- Manage stormwater in accordance with the Lake Illawarra Coastal Management Program.

Outcomes

- The use of locally appropriate WSUD measures at the source of subdivision runoff to minimise the water quality impacts downstream.
- The use of a treatment train approach including systems such as bio-retention, swales, wetlands and raingardens which exceed current stormwater quality targets.
- No reduction in water quality in Lake Illawarra related to stormwater quality issues in the release area.
- A water quality monitoring system that monitors the effectiveness of stormwater treatment systems within the urban release area, the quality of water entering receiving waters and agreed systems and processes for addressing any inadequate water quality issues.
- Stormwater quality reduction targets are verified through focussed monitoring, evaluation and reporting activities.
- The flood risk to existing development is not increased.

Principle 7 - Integrate stormwater management into the natural and urban land form in an unobtrusive way.

Objectives

- Manage the flow of stormwater from the urban release area using both natural and man-made drainage networks to a formal point of discharge.
- Integrate Water Sensitive Urban Design (WSUD) into roads, landscape and open space to collect and treat runoff prior to discharge into receiving waters and Lake Illawarra.
- Identify, manage and enhance the function of existing natural trunk drainage paths where possible.
- Make provision in the master planning phase of the urban release area for adequate proportion of land that serves stormwater management functions.

- Avoid locating 'hard engineering' stormwater infrastructure within existing vegetation or riparian corridors where possible.
- Minimise the use of hard engineered stormwater infrastructure.
- Ensure stormwater systems are safely integrated with parks, conservation areas and riparian buffers in a visually appealing way to achieve quality environmental and social outcomes.
- Promote the community acceptance of places which integrate stormwater systems with the environment.

Outcomes

- A network of interconnected multi-functional drainage corridors within West Dapto which act as watercourses, floodways, flora and fauna habitat and water quality treatment areas.
- Stormwater treatment systems which are integrated within public open spaces and streetscapes to enhance visual amenity.
- Online stormwater basins only where environmental impacts are minimised and development benefits maximised.
- Man-made drainage infrastructure which has been designed and landscaped to mimic natural ponds and waterways, and also provides public amenity.
- Places which are safe, visually appealing and encourage active passive use by the community.
- Places that provide access to and awareness of the total stormwater system for the community.
- Native vegetation used within stormwater management infrastructure.
- Road corridors located above the 1% Annual Exceedance Probability (AEP) which have incorporated WSUD measures.

Principle 8 - Provide efficient and sustainable stormwater infrastructure for the urban release area.

Objectives

- Ensure that the stormwater infrastructure is practical, cost effective and maintainable, with preference given to options achieving the lowest lifecycle costs.
- Ensure stormwater infrastructure is designed to remain viable for the long term and under the widest range of probable climate futures.
- Ensure that lifetime maintenance costs are factored into decision making processes and strategies are in place to ensure adequate maintenance over the life of the system.
- Incorporate best practice stormwater management principles and strategies in developments, including monitoring regimes that can demonstrate the effectiveness of the system.
- Discourage interim stormwater management solutions unless it can be replaced with an ultimate strategic solution.
- Ensure that stormwater management systems applied within West Dapto achieve aesthetic, recreational, environmental and economic benefits and avoid introducing social risks;
- Achieve a uniform standard of stormwater drainage design for all urban developments.
- Increase public convenience and public safety as well as protection of property.
- Ensure stormwater infrastructure is designed with consideration to blockage and maintenance access.

Outcomes

- The overall number of stormwater systems is tailored for the neighbourhood, precinct and regional zones to detain or retain as much of the catchment runoff as possible.
- Infrastructure such as swales, basins, wetlands and gross pollutant traps which have been designed with consideration to maximum functionality and longevity, minimal construction and ongoing maintenance costs, infrequent maintenance periods and low potential for attracting

mosquitos and algal blooms.

- Stormwater infrastructure such as open channel trunk drainage and basins that is designed to fit within the existing topography, with minimal impact upon the environment.
- Reduced capital costs due to implementation of soft engineering treatments.
- Installation of stormwater infrastructure which has been designed with consideration to climate change in a practical, sustainable and cost effective manner.
- Stormwater infrastructure designed and constructed with consideration to the ultimate strategic stormwater plan for West Dapto.

Principle 9 - Preserve the natural environment and enhance where possible in keeping with stormwater quantity and quality management objectives and targets.

Objectives

- Protect and enhance the habitat value of the surrounding environment and downstream waterways, by controlling water quality and water quantity.
- Improve key riparian corridors and ensure the ecological values of the creek systems are enhanced without flooding impact on existing development.
- Protect and enhance where possible natural watercourses, riparian corridors and wetlands;
- Reduce the impacts typically associated with urbanisation on receiving waterways and wetlands, including a reduction in streamflow erosion potential.
- Adopt the treatment of all watercourse corridors including widths according to the Riparian land management chapter in the Wollongong DCP.
- Maintain riparian connectivity of category 1 and 2 watercourses by using piered deck structures where road crossings are proposed.
- Minimise the number of road crossings across category 2 watercourses to preserve riparian connectivity.
- Minimise the edge effects at the riparian corridor / urban interface by the provision of a suitable riparian corridor width and integrated transition at the urban and riparian interface (for example, perimeter roads with houses fronting, gentle batters if needed otherwise avoid batters and retaining walls).
- Protect and rehabilitate existing waterways into 'living' waterways.
- Enhance urban areas by applying Councils 'Urban Greening Strategy'.
- Enhance the appeal of the natural environment to the community by introducing adjacent open spaces.

Outcomes

- Key watercourses within development precincts which have been enhanced with natural bed stability and sympathetic re-vegetation to minimise erosion and promote habitat without causing adverse impacts to surrounding urban development in times of flood.
- Watercourses protected by providing a buffer of natural vegetation to urban development.
- Urban development which has minimal disturbance to soils and vegetation by maintaining the natural landform.
- Waterways that are rehabilitated and provide fish habitat, pools and riffles, adequate riparian buffers and community access to the waterbody.
- Appropriate monitoring systems in place to demonstrate the habitat value of downstream waterways is being protected including agreed systems and processes to manage stormwater quality and/or quantity if the habitat values are shown to not be protected.
- Community open space areas located adjacent to riparian buffers that provide a natural visual backdrop.

- Clear connectivity between riparian corridors and residential areas / roads by avoiding steep batters and retaining walls or opaque fences.

Principle 10 - Promote liveability and amenity for the community by using water in all environments.

Objectives

- Promote the community acceptance of places which integrate stormwater systems with the environment.
- Protect and rehabilitate existing waterways into 'living' waterways.
- Enhance the appeal of the natural environment to the community by introducing adjacent open spaces.

Outcomes

- Places which are safe, visually appealing and encourage active passive use by the community.
- Places that provide access to and awareness of the total stormwater system for the community.
- Waterways that are rehabilitated and provide fish habitat, pools and riffles, adequate riparian buffers and community access to the waterbody.

Other General requirements

1. A water cycle management report is to be submitted with Development Applications for subdivision in accordance with the Water Cycle Management Study (URS, 2004) and the Floodplain Risk Management Study and Plan (Bewsher Consulting, 2010). The report must address water cycle management, water quality management, watercourse and corridor management, conservation and rehabilitation of aquatic habitat, and floodplain management. It must also address the requirements of the NSW Office of Environment and Heritage (OEH) within the Planning, Industry and Environment cluster.
2. Land that remains below the post 1% AEP flood level after flood management works inclusive of riparian corridor enhancement as approved by the consent authority is not suitable for urban development.
3. Subdivision of land is not to create any additional flood affected residential allotments. A flood affected allotment is defined as being wholly or partly below the post Flood Planning Level (FPL) - (i.e. the post 1% AEP flood level plus a freeboard of 500mm).
4. There is to be no net removal of flood plain storage capacity.
5. There is to be no filling or development within the high hydraulic hazard areas.
6. Enhanced riparian corridors cannot be used to offset any floodplain storage in the flood modelling.
7. The minimum habitable floor level of dwellings to be set at the post climate flood planning level (FPL) - (i.e. the 1% AEP flood level plus a freeboard of 500mm plus an allowance for climate change).

   Note: the allowance for climate change is determined from the Mullet Creek Flood Risk Management Study and Plan or the Duck Creek Flood Risk Management Study and Plan.
8. Subdivisions are to be design according to Water Sensitive Urban Design principles. Development applications are to include a statement indicating how the proposed design complies with these principles. Refer to Chapter E15: Water Sensitive Urban Design.
9. Detention basins are required for each precinct to control the increase in runoff. Consideration will be given to proposals for larger basins that serve multiple precincts and sub-catchments or other innovative design. The location of basins needs to be agreed to by adjoining land owners as part the Precinct Plan. Where a basin is on an adjoining property, owners consent and the creation of an easement is required. The design of detention basins shall enable the colonisation by native fish species moving upstream from Mullet and Duck Creeks.
10. Developments to have reliable access in a 1% AEP event to Council's designated flood reliable roads within the West Dapto Urban Release Area.

11. Development Proposals must consider flood events larger than the 1% AEP event.

12. The Lake Illawarra Risk Based Framework water quality targets shall be used as a minimum for all water quality modelling. Note: This general requirement is subject to the outcome of the Office of Environment and Heritage Project: *Applying the OEH / EPA Risk Based Framework in the Lake Illawarra Catchment*.

13. Refer to Chapter E13: Floodplain Management and Chapter E14: Stormwater Management and Chapter E15: Water Sensitive Urban Design for additional controls relating to floodplain and stormwater management.

8 CONSERVATION PRINCIPLES

8.1 Environment conservation

In adopting the concept of ecologically sustainable development (ESD, also see DCP Chapter A2), regionally significant releases, such as the West Dapto Urban Release Area, present opportunities to preserve remanent vegetation and enhance its ecological connectivity (structural and functional). This section identifies the strategic environmental priorities to guide planning and development of the West Dapto Urban Release Area integrating conservation priorities with opportunity for a future West Dapto Biodiversity Conservation Strategy (BCS) and Biodiversity Conservation Strategy Structure Plan (BCSSP).

A BCS provides opportunity for Council to achieve biodiversity certification (bio certification) in a coordinated approach for the whole release area, improving the overall conservation outcomes beyond what would be achievable developing site by site. Council will continue to work closely with the NSW Office of Environment and Heritage and Department of Planning and Environment to achieve this strategic outcome. The principles should also be used to guide site by site considerations.

Principle 1: Prioritise areas that offer high environmental value for conservation

Consider information that identifies areas of threatened ecological communities or stands of habitat greater than 4 ha (considered to present high environmental value in terms of habitat size and area) and avoid impacts as a result of land use changes to these areas.

Principle 2: Connectivity of habitat areas

Connecting patches of habitat that have high biodiversity value will provide opportunity for ecological migration over time as well as opportunity for improvement to habitat quality and values. These are more commonly known as biodiversity corridors providing strategic connection of larger and better condition patches of vegetation either by re-establishing continuous native vegetation cover in one or more stratums over an alignment or designing stepping stones of habitat that traverse local corridors recognised in planning instruments and studies.

Principle 3: Protect Environmental Values

Community values of environmental function in a landscape are aided by planning and providing complimentary land uses alongside conservation sites to assist in improving and protecting the ecological function of the site and enhancing its resilience.

Secure areas that present high environmental value as areas for conservation and long term management (ideally through a bio certification process).

Main development interfaces with the escarpment on the western edge of the release area are considered environmentally sensitive and zones reflect E2 Environment Conservation. Environment Conservation land will form a transitional development edge with lower densities of development adjacent to these areas. Increased opportunity for planting will be accommodated to complement the wooded slopes and riparian corridors.

Development interfaces with the predominantly west-east running riparian corridors which are considered to be where revegetation and ongoing management is required, or will be, zoned E3 Environmental Management.

Environmentally sensitive design and siting will be required for development in the E4 Environmental Living zone.

Refer to Chapter E17: Preservation and Management of Trees and Vegetation, Chapter E18: Threatened Species, Chapter E23: Riparian Land Management.

8.2 Heritage conservation

Understanding and conserving the heritage values of the West Dapto Area presents an opportunity to enrich the social values of the release area and to promote cultural understanding of our shared heritage.

The Australian Heritage Commission (2000) states the aim of both natural and cultural heritage conservation is to retain the significance of place and in the case of West Dapto the natural and cultural heritage values are deeply entwined and cannot be separated. (Australian Government, Department of Environment and Energy, 2017). Impacts to heritage significance are a key consideration for

development of the release area at each planning stage. Land use changes should retain, integrate and enhance heritage values. The principles for West Dapto aim to promote heritage conservation and meaningful consideration of the significance of place to ensure future development enhances the heritage values of West Dapto.

Principle 1: Prioritise the Conservation of Heritage Items and sites of Aboriginal Heritage Significance

Local Heritage items listed in Schedule 5 of the Wollongong LEP 2009, sites of Aboriginal Cultural Heritage significance as well as areas of potential archaeological significance should be retained and conserved within new development areas and appropriate curtilages and visual settings established. Development planning should account for the significance of sites and places and their visual relationships to each other or key landforms and key sites that contribute to the historic setting or cultural significance of newly developing neighbourhoods should be retained.

Principle 2: Respect the Cultural Landscape

The West Dapto Release Area has a rich and diverse history of Aboriginal and non-Aboriginal occupation. The area retains a range of key landscape elements, landforms, natural features such as creeks and ridgelines, important views and visual connections, and historic road and transport corridors that are important and unique aspects of the local area, and contribute to the character and significance of West Dapto through connection to Dreaming stories and by telling the story of the development of the area. Proposed development should be guided by an understanding of, and respect for significant features of the natural landform and historic setting, and assist new communities in understanding and appreciating the unique visual and physical connections between places and features within and outside of their development areas.

Views and Vistas

Generally land in the release area around and above the 50-60 metre contours is considered to be of High Scenic Quality. There are high levels of concern for visual resource based on visual quality assessment of the release area. Development within these areas of high scenic quality must be sympathetic to that visual quality as the ability of the area to absorb change is low.

Principle 3: Embed Local History and Character in New Communities

Developments should strive to feature historic sites and places of significance within development areas to provide a unique sense of identity and character for developing neighbourhoods. The adaptation and re-use of historic buildings in an appropriate manner that provides for their conservation and integration into new developments is encouraged. The retention and integration of significant Aboriginal sites as well as significant trees and landforms into natural area reserves, parks and as conservation areas is also encouraged. The use of historically relevant street names, integration of interpretation and the celebration of aspects of a site's Indigenous and post settlement history, are encouraged to ensure that the rich history of the area is celebrated and recognisable in the identity of developing communities.

Other Requirements

There are additional responsibilities of developers to complete various **heritage studies** to understand the significance of Indigenous and European heritage sites and the potential impacts of the proposed for development in order to determine further conservation management requirements and approval needs.

Neighbourhoods within precincts of the release area will include visual character and cultural landscapes and will ensure:

1. Design of subdivision patterns and road layouts are to have regard to the retention of view corridors and vistas through, and to, areas of high scenic quality.
2. Primary Street planting is to be undertaken and established prior to the commencement of individual lot development or housing construction to minimise the visual impacts of proposed development.
3. A **visual impact assessment** is to be prepared by the applicant and submitted with any Development Application in areas of high scenic quality (at or above 50-60m contours). The visual impact assessment is to assess any potential impact to the visual quality and how the design will respond to this. The assessment will include recommendations for the development design. The development application will demonstrate how the visual quality of the visual catchment will be protected and incorporated through design responses.

4. An **Aboriginal Cultural Heritage Assessment Report** (ACHAR) is to be prepared for any proposed development where the site has been identified having moderate to high archaeological potential or cultural significance, where an Aboriginal site or object has been recorded in the vicinity, or if an area of potential archaeological deposit (PAD) has been identified through a Due Diligence Assessment or other study undertaken on the site, The recommendations of the ACHAR should inform the development outcomes.

Wollongong LEP 2009 identifies a number of heritage items within the West Dapto Release area. In addition to the statutory controls contained under the LEP the Wollongong DCP 2009 contains requirements in relation to these items.

1. Refer to Chapter E10: Aboriginal Heritage and Clause 5.10 of the Wollongong LEP 2009 for specific controls relating to Aboriginal Heritage.
2. Refer to Chapter E11: Heritage Conservation, Clause 5.10 of the Wollongong LEP 2009, The NSW Heritage Act 1977 and The Burra Charter.

8.3 Riparian Corridors

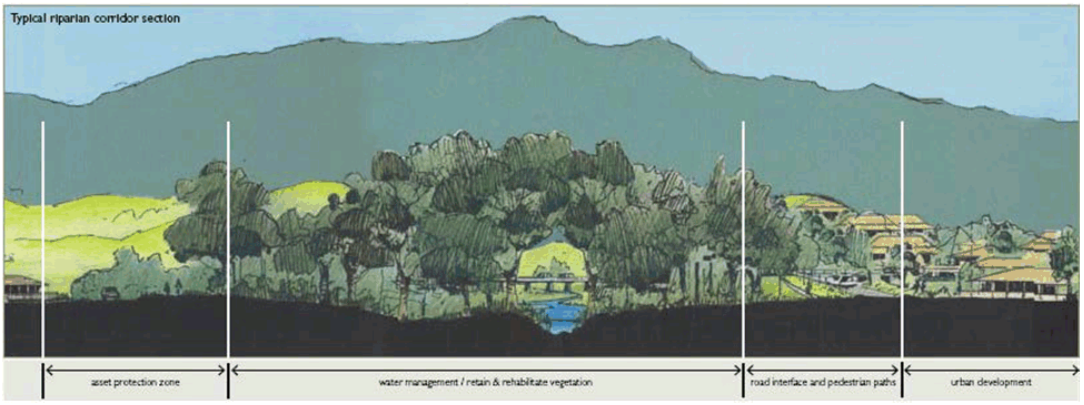


Figure 9. Typical riparian corridor cross section

West Dapto is dissected by fast flowing creeks and extensive areas of flood prone land, the riparian corridors. These areas offer an opportunity for recreation, visual separation and conservation. The corridors will result in significant amounts of open space creating wider landscapes within easy reach of all parts of the new development areas, meaning walking, cycling, recreation and nature will form a part of daily life. These riparian corridors have been, or will be, zoned for Environment Protection with limited development being allowed in these areas.

The riparian corridors will link the escarpment to Lake Illawarra through the release area. They will be vegetated with avenues of intensive planting and water management running through the urban street pattern to create a connected web of open space. This will encourage walking and create a sense of nature interacting with urbanity (see cross section in **Figure 9**).

Land between the watercourse and the 1% Annual Exceedance Probability flood level can either be:

1. Retained in private ownership and used for grazing, recreational activities or other permissible uses, or
2. Dedicated to Council at no cost to Council, for use as bushland, agricultural purposes or recreational purposes. There are no development contributions off-set for the dedication / transfer of this land.

Controls:

1. Precinct Plans will identify proposed land use and ownership of the riparian land.
2. Revegetation of riparian corridors shall not increase the flood risk to surrounding residential land.
3. Refer to Chapter E23: Riparian Land Management for controls relating to riparian lands.
4. The Riparian Land Management Area can include land used for bushfire mitigation activities.

9 OPEN SPACE PRINCIPLES

This section establishes the open space principles for the West Dapto Urban Release Area. This section should also be read in conjunction with Community and Education Facilities principles and at a landscape structure level, will contribute to delivering against the Urban Greening Strategy. An overarching framework with four inter-related principles is designed to achieve the open space objective for the West Dapto Urban Release Area. Open spaces need to be considered places that are designed responding to principles to ensure they provide for a resilient community.

There are more details regarding Council's specific requirements for each open space facility and subdivision requirements provided in the **West Dapto Open Space Design Manual and the West Dapto Open Space Technical Manual.**

Principle 1: Functionality

- Open space needs to be of an appropriate size and flexible footprint for multiple functions and uses (Hierarchy of facilities).
- Open space and recreation outcomes are not compromised by other competing functional elements. For example, flooding and water management, traffic and road infrastructure, cultural heritage and biodiversity.

Principle 2: Accessibility

- Walkable distances from residential areas, universal design principles used for facilities with a focus on 'play' and diverse experience (resident catchments).
- There is a well-distributed network of accessible (in both location and design), attractive and useable public open spaces and natural areas within the existing and future neighbourhoods of West Dapto.

Principle 3: Connectivity, movement and flow

- Open space must be connected spaces with shared paths and trails to other facilities or places of interest including centres, heritage sites (if not sensitive), riparian areas, natural areas, employment centres, transport nodes community facilities and the like.
- The open space areas are highly connected to create a network of open space with a range of functions to complement the existing landscape features and provide opportunities for ecological connectivity.

Principle 4: Value and amenity

- Future uses complement and add to existing values for example open space may present opportunities to preserve remanent vegetation or support regrowth of bushland vegetation (avoid conflicting landuse outcomes. For example, an active play facility may jeopardise a threatened ecological community, water management may restrict active use etc.).
- That public open space and natural areas will provide opportunity for interaction filling a variety of recreational, sporting, play, the physical and social needs of the community.

9.1 Hierarchy and catchments

Based on the principles of functionality, accessibility, connectivity and values, there are some guides to the level of open space based on size and characteristics of projected population and its recreational needs. **Table 1** categorises relevant population catchment distances for each level of open space provision (hierarchy) and how it generally relates to size requirements in the future urban and residential areas based on NSW Recreation and Open Space Planning Guidelines for Local Government (2010).

It is important to emphasise that any benchmark standards cannot be used as a 'one size fits all' assessment tool. Through analysis of local context and community needs, these standards can and should be varied if based on sound evidence.

Table 1. Open space provision standards (based on NSW Recreation and Open Space Planning Guidelines for Local Government (2010) and the Elton Report (2007) recommendations).

Function and service	Size	Catchment radius (distance)
Local Passive	0.5-2 ha	400-600m
Local Active	1-2 ha	400-600m
Neighbourhood Passive	2-4 ha	2km
Neighbourhood Active	3-5 ha	2km
District Active	5-8 ha	Southern ward of LGA
City wide Active	8 + ha	Facility to serve the whole LGA

Note: If stormwater infrastructure is proposed to be co-located with open space the general size requirements in **Table 1** should be considered with reference to Council's **West Dapto Open Space Design Manual.**

The relationship can also be understood in catchments for community populations. **Figure 10** shows proposed open space catchments of West Dapto (based on methods established in NSW Recreation and Open Space Planning Guidelines for Local Government, 2010). These catchments will be developed further for Stages 3 and 4 and are shown for illustration purposes only.

Catchment refers to the area and resident (or future resident) population the open space facility is intended to provide for. As part of the open space network for the West Dapto Urban Release Area, open space will need to be provided at all hierarchy and catchment levels.

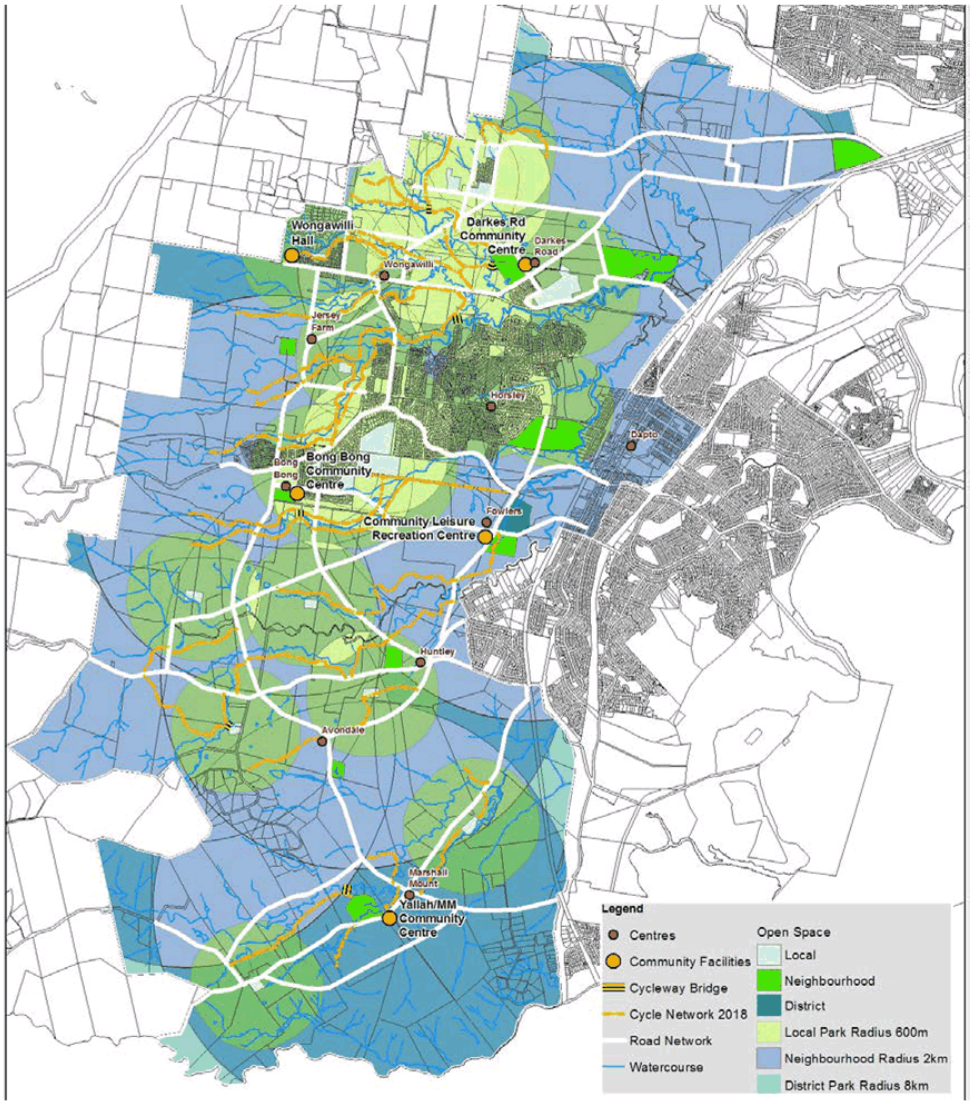


Figure 10. Planning for open space in West Dapto Urban Release Area

10 COMMUNITY AND EDUCATION PRINCIPLES

Community facilities are an increasingly important component of local service provision across a range of areas in the public and private sector. For example, there is a clear trend in public health and alternative education to use local community facilities for regular and specialist community services rather than develop individual facilities. Council understands this increases the importance of flexible design, location and efficiencies to be achieved by these facilities for them to make the best contribution to community outcomes.

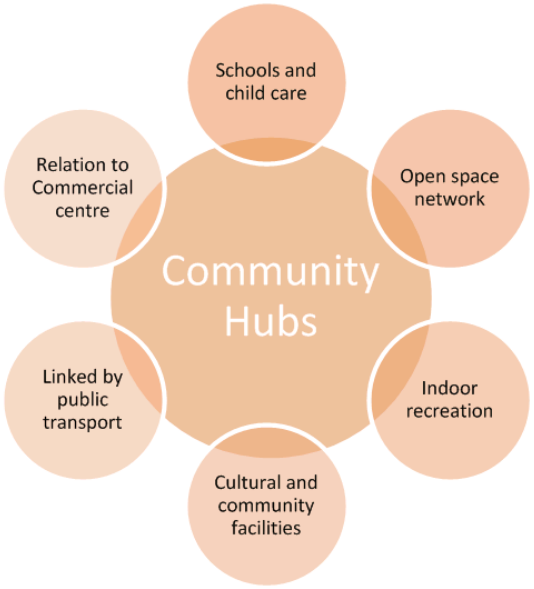


Figure 11. Community hub concept – co-location, joint use and multi-purpose centres

Principle 1: Healthy, diverse and resilient

Community facilities contribute to quality of life to support healthy, diverse and resilient community.

Principle 2: Efficient

Making efficient use of resources through shared or co-located facilities and multiple use agreements (multi-purpose community hubs) with flexible design that can respond, expand and adapt as needs change.

Principle 3: Safety, security and adding to civic identity and sense of place

Promote safety, security and provide focal points adding to civic identity and sense of place through clustering community facilities.

Principle 4: Self-sufficient and resilient community

Community facilities provide opportunity for self-sufficiency to build capacity and social capital and to actively contribute to community resilience.

Principle 5: Vibrant and accessible

Placing facilities in convenient, central locations, adjacent to open space. Promotes access and contributes to the vibrancy of the development, and allow for overflow activities such as children's play.

Principle 6: Equitable

Provide equitable access for all sections of the population, through the distribution, design and policies of facilities.

Principle 7: Diversity

Community facilities promote diversity and encourage people from culturally and linguistically diverse

backgrounds to participate in the social and economic life of the community.

Principle 8: Viable and sustainable

Developing sustainable funding, ownership, governance, management and maintenance arrangements, including private partnership arrangements where community benefit is achieved.

Principle 9: Coordination

Council will work with the State Government and non-government schools sector to promote best-practice education outcomes for the community of West Dapto. This will include sharing data and integrating asset solutions, such as opportunity for shared and joint-use facilities.

Planning for the provision of education is important for West Dapto's growing community. In NSW, the Department of Education provides funds and regulates education services for NSW students from early childhood to secondary school. The Department of Education provided previous support for the six primary schools and two high schools based on the projected housing provision and related future population estimates.

Figure 12 shows some indicative school locations in developing or future residential areas within the release area.

The distribution pattern for the schools ideally would include two primary schools one being the current Dapto Public School plus two new schools in the vicinities of Darkes Road and Wongawilli Village.

In Stage 3 of the release area, a new secondary school in proximity to Bong Bong Town Centre supported by three primary schools potentially Jersey Farm Robins Creeks, Bong Bong/Cleveland and Avondale/Moorland.

A third secondary school potentially located in Calderwood Urban Release Area has been approved and will service a primary school in Marshall Mount area as well as the required primary schools in Calderwood.

A special needs school should be either co-located with or separate to a mainstream school in the release area.

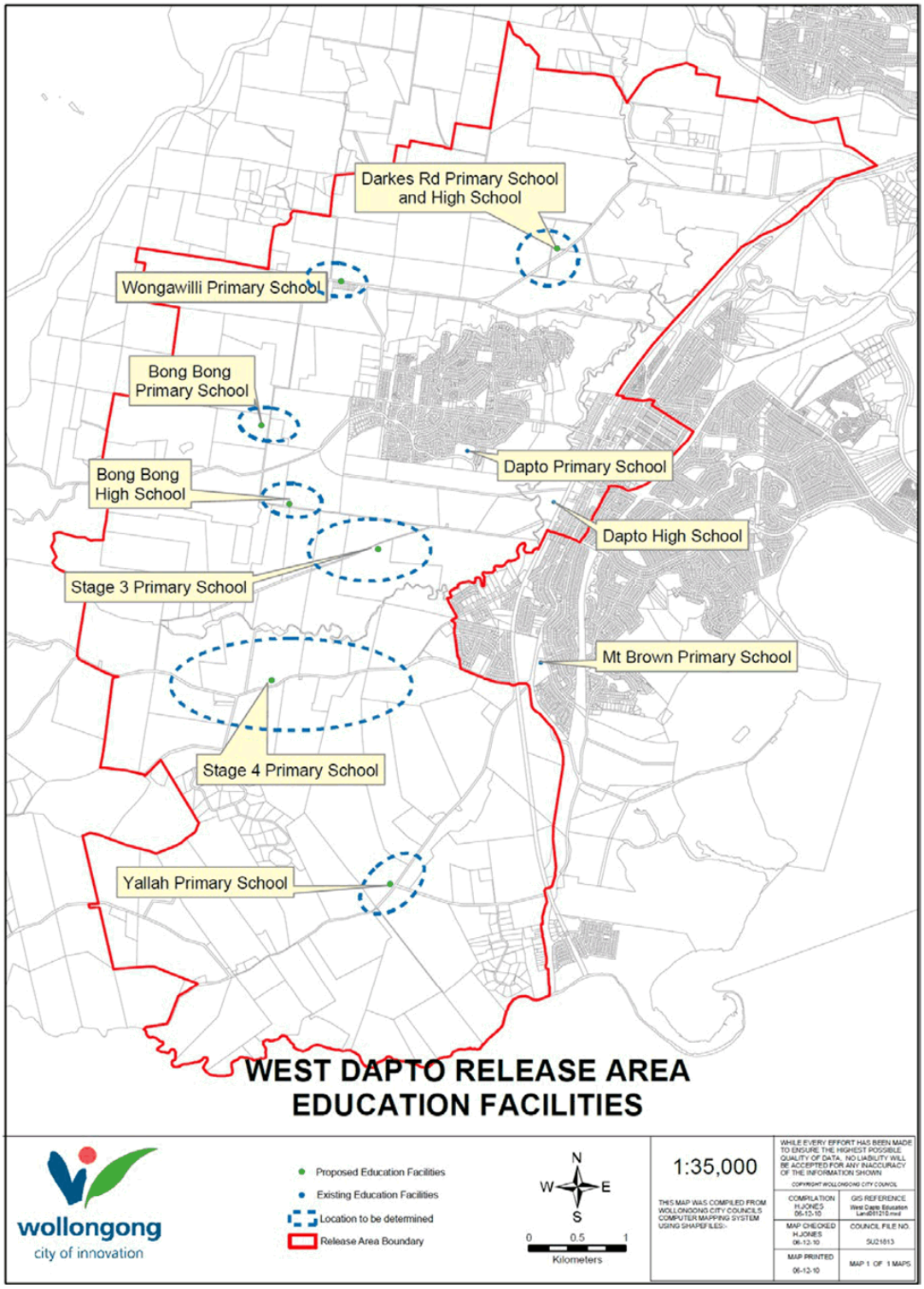


Figure 12. Potential school locations (Council Work with NSW Department of Education)

11 TOWN CENTRE PRINCIPLES

As a new release area, there is an opportunity to ensure that the ideal treatments are made to establish sustainable, appealing and functional residential living as well as commercial and light industrial areas providing employment, social and cultural opportunities with sufficient flexibility to cater for the future populations needs. As with other previous principles the town centre principles should not be considered in isolation.

The town centres of West Dapto will fill diverse roles, functions and mixed uses. The key objective of town centre principles is to help identify centre locations, function and existence. Configurations will reflect the town centre hierarchy with a focus on pedestrian priority. Supported with a decision process (zoning, precinct planning, etc.), appropriate locations will promote the social and economic functions and outcomes sympathetic to character and 'place'.

There are three principles to be considered in planning of town centres to meet the objectives for West Dapto Urban Release. Council expects the town and village centres of West Dapto to be:

1. Master planned with the plan responding to the release areas planning principles.
2. Walkability modelling and plans that demonstrate public and employment base access to active and public transport.

Principle 1: Hierarchy

Hierarchy provides a basis for which to establish functions, order, and visions as well as allowing the protection of these. Hierarchy is not the only way to understand or to set direction in planning for centres, we understand that the centres are also a connected network, which can support each other in an interlocking way.

Each level of the hierarchy represents the size and general characteristics of the centres commercial, retail and business roles (see **Figure 13**). The Hierarchy reinforces role and function, supports the Wollongong City Centre and higher order centres and provides certainty for investment decisions. Hierarchy reinforces character and identity as well as provides direction around appropriate residential density sympathetic to community facilities and service locations.

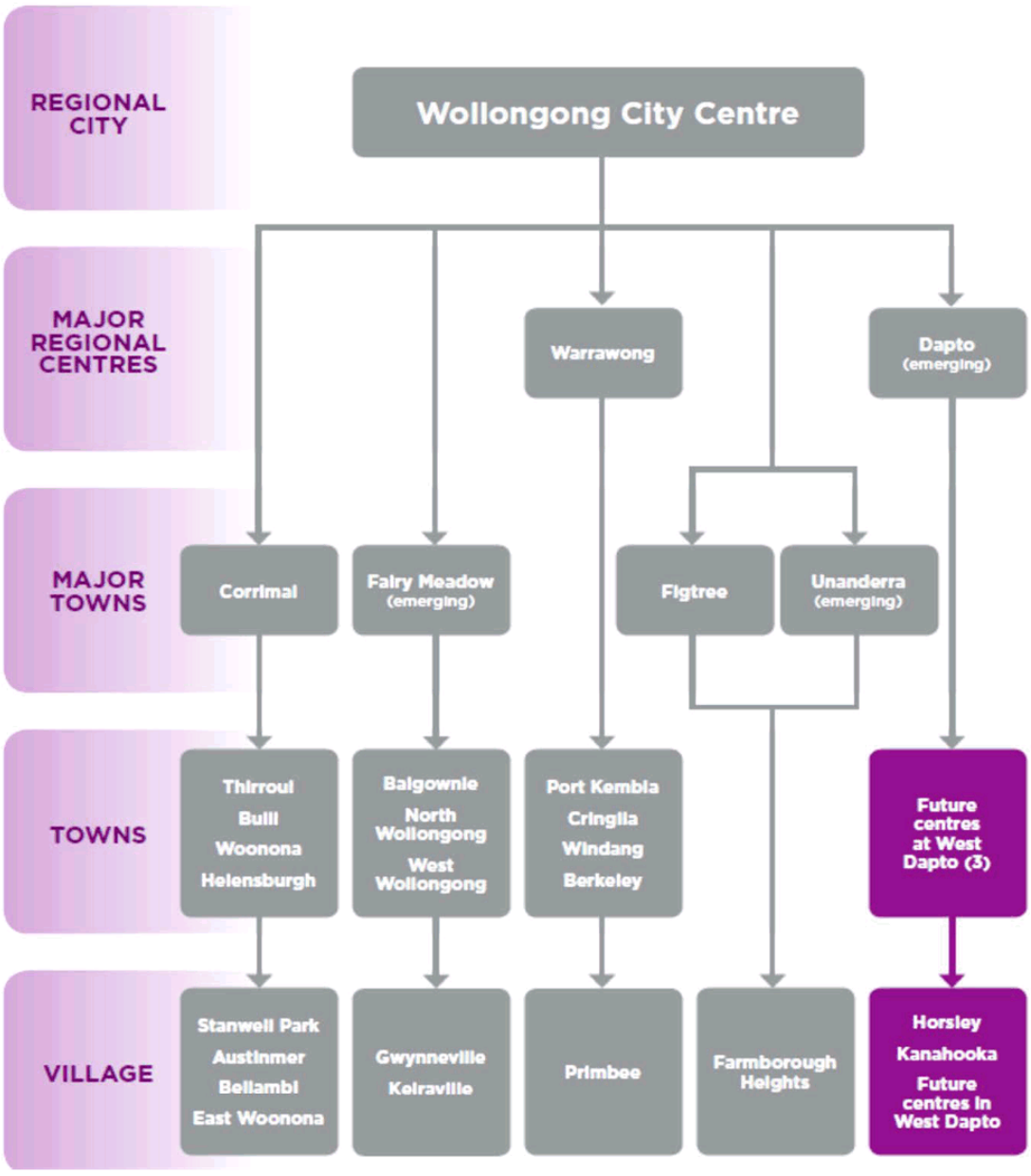


Figure 13. Wollongong Town Centres Hierarchy

Requirements for development in Business zones must comply with contents of the DCP **Chapter B4: development in Business Zones**. B4 outlines the Hierarchy for the LGA as well as other studies or assessments needed to support development applications.

Regional Centres

Wollongong Local Government Area has two major regional centres Warrawong and Dapto. It forms and important commercial and business centre role in Wollongong LGA.

Located in close vicinity of Dapto's existing urban landscape, will be a series of new centres. Supporting Dapto's development as a regional centre will be an important consideration in the planning of new town and village centres. These lower order centres must be sensitive to the levels of hierarchy so as to maintain existing functions and minimising any negative impact on the hierarchy.

Town Centres

There are three town centres planned for the urban release area.

The objective of the town centres is to ensure that development in the Bong Bong, Darkes Road and Marshall Mount town centres contributes to the creation of retail, business, commercial, and community hubs that act as public transport nodes and provide significant local employment opportunities.

Major town centres (~15,000m2) are planned within the central western (Bong Bong Road) and the southern (Marshall Mount) parts of the release area. A local town centre is planned in the northern (Darkes Road) area. These are intended to create local retail, business, commercial and community hubs providing significant local employment opportunities. They will need to complement rather than compete with the higher order major regional centre of Dapto.

Council expects the town centres of West Dapto to be master planned demonstrating how the plan responds to these planning principles.

Village Centres

The West Dapto further review of release area centres and controls (Urbacity, 2014) noted the role of Villages, as a lower order centre, is to *"provide convenient alternative to the supermarket based town centres for daily goods and services with a focus on amenity for housing density and improved public transport use".*

Village and local centres will develop localised business opportunities at key places / intersections where bus stops, community facilities and local open space come together to create an urban focal point for the local community. Small villages are proposed ~2,500m^2 of floor space and accommodate a 1,000-1,500m2 supermarket and variety shops.

Principle 2: Movement sensitive

The town centres of West Dapto are expected to facilitate social contact, employment, and living needs in a sustainable manner. That is, the town centres will be located to promote active transport, public transport and healthy lifestyles. Living within 400-800 metres of a mix of destinations is consistently associated with higher levels of active transport in adults and older adults (Heart Foundation, 2017).

Movement sensitive means movement (accessibility, location etc.) will be a key consideration for co-location of a mix of destinations (or land uses) within a centre. Centres will provide a location for activity, attraction, service for people to walk or cycle to. A focal point and community hub and transport node within the neighbourhood that allows for multiple activities to be undertaken and different daily needs (i.e., live, work, play) to be met in the one location.

Centres must also be supported and surrounded by a network of connected streets, paths and cycle ways, providing and promoting opportunities for active transport, and convenient access to public transport rather than private vehicles. The network will link open space works with Open Space and Recreation principles.

Precinct Plans of the release area must consider the ability for adjoining areas to develop. They must also consider how different land use parcels are linked with a road network and pedestrian / cycle paths within precincts and between different precincts.

Principle 3: Diversity and identity

Centres will be facilitating a diverse range of activities by prioritising places and spaces for people of all ages that become vital to the social fabric of a neighbourhood where people gather, meet friends and family and engage in social activities.

Especially important for new centres are creating a vision that encourages diversity and that shapes and reflects centres character. Centres will be diverse from each other (through hierarchy, features and visions). The vision in some respects can be understood as capitalising on existing features of heritage, environment (vegetation, topography etc.) contributing to a new theme expressing the centres role in the new urban residential landscape. In other words, a vision and purpose for people to create from, understanding that activity, physical setting and meaning come together to create a 'sense of place' framed by the built forms that provide a variety of building types.

The Town Centres will have a variety of building typologies with urban characteristics such as increased height, minimal or zero street setbacks and street level awnings and verandahs. The public domain is

intended to reflect an urban character, with high quality hard and soft landscape and paved footpaths with advanced planting of shade trees. Parking will be at the rear of blocks and underground as well as good on street provision of kerbside parking – building setbacks to accommodate front parking lots will not be permissible, as these detract from the street qualities sought in these centres.

Other Chapters of Wollongong DCP 2009 containing development controls relating to the developments within the town and village centres include:

1. Chapter B3 – Mixed Use Development for specific controls relating mixed use developments.
2. Chapter B4 – Development in Business Zones for specific controls relating to business and town centre developments.

11.1 Town centre development controls

Development in the West Dapto Town Centres is to comply with the following development controls:

1. Establish a strong urban form that clearly distinguishes the centre / local node from surrounding areas.
2. Taller buildings of 4-6 stories are encouraged in the core of the town centre. Lower scale buildings up to 3 stories in height should surround and support the core.
3. The street wall height should have a 2-3 storey building form.
4. Building setbacks on main streets to be nil (zero) while other streets are generally to have a setback of between 0 – 2.5 m.
5. Side and rear building setbacks are as follows:

Setback	Distance
Side	Zero
Rear	Zero where lot adjoins allotment zoned B2 Local Centre or 5-6m where lot adjoins allotment with any residential zone.

6. Civic public spaces designed to encourage social interaction with paved areas, outdoor seating and urban green spaces are encouraged to balance the indoor building provisions.
7. Provision of shared parking facilities is encouraged with access via laneways of minor streets. Parking lots and parking areas are generally not to be visible from the streets, allowing built form to perform a clearly street defining urban function.

11.2 Village centre development controls

Development in the West Dapto Village Centres is to comply with the following development controls:

1. Building setbacks can be either street aligned (zero) or setback up to 5m to create commercial forecourts or residential courts to the street.
2. Variation of setbacks between buildings is encouraged to create an informal organic character.
3. Building height of up to 2 storeys is encouraged to create an urban village character with upper floor uses including small scale commercial and residential developments.
4. Parking to be provided at the rear of buildings in the form of rear laneways and parking areas accessed from the rear laneways / car courts.
5. All shops should address street and be entered by front from the major street where possible or secondary street.
6. Community congregation areas to be north facing and where possible take advantage of escarpment views.
7. Street parking to be maximised around villages.
8. Parking lots and parking areas are generally not to be visible from the main collector roads, allowing built form to perform a clear street defining urban function.

12 EMPLOYMENT PRINCIPLES

Five of the Seven Employment Principles in the West Dapto Vision 2018 intend to guide the development and creation of sustainable employment outcomes for West Dapto release area.

The creation of employment opportunities within and near to West Dapto is a key strategy in enabling people to work close to where they live and thereby reduce the overall traffic generated by the development.

The Structure Plan **(Figure 2)** indicates employment land in purple. These areas are zoned mostly light industrial land uses as well as some heavy industrial. The main employment area is in Kembla Grange, in the north of the urban release area. There is also some limited areas of light industrial land arranged in an enterprise corridor north and south of the Dapto Regional Centre, and some west of the M1 and along Yallah Road, Yallah to provide additional local employment opportunities.

Other Considerations

1. Wollongong Economic Development Strategy and Implementation Plans, and Advantage Wollongong, Invest Wollongong.
2. Chapter B5 Industrial Development for controls relating to development on industrial lands.

Principle 1: Support local sustainable and accessible employment

1.1 Support a variety of employment opportunities accessible to the whole community (and LGA)

1.2 Employment containment to reduce commuting out of the release area and region.

1.3 Local access to higher order (career generating) employment opportunities.

1.4 Encourage high density employment opportunities within walking distance of existing or proposed public transport services.

1.5 Encourage employment area developments adjoining the structural road network to take advantage of accessibility and exposure.

Principle 2: Attract, facilitate and support industries, enterprises and business to locate in West Dapto (this principle is supported by Council, Business chambers and other organisations as required).

Principle 3: Ensure Town & Village centre employment outcomes are prioritised

3.1 Town and village centres are to ensure planning decisions (such as master plans and spatial arrangements) support and prioritise employment outcomes.

3.2 Encourage / promote / emphasise provision of professional service type jobs/roles and beyond, vs the normal retail type jobs that one might normally expect in new urban release areas.

Principle 4: Protect existing employment land

4.1 Maintain existing zoned employment land within the release area to ensure a supply is maintained over time and is available to take advantage of employment generating opportunities.

4.2 Create a strategy to enable appropriate interim uses of employment areas that also allows for gradual intensification over time.

4.3 Support the preservation of large lot parcels and clusters of light and heavy industrial land and ensure business parks are not accommodated in light industrial zones.

Principle 5: Take advantage of and encourage employment innovations

5.1 Planning decisions to anticipate, be responsive to and cater for innovative employment solutions.

Principle 6: Improve employment opportunities whilst ensuring development is of a high standard

6.1 Ensure developments are considerate of their context and compatibility with residential and sensitive land uses as well as conservation outcomes of the urban release area.

6.2 Apply merit based approach when assessing employment generating activities.

6.3 Encourage development for employment which provides a range of goods and services without adversely affecting the amenity, health or safety of any adjoining area.

13 HOUSING PRINCIPLES

Any specific controls for Precinct Plans of the release area must consider the ability to develop adjoining areas including linkages to those areas.

The Housing Principles should be read in conjunction with Council's LGA-wide Housing Policy setting, which is updated from time to time to ensure we are addressing the challenges of a changing housing environment.

These principles should be considered in conjunction with all other planning principles as they all contribute to achieving the vision for the West Dapto Urban Release Area and ultimately sustainable housing outcomes.

"*The communities will be healthy, sustainable and resilient and will have access to diverse housing choice and active or passive open space accessible by walkways, cycle ways and public transport.*"

Urban Residential Density Distribution

The intention for the urban structure in West Dapto is to provide for varying housing densities with increased densities around town and village centres and community hubs. Delivering density in housing particularly targeting delivery of the medium residential densities in the release area will help encourage population diversity, make the provision of efficient public transport more viable and support sustainability of the town and village centres. A range of housing types are to be provided to ensure that the housing needs of all household types are met. A diverse demographic profile will help ensure a sustainable and vibrant community in the long term.

The areas of lower residential density (R2 Low Density Residential zone), should provide an average of 13 dwellings per hectare and then in later stages, 15 dwellings per hectare. In the more sensitive areas such as the "transition" areas identified on the structure plan (**Figure 2**) Council proposes densities around 5 to 10 dwellings per hectare to enable protection of environmental values and minimize visual impact. The areas of medium residential density (R3 Medium Density Residential zone) should provide an average of 20 to 25 dwellings per hectare. Density measures such as Gross Density help inform and set targets at a precinct level (based on Landcom, 2011, Residential Density guide and supporting charts, See **Figure 15**). Net density (see **Figure 14**) will be used as an indicator to show over time where the release area development is achieving desired mix and ultimate (finished development) housing densities. These are NOT site by site or zone controls as the aim is for diversity but they help inform infrastructure planning, understand intensity of built forms and population.

Principle 1: Encourage housing diversity

Diversity can be delivered through different products at different stages of planning by promoting and providing a range of density and lot size and shapes to offer a range of choice to better meet changing community needs.

Mixture of density low to high, single dwellings, dual occupancy, town houses and apartments in appropriate locations should all be considered in precinct planning and subdivision design stages.

Promote increased densities and innovative design types close to town and village centres and transport infrastructure where possible.

A variety of lot sizes and dimensions must be provided to achieve diversity in products to suit a range of household structures and to meet the density targets relating to the residential zones (Refer to **Figure 14**).

Reference chart | Residential density and planning controls

TYPICAL FSR & LOT AREAS FOR HOUSE TYPES

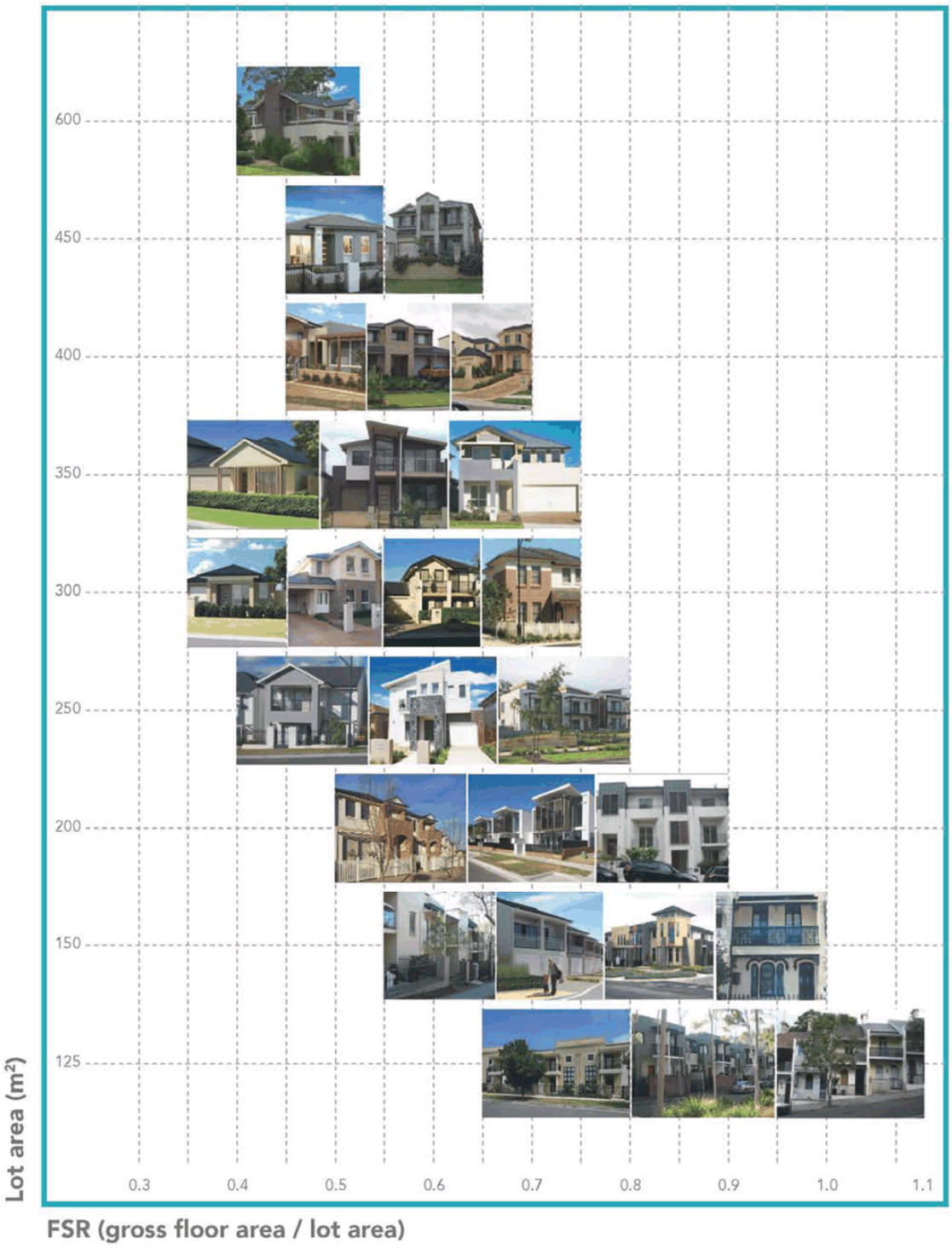


Figure 14. Net Residential Density Chart (Landcom, 2011).

Figure 15. Gross Residential Density (Landcom, 2011)

Principle 2: Promote housing affordability

Residential neighbourhoods cater for a variety of demographic and socio-economic characteristics. Promoting housing mixture is one tool that provides opportunity for more affordable housing options and reduces housing stress.

Principle 3: Establish sustainable, energy efficient, appealing and functional residential living

1 Target an increased use and uptake of renewable energy through housing and neighbourhood design.

2 Seek to promote best practice design excellence in housing provision and precinct planning.

3 Lots must have the appropriate area and dimensions for the siting of dwellings, canopy trees and other vegetation, private outdoor open space, rainwater tank, and vehicular access and on-site parking.

Principle 4: Creating local amenity and a sense of place

Design safe, healthy and active neighbourhoods with interactive interfaces between residences, the streets and surrounds. It is about ensuring there is visual connection between housing and the streets, parks and activity areas they are adjoining or interfacing with.

Encouraging and supporting housing design that responds to place. Creating site responsive built form and lot layouts that consider existing features and landscape context, natural land form and surrounding land uses.

Manage housing growth to protect and promote the conservation values that contribute to concepts of 'place' in West Dapto.

1. Lot size and layout must respond to the physical characteristics of the land, such as slope and existing significant vegetation, and site constraints including bushfire risk.

2. Lot design is to facilitate housing fronting onto creek line corridors and other areas of public open space, to incorporate these spaces into the living environment, facilitate surveillance, and prevent isolation and degradation of these spaces.

Principle 5: Housing transition to the Illawarra Escarpment

Reduce housing density on the fringe of the urban release area to provide delineation to the housed urban areas and a buffer to the Escarpment and important environmental features.

14 Neighbourhood to Precinct – TRANSITIONAL ARRANGEMENTS

Wollongong City Council recognises that the WDURA is an active release area where much development has already occurred, and new neighbourhoods forming. Council also understands that Precinct Plans will be developed over time. Therefore, it is important to acknowledge that existing adopted Neighbourhood Plans will continue to play an important role in guiding development application preparation within the release area until such time that a Neighbourhood Plan is replaced by a Precinct Plan.

Council has identified the following transitional process while Precinct Plan preparation occurs.

All existing adopted Neighbourhood Plans in Section 16 remain the guiding step between the West Dapto Structure Plan and Development Applications until such time that a Neighbourhood Plan is repealed by an amendment to this chapter of the Wollongong DCP 2009 (Chapter D16: West Dapto Urban Release Area) where the guiding function of that Neighbourhood Plan is replaced by a Council adopted Precinct Plan.

Development Applications will continue to be prepared by an applicant and assessed by the relevant consent authority (eg. Council) where an existing adopted Neighbourhood Plan is in place. The applicant and consent authority should give regard to a Precinct Plan only when a Precinct Plan has been adopted by Council for inclusion in Chapter D16 of the Wollongong DCP 2009.

In accordance with Clause 6.2 of Wollongong Local Environmental Plan 2009, Development Consent cannot be granted for development on land within the WDURA where a development control plan that provides for certain matters prescribed in Clause 6.2 has not been adopted. Adoption of either a Neighbourhood Plan or Precinct Plan by Council for inclusion in Wollongong DCP 2009 would meet the requirement of Clause 6.2.

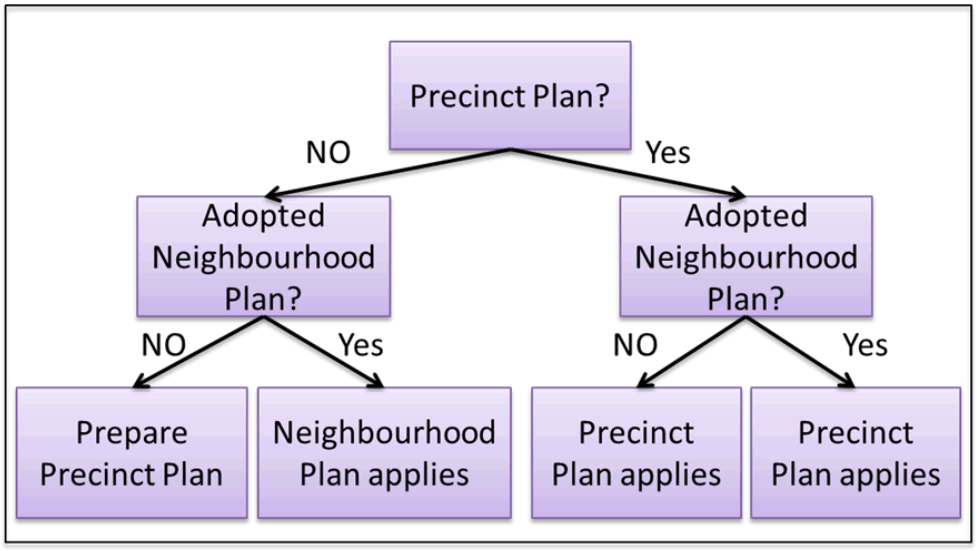


Figure 16. Transitional arrangements Neighbourhood Plans and Precinct Plans

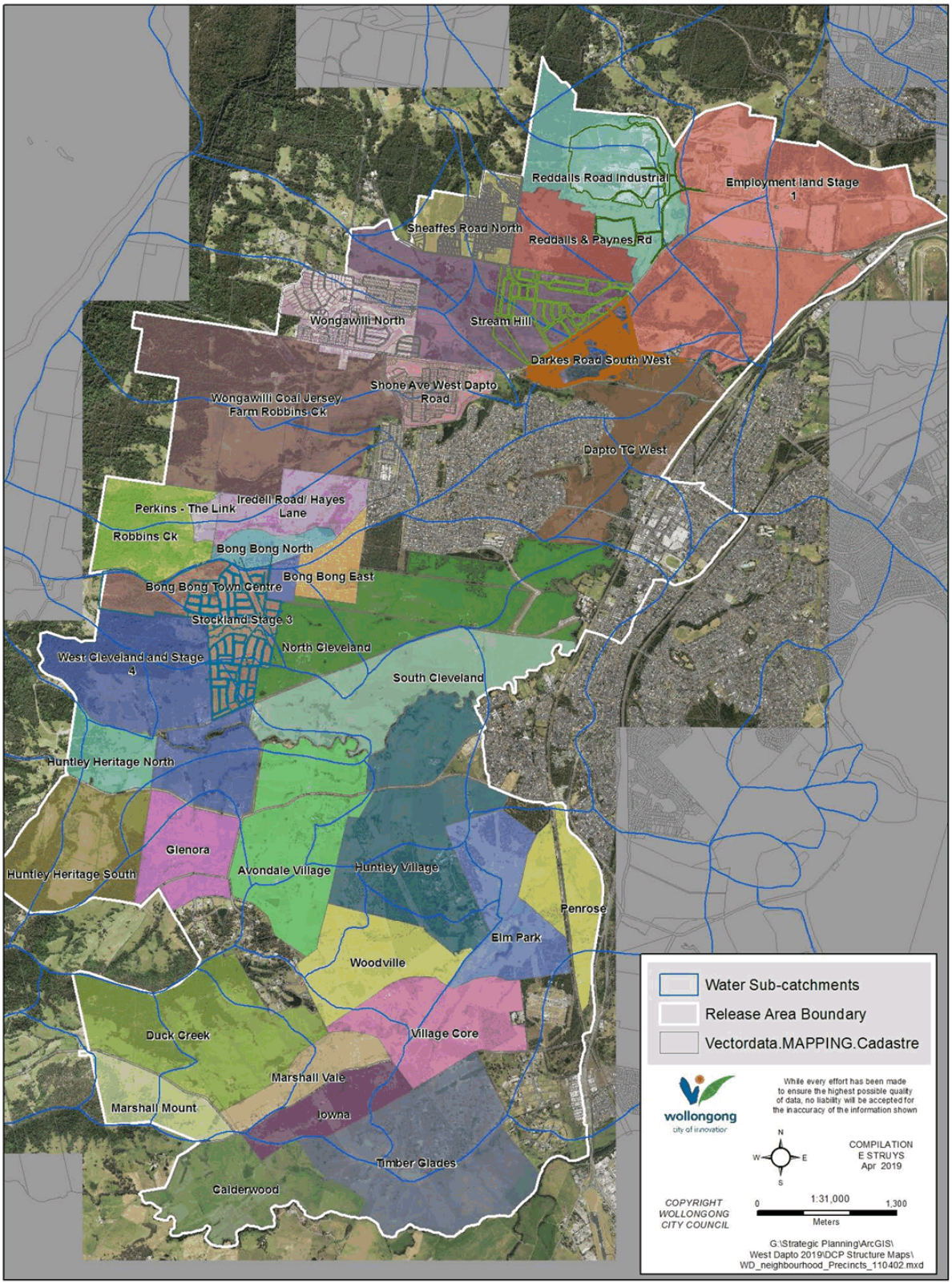


Figure 17. Precinct Plan Areas of West Dapto Urban Release Area

15 PRECINCTS

A Precinct Plan is a step between the West Dapto Structure Plan and a Development Application. It allows issues to be considered on a precinct/ catchment scale.

The intent for precinct planning is to:

- ensure adjoining land owners jointly (or on behalf of another) consider common constraints and design issues.
- provide a means to work through issues around access and staging of development.
- allow Council and other agencies to better align infrastructure planning and delivery to where development fronts are occurring.
- achieve efficiencies of shared infrastructure requirements (eg. stormwater) at an appropriate scale for the infrastructure to occur.
- at an appropriate scale, set urban density targets and understand tracking against them to support town and village centre development.
- align precincts between ownership/cadastre and water sub-catchments as an indicator of existing physical environmental setting.

Precinct Plans will be exhibited as an amendment to this Chapter and in place prior to determination of a development application for sites affected, subject to the transitional arrangement outlined in Section 14 of this Chapter.

15.1 Precinct Plan Requirements

Precinct Plans are required to:

- Support and reflect the West Dapto Vision, Planning Principles and Structure Plan detailed in the West Dapto Vision 2018.
- Confirm the developable areas within the defined Precincts outlined in **Figure 17**. Council will consider any proposals to consolidate precincts.
- Supplement the information prepared by Council during rezoning of West Dapto. Council did not have sufficient resources to consider every property in detail and Council's consultants were not granted access to all properties. Copies of the studies undertaken by Council are available on request (Note the West Dapto Aboriginal Heritage Study is not a public document).
- Consider all potential constraints, mitigate impacts or propose solutions to managing constraints on a precinct / catchment scale, rather than property by property.
- Plan the sequence of development for all affected parcels within a precinct, to ensure adjoining land owners consider the proposals, concepts and development timeframes of each other (planning through any access issues etc).
- Encourage the integration of development sites, development sequencing and economies of scale and avoid exclusion of adjoining lots that may result in development isolation or disjointed development outcomes (eg. opportunities for efficiencies through shared infrastructure, integrated outcomes with well-considered interfaces between landuses).
- Provide more detailed Precinct specific information guided by the West Dapto Structure Plan such as future residential density, open space functions, conservation areas, water management structures.
- Ensure sufficient space is provided in a Precinct for water management, open space and any other landuses or infrastructure required (considering the vision and Principles in the West Dapto Vision 2018) to support safe and sustainable residential communities.
- Ensure interfaces between land uses and delivery of large infrastructure is well coordinated within precincts and with adjacent precincts.

The Precinct Plan process:

1. Discuss site with Council's Urban Release Team and Land Use Planning Team.
2. Prepare Concept Precinct Plan, Staging or development Sequencing Plan and supporting technical studies. Council officers will review and provide feedback regarding any change needed before accepting and progressing with a draft Plan.
3. Council officer will report the draft Precinct Plan to Council as an amendment to the Wollongong DCP 2009 – Chapter D16 West Dapto Release Area.
4. Draft Precinct Plan Exhibition.
5. Council officers review submissions, consult with landowner / consultant over any further amendments needed and then report on submissions and the final Precinct Plan to Council.
6. Council adopts Precinct Plan as an amendment to the DCP (including where relevant any updates needed to the Structure Plan **Figure 2** or **Figure 17** Overview of West Dapto Precincts).

After the exhibition and adoption of a Precinct Plan, Development Applications for sites within the defined precinct can be lodged by individual landowners (or their consultants), for development in their part of the Precinct depending on appropriate sequencing/identified stage of the precinct the site is located in. A Development Application can be submitted on behalf of a number of landowners, provided owners consent is obtained. Note submission of a Development Application within a defined precinct will not be accepted unless the subject Precinct Plan has been adopted by Council.

Any proposed variation to the agreed Precinct Plan area will require justification considered on merit and any variation on or near a property boundary will require agreement of the adjoining owner.

15.2 Matters to be addressed in Precinct Plan and application

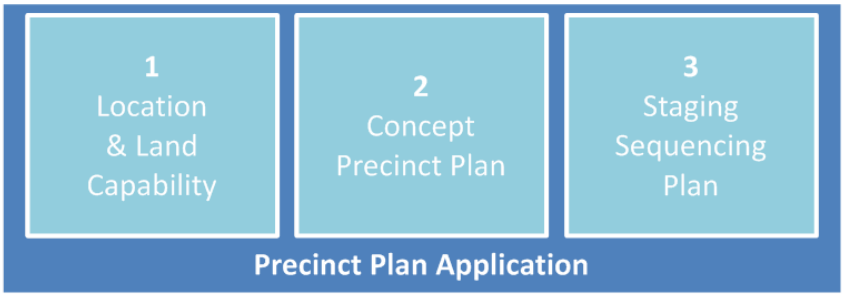


Figure 18. Items of a Precinct Plan application

A Precinct Plan Application should include:

1. Site location and description, and land capability assessment, addressing existing issues such as:
   - Wollongong LEP 2009 provisions (including Zoning, Minimum Lot Size, FSR, Building Height, Flooding, Heritage, Acid Sulfate Soils, riparian corridors etc).
   - Any other relevant legislation
   - The areas setting within West Dapto, eg proximity to commercial centres, main roads, community services.
   - Flooding and bushfire constraints.
   - Topography, known geotechnical constraints, known contamination constraints.
   - Biodiversity (EECs, bushland, significant trees, habitat).
   - Heritage - historical land use, heritage sites, including Indigenous Heritage cultural issues and visual character.

- Existing road network.
- Available utilities & services and existing easements.
- Need for community and recreation facilities.
- Noise impacts (e.g. from the main roads, industrial areas or public & private railways).

2. A concept Precinct Plan and supporting documentation, showing proposed:
   - All landuse areas including, but not limited to, Residential, retail, employment, recreation and conservation areas.
   - Road layout & hierarchy.
   - Indicative dwelling density (**Figure 15**) & yield.
   - Public transport, bicycle and pedestrian routes demonstrating walkability.
   - Drainage management concept plan based on modelling (water quantity & quality and flood behaviour) inclusive of indicative locations and sizing of infrastructure.

   Note – where a drainage/water quality solution is developed at a catchment or precinct level, Council will consider acquisition where the agreed detention basin site is consistent with the West Dapto Development Contributions Plan.

   - Buffers to heritage items or other proposed heritage conservation management measures.
   - Riparian corridors, buffers and proposed future uses.
   - Location of schools, community facilities, recreation facilities and parks, including any proposed public land.
   - Indicative or conceptual Bulk Earthworks Plan linked to demonstrating feasibility of the drainage (stormwater) infrastructure and road layout plans.
3. In collaboration with Council advice, a staging or sequencing plan supporting the concept Precinct Plan showing:
   - All existing site boundaries within the precinct
   - Proposed development staging within the precinct, taking into consideration delivery of essential infrastructure, access and logical progression as a development front.
4. Submission in electronic and PDF form.
   - All the above data layers are required to be presented in electronic form. The electronic Precinct Plan package will include either a set of Shapefiles, a Geodatabase or set of CAD files or be provided in another form as required by Council. The applicant shall also seek Council specific naming conventions, coordinate system and metadata requirements prior to lodgement of the Precinct Plan.
   - Council also requires the Precinct Plan and all supporting layers to be provided in PDF form.

16 NEIGHBOURHOOD PLANS

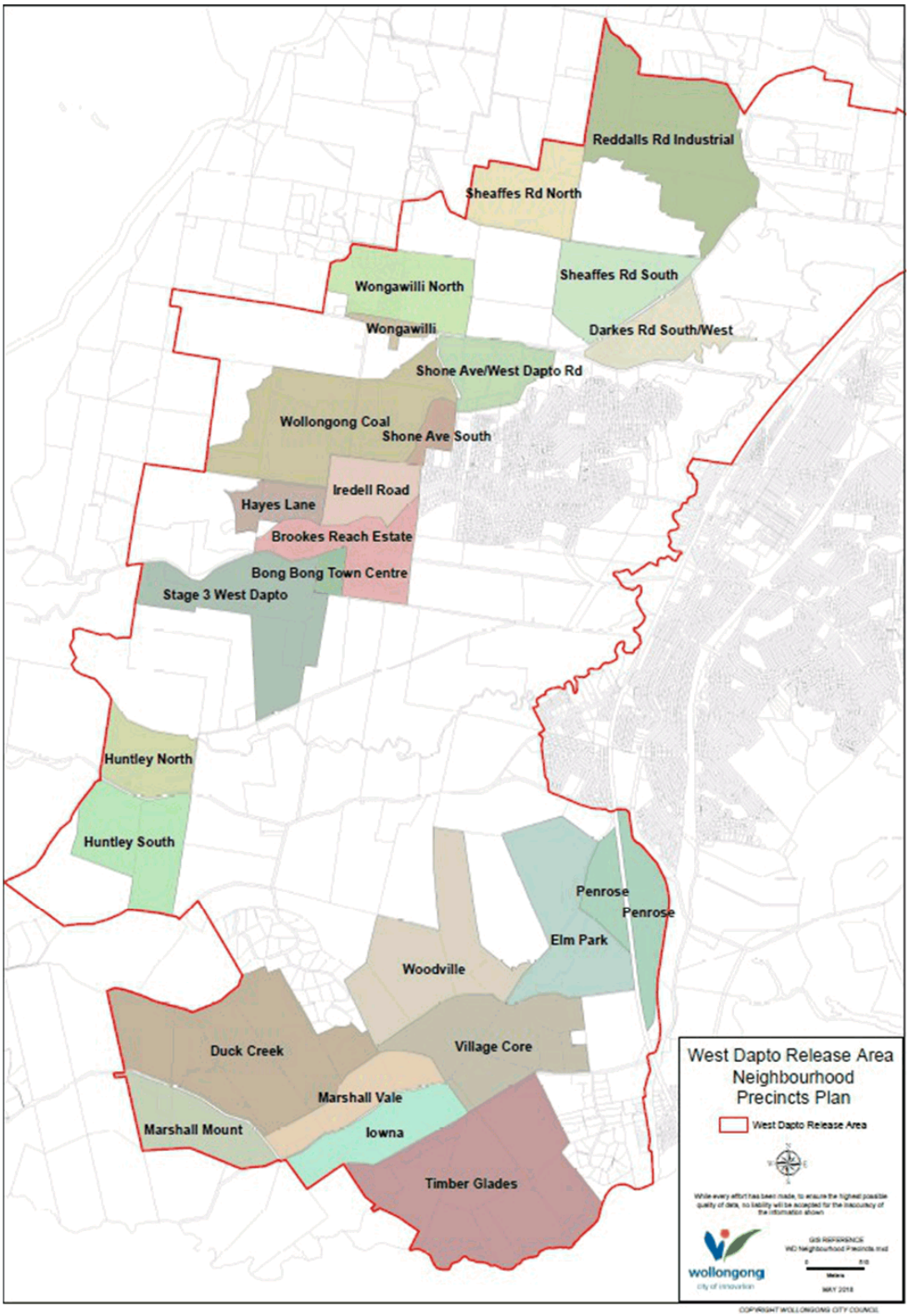


Figure 19. Defined Neighbourhoods in West Dapto Urban Release Area.

16.1 Adopted Neighbourhood Plans

The following Neighbourhood Plans have been adopted for the purposes of this Part:

Neighbourhood Plan	Submitted by	Adoption Date
16.1.1. Bong Bong East and north	Stockland	14 December 2010
16.1.2. Bong Bong Town Centre	Vinta Group / Bong Bong Town Centre	14 December 2010
16.1.3. Wongawilli north	Cardno Forbes Rigby and Jones Flint and Pike.	26 November 2012
16.1.5 Shone Avenue south	KF Williams	26 July 2011
16.1.6 Reddalls Road Industrial	Beadnell	9 December 2013
16.1.7 Sheaffes Road North	SMEC Urban	8 April 2013
16.1.8 Darkes Road South West	Don Fox Planning	24 March 2014
16.1.9 Avondale Road North, Huntley	Urbis	3 August 2015
16.1.10 Shone Avenue / West Dapto Road	KF Williams	24 August 2015
16.1.11 West Dapto Road / Sheaffes Road (south)	Watts Consulting for Wollongong City Council	19 October 2015
16.1.12 Bong Bong South	Stockland	19 November 2018

16.1.1 Bong Bong East and North

Figure 20. Neighbourhood Plan 1 - Bong Bong East and North

The following variations to development standards have been accepted:

Chapter B1 Residential Development - Section 4.5 Front setbacks – controls 1 and 2 are replaced with:

1. The following setback requirements apply from the primary street frontage to the front façade of the building:

(a) Front building line: 4.5 metre minimum setback, except for garages which must be setback at least 5.5 metres from the property boundary on the primary road.

(b) Articulation zone: An articulation zone up to a maximum of 1.5 metres measured from the foremost edge of the building line may be incorporated within the front setback zone. The following building elements are permitted in the articulation zone:

- i) an entry feature or portico,
- ii) a balcony, deck, patio, pergola, terrace or verandah,
- iii) a window box treatment,
- iv) a bay window or similar feature,
- v) an awning or other feature over a window,
- vi) a sun shading feature.

(c) A building element must not extend above the eave gutter line, other than a pitched roof to an entry feature or portico that has the same pitch as the roof on the dwelling house.

(d) The maximum area of all building elements within the articulation zone, other than a building element listed in (v) or (vi) above, must not be more than twenty five percent of the area of the articulation zone, measured through the horizontal plane of the elements.

2. For corner allotments the following setback requirement applies from the secondary street frontage to the façade of the building:

(a) Secondary building line: 2 metre minimum setback.

Chapter B1 Residential Development - Section 4.6 Side and rear setbacks – controls 1 to 3 are replaced with:

1. A dwelling house and any carport, garage, balcony, deck, patio, pergola, terrace or verandah that is attached to the dwelling house with a building height at any point up to 3.8 metres on an allotment with an area greater than or equal to 450m2 must have a setback from a side boundary of at least 900mm. This control does not apply to a secondary street frontage.
2. Any part of a dwelling house that has a building height in excess of 3.8 metres and any carport, garage, balcony, deck, patio, pergola, terrace or verandah that is attached to a dwelling house on an allotment with an area greater than or equal to 450m2 must have a setback from a side boundary of at least the sum of 900mm and an amount that is equal to one quarter of the additional building height above 3.8 metres. This control does not apply to a secondary street frontage.

   N.B. A two storey dwelling house may have its ground floor component (up to 3.8 metres in height) setback 900mm from the side boundary with the second storey setback further as required by the formula in (2).

   A dwelling house that is part two storey and part single storey may have the single storey portion of the dwelling house (up to 3.8 metres) setback 900mm from the side boundary and the two storey portion of the dwelling house setback further as required by the formula in (2).
3. On an allotment with an area less than 450m2 and a lot width 10m or less, where an easement for access and maintenance as well as driveway crossing locations (which are located so as not to adversely impact on-street parking capacity) are provided on title, a zero side setback may be applied to one side for the single storey component of the dwelling. The two storey component of the dwelling is to be setback further as required by the formula in (2). This control does not apply to a secondary street frontage.

The following additional controls to apply:

1. A dwelling house and any carport, garage, balcony, deck, patio, pergola, terrace or verandah that is attached to the dwelling house with a building height at any point up to 3.8 metres must have a setback from the rear boundary of at least 3 metres.
2. A dwelling house with a building height of more than 3.8 metres and any carport, garage, balcony, deck, patio, pergola, terrace or verandah that is attached to the dwelling house must have a setback from the rear boundary of at least 3 metres, plus an amount that is equal to three times the additional building height above 3.8 metres up to a maximum setback of 8 metres.
3. Despite (6) and (7), an allotment that has a rear boundary with a laneway may have a building line that abuts that boundary for up to 50 per cent of the length of that boundary.

Chapter B2 Residential Subdivision – Section 13 Cut and Fill land reshaping works – does not apply to master planning of land and precinct subdivision applications.

16.1.2 Bong Bong Town Centre

In the area where Bong Bong Road adjoins the north-south arterial route a new district town centre is to be established, based on a north-south orientated main street (see **Figure 20** Bong Bong East and North Neighbourhood Plan). The Bong Bong Town Centre is to be the primary town centre in the release area. The Bong Bong Town Centre is to be a supermarket based centre with a range of shops and would accommodate around 15,000m2 of retail floor space.

16.1.3 Wongawilli – North

Wongawilli North will provide a mix of housing densities from large lot housing towards the escarpment and becoming denser towards the east and surrounding the village centre. The riparian corridor will create some structural form for passive recreation and active transport links along shared paths between the residential pockets.

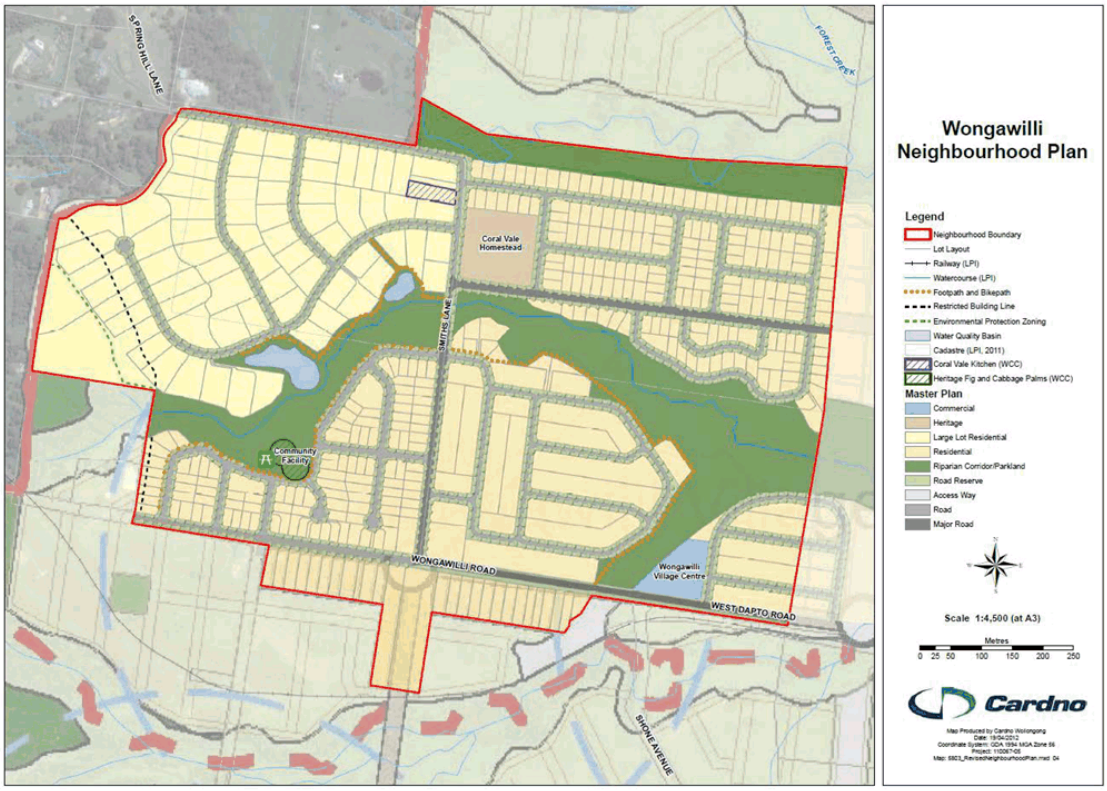


Figure 21. Wongawilli North Neighbourhood Plan

The following modified and additional controls to apply:

1. Minimum Lot width fronting Wongawilli Road and Smiths Lane of 15m;
2. Minimum front building line setback of 4.5m for all lots fronting Wongawilli Road and Smiths Lane;
3. The maximum length of cul-de-sacs that provide access to lots fronting Wongawilli Road Should not exceed 130m;
4. For Lots with a dual road frontage:

(a) Wongawilli Road and Smiths Lane is considered to be the primary road frontage and the internal unnamed road is considered to be the secondary road frontage and the rear of the lots;

(b) All dwellings must face, address and activate the primary road frontage of Wongawilli Road and Smiths Lane;

(c) Car ports or garages must be located and accessed from the secondary road frontage rear of the lots;

(d) Minimum rear setbacks are to remain in accordance with Chapter B1, garages and carports are to have a minimum rear setback of 5.5m in accordance with the principles shown in **Figure 22**;

(e) Fencing and landscaping treatment of the secondary road frontage is in accordance with the principles shown in **Figure 22**. Examples of Articulated fencing include, but are not limited to:

i) Masonry to 1.2m high with open type lattice or slates above with masonry elements no wider that 150mm;

ii) Timber Lap and Cap;

iii) Colourbond solid to 1.2m with Colourbond lattice style top sections.

5. For Lots backing onto or adjoining the Rural Fire Service (RFS) Property:

(a) Dwelling house, secondary dwelling and any habitable areas must be setback at least 10m from the rear or common property boundary that adjoins the RFS property;

(b) Outbuildings and garages must be setback at least 5m from the rear of common boundary that adjoins the RFS property.

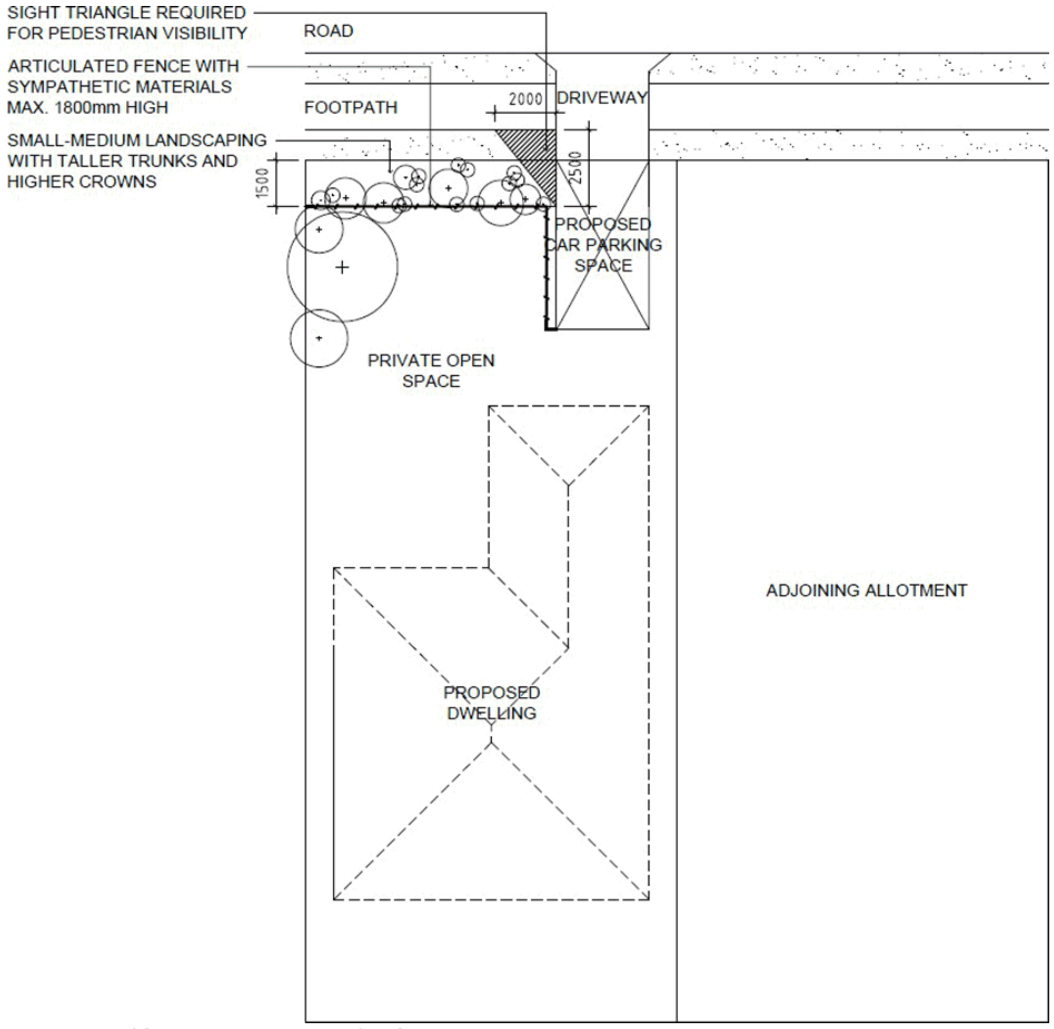


Figure 22. Dual frontage property secondary frontage treatment

Wongawilli Village centre will provide a small convenience centre with a small grocer and some mixed retail shops. The centre will be designed focusing on activating the interface with the riparian boundary and its West Dapto Road frontage. Parking will be included in the village design with street parking along the secondary street and a parking lot area provided along the north, generally not visible from West Dapto Road, allowing built form to perform a clear street defining urban function. The village will take form guided by the concept design presented in **Figure 23**.

Figure 23. Wongawilli Village Centre – Conceptual design

16.1.4 Wongawilli Mine Spur Rail line

It is anticipated that the Wongawilli Mine will continue to operate for the next 30 years, or longer. Coal is transported from the mine to Port Kembla via the rail network. Future urban development should be designed to recognise the continued use of the rail spur line and include measure to mitigate noise and other potential impacts. Division 15 of SEPP Infrastructure 2007, applies to development near the spur line.

Objectives:

(a) To facilitate the transport of coal from Wongawilli Mine to Port Kembla by rail transport.

(b) To minimise rail noise, vibration and other impacts on dwellings near the rail spur line.

Controls:

1. Development Applications for subdivision and dwelling houses within the rail buffer area (Refer to **Figure 24**), are to include sound attenuation measures that achieve a maximum of 35dBA within the dwelling.
2. Development Applications for subdivision and dwelling houses within the rail buffer area, are to include consider vibration impacts and include mitigation measures.
3. The development applications must satisfy the requirements of SEPP Infrastructure Division 15.

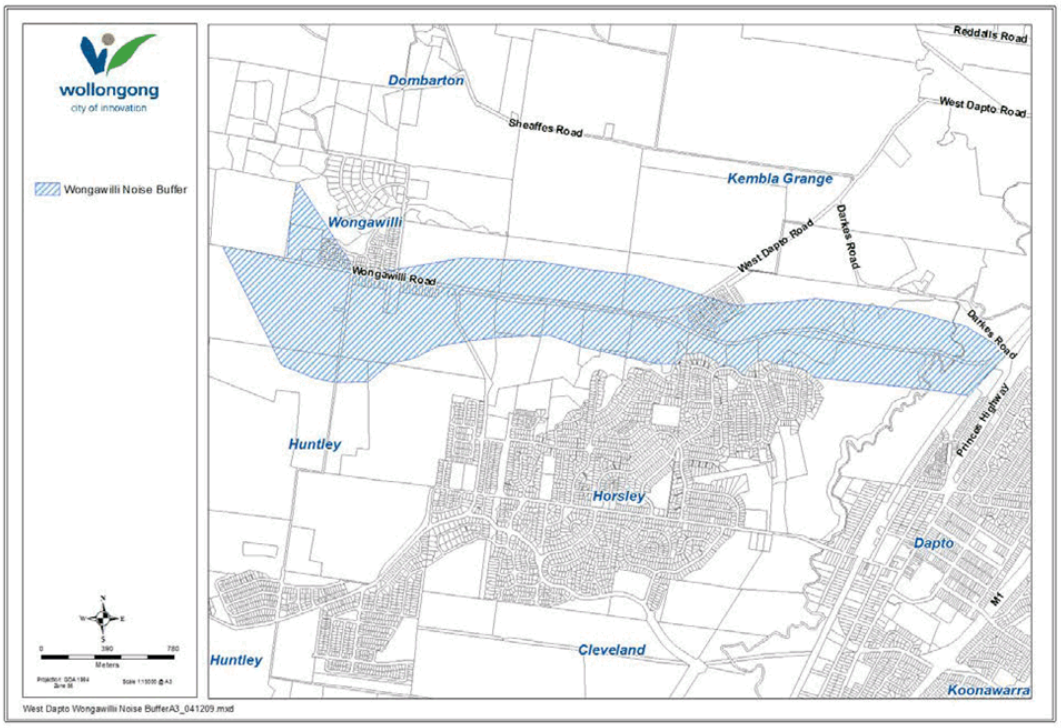


Figure 24. Wongawilli rail noise area

16.1.5 Shone Avenue - South

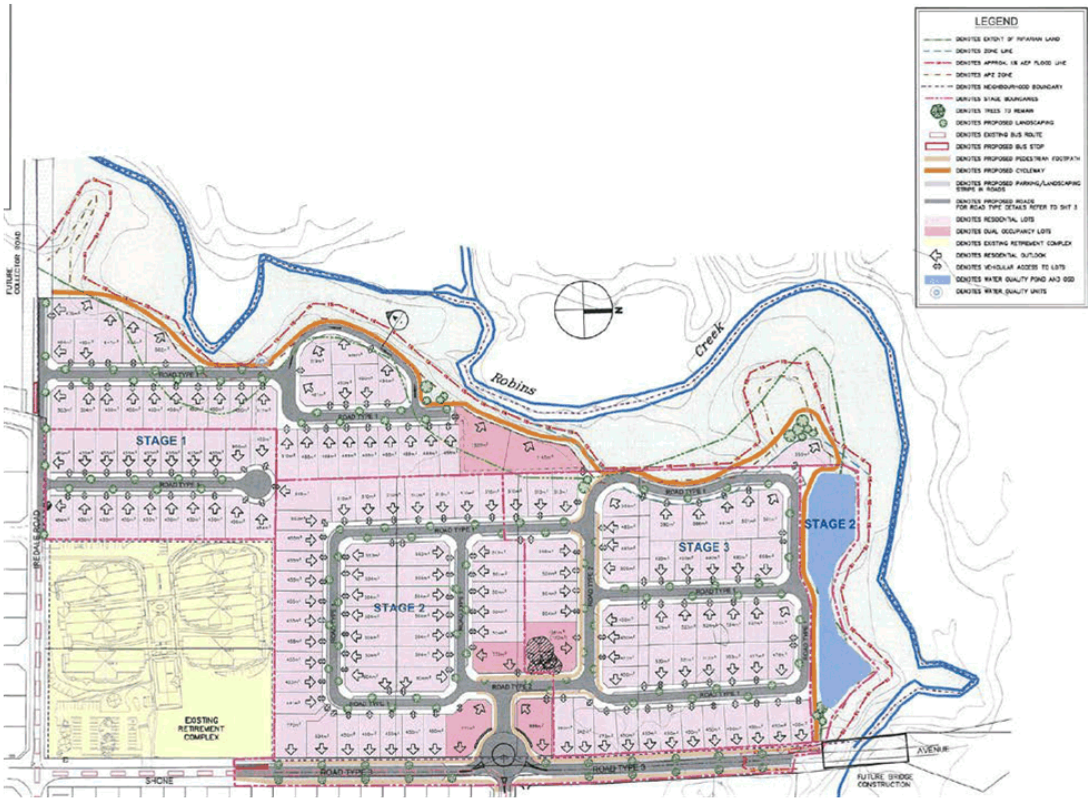


Figure 25. Shone Avenue South Neighbourhood Plan

The following modified and additional controls to apply:

1. For Lots with a dual road frontage:

(a) Shone Avenue and Iredell Road are considered to be the primary road frontage and the internal unnamed road is considered to be the secondary road frontage and the rear of the lots;

(b) All dwellings must face, address and activate the primary road frontage of Shone Avenue and Iredell Road;

(c) Car ports or garages must be located and accessed from the secondary road frontage rear of the lots;

(d) Minimum rear setbacks are to remain in accordance with Chapter B1, garages and carports are to have a minimum rear setback of 5.5m in accordance with the principles shown in **Figure 26**;

(e) Fencing and landscaping treatment of the secondary road frontage is in accordance with the principles shown in **Figure 26**. Examples of Articulated fencing include, but are not limited to:

i) Masonry to 1.2m high with open type lattice or slates above with masonry elements no wider that 150mm;

ii) Timber Lap and Cap;

iii) Colourbond solid to 1.2m with Colourbond lattice style top sections.

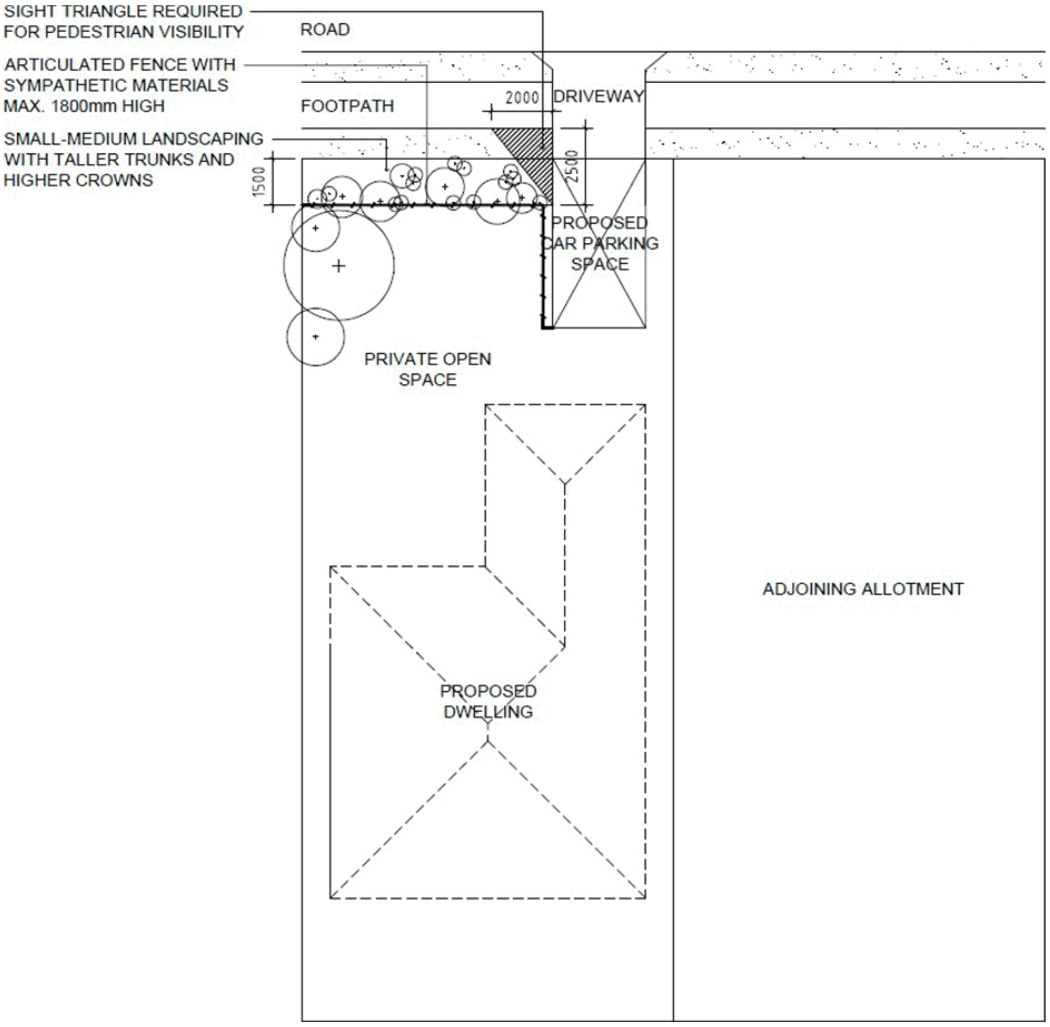


Figure 26. Dual frontage property secondary frontage treatment

(No vehicle Access)

16.1.6 Reddalls Road Industrial

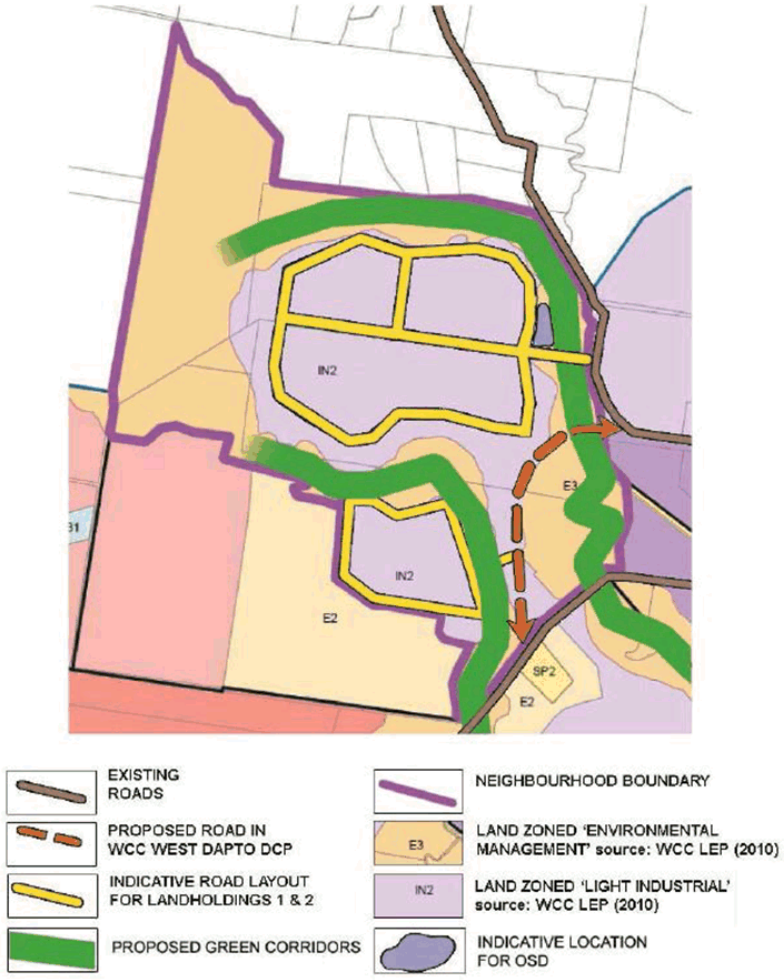


Figure 27. Reddalls Road Industrial Neighbourhood Plan

The following additional controls to apply:

1. The proposed cycleway must have adequate passive surveillance to ensure safety by design.
2. Indicative future bus stop locations should be identified and shown on road types capable of handling bus routes. A minimum number of stops should be located in a manner to ensure that the majority of lots are within 400 metres of a bus stop.
3. Any proposed development of the neighbourhood will require the applicant upgrading the relevant section of Reddalls Road to a standard that is suitable for the normal range of Heavy vehicles at no cost to Council. These upgrade works would also include any required intersection treatment to Reddalls Road and the new proposed Access Road as well as any necessary road safety works.

16.1.7 Sheaffes Road North

Figure 28. Sheaffes Road North Neighbourhood Plan

The following modified and additional controls to apply:

1. For Lots with a dual road frontage:

(a) Sheaffes Road and Paynes Road is considered to be the primary road frontage and the internal unnamed road is considered to be the secondary road frontage and the rear of the lots;

(b) All dwellings must face, address and activate the primary road frontage of Sheaffes Road and Paynes Road;

(c) Car ports or garages must be located and accessed from the secondary road frontage rear of the lots;

(d) Minimum rear setbacks are to remain in accordance with Chapter B1, garages and carports are to have a minimum rear setback of 5.5m in accordance with the principles shown in figure 6.3.6.2;

(e) Fencing and landscaping treatment of the secondary road frontage is in accordance with the principles shown in **Figure 29**. Examples of Articulated fencing include, but are not limited to:

- i) Masonry to 1.2m high with open type lattice or slates above with masonry elements no wider that 150mm;
- ii) Timber Lap and Cap;
- iii) Colourbond solid to 1.2m with Colourbond lattice style top sections.

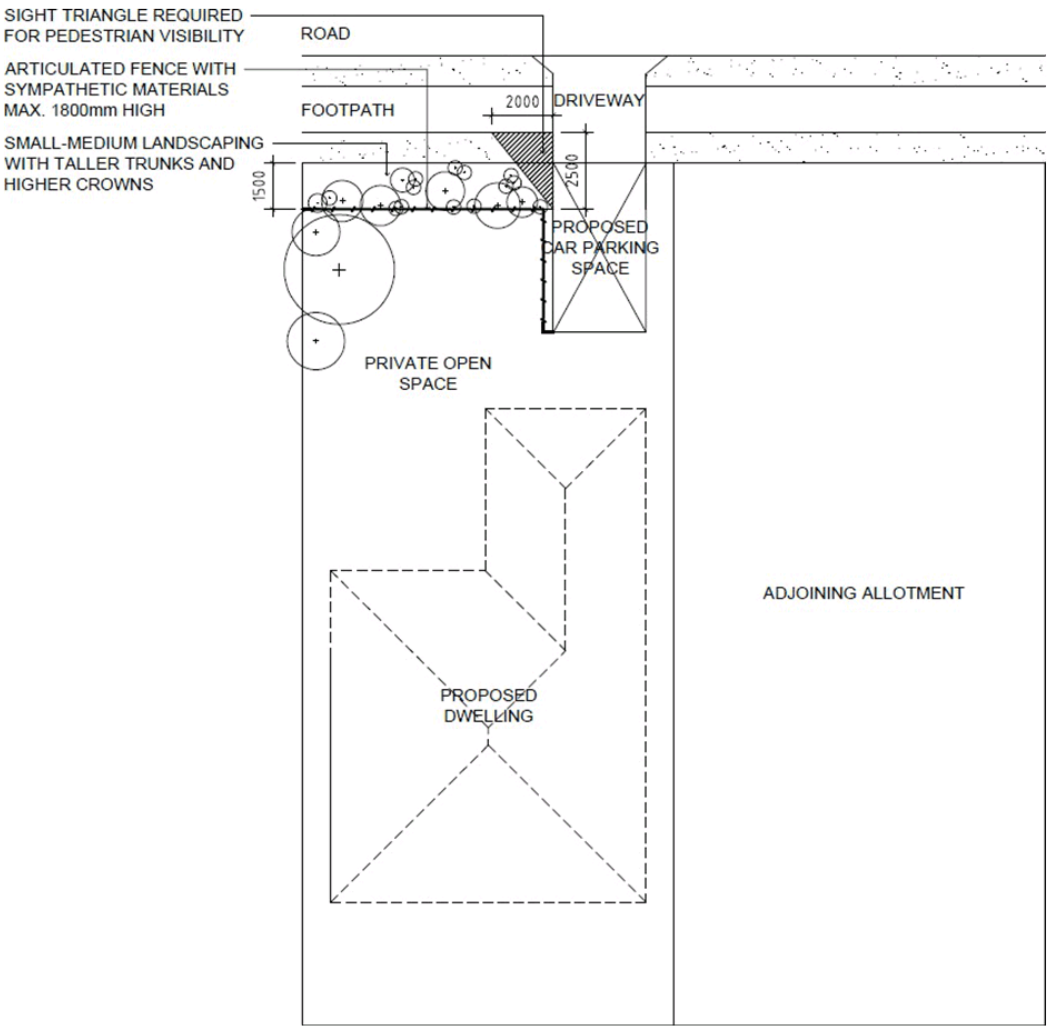


Figure 29. Dual frontage property secondary frontage treatment

PRIMARY ROAD
(No vehicle Access)

16.1.8 Darkes Road South West

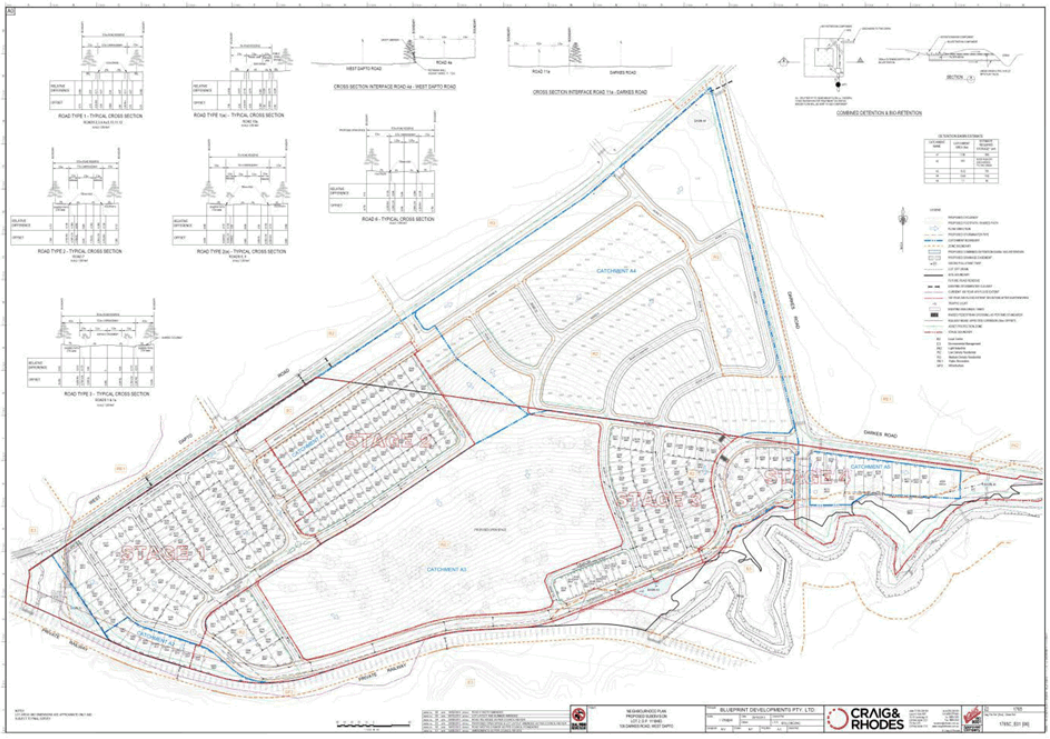


Figure 30. Darkes Road South West Neighbourhood Plan

The following modified and additional controls to apply:

1. Lot Width, Depth and Aspect are to be in accordance with Figure 6.3,7.1 above and are not required to comply with Chapter B2 Section 6 Subdivision Lot Layout – Aspect & Solar Access Orientation as well as Section 8 Lot Width & Depth Requirements. The relevant issues have been considered and the lot layout and details shown are considered acceptable. Should the lot layout depart substantially from that shown then compliance with Chapter B2 is required unless variation is sought in accordance with Chapter A1.
2. On an allotment with an area less than 450m2 and a lot width 10m or less, where an easement for access and maintenance as well as driveway crossing locations (which are located so as not to adversely impact on-street parking capacity) are provided on title, a zero side setback may be applied to one side for the single storey component of the dwelling. The two storey component of the dwelling is to be setback further as required by the formula in (2). This control does not apply to a secondary street frontage.
3. For Lots with a dual road frontage:

(a) West Dapto Road and Darkes Road is considered to be the primary road frontage and the internal unnamed road is considered to be the secondary road frontage and the rear of the lots;

(b) All dwellings must face, address and activate the primary road frontage of West Dapto Road and Darkes Road;

(c) Car ports or garages must be located and accessed from the secondary road frontage rear of the lots;

(d) Minimum rear setbacks are to remain in accordance with Chapter B1, garages and carports are to have a minimum rear setback of 5.5m in accordance with the principles shown in figure

(e) **Figure 31** below;

(f) Fencing and landscaping treatment of the secondary road frontage is in accordance with the principles shown in **Figure 31**. Examples of Articulated fencing include, but are not limited to:

i. Masonry to 1.2m high with open type lattice or slates above with masonry elements

no wider that 150mm;

ii. Timber Lap and Cap;

iii. Colourbond solid to 1.2m with Colourbond lattice style top sections.

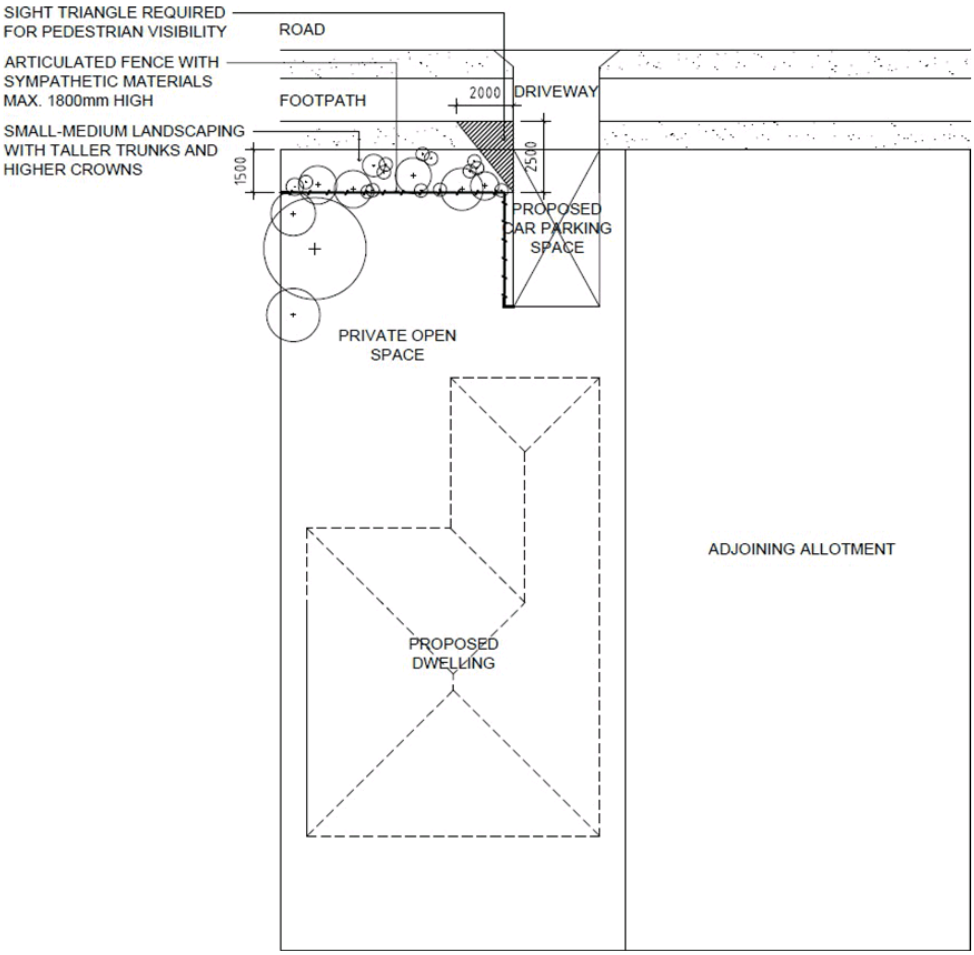


Figure 31. Dual frontage property secondary frontage treatment

PRIMARY ROAD
(No vehicle Access)

1. For all development applications outside of the area denoted as Stage 1:

(a) An Aboriginal Heritage Assessment is to be undertaken in accordance with the Wollongong Development Control Plan 2009 Chapter E10.

(b) Additional archaeological investigations are required to be undertaken to the previously recorded archaeological sites and three (3) potential archaeological deposits (PADs) identified. This work is required in order to better determine the significance and extents of these areas.

(c) In-principle support for the intended mitigation or Aboriginal Heritage Impact Permit (AHIP) proposals is to be gained from the NSW Office of Environment and Heritage (OEH) prior to the determination of the associated development application.

(d) Further consultation with Local Aboriginal Groups is to be undertaken within the assessment of any future Development Applications.

(e) Consideration of the impacts of the proposal on identified Non-Indigenous Archaeological Deposits located on the site during the preparation of the Heritage reports and which are subject to Section 140 of the NSW Heritage Act 1977.

(f) Conservation planning related to any retained structures or features on the site (e.g. The Silo and gardens).

(g) Interpretation planning relating to the history and heritage significance of the development area.

2. Bushfire Matters

(a) Certain construction standards apply for development on Bushfire Prone Land. The applicable Construction Standards for proposed development are to reflect the Bushfire Attack Level (BAL) as identified at **Figure 32** below.

(b) Given that the site is identified as Bush Fire Prone Land, when a development application for subdivision is made, the development will require a Bush Fire Safety Authority to be issued by the NSW RFS under Section 100B of the Rural Fires Act 1997. The RFS has indicated that it is likely that by condition of the Bush Fire Safety Authority, restriction on the titles of the lots requiring the provision and maintenance of the necessary APZ's will be required.

APPENDIX 1 (Map 2): *AS 3959 – 2009 (Table 2.4.2) BAL Construction Standards relevant to the Neighbourhood Plan*

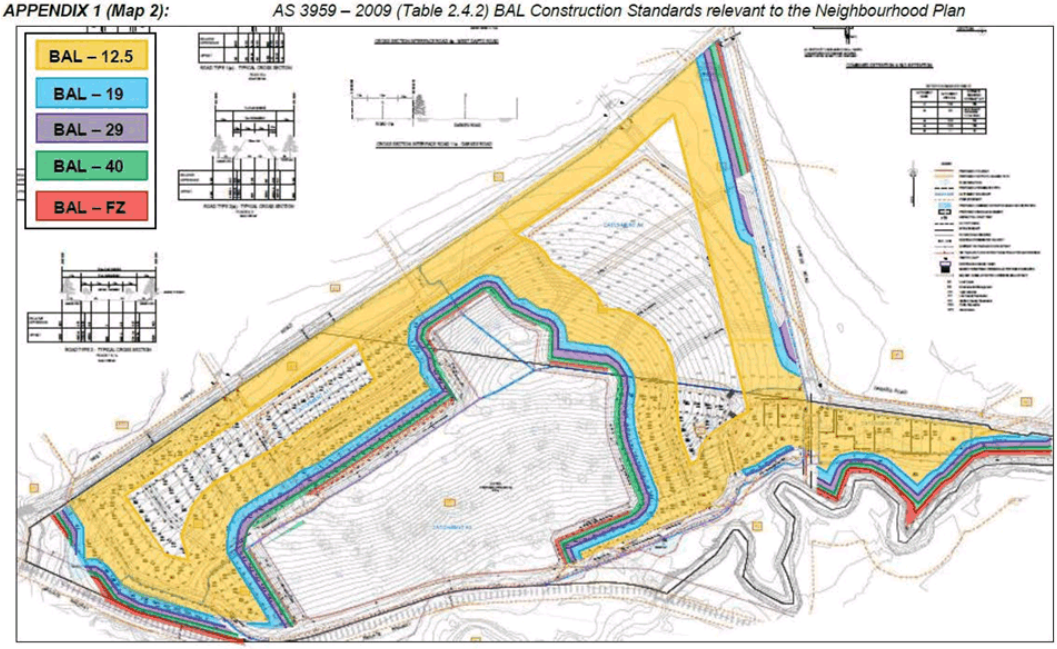


Figure 32. BAL Construction Standards relevant to the Neighbourhood Plan

1. Access

(a) An appropriate access track is to be provided to the Detention Basin A1 to facilitate sufficient maintenance access for Council.

(b) Appropriate access is also to be provided to the Wongawilli Rail Spur Line from the Detention Basin A1 and from Road 01.

(c) The final form of the access track is to be determined in conjunction with Council Engineering Officers within the assessment of future Development Applications. Hardstand access will be required.

2. There may be scope to amend the current Council Drainage Acquisition Maps to reflect more up to date flood mapping of the area. This is to be further investigated within future Voluntary Planning Agreements (VPAs) and assessment of Development Applications.

16.1.9 Avondale Road North, Huntley

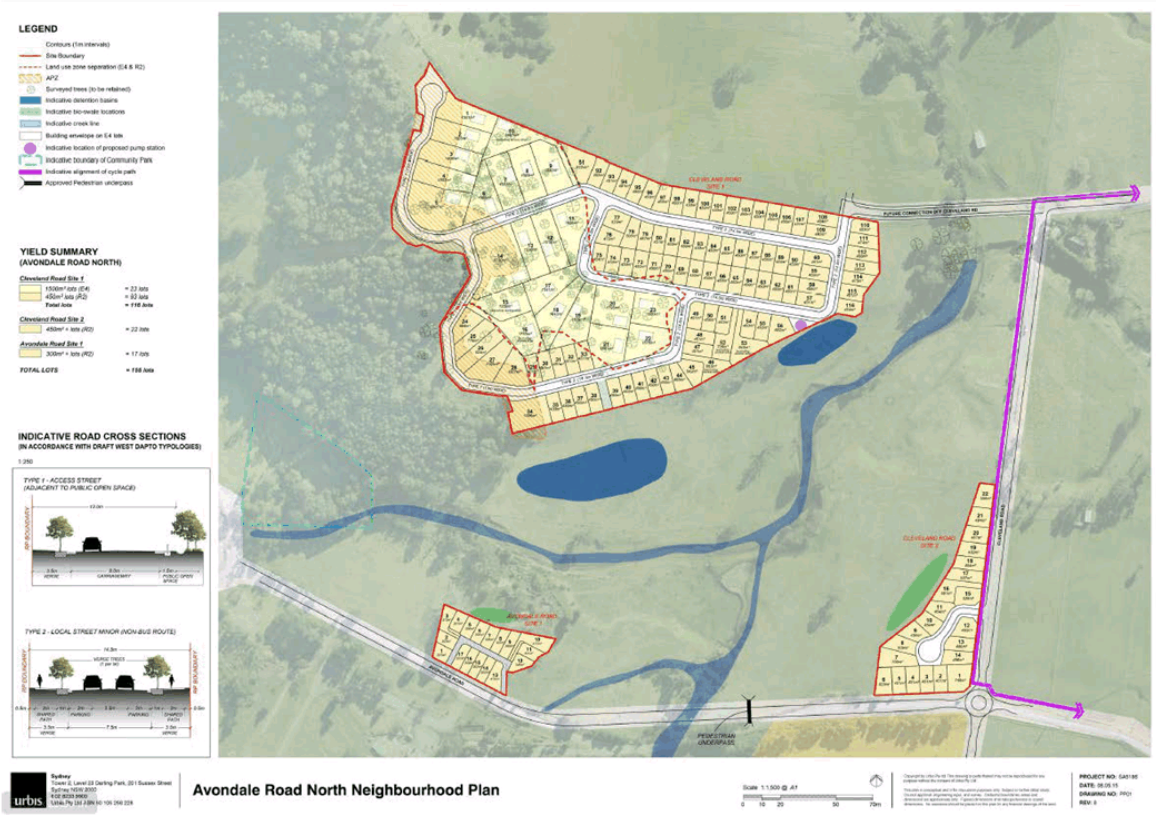


Figure 33. Avondale Road North, Huntley Neighbourhood Plan

16.1.10 Shone Avenue / West Dapto Road

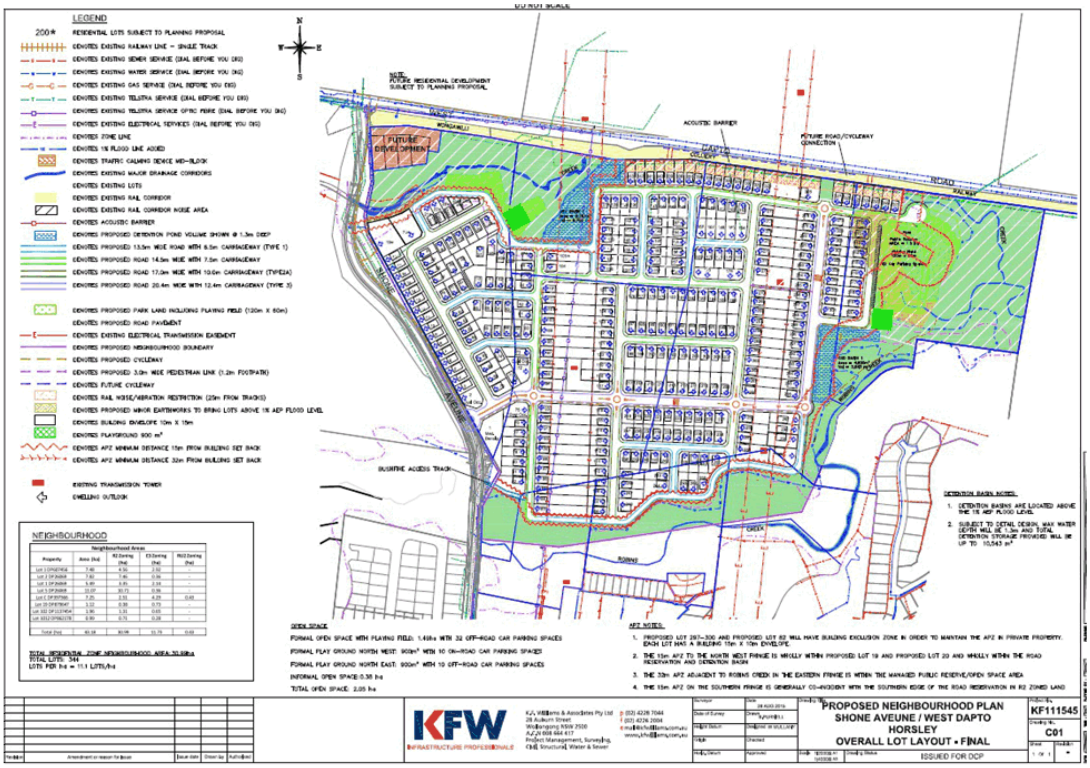


Figure 34. Shone Avenue and West Dapto Road Neighbourhood Plan

The following modified and additional controls apply:

1. For Lots with a dual road frontage:

(a) Shone Avenue is considered to be the primary road frontage and the internal unnamed road is considered to be the secondary road frontage and the rear of the lots;

(b) All dwellings must face, address and activate the primary street frontage of Shone Avenue – this is the main address of the dwelling;

(c) The minimum front setback on Shone Avenue is 4m (being a greenfield site) and the minimum setback from the secondary road is 4m;

(d) No car access to residential lots is permitted from Shone Avenue (ie lots are access denied). Carports or garages must be located and accessed from the secondary road frontage rear of the lots;

(e) Garages and carports must be setback a minimum of 5.5 metres from the property boundary on the secondary road to enable a vehicle to park or stand in front of the garage or carport (ie allow off street parking that does not impede the footpath) and in order to be a non dominant component of the streetscape;

(f) Fencing controls for the primary street frontage of Shone Avenue are outlined in Chapter B1: Residential Development and are designed to complement the objectives of passive surveillance;

(g) Fencing and landscaping treatment of the secondary road frontage must ensure that clear lines of sight are maintained for motorists and pedestrians to and from the lot, and ensure the design complements the objectives of passive surveillance. To help soften the visual impact and improve the streetscape appearance of the fence, and allow visual connection between the dwelling and the street, any fence will be required to be well articulated and landscaped with appropriate planting. Articulated fencing should be provided to a maximum height of 1.8 metres. Examples of articulated fencing include, but are not limited to:

i) Masonry to 1.2m high with open type lattice or slates above with masonry elements no wider than 150mm;

ii) Timber Lap and Cap;

iii) Colourbond solid to 1.2m with Colourbond lattice style top sections.

NB. Fences in bush fire prone areas shall be of a metal or masonry construction only.

(h) Any gates associated with the secondary street fence should open inwards so as to not obstruct the road reserve.

(i) Where garage door openings face the secondary road they shall be a maximum of 50% of the width of the dwelling. Refer to Chapter B1: Residential Development for other car parking and access controls.

2. For Lots backing onto West Dapto Road:

(a) An acoustic building exclusion zone of 25 metres applies along the length of the rail corridor to reflect Noise Report recommendations;

(b) A sound wall is to be erected by the developer along the length of the rail corridor, as indicated in the Neighbourhood Plan.

16.1.11 West Dapto Road / Sheaffes Road (south)

Along West Dapto Road a town centre (large local town centre) is to be established to the west. The town centre will interface with large neighbourhood open space provisions that will cater for active organised sporting needs. The Town centre will perform an important role in the provision of public transport, as a node with active transport facilities will meet with the public transport network. The core part will contain the primary retail and commercial functions and be surrounded by some business and medium density housing. It is envisaged that this centre would accommodate around 7,500m2 of retail floor space to support the employment land.

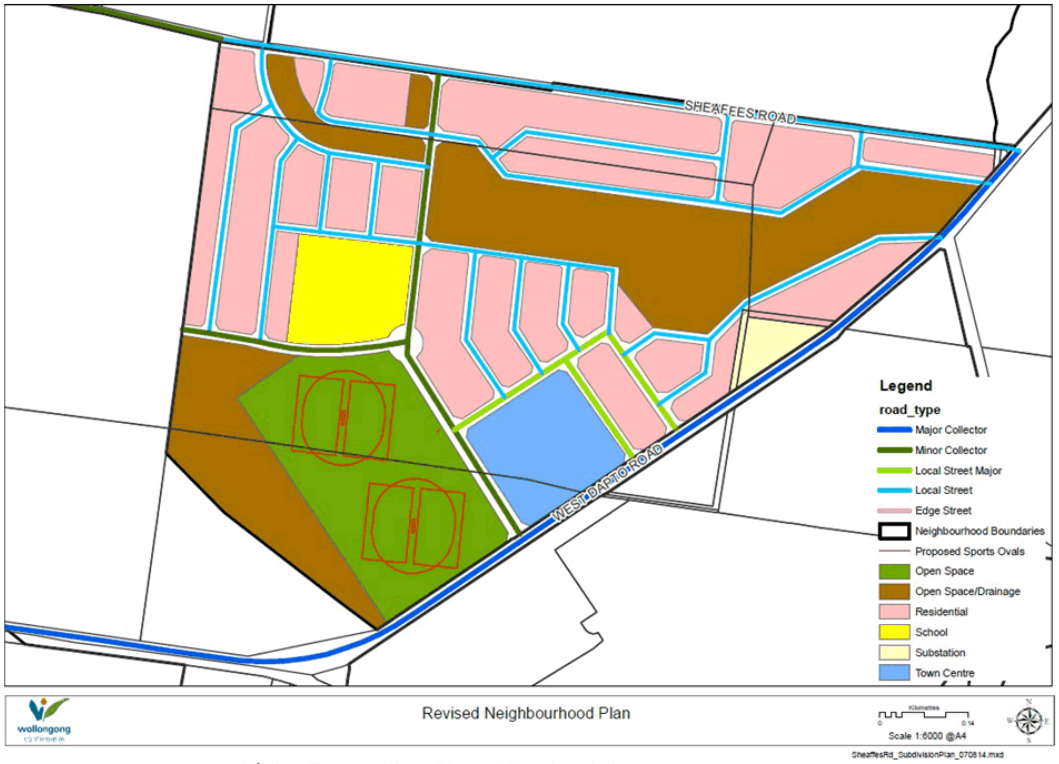


Figure 35. West Dapto Road / Sheaffes Road (south) Neighbourhood Plan

16.1.12 Bong Bong South

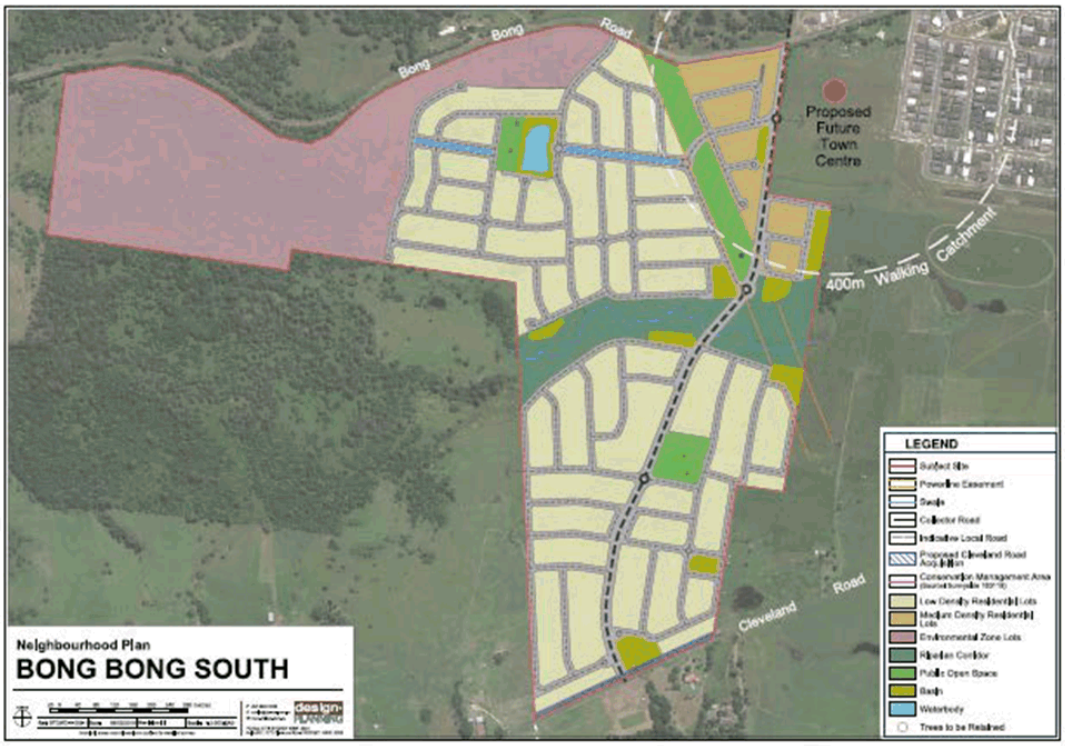


Figure 36. Bong Bong South Neighbourhood Plan

17 Matters to be addressed in Development Applications

The documentation accompanying the Development Application for subdivision will have to provide more detailed site specific information and specialist reports, addressing issues such as:

- Detailed site survey by a registered surveyor.
- Development plans – lot layout, detailed road designs, landscape plans, subdivision stages (if any) (Chapters B2, B3 and B4).
- Flora and fauna assessment and future management (Chapters E18, E23).
- Drainage/flooding/water quality modelling, WSUD (Chapters E13, E14, E15 and E22).
- Land contamination assessment (Chapter E20).
- Bushfire management (Chapter E16).
- Traffic assessment (Chapter E3).
- Aboriginal heritage assessment (Chapter E10 and E11).
- Noise assessment (where relevant) (Chapter E4).
- Pedestrian and bicycle routes, including accessibility for persons with a disability (Chapter E1).
- Crime Prevention through Urban Design (Chapter E2) etc.

The documentation accompanying a Development Application for a Dwelling House on a newly subdivided lot should have regard to Part A and B1 (Dwelling Houses) of this DCP and any variations to the generic controls under this chapter (e.g. the standard setbacks in individual neighbourhoods may have been varied).

An application for a Dwelling House can also be undertaken in accordance with the requirements of SEPP Exempt and Complying Development, which can be assessed by Council or a Private Certifier.

Contents

Figures

Tables

1 INTRODUCTION

1. This Chapter of the DCP outlines the objectives and detailed controls for residential subdivision in addition to the planning controls contained in the relevant Local Environmental Plan.

2. The purpose of this chapter of the DCP is to provide Council's detailed requirements for residential subdivision development upon land zoned either: R1 General Residential, R2 Low Density Residential, R3 Medium Density Residential, R4 High Density Residential, R5 Large Lot Residential, B1 Neighbourhood Centre and B4 Mixed Use.

3. This part of the DCP should be read in conjunction with:

   (a) The relevant Local Environmental Plan which prescribes the zoning and minimum subdivision lot size requirements.

   (b) Part A (Introduction and General Requirements) of the DCP which provides advice on the lodgment requirements for a Development Application.

   (c) Part D (Locality based DCPs / Precinct Plans) of the DCP which provides specific locality based or precinct based planning controls which may affect a proposed residential subdivision in a specific locality.

   (d) Part E (General Planning Controls City Wide) of the DCP which outlines Council's general planning requirements for all developments.

   (e) Council's Subdivision Policy which outlines Council's minimum design and construction specifications for all components of a subdivision including but not limited to earthworks, drainage and road works etc.

2 OBJECTIVES

The objectives of this Part of the DCP are:

(a) To facilitate a range of lot sizes to permit a range of housing styles and housing mix, in order to meet the changing demographic profiles and housing requirements for residents in the City of Wollongong Local Government Area;

(b) To ensure the subdivision of land is responsive to inherent site conditions and constraints;

(c) To ensure that all subdivisions are designed to take into account the principles of ecologically sustainable development and solar energy efficiency, to assist in ensuring that subsequent development is significantly more energy efficient;

(d) To ensure subdivisions achieve high quality urban design outcomes through maximising the number of new lots with principal street frontage and to restrict the number of battle- axe lots;

(e) To ensure that lot sizes, dimensions and layout are consistent with best practice in terms of urban design, solar access orientation and energy efficiency;

(f) To establish a clear hierarchy of different road types which cater for different types of traffic movement through residential subdivisions; and

(g) To ensure that the majority of residential allotments are within a 400 metre walking distance from an existing or proposed new bus stop.

3 DEFINITIONS

Corner Allotment Is a lot which has frontage to two roads on adjacent boundaries.

Irregular shaped allotment means an allotment which is not regular in shape.

Regular shaped allotment means either:

(a) Allotment which is either square or rectangular in shape; or

(b) Allotment of another shape where a square or rectangular shape equivalent in area to the minimum lot size area for the allotment type could be contained within the boundaries of the allotment and includes a battle-axe shaped allotment and a corner allotment where the only deviation from the above requirements is the access handle (ie battle axe lot) or the splay corner (ie corner lot).

4 TYPES OF RESIDENTIAL SUBDIVISION

In NSW, there are three (3) main forms of residential subdivision, namely:

1. Torrens Title subdivision;
2. Strata Title subdivision; and
3. Community Title subdivision.

4.1 Torrens Title Subdivision

Torrens Title subdivision is the main form of subdivision of a parcel of land.

Torrens Title is a system of title, based on registration. The property owner is referred to as the 'registered proprietor' who holds the land subject to interests and other rights recorded in the register but is free from all other interests. The registered proprietor is issued with a Certificate of Title (CT) that is a duplicate copy of the folio entry in the central Torrens Lands Title register, held by the NSW Department of Lands (Land & Property Information).

Any Development Application for a proposed Torrens Title subdivision must be supported by the following documentation:

(a) A registered survey plan of the subject site;

(b) A draft subdivision plan which shows all existing and proposed easements or covenants over relevant lots in the proposed subdivision;;

(c) A draft written instrument outlining the creation of any easements / restrictions under Section 88B or 88E of the Conveyancing Act 1919; and

(d) A Statement of Environmental Effects which addresses the proposal's relationship with relevant environmental planning instruments (including any relevant State Environmental Planning Policy, State Code, Wollongong Local Environmental Plan 2009 etc) and this DCP.

4.2 Strata Title Subdivision

The application of the Strata Titles Act applies principally to the subdivision of residential flat buildings, townhouses, villas or dual occupancies into separate parts / units.

Strata title subdivision is essentially the subdivision of space in three dimensions defined by or with reference to walls, floors and ceilings as well as courtyards. It allows for the horizontal subdivision of land

and / or airspace into separate titles for separate "strata" lots or units. Each lot or unit represents a separate apartment. An owner of a strata title unit has title to the air bounded by the inner skin of the boundary walls of the unit and by the ceiling height above and the floor level below horizontally.

The legal title to the land and building structure is owned by the "Owners Corporation" being a corporate body comprising and representing the owners of all the units in the building. The common property in the strata title includes the building itself, common open space, waste and recycling storage bin areas, visitor car parking and driveways on the land. Generally, car parking spaces (except visitor car parking spaces) are marked on the strata plan and form part of the unit title for the unit owner's exclusive rights.

Any Strata Title subdivision application must be accompanied by:

(a) A survey plan of the site and the building;

(b) A strata subdivision plan showing individual entitlements, common property (including common open space and visitor car parking) and any easements or other restrictions;

(c) A Statement of Environmental Effects which addresses the proposal's relationship with any previous development consents granted upon the site and consistency with relevant environmental planning instruments such as State Environmental Planning Policies (including SEPP 10 – Retention of Low Cost Rental Accommodation where relevant) and Wollongong LEP 2009, any State Codes and this DCP;

(d) A written 88B Instrument applying to any existing or proposed easements / restrictions (where relevant); and

(e) A copy of any previous Development Consents and Construction Certificates applying to the site, including any buildings upon the site.

4.3 Community Title Subdivision

Community Title subdivision is a form of subdivision which lies between conventional Torrens Title subdivision and Strata Title subdivision. Community Title enables common (shared) property to be created within an otherwise conventional subdivision.

Community title subdivision is primarily governed by the Community Land Development Act 1989 and Community Land Management Act 1989.

The Community Land Development Act 1989 permits community title subdivisions to be staged or non-staged developments. The main advantage of staging of larger Community Title subdivisions is that the initial development costs will be lower because the first stage(s) of the development can be used to finance the construction of later stages. It also enables the development of planned communities of any residential type where the use of some land is shared.

Council encourages urban consolidation / housing density initiatives involving Community Title subdivisions, particularly in areas within proximity to railway stations. In certain cases, Council may generally agree to the road carriageway widths for private roads servicing up to 12 dwellings within the subdivision being reduced in width, except where in the opinion of Council there is a potential adverse traffic management issue.

Management Structure

The Community Titles legislation allows for a multi-tiered management structure incorporating either two (2) or three (3) main levels or types of schemes, namely:

(a) Community;

(b) Precinct; and

(c) Neighbourhood.

The multi-tiered management structure applies only to Community Title schemes which are developed in stages. The multi-tiered management structure includes all three (3) levels in a scheme.

The Community Plan shows the development of the total area broken up into at least two (2) development lots plus common property.

The Precinct Plan is the subdivision of a development into at least two (2) precincts plus common property and is managed by a Precinct Association which comes under the control of the Community Association.

The Neighbourhood Plan is the further re-subdivision of a precinct within the Precinct Plan. Lots within the Neighbourhood Plan are managed by a Neighbourhood Association which comes under the control of both the Precinct Association and the broader Community Association.

It also allows a further level as a strata scheme integrated into the overall scheme.

In a proposed two tier management structure, the second tier of management is created by the registration of a neighbourhood plan subdividing a community development lot in a community plan into lots for separate use or disposition known as neighbourhood lots. The neighbourhood scheme is administered by a neighbourhood association which will automatically become a member of the community association.

The by-laws for each community scheme are set out in the Management Statement which is registered with the relevant plan of subdivision. Each community scheme is bound by the rules set out in its own Management Statement. The Management Statement is required to cover a range of matters including:

(a) The management, use and maintenance of community property such as roads and special facilities such as constructed wetlands, recreational facilities and open space areas;

(b) Waste and recycling storage and collection areas etc;

(c) Insurance of common property; and

(d) The proceedings of the Executive Committee.

The Development Contract is the construction agreement between the developer and the members of the scheme regarding the type and timing of facilities proposed to be constructed within the common property.

Any Development Application for a proposed Community Title subdivision must be accompanied by the following documents:

(a) A subdivision plan which shows the proposed individual lots and proposed “Association Property” lots (including any private roads, common open space, recreational facilities etc) as well as any necessary easements / restrictions;

(b) A draft Management Statement and a draft Development Contract which comply with the provisions of the Community Land Development Act 1989 and Community Land Management Act 1989;

Note: If development consent is ultimately granted to the Community Title subdivision, the final Management Statement and final Development Contract will be required to be lodged with the final plan of subdivision as part of the Subdivision Certificate application.

(a) A survey plan of the subject site;

(b) A written 88B Instrument for any necessary easements / restrictions; and

(c) A Statement of Environmental Effects which addresses the proposal’s relationship with relevant environmental planning instruments (including any relevant State Environmental Planning Policy, State Code, Wollongong Local Environmental Plan 2009 etc), any State Code and this DCP.

5 TOPOGRAPHY, LANDFORM CONSERVATION

Objectives

(a) Ensure the design of any proposed residential subdivision takes into account inherent site constraints and natural landform features.

(b) Ensure that the design of any proposed residential subdivision takes into account any significant trees or other vegetation upon the subject site, including any endangered ecological community or

threatened species.

Development Controls

1. The topography and landform of the site must be taken into consideration as part of the design of the subdivision layout, in order to optimise solar access opportunities and maximise views to key natural features.

2. The topography and landform of a locality are important place-making elements. Roads should be designed to respond to such features and work to minimise cut and fill. Roads must be constructed at the natural ground level of the site, wherever practical.

3. The subdivision lot layout should be designed to improve views to special features such as the escarpment backdrop, remnant stand of significant trees (ie Spotted Gum forest or stand of Norfolk Island pine trees) or the coastline.

4. Where the land slopes at a grade of 6% or greater, the predominant road alignment should be perpendicular to the contours of the site, wherever practicable.

5. The subdivision layout should be designed to minimise lots which are considerably higher or lower that the road level.

6. The road alignment should be straight or gently curved, wherever possible, to enable edges (eg street trees or building line setback frontages) to frame the vista.

6 SUBDIVISION DESIGN

Subdivision layouts are to incorporate adequate pedestrian, bicycle and vehicle links to the road network, public transport nodes, pedestrian/cyclist network, and public open space areas. The street and subdivision layout should minimise fuel use by reducing travel distances and maximising public transport effectiveness. Connectivity within neighbourhoods is essential to ensure the majority of dwellings are within 400 metres walking distance to bus stops.

1. The design of any residential subdivision must include a land suitability assessment, addressing the following issues where relevant:
   - Existing land use.
   - Flooding.
   - Bushfire.
   - Topography, geotechnical constraints, contamination constraints.
   - Biodiversity (Ecologically Endangered Communities, bushland, significant trees, habitat).
   - Known or likely heritage sites, including Indigenous heritage cultural issues.
   - Existing road network.
   - Street frontage and access.
   - Available utilities & services and existing easements.
   - Need for community and recreation facilities.
   - Visual character.
   - Noise impacts (e.g. from the main roads, industrial areas or public and private railways).
2. Subdivisions comprising 4 lots or more must demonstrate the following where applicable:
   - Proposed road layout and hierarchy.
   - Proposed public transport, bicycle and pedestrian routes.
   - Proposed drainage management concepts.
   - Proposed buffers to heritage items.

- Riparian corridors, buffers and proposed future use and ownership.
- Proposed Asset Protection Zone requirements.

3. New roads within subdivisions should:
   (a) Improve the landscape character of the locality;
   (b) Reduce the linearity of roads by segmentation;
   (c) Avoid continuous long straight lines (kerb lines) for local roads; and
   (d) Maximise the continuity between existing and new landscape areas.

4. Refer to Council's Subdivision Policy for general subdivision design and the construction requirements for roads, stormwater drainage, utility services etc.

6.1 Lot layout – Aspect and solar access

Objectives

(a) To ensure residential lots are well designed to take into account aspect, orientation, slope issues and optimal solar access.

(b) To provide residential lots which maximises solar access and energy efficiency opportunities for future dwellings and private open space areas.

Development Controls

1. Aspect is a major factor in designing the layout of a subdivision.
2. Roads running generally east – west are preferred since they provide for lots with a north-south axis which caters for optimum solar access to dwellings and private open space. Lots with a main north-south axis (20ºW to 30°E) provide the best flexibility for the siting of future dwellings and also reduce potential overshadowing problems.
3. Lots with a main east-west axis (ie roads running north-south) should be widened, in order to ensure satisfactory solar access opportunities into living rooms of future dwellings and rear private open space areas and to help prevent overshadowing of dwellings and private open space on adjoining lots.
4. Lots with a NW – SE or NE – SW axis are less favourable and may need to be specifically designed or larger than normal to allow for the siting of a dwelling which is not directly parallel to the boundaries.
5. Lots should be rectangular shaped rather than irregular shaped, wherever practicable, in order to maximise solar access opportunities. Lots on the southern side of any road should have a greater frontage to the road, to allow improved solar orientation for the future dwelling.
6. Wherever possible, an access way to a rear battle-axe lot should be located on the southern side of an allotment, in order to minimise any potential overshadowing of future adjoining dwellings.
7. Any subdivision proposal adjoining a rear lane shall be designed so as to provide both vehicular and pedestrian access to the front road.

6.2 Lot size

1. The minimum subdivision allotment size requirement for a particular parcel of land shall be in accordance with the provisions of Wollongong LEP 2009 and the accompany Lot Size Map, relevant to the land.
2. Irregular shaped lots shall have a minimum allotment size of 485m2.
3. Regular shaped corner lots shall have a minimum allotment size of 500m2 as per Table 1 below and as illustrated in Figure 1 below.
4. Regular shaped battle axe allotments within residential zones shall have a minimum allotment size of 550m2, excluding the battle axe access handle. Irregular shaped battle – axe lots shall have a minimum allotment size of 600m2 (excluding the access handle). Refer to Figure 1 and Table 1 below.

Table 1. Minimum allotment sizes

Allotment Type	Minimum Lot Size Requirement for Regular Shaped Lots	Minimum Lot Size Requirement for Irregular Shaped Lots
Standard Lot	Subject to Wollongong Local Environmental Plan 2009 (relevant Lot Size Map)	485m2
Corner Lot	500m2	NA
Battle-axe Lot (excluding access handle)	550m2	600m2

However, larger allotments may be required in certain circumstances such as lots containing steeply sloping land or land containing a watercourse or land fronting an arterial road.

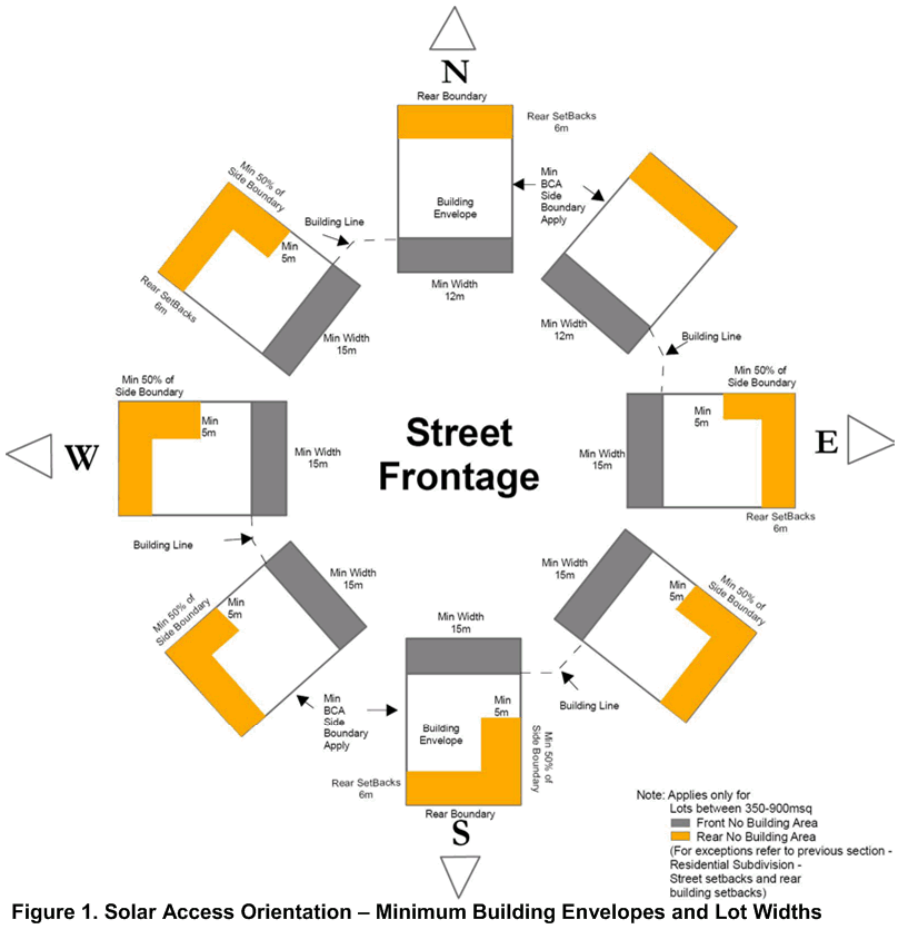


Figure 1. Solar Access Orientation – Minimum Building Envelopes and Lot Widths

6.3 Lot width and depth

Objectives

a) To ensure residential lots are designed to provide sufficient lot width and depth, to cater for a suitable range of dwelling styles having regard to any site constraints or environmental qualities of that land.

b) To ensure residential lots in low density residential areas provide sufficient site area to cater for detached dwelling-houses with sufficient rear private open space which gains appropriate sunlight access during mid-winter.

Development Controls

1) A minimum 12 metre lot width is required for residential allotments with N to NE rear boundary alignment.

2) Lots with a NW, W, SW, S, SE or E alignment should be 15 metres wide at the front building alignment, in order to ensure satisfactory solar access opportunities into living rooms of future dwellings and rear private open space areas and to help prevent overshadowing of dwellings and private open space on adjoining lots.

3) A minimum 15 metre lot width may be required where Council determines on-street parking is required.

4) The minimum depth for a residential allotment should be at least 25 metres.

6.4 Battle-axe lots

Objectives

(a) To encourage conventional residential subdivisions with direct public road access, rather than a series of battle axe allotments one behind each other, in order to maintain the residential amenity and character of the locality.

(b) To minimise the potential adverse streetscape and amenity impacts upon the locality arising from a number of battle axe lots sharing a common access corridors.

(c) To ensure each battle axe lot has a sufficient site area with a suitable building envelope to accommodate a range of different dwelling styles, in order to minimise any potential amenity or privacy impacts upon adjoining residential properties.

(d) To ensure each battle axe lot has a sufficient site area to provide satisfactory on-site parking with suitable vehicular access and maneuvering areas.

Development Controls

1. The minimum allotment size requirement for battle-axe lots shall be in accordance with the relevant LEP and accompanying Lot Size Map, excluding the site area required for the battle-axe lot access handle.

2. The minimum lot width for a battle-axe allotment shall be 15 metres as measured at the front building line (ie exclusive the access handle). The 15 metre minimum lot width requirement for battle axe lots is set at 6 metres from the end of the battle axe handle (ie within the main building portion of the site).

3. A maximum of two (2) battle-axe allotments will be permitted behind an allotment which has direct frontage to a dedicated public road in the proposed subdivision. This allows for inherent site constraints such as slope or topography which may otherwise prevent a conventional residential subdivision providing direct public road access to all lots. Under no circumstances will Council favourably consider any subdivision proposal involving a series of battle-axe lots, one behind each other.

4. All battle-axe allotments must have direct access to a dedicated public road, through the provision of an access handle attached to each battle-axe lot or via a shared access corridor (ie maximum of two (2) lots may share a common access corridor).

5. The minimum access corridor width for a battle axe allotment shall be 5 metres with a minimum road pavement width of 3 metres for the entire length of the access handle.

6. A 1 metre wide landscaping strip shall be provided along each side of the required 3 metre wide road pavement. The landscaping strip shall be planted with suitable small trees, shrubs and groundcovers.

7. A shared access corridor may be permitted for a maximum of two (2) battle axe allotments where, in the opinion of Council, the proposed access arrangement will satisfactorily cater for safe vehicular and pedestrian access to each of the lots and that satisfactory sight line distances are available between the subject lots and the public road.

8. Any access corridor shared between two (2) battle axe allotments must be created through reciprocal rights of carriageway under Section 88B of the Conveyancing Act 1919. The minimum shared access handle width shall be 5 metres with a minimum road pavement width of 3 metres for the entire length of the access handle. However, the shared access handle must be designed wide enough to satisfactorily cater for the placement of garbage and recycling bins (ie associated with the dwellings on the two battle axe lots) adjacent to the access handle road pavement

9. A minimum 1 metre wide landscaping strip must be provided along each side of the required 3 metre wide road pavement of any shared access handle. The landscaping strip shall be planted with suitable small trees, shrubs and groundcovers. A hard stand area on one side of the access handles for garbage and recycling bins (ie directly abutting the public road reserve). The opposite 1 metre wide landscaping strip in the shared access handle shall include letterboxes for the two lots (ie. directly abutting the public road reserve).

10. All battle-axe lot access corridors must be provided with all-weather road pavement. All access handle driveway crossings must be of a full concrete or asphalt construction and must be designed having regard to current fire regulations for fire hydrants. Driveways must be sited to allow for visibility of vehicles entering and leaving the site.

11. Driveway construction must give consideration to driveway drainage, utility servicing and retaining structures.

12. Within bush fire hazard areas, access to allotments shall be in accordance with the requirements of the NSW Rural Fire Service Planning for Bush Fire Protection 2006 guidelines. In the event of any inconsistency between the access requirements to lots between this part of the DCP and the Planning for Bush Fire Protection 2006 guidelines, the Planning and Bush Fire Protection guidelines.

13. Each battle axe access corridor must have capacity for vehicular turning facilities and two (2) on-site parking spaces must be provided for each battle axe lot.

14. Access corridors within bush fire prone areas must provide a suitable turning area, in order to enable the satisfactory maneuvering of fire fighting vehicles in accordance with the requirements of the NSW Rural Fire Service Planning for Bush Fire Protection 2006 guidelines will prevail.

15. The maximum gradient for any access way required for a battle axe lot subdivision should be 25%.

16. The gradients for access handles for allotments within bush fire prone areas shall be in accordance with the requirements of the NSW Rural Fire Service Planning for Bush Fire Protection 2006 guidelines.

17. Stormwater drainage on driveways must be contained in kerbs or a central dish and conveyed to the Council stormwater drainage system via the public road.

6.5 Building envelopes

Objectives

(a) To ensure each residential lot has a suitable building envelope to accommodate a range of different dwelling styles, in order to minimise any potential amenity or privacy impacts upon adjoining residential properties.

(b) To ensure the building envelope for each residential lot, takes into account all relevant constraints of the site and / or any easement or other restrictions pertaining to the land.

(c) To ensure the building envelope for each residential lot takes into account any area of the subject land which contains significant remnant trees or other significant vegetation (including riparian vegetation).

(d) To ensure building envelopes are appropriately positioned to maximise solar access opportunities and energy efficiency for future dwellings and rear private courtyards for each residential lot.

Development Controls

1. Council may require residential lots to provide a specific rectangular building envelope with minimum dimensions of 15 metres (depth) x 10 metres (width), where the subject site contains any inherent site constraint(s) (eg flooding, geotechnical constraints etc) or contains significant remnant vegetation, any threatened flora species, endangered ecological community etc. Any

such building envelope shall be exclusive of the required setback requirements for a dwelling - house as per Chapter B1: Residential Development.

2. A 15 metre (depth) x 10 metre (width) building envelope will be required for any proposed battle axe allotment upon land zoned R2 Low Density Residential, since the erection of a two storey .dwelling on a battle axe allotment is not permitted for land zoned Residential R2, under Chapter B1: Residential Development. Therefore, a building envelope is required to provide a sufficient building platform, to cater for a single storey dwelling.

3. Any proposed building envelope shall be shown on the required subdivision concept layout plan accompanying the Development Application. Additionally, any existing easements or other restrictions on the use of the land should be shown on the required subdivision layout plan.

Note: In the event that Council ultimately supports the proposed subdivision, a condition of consent may be imposed requiring the imposition of a restriction on the use of land pursuant to the provisions of Section 88B of the Conveyancing Act 1919 which shows the building envelope for each lot within the subdivision. This requirement may apply to certain subdivisions where sites are subject to inherent site constraints (eg geotechnical /slope instability issues etc) or contain significant vegetation, threatened flora or fauna, flood prone / riparian land or other constraints which may require the building envelope to be specifically identified on the lot(s).

6.6 Superlots in residential subdivisions for integrated housing or medium density housing

Objectives

(a) To ensure large residue lots or super lots for future dual occupancy or medium density housing are well planned and are strategically placed to reflect future traffic management conditions and other environmental conditions.

(b) To encourage large residue lots to be earmarked for medium density housing early in the residential subdivision process.

Development Controls

1. The configuration and lot size of residue or super lots shall be designed to meet the future planning requirements for either dual occupancy, multi dwelling development or residential apartment building developments contained in this DCP. Accordingly, the subdivision plan accompanying the Development Application shall indicate the intended future residential use of the residue lot.

2. In the event that the residue lots are not designed to comply with the future planning requirements for the intended future residential development, then a reduced dwelling yield may occur when the Development Application for the development of the residue lot is assessed.

3. Large residue lots should be located in strategically placed locations in subdivisions and generally not at the end of cul-de-sacs. However, in certain circumstances, the positioning of a residue lot at the end of a cul-de-sac may be supported where individual site circumstances such as traffic management and other environmental conditions, support this arrangement.

6.7 Existing easements

Objectives

(a) Guide the use land under electrical easement for appropriate urban purposes.

(b) Guide the use of land over gas easements for appropriate land uses.

Development Controls

1. A Development Application shall include the proposed use of all land under easement.

2. Water management can be carried out in electrical easements

3. Landscape planting (low rise) can be established in electrical easements while allowing for

necessary service access.

4. More significant planting can happen on the edge of electrical easements to create a visual buffer to electrical infrastructure

5. Recreational uses and open space can be established within easements.

6. Easements can be used for roads, pedestrian and bicycle routes subject to approval by the easement authority.

7. Consultation with TransGrid is required to ensure that buffers, road levels and access are adequate.

7 MAJOR RESIDENTIAL SUBDIVISIONS

A major subdivision is considered to be a subdivision of lots creating more than 15 lots and/or applies to an area greater than 3600m^2 and creating an increase to the number of dwellings in the site.

If the subdivision is within an urban release area the development may have additional staging and sequencing requirements relating to development Concept, Precinct Plan or Neighbourhood Plans (eg. DCP Chapter D16: West Dapto Urban Release Area).

Objectives

(a) To ensure the staging of a major residential subdivision is well planned and that all relevant roads, drainage and other infrastructure services are provided for each stage in the subdivision.

(b) To ensure the staging of the development minimises any potential adverse noise or amenity conflicts, arising from construction equipment and plant operating on later subdivision stages upon residents in early release stages.

Development Controls

1. In cases of a major residential subdivision, a staging plan will be required which shows the proposed staging program. Additionally, the Statement of Environmental Effects shall provide a detailed outline of the proposed staging program, including the proposed total number of lots within each relevant stage.

2. The subdivision staging should be designed to minimise conflicts arising from construction plant and equipment operating during the construction of later subdivision stages impacting upon the amenity of residents living in dwellings within the earlier subdivision stages. This may also require the provision of temporary access arrangements for heavy vehicles associated with the stages under construction separate from the first stage(s) of the subdivision. The provision of suitable landscaping treatment and / or acoustic walls may also be necessary to minimise potential privacy, amenity or noise impacts upon first stage residents.

3. In the event that the staging of the subdivision is approved, all necessary subdivision works (including road works, drainage works, water and sewerage infrastructure, telecommunications, electricity supplies etc) must be completed for each relevant stage, prior to the release of any Subdivision Certificate.

8 CUT AND FILL LAND RE-SHAPING WORKS

Objective

a) To ensure all finished residential lots are provided with a satisfactory fall towards the stormwater drainage system, in order to guarantee satisfactory stormwater run-off from each lot and to ameliorate against any potential water ponding impacts within the subdivision.

b) Ensure that the design of any proposed residential subdivision responds to the natural topography and landform features and minimizes as far as practicable and cut/fill and unnecessary re-shaping of the site.

Development Controls

1. All finished lots shall have a minimum 2% fall towards the proposed stormwater drainage system, in order to allow for suitable stormwater run-off from the site and to help minimise any potential

water ponding.

2. Excessive cut and fill and/or site re-shaping will not be supported.

9 PUBLIC RESERVES AND OPEN SPACE

Objectives

a) To ensure the provision and embellishment of public open space is consistent with Council's planned requirements, to meet the recreational needs of the community.

b) To provide public open space (ie both active and passive) within reasonable proximity for all residential lots within existing urban areas and new release areas.

c) To preserve remnant native bushland including endangered ecological communities within public open space buffers, where possible.

d) To limit the amount of land proposed to be dedicated to Council for public open space, to only lands zoned RE1 Public Recreation, under the relevant LEP or other lands previously identified by Council as being required for public open space.

e) To minimise costs of on-going maintenance of public open space.

Development Controls

1. The size and location requirements for public open space shall fall within a hierarchy of provisions in accordance with Council infrastructure planning and generally as indicated in Table 2. Exact location and the level of equipment or other embellishment required for the open space must be discussed with Council upfront, prior to the lodgment of the Development Application, where such open space is proposed to be dedicated to Council for a public reserve or other purposes.

Table 2. Size and Location Criteria for Public Open Space

Open space type	Minimum Area	Maximum walking catchment
Local open space	1-2 hectares	400-600 metres
Neighbourhood open space	2-4 hectares	2km via road or pedestrian/ bicycle networks
District open space	5-8 hectares	Ward based catchments (3 wards of Wollongong LGA)

Note: Whilst Council may have had preliminary discussions with an applicant upfront over the possible future dedication and embellishment of land for public reserve(s), there is no guarantee that the proposed subdivision will be ultimately approved until such time as the application is properly assessed and determined on its merits, based on the "Matters for Consideration" as listed under Section 79C of the Environmental Planning and Assessment Act 1979.

2. Council will not accept the dedication of land for the purposes of public reserve where in the opinion of Council, there is already sufficient public open space in the locality and / or the land is not zoned RE1 Public Recreation.

3. Any approved public reserve lot shall be fully embellished in accordance with Council's requirements, prior to the release of the Subdivision Certificate.

4. Private open space may be provided as community lots in a Community Title subdivision. Any small open space area in a Community Title subdivision should be at least 500m^2 - 1,000m^2 in area and should make provision for seating as well as provision for an integrated children's playground equipment.

5. Wherever possible, riparian corridors should form the 'spine' for public open space within a subdivision.

10 PEDESTRIAN AND BICYCLE NETWORKS

Objectives

(a) To ensure residential subdivisions provide safe and convenient pedestrian and bicycle linkages to facilities and services within the surrounding locality.

(b) To ensure the road network adequately caters for the safety of pedestrians, cyclists and motorists through the provision of adequate sight lines at critical locations such as intersections, driveway crossings, bus stops and crossing points.

(c) To ensure all pedestrian footpaths, and shared paths are designed in accordance with relevant Australian Standards and AUSTROADS.

(d) To ensure all pedestrian footpaths and shared paths are designed to incorporate Crime Prevention Through Environmental Design (CPTED) principles..

Development Controls

1. Any residential subdivision should identify the overall layout of dedicated pedestrian footpaths and shared paths within the subdivision. The constructed pedestrian footpath shall be a minimum width of 1.5 metres. For any shared path, a minimum 2.5 metre width is required and widened to 3 metres if the shared path is adjacent to any structure, or on a Minor Collector (Type 4) road.
2. Pedestrian and shared paths should be provided to link roads including cul-de-sacs and to directly access public transport routes/bus stops, public reserves, sporting / community facilities, schools, business precincts and adjacent residential subdivisions.
3. All pedestrian footpaths or shared paths should be designed in accordance with the requirements of relevant Australian Standards, AUSTROADS Guides and Council's Subdivision Policy as appropriate. All paths should be constructed of concrete, except where varied by Council.
4. Safe pedestrian crossings are to be created with the use of pedestrian refuges, slow points, kerb extensions or other appropriate measures, designed in accordance with relevant Australian Standards and AUSTROADS Guides.
5. All footpaths and shared paths are to be provided with appropriate lighting and designed to incorporate Crime Prevention Through Environmental Design (CPTED) principles by minimising any potential hiding places and maximising passive surveillance.
6. The full design details of any footpaths, shared paths, pedestrian crossings or any other associated infrastructure shall be clearly shown on the subdivision plans submitted with the Development Application.

(Note: "shared path" refers to a path that is shared by both pedestrians and cyclists)

11 ACOUSTIC ASSESSMENT

Objective

(a) Ensure appropriate acoustic measures are planned for and provided for subdivisions which are subject to potential adverse noise impacts, in order to provide a pleasant acoustic environment for all residential lots within the subdivision.

Development Controls

1. Council will refer to NSW Roads and Maritime Services (RMS) and Department of Planning to determine if an acoustic assessment is required as outlined in "Development near Rail Corridors and Busy Roads – Interim Guidelines" (Department of Planning).
2. When required, full details of the proposed acoustic mediation shall be submitted with the Development Application.

12 STREET TREE PLANTING

Objectives

(a) To provide suitable street trees within residential subdivisions, in order to improve the streetscape

character of the locality.

(b) To improve the general residential amenity of the subdivision.

(c) To ensure the planting of street trees in new subdivisions is appropriate and compatible with existing street tree planting within certain suburbs in the city.

Development Controls

1. The planting of street trees shall be integrated with driveway crossings, utility services, street lighting and shall be undertaken in accordance with the general requirements contained in the Chapter E6: Landscaping in this DCP.
2. Council may require the planting of a specific tree species for certain roads in a subdivision, especially if there is already an existing street tree scheme in the suburb. This requirement will be determined by Council as part of the assessment of the Development Application.

13 ENTRY STATEMENTS

Objectives

(a) Ensure entry statements are appropriately designed and constructed to enhance the streetscape character of the residential estate.

(b) Ensure all entry statements and supporting structures (including night lighting) are contained wholly within the private realm of the subdivision, rather than within any existing or proposed future public road reserve.

(c) Ensure all entry statements minimise any potential obstructions to motorists, pedestrians and cyclists and to prevent any potential adverse traffic visibility impact and / or visual distraction to motorists.

Development Controls

1. Entry statements mark and define the entry to a residential estate and are designed to enhance the streetscape character of the estate.
2. All entry statements (including associated special effects and night lighting) at the entry to residential subdivisions must be contained wholly within the private property and not within any land proposed to be dedicated as public road reserve.
3. The location and form of the entry statement must not unduly impede or restrict pedestrian, cyclist or public and private vehicular movement to or from the site. The siting and design of an entry statement must not reduce traffic visibility on adjacent roads and should not cause an unsafe visual distraction to vehicle drivers.
4. The entry statement should also be designed to incorporate Crime Prevention through Environmental Design (CPTED) principles by minimising any potential hiding places.
5. The full design details of the proposed entry statement(s) shall be shown on the required Landscape Plans to be submitted with the Development Application.

14 TRAFFIC FACILITIES

14.1 Road connectivity, permeability and legibility

Objectives

(a) To establish a legible and well connected road network that promotes safe pedestrian and bicycle movement as well as convenient vehicular access.

(b) To provide improved road, pedestrian and bicycle connections linking residential areas with public reserves, business centres, public services and facilities.

Development Controls

1. New subdivision roads should be designed to be integrated and connected with the existing local road network of the surrounding neighbourhood, wherever possible. In new subdivisions, cul-de-sacs should be minimised, wherever possible, in order to ensure connectivity within an estate.
2. Road design taking into account the surrounding local road network in the locality, especially the existing road hierarchy.
3. The subdivision design must achieve enhanced vehicular permeability and legibility in the location and layout of the road pattern.
4. The integration of new subdivision roads with existing roads will help to:
   (a) Improve interconnections and minimise travel distances to / from facilities and services;
   (b) Provide a choice of routes; and
   (c) Spread traffic loads throughout the local road network, rather than intensifying traffic volumes to a restricted number of roads.
5. Connected grid networks may also improve safety when dwellings are sited to address block edges, to enable passive surveillance.
6. The road network should provide internal connectivity to allow for a distributed traffic flow as well as encourage walking and cycling within the subdivision and wider area.
7. Pedestrian footways and shared paths should be safe and convenient to encourage alternative transport options to motor vehicles.
8. A larger subdivision involving 50 or more residential lots should be designed to minimise any excessive “backtracking”. Therefore, the creation of multiple cul-de-sacs and “no through” roads within a larger subdivision is discouraged.
9. Developments that include commercial /retail or business that will generate employment for more than 10 people should develop and submit a Workforce Travel Plan that demonstrate there will be facilities provided to encourage positive active transport and public transport outcomes.

14.2 Road hierarchy and design requirements

Objectives

(a) To provide a defined hierarchy of roads, in order to provide an acceptable level of access, safety and convenience for all road users.

(b) To ensure that the design features of each residential road within a subdivision reflects the role of the road within the overall road network.

(c) To provide an acceptable level of access, safety and convenience for all road users within existing urban areas and new release areas, whilst ensuring acceptable levels of amenity and minimising traffic management issues in the particular locality.

(d) To provide appropriate road access for larger and special purpose vehicles including garbage and recycling trucks, fire trucks, delivery trucks etc.

(e) Ensure sufficient road carriageway and verge widths are provided for each road type, in order to enable all roads to perform their designated function within the road network.

(f) Ensure that the road reserve adequately caters for all required functions including safe and efficient vehicular and pedestrian movement throughout the road network, provision of on-street parking and the provision of street tree planting and other landscaping, where appropriate.

(g) Ensure road verges are of sufficient width to physically accommodate all necessary infrastructure assets and utilities.

(h) Provide road geometry that is consistent with the designated function of the specific road as well as the physical characteristics of the locality.

(i) Ensure the road network is simple and safe for all road users, including motor vehicles, pedestrians and cyclists.

(j) Ensure that appropriate vehicle speed limits are incorporated into the road design to enhance the

safety of pedestrians and cyclists, the young and people with a disability.

(k) Ensure new release areas are designed to provide for safe, convenient and efficient bus routes.

Development Controls

1 The design of any road as part of a subdivision shall be in accordance with the following Table 3, Table 4 and Table 5, the Road Type Cross-Sections accompanying this section 14.2 and in accordance with Council's Subdivision Policy.

2 Roads should be designed to provide visual interest in the streetscape through kerbs (where appropriate), landscaping and paving treatments. The road design should be compatible with the existing road pattern in the locality.

3 The minimum spacing of staggered intersections in a local subdivision road network (generally Road Types 5 and above) should be 20 metres.

4 Street layout and curve radii must make provision for service vehicles to manoeuvre.

5 The provisions of the NSW Rural Fire Service publication "Planning for Bushfire Protection" and the State Government Publication "Fire Safety Guideline – Access for Emergency Vehicles and Emergency Service Personnel" must be met and will take precedence.

6 The maximum length of cul-de-sacs should not exceed 80 metres.

7 Painted centerline marking required where AADT exceeds 1,000vpd.

8 For all roads that permit direct driveway access, a minimum 15 metre lot width may be required at the street frontage, where Council determines that on-street parking is required.

9 Angled parking may be utilised adjacent to active open space and in town and village centres, particularly for lower volume roads, provided it does not unduly impact traffic flow or public transport services. Angled parking must comply with Australian Standards and will be assessed by Council as to its merits on a case-by-case basis.

Table 3. Road network environment

Street Types		Road Environment				
		Access (driveway)	Indicative Daily Traffic Volume (vpd)	Target Speed (km/h)	Street Pavement Type	Parking
Sub-Arterial Road	Type 1 *(entry road with WSUD median strip (4.2m) & bus services)*	No Access	20,000 - 40,000+	70	Asphalt	No
	Type 2 *(with bus services)*	No Access	15,000 - 20,000+	60	Asphalt	No
	Type 2A *(with parking & bus services)*	No Access	10,000 - 15,000	60	Asphalt	Yes
Major Collector Road	Type 3 *(with parking & bus services)*	No Access	3,000 - 15,000	60	Asphalt	Yes
Minor Collector Road	Type 4 *(with parking & limited bus access)*	Access	3,000 - 9,000	50	Asphalt	Yes
Town & Village Centre Road	Type TC	Limited Access	(varies)	40	Asphalt	Yes
Local Road	Type 5 *(with parking)*	Access	1,000 - 3,000	40	Asphalt	Yes
Access Street	Type 6 *(with residential on both sides, and parking)*	Access	300 - 1,000	25	Asphalt	Yes
Access Place	Type 7 *(with parking)*	Access	< 300	25	Asphalt	Yes
	Type 7A *(1-Way, adjacent open space on one side)*	Access	< 300	25	Asphalt	Yes
	Type 7B *(2-Way, adjacent open space on one side)*	Access	< 300	25	Asphalt	Yes
Laneway	Type 8 *(no parking)*	Access	< 150	10	Asphalt	No

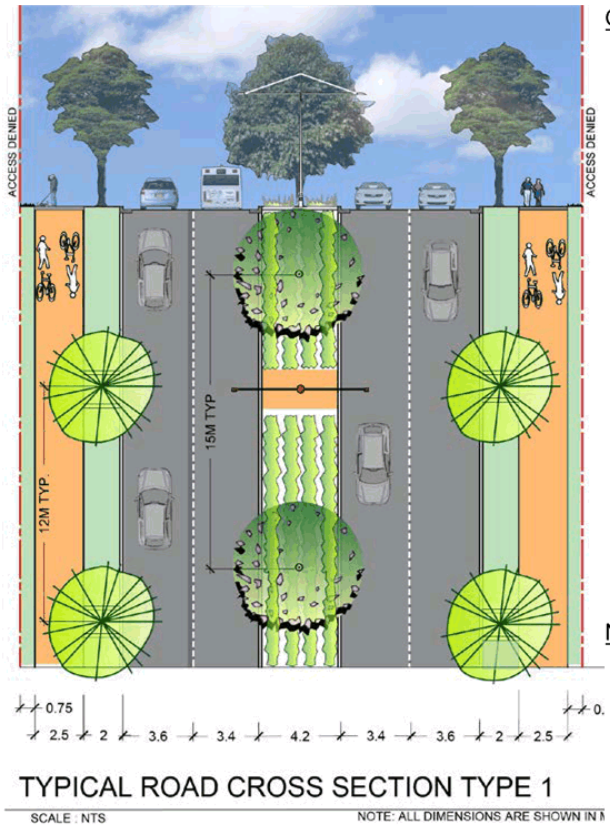
Table 4. Carriageways and verges

Street Types		Carriageway			Verge			
		Kerb Lane (m)	Centre Lane (m)	Total (m)	Verge (m)	Total Reserve (m)	Footpath (m)	Shared Path (m)
Sub-Arterial Road	Type 1 (entry road with WSUD median strip (4.2m) & bus services)	3.6	3.4	18.2	10.5 (5.25 each side)	28.7	n/a	5m (2.5m each side)
	Type 2 (with bus services)	3.5	3.2	13.4	9.5 (4.75 each side)	22.9	n/a	5m (2.5m each side)
	Type 2A (with parking & bus services)	3.5	3.2	13.4	9.5 (4.75 each side)	22.9	n/a	5m (2.5m each side)
Major Collector Road	Type 3 (with parking & bus services)	3.0	3.2	12.4	9.5 (4.75 each side)	21.9	n/a	5m (2.5m each side)
Minor Collector Road	Type 4 (with parking & limited bus access)	2.6	3.0	11.2	9.75m (5.25m one side, 4.5m other side)	20.95	1.5	3m
Town & Village Centre Road	Type TC	(varies)	(varies)	(varies)	9m (4.5m each side) or 9.75m (5.25m residential side, 4.5m centre side)	(varies)	4.5m full width commercial side	3m to be provided on one side if residential frontage
Local Road	Type 5 (with parking)	2.1	2.8	9.8	9m (4.5m each side)	18.8	3m (1.5m each side)	n/a
Access Street	Type 6 (with residential on both sides, and parking)	2.3	3.5	8.1	9m (4.5m each side)	17.1	3m (1.5m each side)	n/a
Access Place	Type 7 (with parking)	3.5	n/a	7.0	8m (4m each side)	15	n/a	n/a
	Type 7A (1-Way, adjacent open space on one side)	2 (parking lane) or 3.5 (travel lane)	n/a	5.5	5.5m (1.5m open space side, 4m other side)	11	n/a	n/a
	Type 7B (2-Way, adjacent open space on one side)	3.5	n/a	7.0	5.5m (1.5m open space side, 4m other side)	12.5	n/a	n/a
Laneway	Type 8 (no parking)	n/a	n/a	5.5	2m (1m each side to property boundary)	7.5	n/a	n/a

Table 5. Street vegetation

Street Types		Verge Trees	Street Tree Planting
Sub-Arterial Road	Type 1 *(entry road with WSUD median strip (4.2m) & bus services)*	1 every 12m	n/a
	Type 2 *(with bus services)*	1 every 12m	n/a
	Type 2A *(with parking & bus services)*	1 every 12m	1 every 30-60m via kerb bulges, small trees < 3m high
Major Collector Road	Type 3 *(with parking & bus services)*	1 every 12m	1 every 30-60m via kerb bulges, small trees < 3m high
Minor Collector Road	Type 4 *(with parking & limited bus access)*	1 per lot or every 15-20m	None – use kerb extensions at intersection
Town & Village Centre Road	Type TC	1 every 12m	Kerb extensions can be used mid-block (eg at pedestrian crossings) and intersections
Local Road	Type 5 *(with parking)*	1 per lot or every 15-20m	None – use kerb extensions at intersection
Access Street	Type 6 *(with residential on both sides, and parking)*	1 per lot or every 15-20m	None – use kerb extensions at intersection
Access Place	Type 7 *(with parking)*	1 per lot or every 15-20m	n/a
	Type 7A *(1-Way, adjacent open space on one side)*	1 per lot or every 15-20m	n/a
	Type 7B *(2-Way, adjacent open space on one side)*	1 per lot or every 15-20m	n/a
Laneway	Type 8 *(no parking)*	1 per lot depending on lane design	n/a

TYPE 1 – Major Sub-arterial road



TYPICAL ROAD CROSS SECTION TYPE 1

SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN IN M

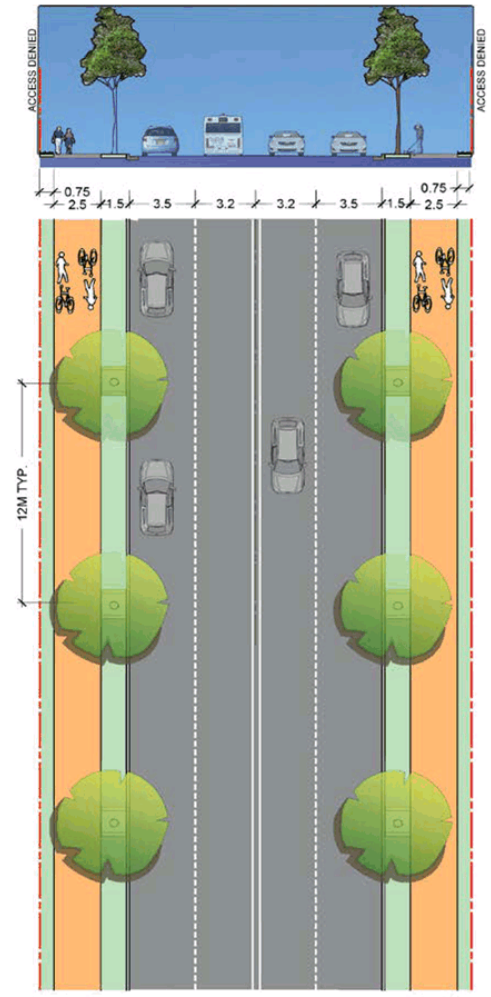
Objectives

1. Provide for high general traffic and heavy vehicle volumes with 4 travel lanes.
2. Provide connectivity between neighbourhoods and local centres/arterial road network.
3. Direct access is not permitted (access denied).
4. Provide for bus routes and bus stops (generally indented stops).
5. Design speed 80km/h, posted speed 70km/h.
6. Provide legible pedestrian and cycle network via shared paths on both sides of road.
7. Provide improved safety and amenity through provision of planted median.
8. Allows for development of right turn lanes at intersections via the central median provision.

Notes

1. The median will include low planting and incorporate WSUD where appropriate.
2. The road capacity is considered to generally cater for greater than 15,000vpd.
3. Lighting can be provided in the median as well as within the verge.
4. A kerbside verge width of 2m has been provided for an improved buffer for pedestrians/cyclists to higher speed road traffic.
5. Barrier kerb used for kerbside lanes.
6. Travel lanes wider than other road types reflective of higher speed limit and proportion of heavy vehicles.
7. Bus stops shall be via indented bus bays where practicable.
8. Intersections are to be controlled (signals, roundabouts) and provide appropriate pedestrian crossing facilities.
9. Priority controlled intersections will only be considered for left turns (eg Left-in/Left-out).
10. Controlled intersections (signals, roundabouts) are to be generally spaced a minimum of 400 metres apart.
11. Mid-block pedestrian crossings not permitted (eg refuges, marked crossings, kerb extensions etc).

TYPE 2 - Sub-arterial road with bus service



TYPICAL ROAD CROSS SECTION TYPE 2
SCALE : NTS
NOTE: ALL DIMENSIONS ARE SHOWN IN METRES

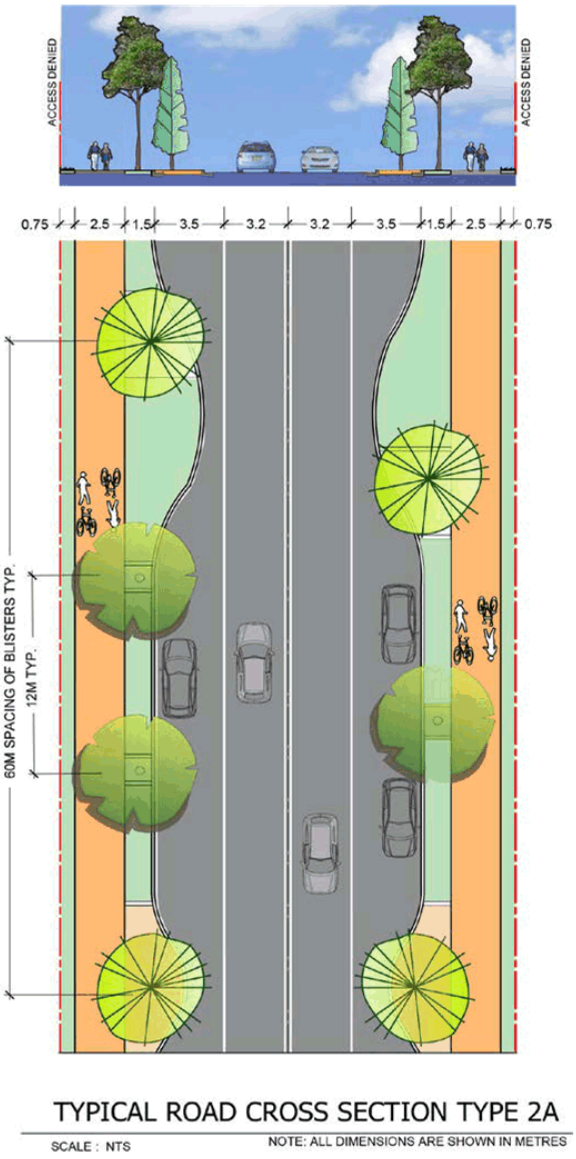
Objectives

1. Provide for high traffic volumes with 4 travel lanes.
2. Provide connectivity between neighbourhoods and local centres/higher order roads.
3. Direct access is not permitted (access denied).
4. Provide for bus routes and bus stops.
5. Design speed 70km/h, posted speed 60km/h.
6. Provide legible pedestrian and cycle network via shared paths on both sides of road.
7. All adjoining lots must provide an active frontage to the Type 2 road (can be direct frontage or via secondary parallel internal road).

Notes

1. The road capacity is considered to generally cater for greater than 15,000vpd.
2. Lighting can be provided within the verge.
3. A kerbside verge width of 1.5m has been provided to allow for space for trees.
4. Barrier kerb to be provided.
5. Bus stops shall be provided in the kerbside lane.
6. Intersections are to be controlled (signals, roundabouts) and provide appropriate pedestrian crossing facilities.
7. Priority controlled intersections will only be considered for left turns (eg Left-in/Left-out).
8. Controlled intersections (signals, roundabouts) are to be generally spaced a minimum of 400 metres apart.
9. Mid-block pedestrian crossings not permitted (eg refuges, marked crossings, kerb extensions etc).
10. Road reserve may need to be locally widened at intersections to allow for turn lane requirements.

TYPE 2A – Sub-arterial with bus service and parking



TYPICAL ROAD CROSS SECTION TYPE 2A

SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN IN METRES

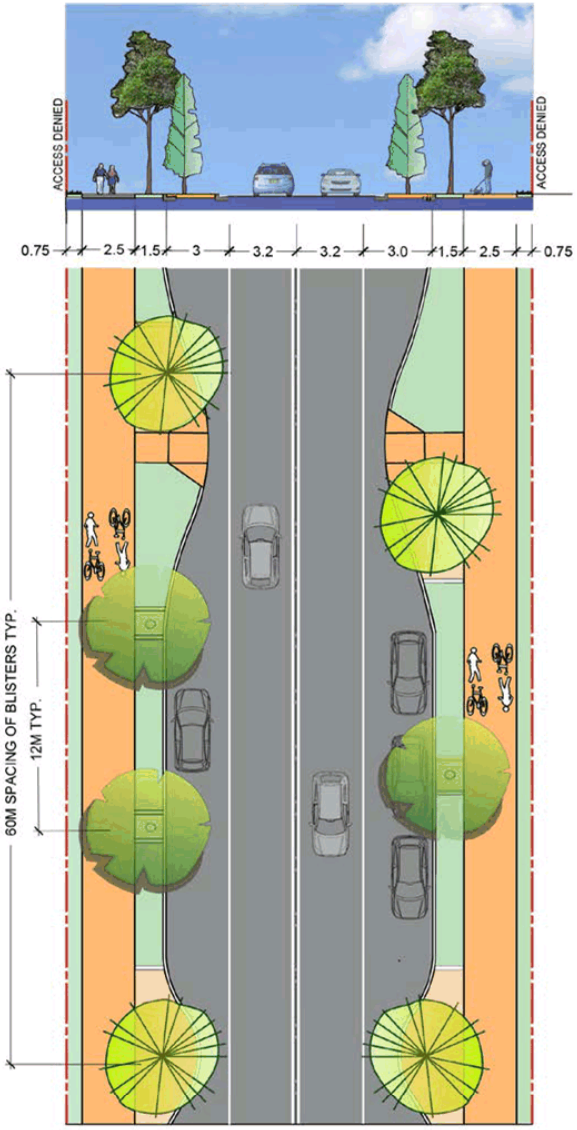
Objectives

1. Provide for moderate traffic volumes with 2 travel lanes and 2 parking lanes, with potential to provide 4-lane capacity when required.
2. Provide kerbside parking.
3. Allow for traffic calming and greening opportunity through provision of regular kerb extensions in parking lane.
4. Provide connectivity between neighbourhoods and local centres/higher order roads.
5. Direct access is not permitted (access denied).
6. Provide for bus routes and bus stops.
7. Design speed 70km/h, posted speed 60km/h.
8. Provide legible pedestrian and cycle network via shared paths on both sides of road.
9. All adjoining lots must provide an active frontage to the Type 2A road (can be direct frontage or via secondary parallel internal road).

Notes

1. The road capacity is considered to generally cater for 10,000 - 15,000vpd.
2. Lighting can be provided within the verge.
3. A kerbside verge width of 1.5m has been provided to allow for space for trees.
4. Barrier kerb to be provided.
5. Bus stops shall be provided in the kerbside (parking) lane.
6. Intersections are to be controlled (signals, roundabouts) and provide appropriate pedestrian crossing facilities.
7. Priority controlled intersections will only be considered for left turns (eg Left-in/Left-out).
8. Controlled intersections (signals, roundabouts) are to be generally spaced a minimum of 400 metres apart.
9. Mid-block pedestrian crossings generally not permitted (eg refuges, marked crossings, kerb extensions etc).
10. Road reserve may need to be locally widened at intersections to allow for turn lane requirements.

TYPE 3 - Major collector with bus service and parking



TYPICAL ROAD CROSS SECTION TYPE 3
SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN IN METRES

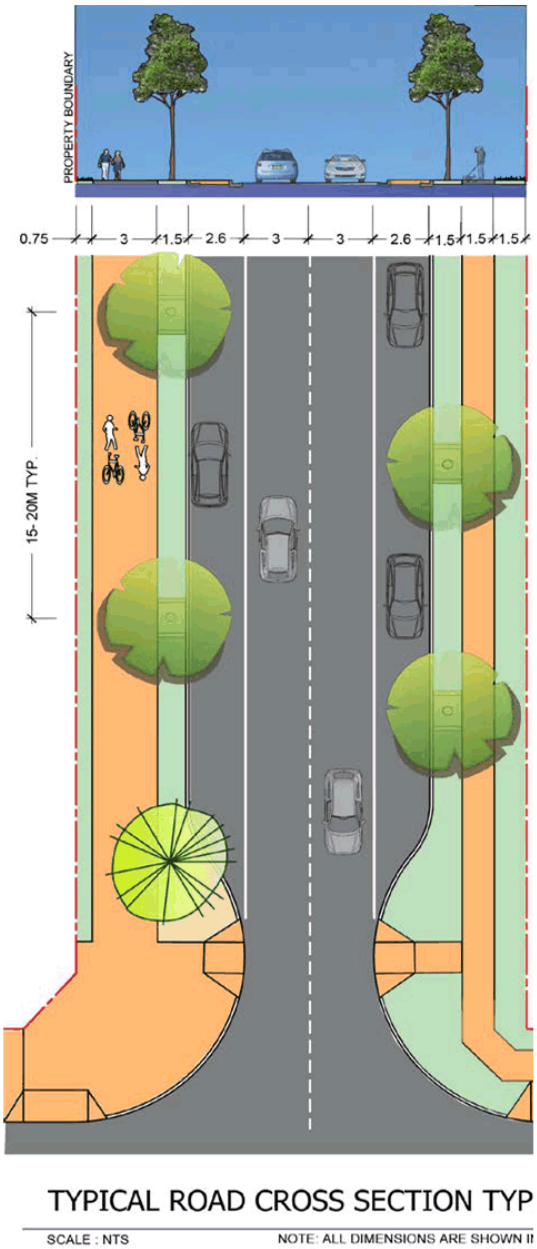
Objectives

1. Provide for moderate traffic volumes with 2 travel lanes and 2 parking lanes.
2. Provide kerbside parking.
3. Allow for traffic calming and greening opportunity through provision of regular kerb extensions in parking lane.
4. Provide connectivity between neighbourhoods and local centres/higher order roads.
5. Direct access is generally not permitted (access denied) but may be considered dependent on traffic demand.
6. Provide for bus routes and bus stops.
7. Design speed 70km/h, posted speed 60km/h.
8. Provide legible pedestrian and cycle network via shared paths on both sides of road.
9. All adjoining lots must provide an active frontage to the Type 3 road (can be direct frontage or via secondary parallel internal road).

Notes

1. The road capacity is considered to generally cater for 3,000 - 15,000vpd.
2. Lighting can be provided within the verge.
3. A kerbside verge width of 1.5m has been provided to allow for space for trees.
4. Barrier kerb to be provided.
5. Bus stops shall be provided in the kerbside (parking) lane.
6. Intersections are to be generally controlled (signals, roundabouts) and provide appropriate pedestrian crossing facilities.
7. Priority controlled intersections may be considered dependant on traffic demand.
8. Controlled intersections (signals, roundabouts) are to be generally spaced a minimum of 400 metres apart.
9. Mid-block pedestrian crossings may be considered based on traffic demand and location (eg refuges, marked crossings, kerb extensions etc).
10. Road reserve may need to be locally widened at intersections to allow for turn lane requirements.

Road Type 4 – Minor collector with parking and limited bus access



TYPICAL ROAD CROSS SECTION TYP

SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN I

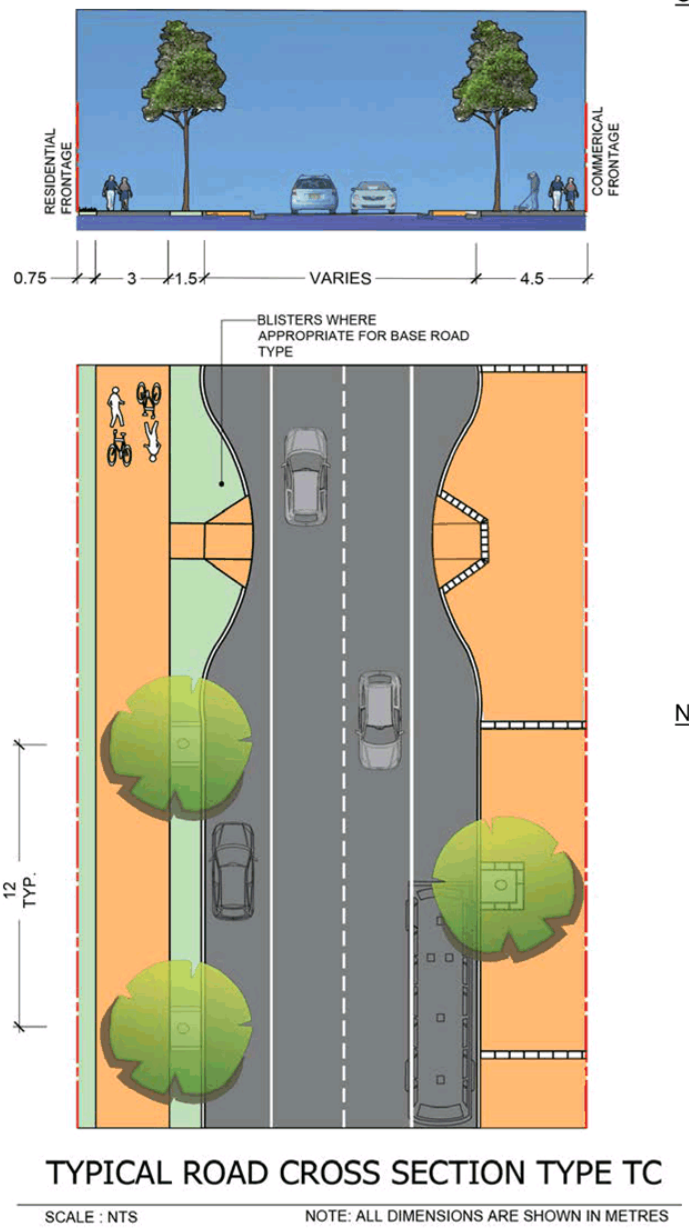
Objectives

1. Provide for low to moderate traffic volumes with 2 travel lanes and 2 parking lanes.
2. Provide kerbside parking.
3. Allow for traffic calming, greening opportunity and improved pedestrian safety through provision of kerb extensions at intersections.
4. Provide connectivity between and within neighbourhoods and to local centres/higher order roads.
5. Direct access is permitted.
6. Limited provision for bus route services in certain circumstances.
7. Design speed 60km/h, posted speed 50km/h.
8. Provide legible pedestrian and cycle network via shared path on one side and footpath on other.

Notes

1. The road capacity is considered to generally cater for 3,000 - 9,000vpd.
2. Lighting can be provided within the verge.
3. A kerbside verge width of 1.5m has been provided to allow for space for trees.
4. Barrier kerb to be provided.
5. Where a bus service exists, bus stops shall be provided in the kerbside (parking) lane.
6. Intersections with higher order roads to generally be controlled (signals, roundabouts) and provide appropriate pedestrian crossing facilities.
7. Priority controlled intersections may be considered where not intersecting the same or higher order road.
8. Road segment length shall be a maximum of 200m between intersections/bends.
9. Mid-block pedestrian crossings are generally acceptable (eg refuges, marked crossings, kerb extensions etc).
10. Verge trees are to be provided at one per lot, located to avoid impacts on utilities, driveways and drainage infrastructure.
11. Road reserve may need to be locally widened at intersections to allow for turn lane requirements.

Road Type TC – Town & Village Centre Road



TYPICAL ROAD CROSS SECTION TYPE TC

SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN IN METRES

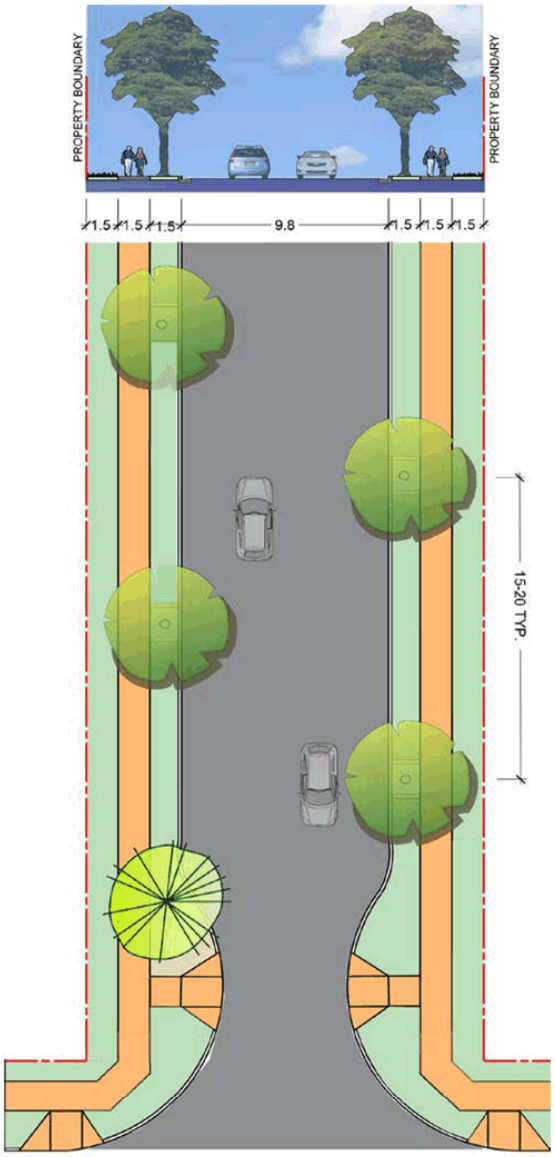
Objectives

1. Provide a variation on Road Types 2-4 specifically for town and village centre environments.
2. Provide for low to moderate traffic volumes.
3. Provide kerbside parking and bus stops.
4. Allow for traffic calming, greening opportunity and improved pedestrian safety through provision of kerb extensions mid-block &/or at intersections.
5. Provide connectivity to local centres/higher order roads.
6. Direct access may be considered on residential side (where relevant) depending on base road type and traffic demands.
7. Consolidation of access points to commercial development to maintain high level of pedestrian amenity and safety.
8. Allows for bus services.
9. Design speed generally 50km/h however road design should seek to encourage lower speeds in these high pedestrian activity areas.
10. Provide improved pedestrian/cyclist amenity through provision of full width sealed paths on commercial frontages and shared path on any residential frontage.

Notes

1. The road capacity varies depending on base road type.
2. Lighting can be provided within the verge (or median if provided).
3. A kerbside verge width of 1.5m has been provided to allow for space for trees on residential frontage.
4. Barrier kerb to be provided.
5. Verge trees to be provided within paved area on commercial frontage with tree grates.
6. Planter boxes, bus shelters and street furniture will be considered for paved verge adjacent commercial development.
7. Bus stops shall be provided in the kerbside (parking) lane.
8. Intersections with higher order roads to generally be controlled (signals, roundabouts) and provide appropriate pedestrian crossing facilities.
9. Priority controlled intersections can be considered depending on base road type and traffic demands.
10. Mid-block pedestrian crossings are generally acceptable (eg refuges, marked crossings, kerb extensions etc).
11. Median treatments can be considered however base road type lane widths must still be provided.
12. Road reserve may need to be locally widened at intersections to allow for turn lane requirements.

Road Type 5 – Local Road with parking



TYPICAL ROAD CROSS SECTION TYPE 5

SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN IN MET

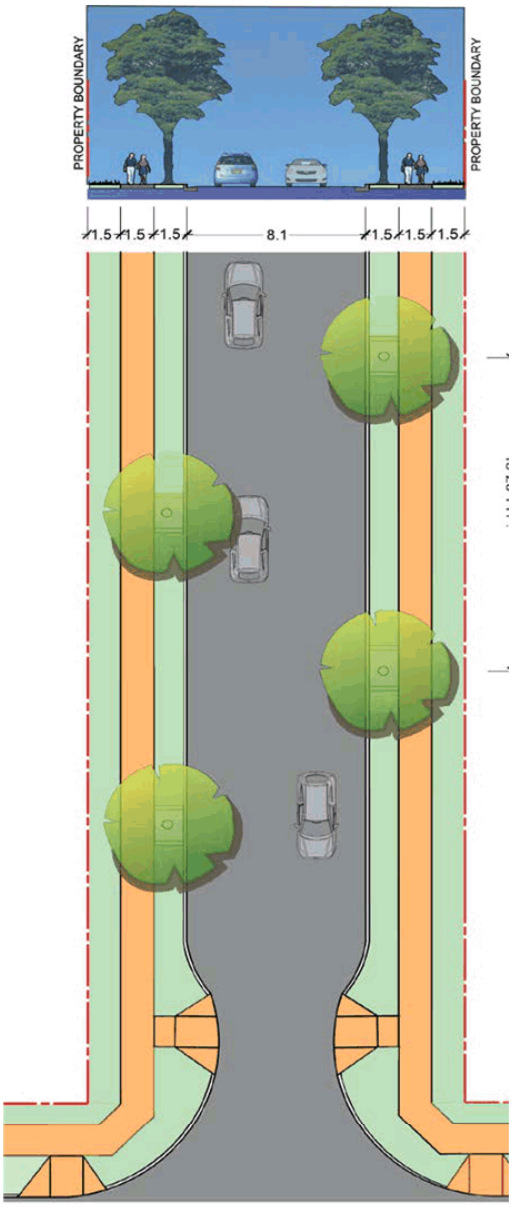
Objectives

1. Provide for low traffic volumes, access to properties and amenity in residential areas.
2. Provide kerbside parking.
3. Allow for traffic calming, greening opportunity and improved pedestrian safety through provision of kerb extensions at intersections.
4. Provide connectivity between and within neighbourhoods.
5. Direct access is permitted.
6. Not intended to cater for bus routes.
7. Design speed 60km/h, posted speed 50km/h.
8. Provide legible pedestrian access via footpaths on both sides of road.

Notes

1. The road capacity is considered to generally cater for less than 3,000vpd.
2. Lighting can be provided within the verge.
3. A kerbside verge width of 1.5m has been provided to allow for space for trees.
4. Road segment length shall be a maximum of 200m between intersections/bends.
5. Barrier kerb to be provided.
6. Intersections will generally be priority control however small roundabouts may be used for traffic calming (eg to break up long sections of road) &/or at 4-way intersections.
7. Traffic calming measures can be used to reduce the likelihood of through-traffic use (rat running).
8. Mid-block pedestrian crossings are generally acceptable (eg refuges, marked crossings, kerb extensions etc).
9. Verge trees are to be provided at one per lot, located to avoid impacts on utilities, driveways and drainage infrastructure.
10. Shared path is required (2.5m width) if the street forms part of a dedicated off-road cycle route (eg riparian shared path route).

Road Type 6 – Access Street



TYPICAL ROAD CROSS SECTION TYPI
SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN IN I

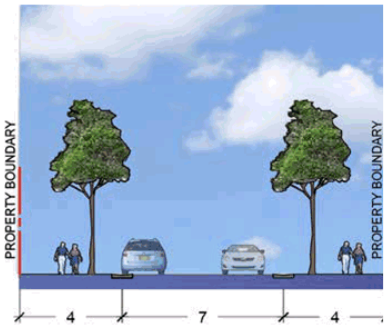
Objectives

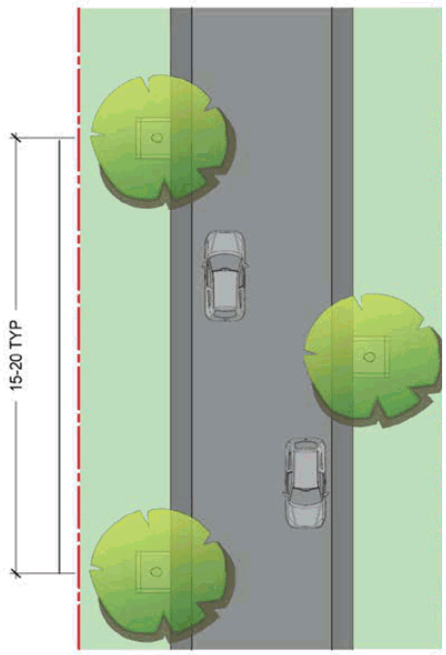
1. To provide access to properties and amenity in residential areas.
2. Allows for some casual on-street parking.
3. Allow for traffic calming, greening opportunity and improved pedestrian safety through provision of kerb extensions at intersections.
4. Provide connectivity within neighbourhoods/subdivisions.
5. Direct access is permitted.
6. Does not cater for buses.
7. Design speed 60km/h, posted speed 50km/h.
8. Provide legible pedestrian access via footpaths on both sides of road.

Notes

1. The road capacity is considered to generally cater for less than 1,000vpd.
2. Lighting can be provided within the verge.
3. A kerbside verge width of 1.5m has been provided to allow for space for trees.
4. Road segment length shall be a maximum of 200m between intersections/bends.
5. Barrier kerb to be provided.
6. Intersections will generally be priority control.
7. Verge trees are to be provided at one per lot, located to avoid impacts on utilities, driveways and drainage infrastructure.
8. Shared path is required (2.5m width) if the street forms part of a dedicated off-road cycle route (eg riparian shared path route).

Road Type 7 – Access Place





TYPICAL ROAD CROSS SECTION TYPE 7
SCALE : NTS
NOTE: ALL DIMENSION ARE SHOWN IN METRE

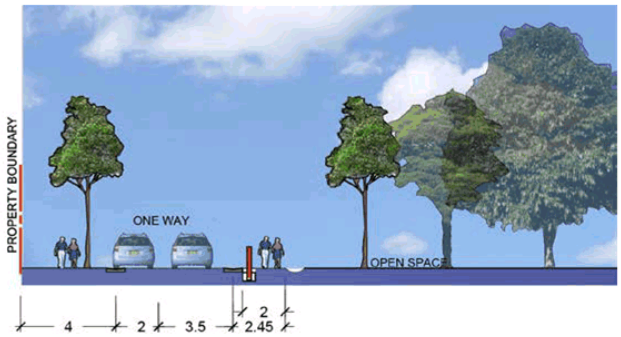
Objectives

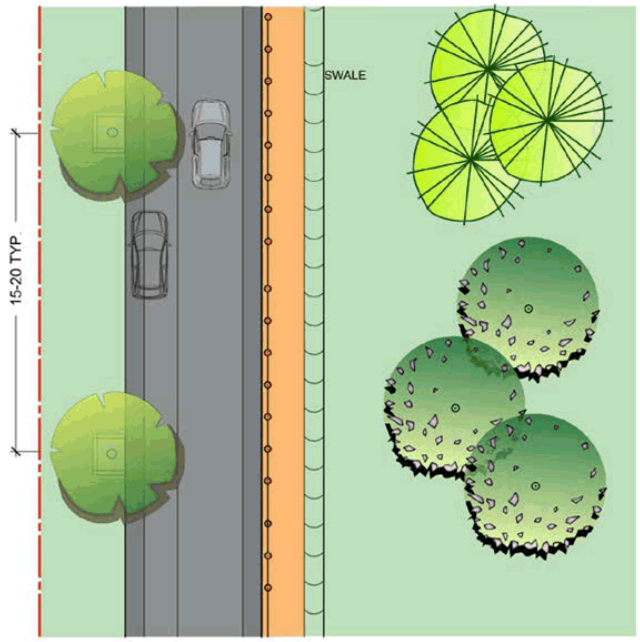
1. Provide for access to small sections of properties & high pedestrian/cyclist amenity in residential areas – no through traffic.
2. Allows for some casual on-street parking.
3. Direct access is permitted.
4. Does not cater for buses.
5. Urban default speed limit of 50km/h applies, however lower speeds maintained through geometry/design.

Notes

1. The road capacity is considered to generally cater for up to 300vpd (ie approx. 30 properties).
2. Lot layout shall be designed to ensure staggered on-street parking in order to present a clear travel lane with passing opportunities.
3. Provides dish drains rather than barrier kerb to increase pedestrian amenity.
4. Road segment length shall be a maximum of 100 metres.
5. Lighting can be provided within the verge.
6. Verge trees are to be provided at one per lot, located to avoid impacts on utilities, driveways and drainage infrastructure.
7. This road type does not provide kerb and gutter for builders to connect stormwater into. The applicant will need to provide a piped stormwater connection point within each lot (eg stub, or pit) draining to the receiving stormwater system.
8. The final method of stormwater collection (ie dish drain, swale, etc) is subject to Council approval.
9. Concrete footpath (1.5m width) is required if the street forms part of a dedicated pedestrian route.
10. Shared path is required (2.5m width) if the street forms part of a dedicated off-road cycle route (eg riparian shared path route).

Road Type 7A – Access Place adjacent to open space (one-way traffic)





TYPICAL ROAD CROSS SECTION TYPE 7A

SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN IN METRES

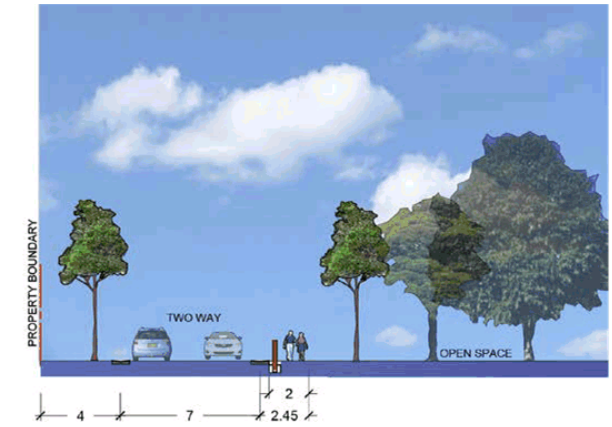
Objectives

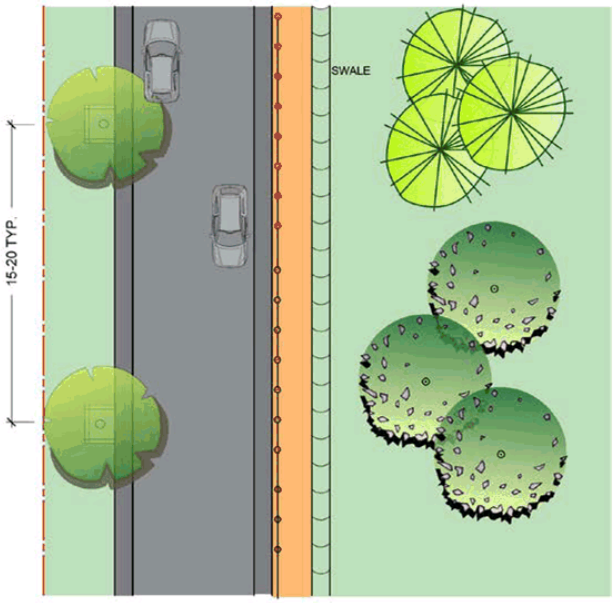
1. Provide for access to small sections of properties & high pedestrian/cyclist amenity in residential areas – no through traffic.
2. Provide for informal access to open space, whilst not generating any more than 300vpd.
3. Allows for some casual on-street parking.
4. Direct access is permitted.
5. Does not cater for buses.
6. Urban default speed limit of 50km/h applies, however lower speeds maintained through geometry/design.

Notes

1. This road is one-way and only permitted adjacent to open space and excludes sporting fields.
2. The road capacity is considered to generally cater for up to 300vpd (ie up to approx. 30 properties) and must include any anticipated traffic from open space component.
3. Provides dish drains rather than barrier kerb to increase pedestrian amenity.
4. Road segment length shall be a maximum of 100 metres.
5. Lighting can be provided within the verge.
6. Verge trees are to be provided at one per lot, located to avoid impacts on utilities, driveways and drainage infrastructure.
7. This road type does not provide kerb and gutter for builders to connect stormwater into. The applicant will need to provide a piped stormwater connection point within each lot (eg stub, or pit) draining to the receiving stormwater system.
8. The final method of stormwater collection (ie dish drain, swale, etc) is subject to Council approval.
9. Verge tree planting on open space side is not required – these requirements will be dealt with separately to the road section.
10. Shared path is required (2.5m width) if the street forms part of a dedicated off-road cycle route (eg riparian shared path route).

Road Type 7B – Access Place adjacent to open space (two-way traffic)





TYPICAL ROAD CROSS SECTION TYPE 7B

SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN IN METRES

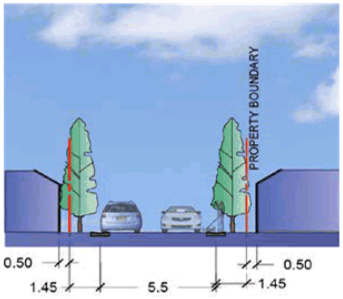
Objectives

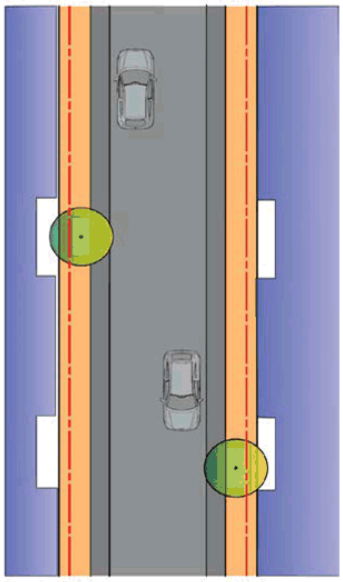
1. Provide for access to small sections of properties & high pedestrian/cyclist amenity in residential areas – no through traffic.
2. Provide for informal access to open space with improved parking opportunity, whilst not generating any more than 300vpd.
3. Allows for some casual on-street parking.
4. Direct access is permitted.
5. Does not cater for buses.
6. Urban default speed limit of 50km/h applies, however lower speeds maintained through geometry/design.

Notes

1. This road is two-way and only permitted adjacent to open space and excludes sporting fields.
2. The road capacity is considered to generally cater for up to 300vpd (ie up to approx. 30 properties) and must include any anticipated traffic from open space component.
3. Road segment length shall be a maximum of 100 metres.
4. Provides dish drains rather than barrier kerb to increase pedestrian amenity.
5. Lighting can be provided within the verge.
6. Verge trees are to be provided at one per lot, located to avoid impacts on utilities, driveways and drainage infrastructure.
7. This road type does not provide kerb and gutter for builders to connect stormwater into. The applicant will need to provide a piped stormwater connection point within each lot (eg stub, or pit) draining to the receiving stormwater system.
8. The final method of stormwater collection (ie dish drain, swale, etc) is subject to Council approval.
9. Verge tree planting on open space side is not required – these requirements will be dealt with separately to the road section.
10. Shared path is required (2.5m width) if the street forms part of a dedicated off-road cycle route (eg riparian shared path route).

Road Type 8 – Laneway





TYPICAL ROAD CROSS SECTION TYPE 8

SCALE : NTS NOTE: ALL DIMENSIONS ARE SHOWN IN METRES

Objectives

1. Provide vehicular access to the rear or side of lots where front access is restricted or not possible.
2. To maximise on-street parking and landscaping in residential street frontages.
3. Provide housing density, diversity and affordable housing options.
4. Reduce vehicular conflict through reduced driveway cross overs on the main road frontage.
5. To create a slow speed zone that is distinctly different in character and materials to residential streets.
6. Urban default speed limit of 50km/h applies, however lower speeds maintained through geometry/design.
7. Does not cater for buses.
8. Verge design allows space for pedestrians, garbage bins, planting and lighting, whilst not encouraging casual parking, storage of boats/trailers etc.
9. All lots adjoining a laneway are to utilise the laneway for vehicular/garage access.

Notes

1. The lane capacity is considered to generally cater for up to 300vpd (ie up to approx. 30 properties).
2. “C” shaped laneways are to be avoided as they do not provide good sightlines for passive surveillance.
3. Lighting can be provided within the verge.
4. No raised kerb is to be provided in laneways to increase pedestrian amenity.
5. Verge trees of appropriate species are to be provided within the verge area (tree grates may be utilised).
6. This road type does not provide kerb and gutter for builders to connect stormwater into. The applicant will need to provide a piped stormwater connection point within each lot (eg stub, or pit) draining to the receiving stormwater system.
7. Any bends or intersections in the laneway must be designed to permit garbage truck movements.
8. Passive surveillance along the laneway from upper storey rooms or balconies of secondary dwellings, studios, lofts over garages &/or principle dwelling is encouraged.
9. No more than 25% of the lots adjoining lanes (excluding corner lots) are to have secondary dwellings or strata studios.
10. The intersection of laneways with other roads should not be designed as a typical street intersection with kerb returns, but instead as a driveway entrance (ie vehicle crossover). Any footpath or shared path along the main road frontage is to be continued across the laneway intersection.

14.3 Road and drainage construction

Objective

(a) To ensure all residential lots have suitable, safe and efficient access to and from public roads and that all road and stormwater drainage infrastructure works are properly constructed.

Development Controls

1. All allotments in a subdivision must gain direct access to / from a properly formed public road.
2. The full cost of the construction of new roads (including the construction of the road carriageway, footpaths and / or shared paths, full kerb and gutter, street tree planting etc), stormwater drainage and the provision of infrastructure services to a subdivision will be borne by the subdivider / developer.
3. The required road, stormwater drainage and infrastructure works shall be constructed in accordance with Council's Subdivision Policy and any necessary requirements by the infrastructure service authority. The roadworks, drainage works and infrastructure services shall be completed, prior to the issuing of a Subdivision Certificate. For approved staged subdivisions, all required road, drainage and infrastructure works must be completed for each stage prior to the issue of the Subdivision Certificate for each respective stage.

14.4 Upgrading poorly constructed or unformed roads

Objective

(a) To ensure all residential lots have suitable, safe and efficient access to and from public roads and that all road and stormwater drainage infrastructure works are properly constructed.

Development Controls

1. All allotments in a subdivision must gain direct access to / from a properly formed public road.
2. In areas where the subdivision fronts a poorly constructed or unformed public road, the subdivision will be subject to the construction of full kerb and gutter, stormwater drainage, full or half road construction and sealing in addition to the provision of nature strips with a 3% cross fall to the roadway. The final decision as to the level of construction required will be at the discretion of Council.

14.5 Half-road construction

Objective

(a) To ensure half road construction is undertaken to effectively and safely meet the needs of road users both in the interim (half road) and final (full road) scenario.

Development Controls

1. Where a subdivision fronts an existing road and requires a road upgrade, it is the developer's responsibility to design and construct the half-road with the associated pedestrian / shared path facilities, adjacent to the subject property. The road and path widths are determined by the road type.
2. Roads with an existing frontage that require half-road construction require a minimum 3m existing travelling lane from the new crown of the road.
3. The construction of the half road requires overlapping of longitudinal joints and may require additional pavement construction of an existing road.

14.6 Bus Routes and public transport

Objectives

(a) Encourage bus services to link existing urban areas (especially business centres) with new residential subdivisions within new release areas.

(b) Ensure residential subdivisions within new release areas are designed to ensure safe, convenient and efficient bus routes within reasonable walking distance to the majority of residential lots in a subdivision.

(c) Provide safe and convenient bus stops along the planned bus route.

Development Controls

1. Large residential subdivisions should be designed to make provision for a bus service to link existing urban areas with the new residential subdivisions. The bus route should be designed to provide adequate servicing by bus companies. Therefore, consultation should take place with the local bus companies and Transport for NSW to determine whether a bus service can be provided within or connecting to the new residential subdivision.
2. The design of roads and infrastructure to support bus servicing should be in accordance with relevant Australian Standards, AUSTROADS guidelines and *'Guidelines for Public Transport Capable Infrastructure in Greenfield Sites'* (Transport for NSW).
3. The bus route should be generally designed along collector roads and linked up to sub-arterial or arterial roads, due to the requirement for wider road carriageways.
4. Bus stops should be generally located within 400 metres walking distance for 90% of the lots in the immediate locality.
5. Bus stop locations should be located to maximize active transport accessibility via footpath and shared path networks.
6. Any proposed roundabout on a bus route must be designed to satisfactorily accommodate bus maneuvering through and around the roundabout.
7. Bus shelters are to be provided at all bus stops. Bus shelters are to be located in positions that will service the maximum number of dwellings. The approved bus shelters are to be installed during the subdivision construction stage by the property developer involved in the subdivision.
8. Bus stops should be easily accessible for all people (including people with a disability), well defined and within casual observation from nearby dwellings, whilst minimising any interference with the streetscape amenity of the locality. All pedestrian pathways leading to and from bus stops should be designed to have a maximum gradient of 1 in 14 and be in compliance with relevant AUSTROADS guidelines and Australian Standards.
9. Safe pedestrian crossing points should be provided at each bus stop on local roads by the introduction of kerb extensions and refuges and in accordance with the requirements of Council. For collector/arterial roads safe pedestrian crossing should be provided by locating stops near controlled crossing points (traffic signals, roundabouts).

14.7 Cul-de-sacs and turning heads

Objectives

(a) Restrict the length of cul-de-sacs within a residential subdivision to improve accessibility to public transport facilities such as bus stops and provide more direct vehicular access arrangements for emergency vehicles.

(b) Ensure cul-de-sacs and turning heads are designed to provide safe and efficient vehicular access for cars, waste collection and recycling trucks, removalist trucks, emergency vehicles etc.

(c) Ensure all new residential lots are capable of being either accessed or serviced by emergency vehicles and other non-passenger vehicles such as waste and recycling collection trucks and removalist trucks, without adversely affecting the performance or safety of the surrounding road network.

(d) Restrict "T" or "Y" turning heads to smaller cul-de-sacs which serve a limited number of residential lots within a subdivision.

Development Controls

1. The maximum length of any cul-de-sac should be 80 metres, in order to ensure adequate accessibility to public transport facilities such as bus stops as well as suitable access arrangements for emergency service vehicles and waste disposal vehicles.
2. The minimum kerb radius for the turning head of any small residential cul-de-sac (ie serving a maximum 30 dwellings / allotments) shall be 10.5 metres.
3. "T" or "Y" turning heads will only be permitted within small cul-de-sacs / access roads which serve up to a maximum of 10 lots / dwellings. In most cases, a "Y" turning head configuration is preferred, in order to discourage potential parking in the turning space. Turning heads must provide sufficient space for larger vehicles such as waste, emergency services and recycling collection trucks to make a three point turn.
4. Where a "T" or "Y" turning head is proposed, a suitable waste and recycling bin storage area(s) must be carefully positioned on the left hand side (forward direction of the truck). The bin storage area(s) must not be located any closer than 5 metres from the forward end and 8 metres from the reverse end of the "T" or "Y" turning head. This is to ensure that waste and recycling collection trucks are able to satisfactorily service the bin storage areas.

14.8 Roundabouts and road junctions

Objective

(a) Ensure all roundabouts and road junctions are safe, designed in accordance with traffic engineering best practice and appropriately spaced to help define residential areas.

Development Controls

1. Roundabouts and other road junctions are to be designed in accordance with the requirements of the relevant AUSTROADS and RMS guidelines and Australian Standards. Roundabouts must also be designed to provide for safe passage of pedestrians and cyclists.
2. The design and construction of a roundabout upon an existing or proposed public road will be subject to the separate approval of Council's Infrastructure Division. As part of this consideration, Council's Infrastructure Division will also consider the whole of life assets cost of the roundabout and determine whether landscaping or hard finishings to the centre island of the roundabout is required.
3. The minimum distance between an access road and a collector road shall be 60 metres where the junction is on the same side of the road or 40 metres where the junction is located on the opposite side of the road.
4. The minimum distance between collector roads shall be 120 metres if the junction is on the same side or 100 metres where the junction is staggered on the opposite side of the road.
5. All intersections are to be T-junctions or roundabouts (ie subject to Council's agreement as to the location and design of any proposed roundabout).

14.9 Traffic control measures

Objectives

(a) Provide appropriate traffic calming devices, in order to improve traffic management flow within large residential subdivisions.

(b) Provide appropriate traffic control devices and signs within residential subdivisions, in order to ensure traffic safety.

Development Controls

1. Traffic calming devices such as thresholds, slow points, speed humps, chicanes and splitter islands are to be designed in accordance with the requirements of relevant AUSTROADS and RMS guidelines and Australian Standards.. Any proposed traffic calming devices will require the approval by Council's Local Traffic Committee.
2. Traffic control signs, pavement markings and guideposts are to be provided for roads,

intersections, pedestrian / cycle paths in accordance with the relevant AUSTROADS and RMS guidelines and Australian Standards.

Location of Traffic Calming Devices

1. The location of traffic calming devices must be consistent with the streetscape requirements of the locality and must also be based upon the location of existing and / or proposed street lighting, drainage pits, driveway crossings, on-street car parking requirements and the location of utility services.

Traffic Calming Devices – Design Vehicles

1. Any proposed traffic calming device must be designed to enable emergency vehicles and garbage trucks to reach all properties from the road.

2. Traffic calming devices upon local roads with a feeding function between arterial or sub-arterial roads and access streets are to be designed in accordance with a 14.5 metre long rigid truck / bus as per AUSTROADS Guide to Traffic Engineering Practice (Drawing No.SD037).

3. Raised platform threshold treatments are not permitted where such treatments may be used as pedestrian crossings by pedestrians.

Design Speed Controls

1. A reduction in vehicular speed can be achieved by creating a visual environment conducive to lower speeds through using landscaping treatments and other traffic calming devices to segment streets into relatively short road lengths (ie generally less than 300 metres long).

2. Speed reduction can also be achieved through using traffic calming devices which shift vehicle travel paths laterally (eg slow points, roundabouts, corner treatments) or vertically through humps, platform intersections etc).

Sight Distance Requirements

1. Any proposed traffic calming device must be designed to cater for critical sight distances for the design operating speed of the subject road.

2. Speed control devices (such as narrowed threshold treatments) should be located in close proximity to existing or proposed street lighting. Any such traffic calming measures must incorporate appropriate reflective treatments to delineate the vehicular travel path.

Streetscape Requirements for Traffic Calming Devices

1. The main streetscape issues to be taken into account in the design of traffic calming devices include the following:

   (a) Improve the landscape character of the locality;

   (b) Reduce the linearity of roads by segmentation;

   (c) Avoid continuous long straight lines (kerb lines) for local roads; and

   (d) Maximise the continuity between existing and new landscape areas.

14.10 Splay corners

Objective

(a) Provide appropriate splay corners at intersections within residential subdivisions, to ensure adequate sight line distances.

Development Controls

1. All intersections in a subdivision shall be provided with a minimum 4.25 metre splay or as required

by Council's Infrastructure Division.

14.11 Street lighting and fire hydrants

Objectives

(a) Provide effective street lighting along all roads within the subdivision, to maximise vehicular and pedestrian safety.

(b) Provide appropriate street lighting at key intersections and pedestrian crossings as well as traffic calming device locations to maximise vehicular and pedestrian safety.

(c) Provide appropriate lighting along all pedestrian pathways and / or shared pathways / cycle ways, in order to maximise pedestrian and cyclist safety.

(d) Provide fire hydrants within close proximity to all residential lots in a subdivision in accordance with the relevant Australian Standard and the requirements of Sydney Water Corporation and Fire and Rescue NSW.

Development Controls

1. Electric street lighting systems are to be provided for roads and intersections as well as pedestrian crossing and traffic calming device locations in accordance with AS / NZS 1158 Road Lighting as indicated in the following Table 3.

2. All allotments created must be within 60 metres to a fire hydrant in accordance with Australian Standard AS 2419. The proposed location of fire hydrants shall be shown on the subdivision plan.

Table 3: Road type - street lighting requirements

Road Type	Street Lighting Category (AS 1158)
Arterial Roads	V4
Collector Road (>7000 vehicles / day)	P3
Collector Road (<7000 vehicles / day)	P4
Access Road in Business Areas	P3
Access Road	P4
Laneway	P5
Public Pathways & Cycleways	P4
Car parks	P11
Traffic Calming Device (including roundabout)	Horizontal illuminance min. of 3.5 lux
Pedestrian Refuge	Horizontal illuminance min. of 3.5 lux

Note: Category of illumination is defined in AS 1158 Part 1.1 and Part 3.1. All lighting designs are to be prepared in accordance with AS / NZS 1158 for the above specified categories.

14.12 Restricted access to arterial or sub-arterial roads

Objectives

(a) Restrict access to any arterial or sub-arterial road to maintain satisfactory traffic flows and safety along such roads, where alternative public road access is available and practicable.

(b) When deemed necessary, create legal restrictions prohibiting direct access to designated roads (Arterial or Sub-Arterial Roads).

(c) Create temporary access agreements for designated roads (Arterial or Sub-Arterial Roads).

Development Controls

1. Direct access to any arterial or sub-arterial road will not be permitted where alternate public road access is available. However, direct property access to / from an arterial or sub-arterial road will not be restricted until such time as alternate public road access is available.
2. Council may require as a condition of consent as part of any subdivision or development that a suitable restriction on the use of land be created pursuant to the provisions of Section 88B of the Conveyancing Act 1919, in order to legally prohibit direct access to / from any adjoining Arterial or Sub-Arterial Road where alternative direct public road access is available to / from the subject site.
3. Temporary access may be granted to a designated road (arterial or sub-arterial road) where alternate public access has not yet been completed. However, this temporary access arrangement will be dependent upon the nature of the access arrangement in relation to the arterial or sub-arterial road. Additionally, the formal concurrence of the NSW Roads and Maritime Services may be required.

15 BUSHFIRE PROTECTION

Objectives

(a) Proposed residential subdivisions designed to minimise the potential bush fire hazard risk to prevent future loss of, and damage to life, property and the environment due to bushfires.

(b) Residential subdivision designed to minimise the siting of future dwellings away from ridge tops and other steeply sloping land, especially upslope lands, within saddles or narrow ridge crests.

(c) Proposed residential subdivisions designed to provide an efficient and safe road network which minimises potential bottle-necks.

(d) Minimise the impact of fire protection measures on vegetation, fauna, views, watercourses and soil erosion, amenity and safe access.

(e) Ensure each residential subdivision upon bush fire prone land is designed to provide satisfactory asset protection zones (APZ) between areas of potential hazard and development.

Development Controls

1. New residential subdivisions in bush fire hazard prone lands will generally require a perimeter road system to assist in providing space and access to fire fighting vehicles. Council will refer to NSW Rural Fire Service regarding compliance with specifications and requirements.
2. Any proposed residential subdivision upon land classified as bush fire prone land is an Integrated Development Application under the *Environmental Planning and Assessment Act 1979*. As such, formal concurrence is required from the NSW Rural Fire Service, pursuant to section 100B of the *Rural Fires Act 1997*.
3. Any Integrated Development Application for residential subdivision upon bush fire prone land will be subject to compliance with the requirements of NSW Rural Fire Service publication *"Planning for Bush Fire Protection"*. The application must be accompanied by a bush fire assessment report. The bush fire assessment report must be prepared by a suitably qualified and experienced bush fire consultant and must provide a comprehensive assessment as to how the proposed development complies with the relevant specifications and requirements.

   The Statement of Environmental Effects (SEE) should specifically address the findings and conclusions of the bush fire assessment report to ensure compliance with the *"Planning for Bush Fire Protection"*. The findings and conclusions of the bush fire assessment report should also be reflected in the design of the proposed subdivision. Council will refer this information to NSW Rural Fire Service for assessment advice.

16 STORMWATER DRAINAGE

Objectives

(a) Minimise stormwater drainage run-off impacts upon downstream properties.

(b) Limit post development discharges to pre-development levels.

(c) Provide a sustainable stormwater drainage and water quality environment incorporating both natural and man-made landscape features and which is aesthetically pleasing.

(d) To encourage water sensitive urban design initiatives for larger residential subdivisions, in order to maintain or enhance the water quality in watercourses.

Development Controls

1. A detailed stormwater drainage concept plan together with calculations is required to be submitted with the Development Application.
2. The proposed stormwater drainage system for the subdivision shall be designed in accordance with the requirements of the Stormwater Management & Water Sensitive Urban Design chapters in Part E of the DCP.
3. For subdivisions involving 20 or more allotments, the proposed stormwater drainage system must incorporate water sensitive urban design techniques, wherever possible, in order to minimise runoff and restrict discharge from the site. This may be achieved by using grass swale drains, bio-filtration, bio-retention basins, detention ponds, reuse systems and retention of natural watercourses including wetlands and pool and riffle zones etc. Other stormwater quality improvement measures such as artificial wetlands, sedimentation basins and gross pollutant traps or trash racks may also be provided to facilitate the removal of sediment and other pollutants.
4. Where water sensitive urban design features (eg grass swales, bio-filtration measures, water quality detention ponds or basins etc) are proposed to be ultimately handed over to Council, upfront consultation is required to be held with Council prior to the lodgment of any subdivision application. This will ensure that appropriate design parameters, minimum performance requirements, monitoring and maintenance regimes are agreed upon between Council and the subdivider for each relevant WSUD treatment measure upfront. In the event that no agreement is reached upfront, Council is unlikely to accept the handover of any such assets.
5. All stormwater drainage systems are to be designed considering 'living waterways' as places for people. Some protections may be needed to prevent access to any highly hazardous features of drainage and water quality facilities.
6. The discharge of stormwater runoff must be restricted into a lawful point of discharge such as a natural watercourse or waterway to which the development site naturally drains or existing stormwater drainage systems as agreed to by Council.
7. Where there is no existing lawful point of discharge, the applicant must:
   (a) Dedicate the discharge point to Council's connecting reserves or easements that provide legal continuity from the site to an off-site legal point of discharge into a natural watercourse or waterway or suitable public stormwater drainage system and
   (b) Construct the necessary connecting drainage works.
8. For downward sloping sites away from public roads or watercourses, written documentary evidence must be provided from downstream property owners which confirms their agreement for stormwater drainage pipes and associated creation of necessary easements through their properties, in order to guarantee that satisfactory arrangements have been made for stormwater drainage from the site.
9. The provision of inter-allotment drainage is required where drainage pipelines convey stormwater from private residential lots across other adjoining residential lots (ie not draining directly to a public road). The creation of 1.5 metre wide inter-allotment drainage easements will be required as part of the subdivision. The inter-allotment drainage easements shall not be vested in Council.
10. Where it is necessary to connect into Council's existing stormwater drainage system, the capacity of the existing stormwater drainage system is to be checked to ensure its capacity of accepting the additional developed run-off from this development. Costs associated with any necessary upgrading or drainage is to be borne by the developer and work is to be undertaken in accordance with Council's Subdivision Policy and Part E Stormwater Management chapter to this DCP.

17 RIPARIAN LAND MANAGEMENT

Objectives

(a) Protect urban creeks and riparian corridors and their native ecology from further degradation and improve their environmental function.

(b) Maintain or enhance the stability of the bed and banks of a watercourse.

(c) Minimize 'edge effects' at the riparian corridor / urban interface by the provision of a suitable riparian corridor width and create borders with perimeter road systems and pedestrian/cycle paths.

(d) To ensure riparian land management measures are compatible with floodplain risk management objectives.

Development Controls

1. Any proposed residential subdivision involving waterfront land on, in or within 40 metres of the top of bank of a river, creek or intermittent watercourse, lake or estuary will be subject to compliance with the requirements of Chapter E23 Riparian Corridor Management in this DCP.

2. Any riparian land within a subdivision will be subject to a Vegetation Management Plan (VMP) to assist in establishing an ongoing management process. This VMP will include ownership, maintenance and management arrangements.

18 SERVICING ARRANGEMENTS

Objectives

(a) To ensure the provision of infrastructure servicing / utilities is carried out in accordance with the requirements of Council and the relevant infrastructure servicing authority.

(b) To maximise the opportunities for shared (common) trenching and to reduce constraints on landscaping within road reserve verges.

Development Controls

1. It is recommended applicants consult with servicing authorities at an early stage in the planning process to ensure that all allotments can be appropriately serviced by reticulated water and sewerage and electricity supplies as different servicing needs may require subdivision lot/layout design responses.

2. Shared common trenches for service infrastructure to be underground are preferred in order to also enable the planting of trees and other landscaping within the road verges.

3. In the event that the subdivision cannot be adequately serviced by reticulated water and sewerage supplies, then Council is unlikely to support any such application.

4. Where a subdivision is approved, a condition of consent will be imposed requiring the submission of a Notice of Requirements from Sydney Water Corporation to Council prior to the release of the Construction Certificate for the proposed subdivision. Additionally, a separate condition of consent will be imposed requiring the submission of a Section 73 certificate from Sydney Water Corporation which confirms that satisfactory arrangements have been made for reticulated water and sewerage infrastructure to the subdivision and the original Section 73 Certificate lodged with the Subdivision Certificate application.

5. Electricity distribution must be underground in all new residential subdivisions. Accordingly, the subdivision plan should provide details of the location of any required electricity sub-stations.

6. Telecommunication services are to be provided to all proposed lots. The submission of documentary evidence from a telecommunications carrier will be required for any approved subdivision, prior to the release of the Subdivision Certificate.

7. All allotments must be designed to enable the suitable provision for waste facilities. In cul-de- sacs, the head of the cul-de-sac must be designed to provide sufficient road reserve width (footpath area), in order to enable the storage of garbage and recycling bins without hindering access to adjacent properties.

8. Battle axe allotments shall be designed to include sufficient area within the existing public road reserve verge to cater for the provision of garbage and recycling bins. Alternatively, a garbage and recycling bin storage area may be provided within close proximity to the adjoining public road, but will be subject to private waste servicing arrangements being made by the property owner in the event that Council's waste contractor is not able to service the bin storage area.

9. Applicants are encouraged to liaise with Council's Waste Services Section of the City Works Division, in order to guarantee satisfactory waste service arrangements and to minimise potential future problems arising from poorly designed waste and recycling storage facilities.

19 ROAD ADDRESSING

Objectives

(a) To ensure that addressing of property is undertaken in a consistent approach across NSW.

(b) To ensure logical and unique identification of property.

(c) Provide improved clarity and direction for emergency services and the community.

(d) Addressing to reflect longstanding address identification to minimise confusion and reduce disruption to the local community.

Development Controls

1. Lot numbering (assignment of address numbers) and road naming is to be undertaken in accordance with the Geographical Names Board - NSW Addressing User Manual.

2. Council has a responsibility to clearly identify public roads in accordance with the Roads Act 1993, and in the interests of public information and safety.

3. Where new roads exist the developer is to apply for a road naming application for the names of new road(s), together with the reasons for the names proposed, should be submitted in accordance with Council's Road Naming Policy for Council's consideration.

4. Where no suggestions are received for the naming of roads, Council will determine the street names.

5. New street name signs are to be paid for and installed by developers.

6. As part of the road naming procedures under the Roads Act 1993, Council will forward the proposed road names in a subdivision to the Geographical Names Board for the Board's appropriate comment. In cases where the Geographic Names Board does not support the proposed road naming, Council will request alternative road names and in certain cases will liaise with the applicant.

7. For any classified roads, the NSW Roads and Maritime Services will determine the road name in consultation with the Geographic Names Board.

8. Upon receipt of development consent Council can assign address numbers. Addressing for lots will be provided from Council according to Councils Property addressing policy, prior to the issue of a construction certificate.

9. Poor or inadequate house numbering (or even no numbering at all) can seriously hamper emergency services in the performance of their duties. Street / property numbering shall be clearly and permanently displayed at the primary frontage of each lot.

20 SUBDIVISION HANDOVER

Objectives

(a) Ensure that local Council assets are handed over to Council in a satisfactory condition and reflecting the assets intended design purpose.

(b) To ensure the community can suitably utilise the asset to be handed over in a safe and practical manner.

(c) To provide clear requirements, procedures and guidelines relating to the handover process.

(d) Provide information and documentation that ensure the longevity and design life of any Council asset.

Development Controls

1. Records are to be kept of the dimensions, length, square meterage and associated costs of constructed roadworks, landscaping and other civil assets intended to be dedicated as public infrastructure. CCTV is required of all pipelines to be dedicated to Council at practical completion of the development and again prior to handover of the asset.
2. Road pavement details, including survey of each layer, material used, during road construction, is to be documented. Additional geotechnical engineering testing results including pavement density and Benkelman beam results must be provided.
3. Operations and maintenance manuals for assets are to be prepared and handed over to Council. These manuals must include but not be limited to proposed type and frequency of establishment and maintenance intervention requirements. Maintenance requirements must cover civil assets (including and not limited to gross pollutant traps, detention basins, water sensitive urban design assets), landscape assets (including and not limited to street trees, reserves, parks, playgrounds), and riparian areas (such as creeks, bushland), and areas covered by vegetation management plans.
4. Risk assessment of carrying out maintenance of constructed roadworks, landscaping and other civil assets to be dedicated as public infrastructure is to be undertaken. Appropriate traffic control plans (prepared in accordance with RMS Guidelines) will need to be submitted for approval where maintenance work takes place in a proposed road reserve.
5. All relevant reports / documentation (e.g. surveillance reports, emergency management plans etc.) associated with any detention storage basin/s, as required by the NSW Dam Safety Committee (DSC) are to be provided, including documentary evidence confirming approval of this reporting/documentation by the DSC.
6. A final inspection is required at the conclusion of the defects liability period outlined in the development consent, for each component/asset to be handed over to Council. This meeting will be undertaken with relevant Council staff to ensure that the assets are in a satisfactory condition for handover to Council. The inspection is a review of works that have received practical completion against the approved drawings/development consent after the defects liability period has ended.

DRAFT

WEST DAPTO OPEN SPACE DESIGN MANUAL

wollongong
city of innovation

Document Revision Status

Author	Revision No.	Review	Date Issue
D. Pollock	Draft A	A. Goldie	1/4/19
D. Pollock	EMC Draft	A. Goldie	7/6/19
D. Pollock	Draft for Council	A. Goldie	20/6/19

OPEN SPACE

Contents

5.0 OPEN SPACE INFRASTRUCTURE DESIGN

1.0 Project Description

1.1 Introduction

The manual provides design guidance to ensure that proposed developments adhere to and facilitate the delivery of the West Dapto Vision, and Council's open space requirements.

This manual outlines the open space requirements and Design Standards to be achieved in the lodgement of all plans for subdivision applications in The West Dapto Urban Release Area and surrounding suburbs.

1.2 Objectives of Design Manual

- To set design objectives and requirements for open space in the West Dapto Urban Release Area.
- To be utilised by both external and internal stakeholders as well as professionals involved with the development, planning and design of open space within the West Dapto Urban Release Area and surrounding suburbs.

1.3 Policy Location

The manual should be read in conjunction with (but not limited to) the following development controls and Strategic Plans:

- Wollongong City Council West Dapto Vision 2018;
- Wollongong City Council DCP 2009 -
  - Chapter D16: *West Dapto Urban Release Area;*
  - Chapter B2: *Residential Subdivisions;*
  - Chapter E2: *Crime Prevention Through Environmental Design;*
  - Chapter E6: *Landscaping*
  - Chapter E10: *Aboriginal Heritage;*
  - Chapter E11: *Heritage Conservation;*
  - Chapter E13: *Floodplain Management;*
  - Chapter E14: *Stormwater Management;*
  - Chapter E15: *Water Sensitive Urban Design;*
  - Chapter E17: *Preservation and Management of Trees and Vegetation;*
  - Chapter E23: *Riparian Land Management;*
- West Dapto Section 94 Development Contribution Plan 2017;
- Wollongong City Council Urban Greening Strategy 2017-2037;
- Wollongong City Council, Wollongong Social Infrastructure Planning Framework 2018-2028;
- Wollongong City Council Civil Specifications 2019;
- Recreational and Open Space Planning Guidelines for Local Government 2010 Department of Planning;
- West Dapto Social, Cultural and Recreational Needs Study – Facility and Open Space Recommendations – Final Report (Elton Consulting, 2007);
- Play Wollongong Strategy 2014 – 2024 – in particular the Background Research Report 2014;
- Wollongong City Council's Public Art Policy 2016, and Animating Wollongong: Public Art Strategy and Guidelines 2016-2021;
- Wollongong City Council - *Vegetation Management Guidelines for Development Applications;*
- West Dapto Open Space Technical Manual;
- Transport Canberra and City Services (TCCS) publication – *'Design Standards for Urban Infrastructure, 24 - Sportsground Design.'*

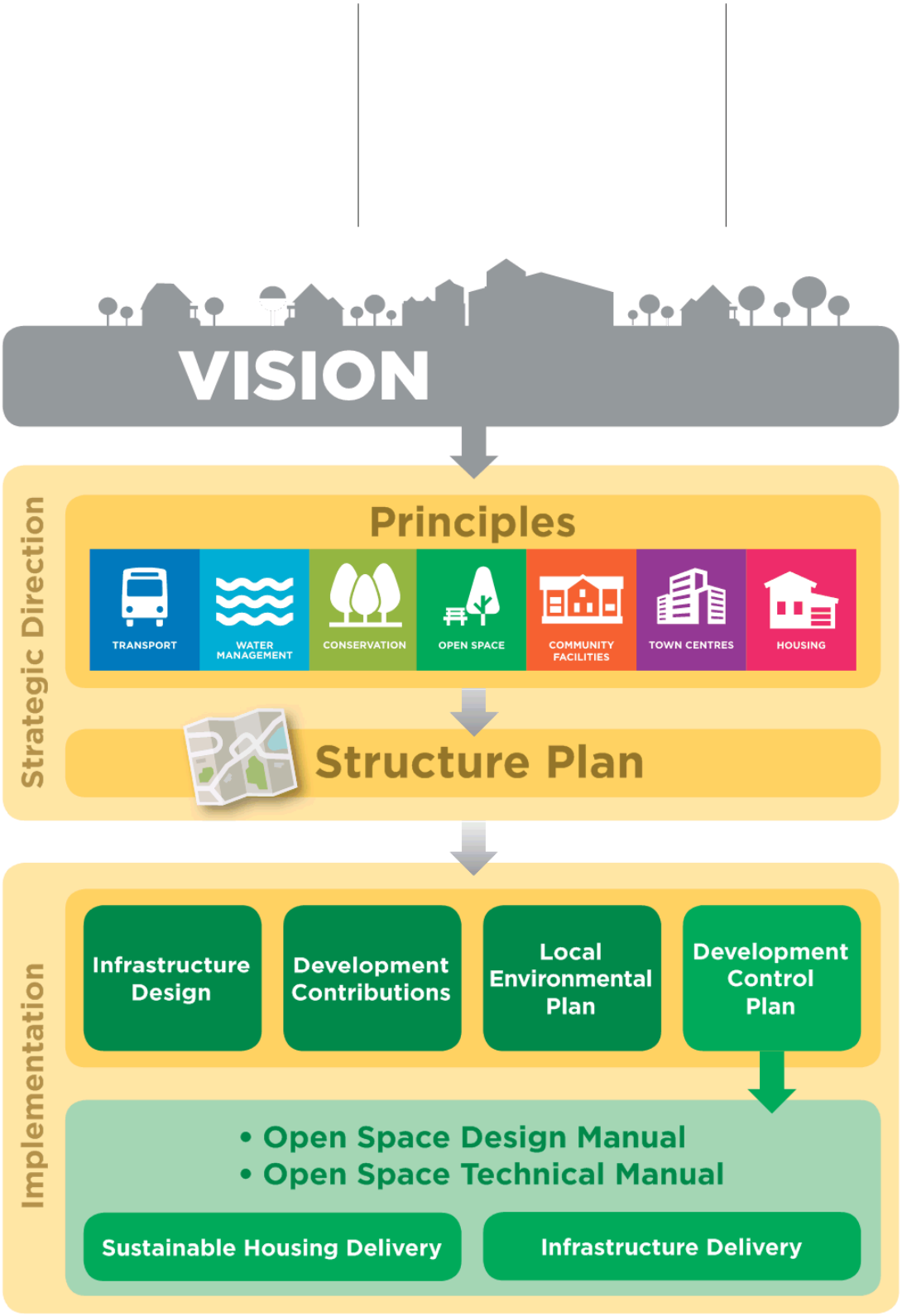


Figure 1
Structure and relationships of principles to planning tools

2.0 West Dapto Open Space Hierarchy

2.1 General Design Principles

Objectives

Open space should be planned and designed to achieve the following key objectives:

Well distributed network of open space – the design of neighbourhoods must provide a connected network of accessible, attractive, and usable public open spaces and natural areas.

Flexibility of design - open space and natural areas must provide for a variety of recreational, sporting, play, and social needs of the community. Sufficient size and flexibility of design must be incorporated to accommodate the needs of the community as they change over time.

Competing functions - flooding and water management, traffic and road infrastructure, cultural heritage and biodiversity must be accommodated without compromising the open space and recreation functions.

Open space embellishment - open space should not contain an excessive amount of embellishments that results in an unsustainable maintenance cost to the community. Embellishments should be appropriate to the intended catchment of users and to the type of park and associated service level of maintenance.

Active (formal) and Passive (informal) functional split – the West Dapto Urban Release Area open space provision must provide for an equal split between active (formal) and passive (informal) recreation.

Crime Prevention Through Environmental Design (CPTED) – CPTED principles are applied in the planning and development of open space, community facilities, and town and village centres.

Connectivity - open spaces must be connected with shared paths, pathways, and trails to other facilities and places of interest. These include: heritage sites, riparian areas, schools, shops, community facilities, public transport nodes, employment centres, and natural areas.

Urban Greening - the West Dapto Urban Release Area presents unique opportunities to increase the quality and quantity of vegetation with the provision of street tree planting, enhancement of existing remnant vegetation, revegetation of riparian areas, and the provision of significant tree planting within open space.

Conservation - the West Dapto Urban Release Area presents opportunities to preserve remnant and regrowth bushland vegetation, and enhance ecological connectivity.

Amenity - open space and natural areas will provide for a variety of recreational and social needs of the community and contribute to the local landscape character.

Value – open space design must deliver quality infrastructure that is robust and made from durable materials and finishes, and neat, uncomplicated designs that minimises maintenance requirements and discourages vandalism.

2.2 Open Space Hierarchy - Function and Catchment Distance

'Catchment' refers to the area and resident (or future resident) population intended to be serviced by the open space facility. The catchment area for an open space facility also relates to the size and function of the facilities to be provided. As illustrated in table 1 below, open space facilities are intended to service city wide, district, neighbourhood or a local catchment.

It is important to note that land parcel size is not the only criteria defining a catchment level to be provided. The proposed function of the open space incorporating the future needs of the community is equally as significant in determining likely catchment.

As part of the open space network for West Dapto, open space is required at all hierarchy and catchment levels. This relationship is illustrated in table 1 below.

Open Space Hierarchy Table

Function and service	Size	Catchment radius (distance)
Local Passive (Informal)	0.5-2 ha	400-600m
Local Active (Formal)	1-2 ha	400-600m
Neighbourhood Passive (Informal)	2-4 ha	2km
Neighbourhood Active (Formal)	3-5 ha	2km
District Active (Formal)	5-8 ha	Southern ward of LGA
City wide Active (Formal)	8 + ha	Facility to serve the whole LGA

Table 1
Open space provision standards (based on NSW Recreation and Open Space Planning Guidelines for Local Government (2010) and the Elton Report (2007) recommendations).

Open Space Hierarchy and Function

The section 94 Development Contribution Plan provides for open space and recreational facilities including neighbourhood and local parks within each stage of the West Dapto Urban Release Area.

Figure 2
Open space hierarchy and functions

City Wide

Sports Park

Darkes Town Centre Sports Park

Cleveland Road Sports Precinct.

These facilities will provide a range of sporting fields and recreational opportunities designed to align with the West Dapto Open Space Design Manual.

District - South Wollongong

Community Leisure Centre

West Dapto Community Recreation and Leisure Centre.

Neighbourhood (min 2 - 4ha size)

Active (Formal) Recreation

Large scale open space designed to facilitate organised outdoor sports and training eg AFL, soccer, rugby league, rugby union, netball, basketball hockey, cricket, baseball and softball, etc.

Passive (Informal) Recreation

Unorganised or structured outdoor sport eg walking, running, cycling, fitness stations, youth spaces, play spaces such as playgrounds, kick about areas and children learn to ride facilities.

Local (min 0.5 - 2ha)

Active (Formal) Recreation

Small scale open space designed to facilitate organised outdoor sports with the provision of modified sportsfields or multi purposed courts to provide active recreational opportunities eg basketball and netball.

Passive (Informal) Recreation

Open space for unorganised activities promoting outdoor movement for all age, eg walking, running, cycling, youth spaces, playgrounds, kick-about areas as well as spaces for picnicking and family gatherings.

3.0 Open Space Categories

3.1 Neighbourhood Parks

Principles

Catchment
Neighbourhood parks are larger scale spaces for residents and visitors providing both active (formal) and passive (informal) recreational opportunities. Neighbourhood parks are intended to service a neighbourhood of residential areas with a catchment radius of 2km depending on the functions of the open space.

Activation and Flexibility
Neighbourhood parks should aim to have five sources of activation to provide a diversity of active and passive recreational opportunities. Neighbourhood parks should have the flexibility to cater for a wide variety of recreational experiences, activities, and formal sports to cater for all age groups and future community needs.

Neighbourhood park example, Rockley Oval 'Googong' Queanbeyan

Active (Formal) and Passive (Informal) Split
Active open space is defined by the Greater Sydney Commission as land set aside for the primary purpose of formal outdoor sports for the community. Active open space supports team sports, training and competition'.

Neighbourhood parks across West Dapto must provide a range of recreational opportunities that must be evenly split between active (formal) and passive (informal). The location of a park will influence the design, function and the range of outdoor recreation, sport and exercise opportunities in response to the size, shape, topography, landscape setting and adjacent land uses.

Passive (informal) open space is land set aside for parks, gardens, linear corridors, conservation bushland and nature reserves. These areas are made available for informal recreation, play and physical activity. Examples of passive (informal) recreation are cycling, exercise stations, running, walking, play spaces, sitting and picnicking.

Neighbourhood Parks adjacent to Natural Areas
Neighbourhood parks, which are near to natural areas zoned as E2 Environmental Conservation, and E3 Environmental Management zones such as bushland or riparian areas, must accommodate self-directed recreational activities such as walking, running and cycling within these areas. This will increase access to these areas and create activity nodes for passive surveillance, and encourage social interaction in a natural setting.

Multi-purpose Sportsfield
Neighbourhood parks must be capable of accommodating multi-purpose sports fields for training and competition in addition to providing attractive green environments for hosting community events.

Site Interpretation
Neighbourhood parks should respond to the local setting and characteristics, and where possible incorporate references to local Indigenous and historical features in the form of interpretive signage and or public art.

General Requirements

- **Utilities** - Where land is to be dedicated to Council for future open space the land must include appropriate utility mains including but not limited to water, sewer, stormwater and power, that can be connected when the embellishment design is carried out.
- **Size** - Neighbourhood parks require a minimum provision for open space of two (2) to five (5) hectares with a particular emphasis on the provision of active (formal) recreational opportunities. The size of the park should respond to the specific requirements of the sport code.
- **Riparian corridors** – Neighbourhood parks cannot incorporate riparian corridors in open space area calculations.
- **Frontage requirements** - Neighbourhood parks should be located along a major road with an additional smaller order road leading to car parking. Seventy-five percent (75%) of the neighbourhood park must have road frontage with no boundary less than thirty (30) metres.
- **Connectivity** - to achieve active transport outcomes in the West Dapto Urban Release Area it is essential that community facilities and neighbourhood parks are connected with shared paths and linked to public transport nodes to ensure pedestrians and cyclists can safely access open space.
- **Equal Access paths** - entry points and internal pathway networks must achieve equitable access. At least one continuous pedestrian path providing access to the major features of the park must be designed to AS1428.1.2009 'Design for Access and Mobility-general requirements for access'.
- **Passive Surveillance** - residential dwellings must be orientated to overlook neighbourhood parks to allow passive surveillance and deter anti-social activities. This includes incorporating **Crime Prevention Through Environmental Design (CPTED)** principles, such as the facilitation of casual community surveillance through layout and design.
- **Inclusive Playgrounds** - play spaces planned for open space should be inclusive with the provision of accessible play features. Supporting infrastructure such as accessible parking and paths of travel are required to help meet the needs of carers and children accessing the space.
- **Amenities** - public toilets are required. The number of cubicles required is subject to an objective assessment of potential demand through a needs analysis.

  Public toilet buildings in parks should be designed, located and constructed in accordance with **Crime Prevention through Environmental Design (CPTED)** principles, relevant Australian Standards and Building Codes. The amenities must:
  - use infrastructure that is readily maintainable
  - be sited to avoid nuisance to neighbours;
  - be within reasonable proximity to a car park or other demand source;
  - be in close proximity to a road, gate or internal maintenance access for servicing;
  - be sited where casual surveillance is possible from surrounding streets.
- **Co-location of social infrastructure**- Neighbourhood parks could include the co-location of leisure and recreational facilities. This could be achieved by co-locating facilities within a multi-purpose community facility as recommended in the Wollongong Social Infrastructure Planning Framework.
- **Car parking** – Neighbourhood park design must include off street parking within the park to facilitate parking for visitors. Car parking within the park should not visually dominate and always incorporate substantial shade tree planting.
- **Park lighting** - Lighting should facilitate evening sports activities on fields and pathways that link to car parking areas. The lighting must be in accordance with AS2560.1:2018 Sports Lighting Part 1: General Principles, AS 2560.2.3 - 2002 Specific Application for football (all codes). Final determination of an appropriate lighting standard, for any particular pathway location, shall be subject to Council approval. Lighting design must consider illumination and spill requirements for functions.
- **Emergency and maintenance vehicles** – Neighbourhood park designs are required to provide appropriate entry points and route alignments for emergency and maintenance access. Emergency access to sporting fields must be carefully planned to allow vehicles to treat injured players.

- **Public art** – park designs should accommodate appropriate public art. Public art can enhance and enrich our experience of a public space by representing and interpreting the local heritage and culture of the area.
- **Signage** - park signage is to be provided at all entries. Refer to West Dapto Open Space Technical Manual.
- **Waste** – litter bins should be located near a road so that trucks are not required to enter the park to service them.
- **Urban Greening** - Significant feature tree planting is required with the aim of establishing canopy and shaded pathway networks, recreational spaces, car parks, and play spaces with 30 percent of the park provided with natural shade.

Active (Formal) Recreation Requirements

- The active (formal) recreational component provided would be in the form of multi-sport fields to accommodate demand for local sports training and competition, including soccer, rugby union, rugby league, cricket, and AFL. Refer to section 5.2 for sports field requirements.
- Gradients of fields are to be no greater than 2 percent. Correct preparation of the subgrade and playing surface, and final grading is the most important design component affecting the performance of a sportsfield.
- Orientation of fields must be between north, and 15 degrees east of north depending on specific sporting requirements of the sporting code to be accommodated.
- The active (formal) recreational spaces are to be designed with appropriate drainage to ensure they are not significantly damaged by flooding, are self draining (ie no entrapped low points) to ensure that they are available for play within three (3) days of a rain/flood event.
- Tennis, netball, and basketball courts are appropriate in neighbourhood parks.

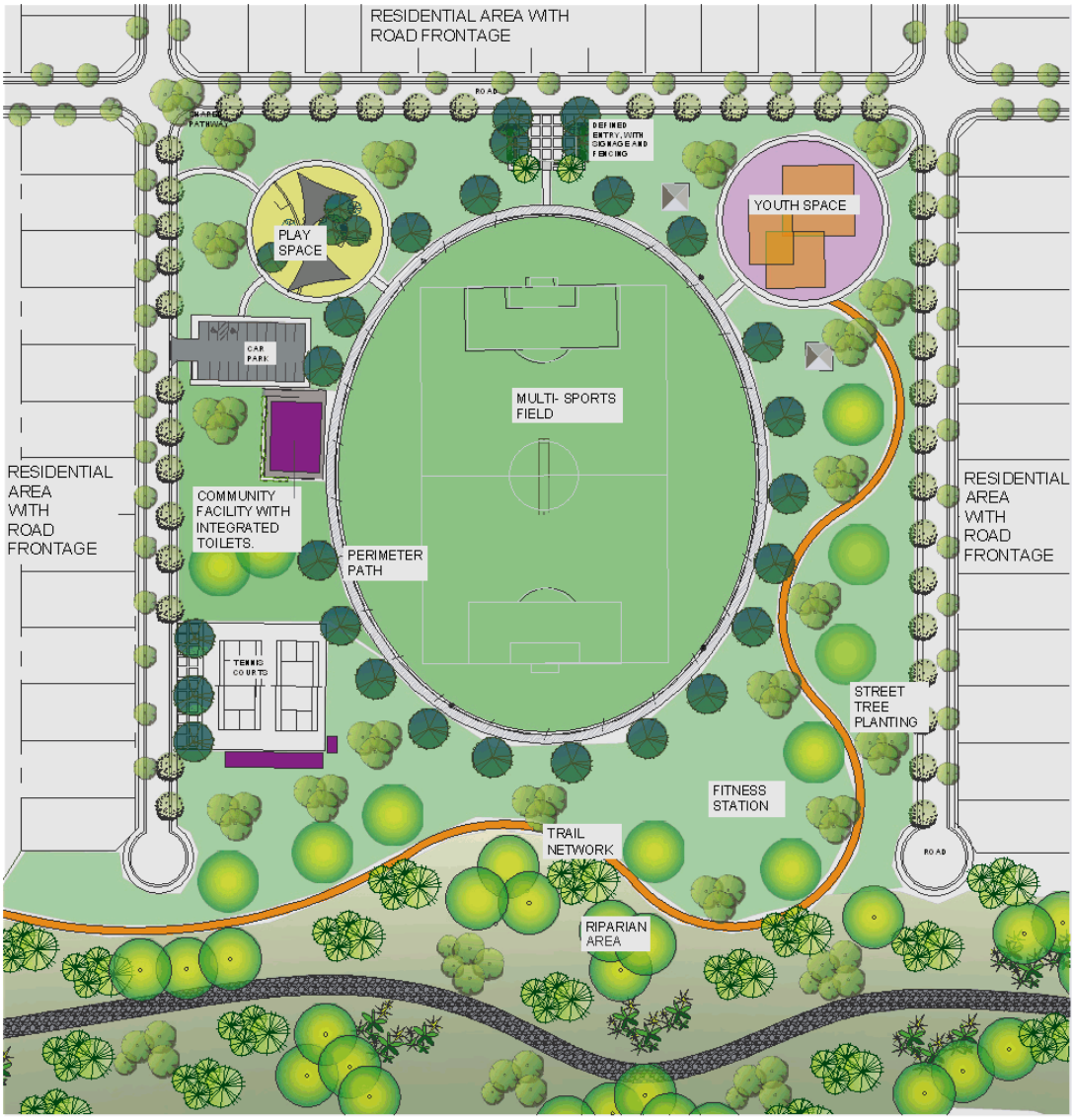
Passive (Informal) Recreation Requirements

- The remnant bushland which may form part of the neighbourhood park, can cater for passive recreational uses as well as achieving the West Dapto Vision conservation principles with acceptable impacts on biodiversity values. Activities such as walking, running and cycling can be integrated, creating experiences enhanced by the site features.
- Neighbourhood parks can offer opportunities for community gardens and conservation themes such as bird watching and nature walks.
- Fitness and exercise stations can be used by all ages to create opportunities for self-directed recreational exercise.

Examples of play space and fitness station

- Youth spaces are required to be incorporated into neighbourhood parks. Youth recreational spaces should aim to cater for activities such as Parkour, ping pong tables, re-bound walls, skate features, BMX, and pump tracks. Seating areas for hanging out spaces should also be incorporated.
- Play spaces within the neighbourhood park should provide play equipment and experiences that provide a range of opportunities for play. Play spaces should be planned to be inclusive. The provision of a children's learn to ride area is an example of a desire play feature.
- Park design must incorporate picnic areas of different sizes with shelters and tables, water, barbecues, and waste stations located offline from the pathway networks.
- Neighbourhood parks should be capable of hosting community events such as market days.

Figure 3
Typical features of a of good neighbourhood park design



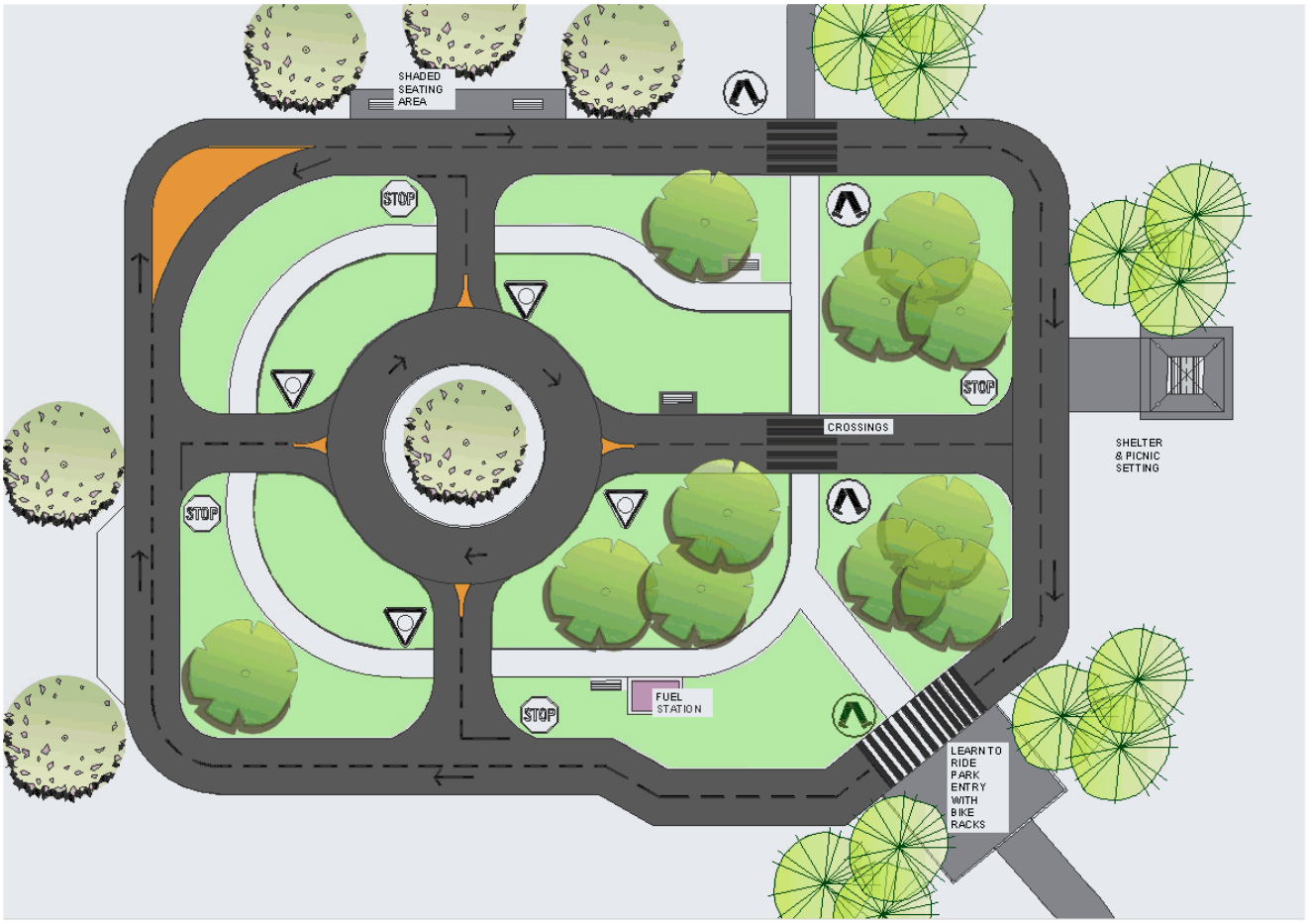


Figure 4 *Typical Learn to Ride facility layout plan*

Learn to Ride facility feature, Stuart Park Wollongong

Learn to Ride facility feature, Mt Stromlo Canberra

3.2 Local Parks

Principles

Access
Local parks should be accessible and be a safe walking distance within 400m-600m of the surrounding residential area.

Passive Surveillance
Local parks must be located in a highly visible location to allow for passive surveillance. The park should have direct residential frontage with four road frontages. This includes incorporating **Crime Prevention Through Environmental Design (CPTED)** principles, such as the facilitation of casual community surveillance through layout and design.

Recreation opportunities
Local park features and activations must service the immediately adjacent residential population. Local parks should provide a range of recreation spaces with a flexible design.

Level of Embellishment
Local parks should not contain an excessive amount of embellishments that results in an unsustainable maintenance cost to the community. Features such as an integrated path network with variable seating options complemented by significant tree planting must be primary features of park designs. Embellishments should be appropriate to the type of park and associated service level, and to the intended catchment of users.

Shade
Significant shade planting must be incorporated into the park design with at least 40 percent of the park provided with natural shade. Tree species should be selected from a minimum of three genus types.

Requirements

- **Size and Gradient** - Local parks require a minimum area of zero point five (0.5) to two (2) hectares with a particular emphasis on the provision of a range of recreational opportunities. The minimum provisions for informal ball sports (kick-about areas) should be 40m wide x 60m long with a maximum gradient of 5 percent and minimum of 2 percent.

- **Frontage requirements** - Local parks must be located on residential streets and not adjacent to main roads. The park should have direct residential frontage with four road frontages.
- **Passive Surveillance** - residential dwellings must be orientated to overlook neighbourhood parks to allow passive surveillance and deter anti-social activities.
- **Connectivity** - to achieve active transport outcomes in the West Dapto Urban Release Area it is essential that local parks are connected with pathways and shared paths to ensure pedestrians and cyclists can safely access open space.

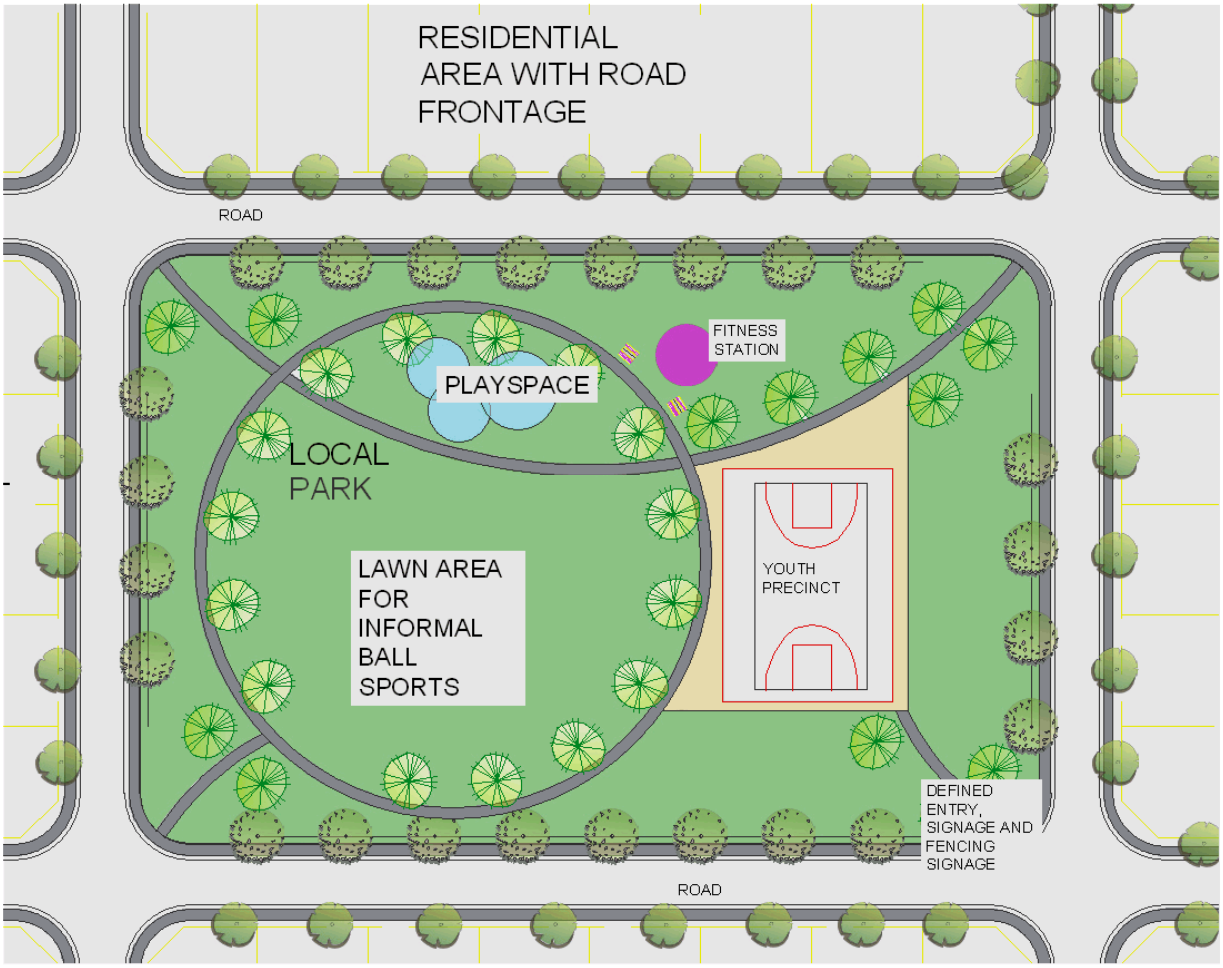
Top: Play feature, Emu Park West Dapto

Middle: Half basketball court, Emu Park West Dapto

Bottom: Skate features West Epping Park, source City of Parramatta

- **Equal Access paths** - Entry points and at least one route within the internal pathway network linking key park features must achieve equitable access as per AS 1428.
- **Play spaces** - within the local park play spaces should provide play equipment and experiences that provide a range of opportunities for play. Play spaces should be planned to be inclusive.
- **Youth spaces** – park designs are required to respond to the progression of children to youth and include facilities such as ball courts and skate elements.
- **Amenities** - Provision of infrastructure such as toilets is not required as most visitors are able to return to their homes if necessary.
- **Park Lighting** - none required. Street lighting only.
- **Emergency and Maintenance Vehicles** – Maintenance and emergency access must be provided.
- **Signage** - park signage is to be provided at all entries. Refer to West Dapto Technical Manual.
- **Waste** – Litter bins should be located as close as possible to entrances and or road frontages for servicing, and near high activity areas such as play spaces.
- **Urban Greening** - Tree planting is a major focus of local parks with mass planting bed provision confined to focal areas only or where slopes exceed 25 percent. Significant feature tree planting is required with the aim of establishing canopy and shaded pathway networks, recreational spaces, and play spaces with 40 percent of the park provided with natural shade. A variety of genus of tree planting to be selected to provide diversity.
- **Picnic nodes** - picnic areas with tables and a variety of seating areas are to be provided through the park. Facilities such as shelters with furniture to accommodate family gatherings such as birthday parties, must be included.

Figure 4
Local Park typical features



4.0 OPEN SPACE DESIGN GUIDELINES

4.1 Natural Areas

Objectives

The West Dapto Urban Release Area presents opportunities to preserve and enhance remnant and regrowth vegetation and other biodiversity values. Natural areas such as riparian environments and remnant and regrowth bushland zoned as E2 (Environmental Conservation) and E3 (Environmental Management) are an important community asset. They provide opportunities to learn about flora and fauna and appreciate and enjoy the environment. The primary purpose of natural areas is conservation however balanced passive (informal) recreation is a key secondary function of natural areas in urban settings.

Good example of walking trail within a conservation area (Tasmania)

Requirements

Trails and Rest Areas

Activities such as walking, running and cycling can be integrated, creating varied experiences enhanced by the diversity of landforms and site features. The creation of appropriate trail networks and rest areas in natural areas will increase access and create activity nodes for passive surveillance, encouraging social interaction in a natural setting.

By allowing controlled access for the public it can also deter damaging activities such as rubbish dumping and other anti-social activities. Designing a trail network within natural areas may also prevent the proliferation of informal trails and reduce impacts on biodiversity values. Trailheads or trail access points should be visible and defined by signage and/or fencing.

Conservation

The primary objective for natural areas is to ensure their ongoing conservation. Conservation can include rehabilitation of areas which have suffered misuse or have been impacted by previous land uses. Areas of thriving natural habitat are to be preserved to ensure they are not adversely impacted by development and human activity. Natural areas or parts of natural areas with biodiversity values of high conservation significance are to be protected and managed to minimise the potential for adverse impacts.

Vegetation Management Plans
Vegetation Management Plans must be developed for all natural areas such as riparian environments and remnant bushland. All works recommended in the Vegetation Management Plans must be undertaken by a licenced bush regeneration company. Embellishments such as trails proposed within a natural area must be integrated and considered as part of the Vegetation Management Plan. Monitoring and ongoing maintenance is required to ensure the effectiveness of the Vegetation Management Plan. Refer to Wollongong City Council Vegetation Management Guidelines for Development Applications.

Recreation and Conservation
Any embellishment works need to be targeted at providing recreation opportunities that minimise the impact to vegetation and wildlife. Low impact recreation such as walking, track running, cycling (on track only), observation points, and rest areas are suitable activities.

Trails and seats should be located away from high conservation areas.

Works within natural areas must make appropriate provisions to accommodate suitable activities and inhibit degrading ones such as vegetation vandalism, firewood collection, four wheeled driving, and motorbike riding.

Access and Frontages
Subdivision design must provide good connectivity to streets and pathway networks, with the majority of the natural area having road frontages to allow for passive surveillance. Road frontages also provide an offset as a fire protection measure to residential dwellings.

CPTED Principles in Trail design
Trails for walking and running should be designed in consideration of Crime Prevention Through Environmental Design (CPTED) in order to facilitate casual community surveillance.

CPTED elements can guide trail design to reduce the likelihood of crime and enhance community safety. For example, routing walking trails around the perimeter of natural areas and the creation of active edges will encourage casual surveillance into these areas.

Routing walking trails on the perimeter will also allow for a clear line of sight for users enabling them to see what is ahead. This is an essential element of people's perception of safety and will therefore encourage use of the trail.

As part of the trail route design the applicant will be required to include a comprehensive risk assessment following CPTED principles within the Development Application documentation.

Good example of walking trail within a conservation area Wisemans Park, Gwynneville

Figure 5
Natural Area within Subdivision typical layout

Riparian Corridors

Refer to Chapter E23: *Riparian Land Management* for riparian corridor objectives.

Classification of Watercourses

All watercourses within the Wollongong Local Government Area have been classified into one or more of the following three (3) categories, depending upon the nature and function of each watercourse:

- **Category 1: Environmental Corridor** – This category aims to provide extensive habitats for terrestrial and aquatic fauna and to maintain and restore the viability of riparian vegetation as well as protect water quality and provide bank stability.
- **Category 2: Terrestrial and Aquatic Habitat** – This category aims to maintain or restore the natural functions of a stream in order to maintain the viability of riparian vegetation and provide suitable habitat for terrestrial and aquatic fauna as well as improve water quality and provide bank stability.
- **Category 3: Bank Stability and Water Quality** – This category aims to minimise sedimentation and nutrient transfer

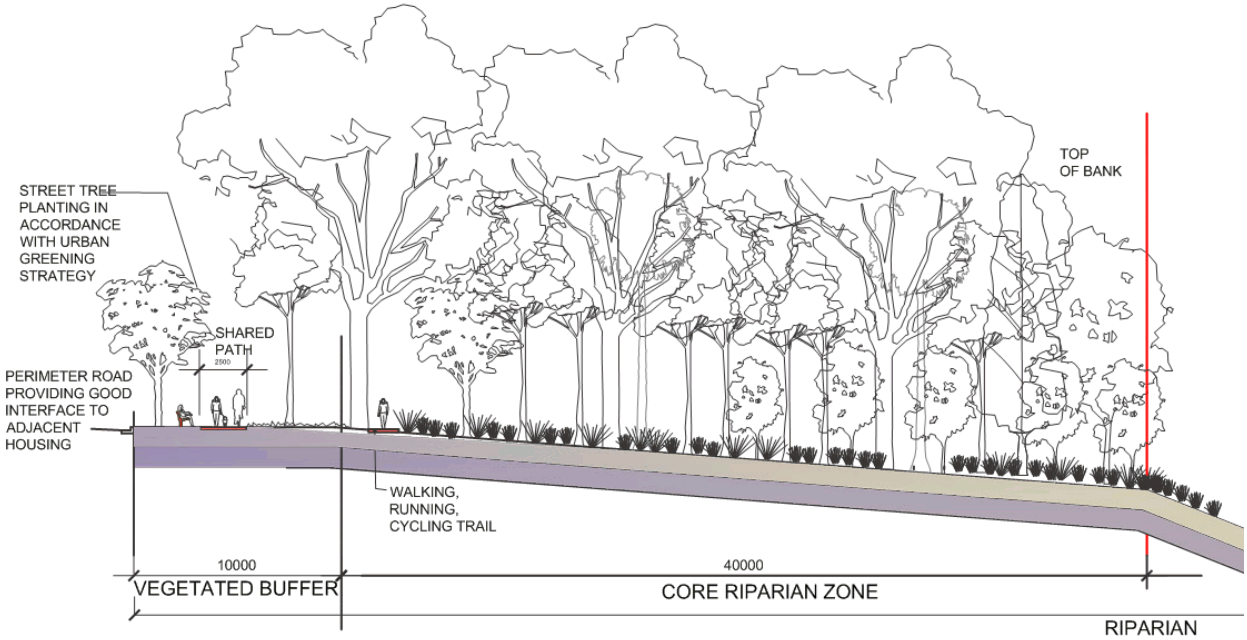
Requirements

- **Frontage requirements** – subdivision layouts should provide a road frontage to all riparian areas.
- **Services** - services must be located on the outer edge of the riparian corridor.
- **Pathways** - locate shared pathways and walking trails sensitively so they do not compromise the integrity of the riparian corridor and facilitate passive (informal) recreation.
- **Passive (Informal) Recreation** - integrate infrastructure such as picnic facilities and exercise equipment sensitively to facilitate passive (informal) recreation. Riparian areas accommodate self-directed recreational activities such as walking, running and cycling. This will increase access to these areas and create activity nodes for passive surveillance, and encourage social interaction in a natural setting.

- **Riparian Vegetation Communities** – subdivision design must retain existing communities and revegetate where necessary riparian vegetation communities to achieve creek bank stability.
- **Access** - the ecological integrity of existing riparian vegetation must be protected by limiting access to the watercourse to strategic locations where the stream bed and bank stability will not be compromised.

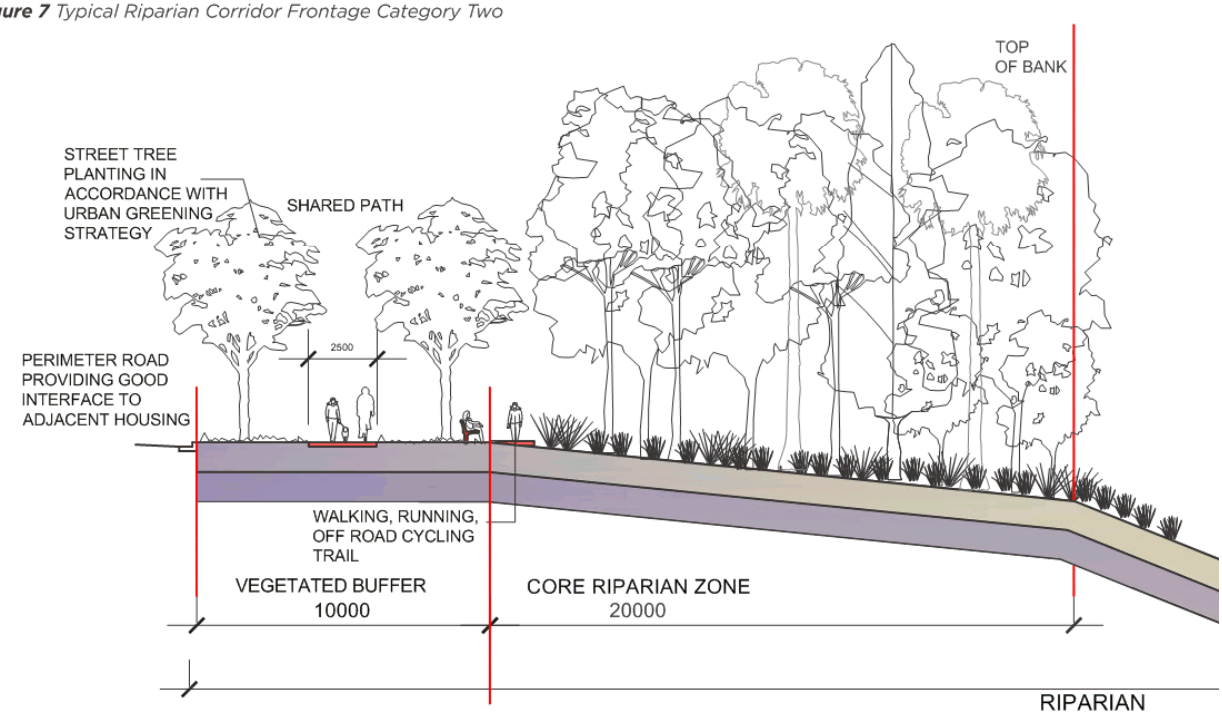
Riparian Corridor - Category One

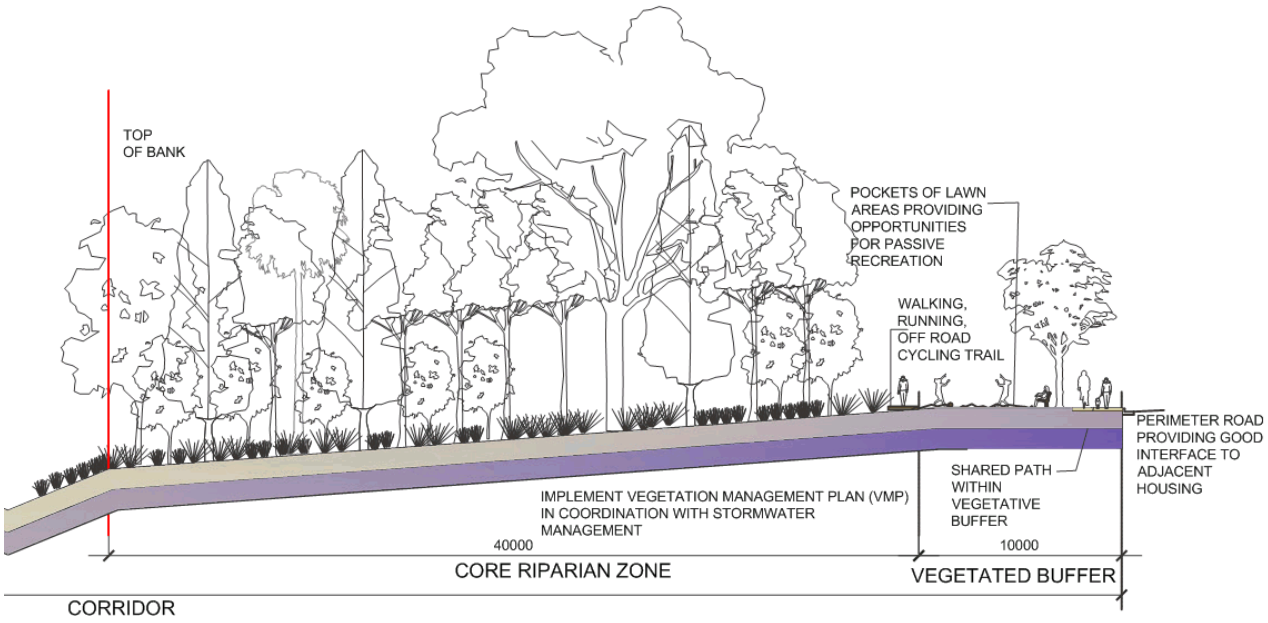
Figure 6 *Typical Riparian Corridor Frontage Category One*



Riparian Corridor - Category Two

Figure 7 *Typical Riparian Corridor Frontage Category Two*

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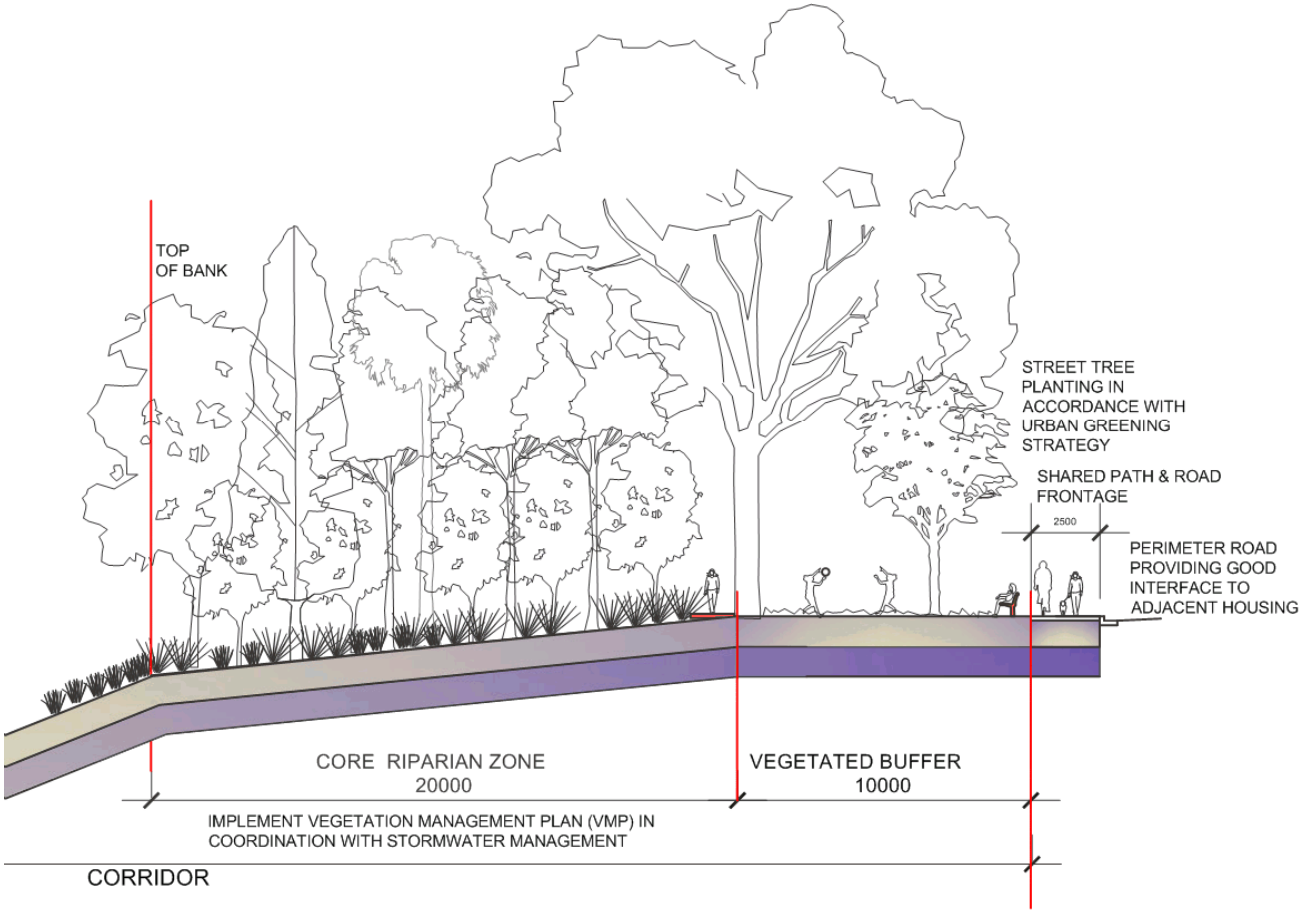
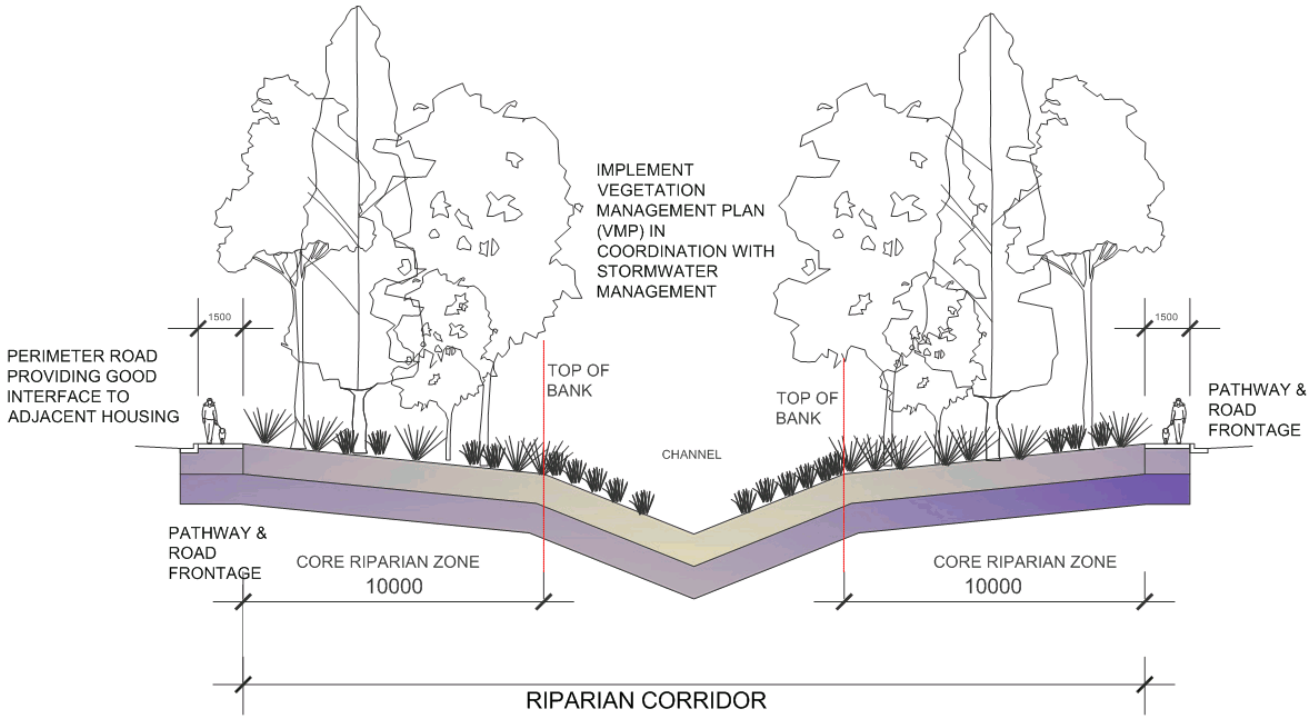
WALKING,
RUNNING,
OFF ROAD
CYCLING TRAIL
PERIMETER ROAD
PROVIDING GOOD
INTERFACE TO
ADJACENT
HOUSING
SHARED PATH
WITHIN
VEGETATIVE
BUFFER
IMPLEMENT VEGETATION MANAGEMENT PLAN (VMP)
IN COORDINATION WITH STORMWATER
MANAGEMENT
40000
10000
CORE RIPARIAN ZONE
VEGETATED BUFFER
CORRIDOR


TOP
OF BANK
STREET TREE
PLANTING IN
ACCORDANCE WITH
URBAN GREENING
STRATEGY
SHARED PATH & ROAD
FRONTAGE
2500
PERIMETER ROAD
PROVIDING GOOD
INTERFACE TO
ADJACENT HOUSING
CORE RIPARIAN ZONE
20000
VEGETATED BUFFER
10000
IMPLEMENT VEGETATION MANAGEMENT PLAN (VMP) IN
COORDINATION WITH STORMWATER MANAGEMENT
CORRIDOR

Riparian Corridor - Category Three

Figure 8 *Typical Riparian Corridor Frontage Category Three*



4.2 Open Space Water Management

Objectives

The design of stormwater management at times has a significant impact on open spaces as it is often integrated. The required facilities should not impede the recreational function of an open space and where possible it should be designed to complement and enhance recreational opportunities.

Permanent detention basins and panels can not be included in open space calculations. Dual use of open space and detention areas must be carefully considered, as there are safety hazards associated with pairing of stormwater management in open space, which may not be obvious to users. Stormwater facilities should be located in consideration of the activity areas function.

The key criteria for the design of stormwater and flood management infrastructure in open space should be aesthetics, safety, maintenance, and public access risk analyses.

Stormwater engineers and landscape architects have a key role in shaping open space and contributing to community benefits that go beyond flood mitigation.

Requirements

Safety
If stormwater and flood plain management infrastructure are integrated into open space it must be demonstrated that all aspects of public access risk analysis, safety and aesthetics have been achieved in the design. The design of stormwater must be in accordance with 'Queensland Urban Drainage Manual Third Edition 2013 - provisional, Department of Energy Pnd Water Supply'. This requires that water management functions are assessed and graded for their ability to safely accommodate public interaction. Where possible the design should offer opportunities for the public to interact with components of the water cycle management system and provide environmental education. Fencing to prevent public access should only be used where all other safety in design measures are not feasible.

Safety in Design Report
A Safety in Design Report is required for the investigation of proposed stormwater infrastructure in open space design, considering the location, type and size of infrastructure necessary, as well as public access requirements and proposed recreational use. Types of stormwater structures may include pipe inlets /outlets, basins, grates and surface flow paths. The associated risks arising from the proposal must be detailed, and how those risks are to be mitigated. This report is required to identify and rectify any potential design safety issues such that future risks can be mitigated during the operational phase of the proposal.

Slope Gradients
The side slopes of detention basins should be a maximum gradient of 16 percent or flatter to allow easy egress up the likely wet surface. Areas with slopes steeper than 25 percent cannot be turfed and will require steps and a handrail to assist egress at regular intervals. Drainage swales and pits and pipes should not impede maintenance operations and the recreational function of a park.

Stormwater Management and Active (Formal) Sports
It is essential that the active (formal) sportsfield component of open space is designed to ensure that it is not significantly affected by flooding and is available year round for competition play except during the flooding event. Sportsfields should be located outside the 10 percent Annual Exceedance Probability (AEP) flood extent. Sportsfields incorporated into open space designs should be available for play with good diversion and subsurface drainage around any active playing areas. Designs of sportsfields should minimise the frequency of maintenance as a result of stormwater run-off.

Stormwater Management and Passive (Informal) Sports
The preservation of the natural waterways and riparian corridors also provides an important community asset that could provide passive recreational opportunities. Low impact recreation such as walking, track running, cycling (on track only) can be integrated into riparian corridors providing an opportunity for off road pedestrian linkages. If the proposed subdivision water management infrastructure is intended to be dual purposed with open space activities (eg an informal ball sports

area within a detention basin) there are specific requirements that must be provided:

- Side slope gradients cannot exceed 16 percent
- Informal ball sports area gradient cannot exceed 5 percent
- Informal ball sports minimum available area to be 40m x 60m. Any storm-water infrastructure such as outlets, weirs, and swales must be located outside this proposed area so as not to impede usage.
- Informal ball sport area to be provided with adequate subsurface drainage.

Urban Greening and Stormwater Management

Tree planting for shade and amenity wherever possible should be integrated in the floodplain. For example, basin floors and some bank designs offer scope for planting when compatible with the required open space provision. Where trees are proposed to be planted in a floodplain, flood modelling and flood impact mapping must be under-taken to identify the impact on flood behaviour and flood levels resulting from the change in vegetation densi-ties and hydraulic roughness. The flood modelling and impact mapping should be undertaken as part of a flood study prepared by a suitably qualified civil engineer in accordance with Chapters E13 and E14 of the Wollongong DCP2009. This information will need to demonstrate compliance with Clause 7.3 of the Wollongong LEP and Chapter E13 of the Wollongong DCP2009, with respect to flood impacts.

Urban greening and stormwater manage-ment, Nyrang Park, Keiraville.

4.3 WCC Urban Greening Strategy

Objectives

The Wollongong Urban Greening Strategy 2017-2037 aims to strategically increase the quality and quantity of all vegetation in an urban setting, particularly tree canopy cover on all land types.

The West Dapto Urban Release Area presents unique opportunities to increase the quality and quantity of vegetation with the provision of street tree planting, enhancing existing remnant vegetation and riparian areas, and the provision of significant feature tree planting within open space.

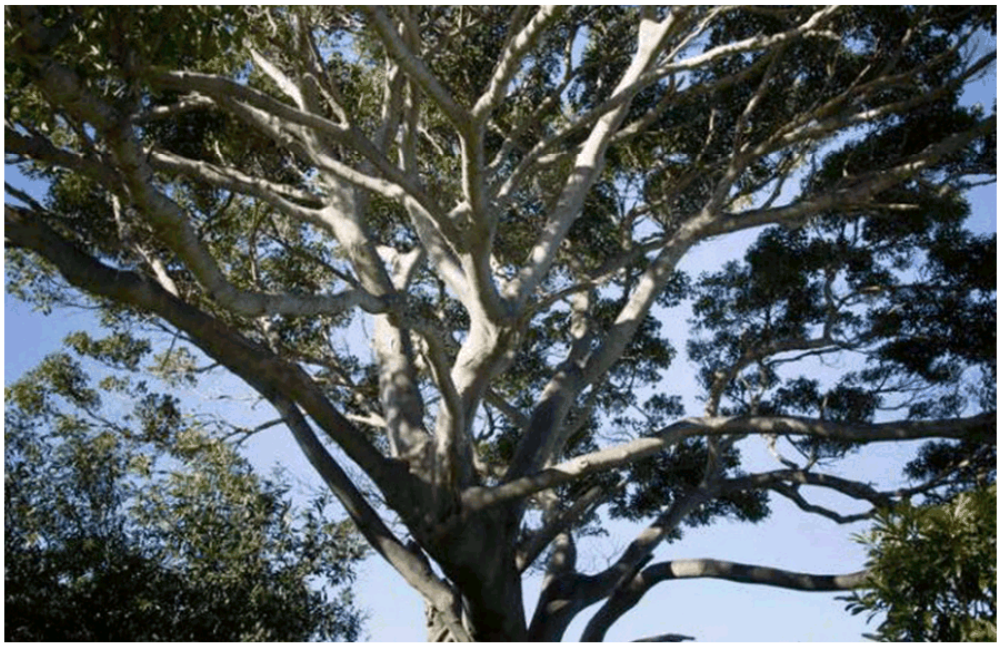
Open space should integrate natural areas such as riparian environments and remnant and regrowth bushland and the active recreational areas with provision of significant tree planting. Open spaces, which are greener and well shaded, will attract people and encourage them to stay longer.

Tree planting is a form of place making as it creates a pleasant place for users. Tree planting provides environmental benefits such as; shade and cooling, protection from prevailing winds, storing carbon, an increased sense of local identity, encouragement of outdoor activity, provision of habitat for local wildlife, and increased property values. Tree planting can frame view corridors and provide privacy.

Tree planting is an essential part of shade provision for open space and associated facilities such as play spaces, seating areas and pathways. Provision of appropriate tree planting around play spaces is considered essential to provide shade for children and carers. Natural shade of play spaces by the provision of evergreen or deciduous trees is preferred to built shade structures.

Street Tree Planting Requirements

- Street tree planting provides a great opportunity to create streetscapes which deliver amenity and environmental performance. Street tree species selected should aim to create avenues of trees which provide shade and visual amenity. A variety of genus and species should be utilised to create diversity. Street tree species selected can be drawn from the West Dapto Open Space Technical Manual Tree Species List or as recommended by Parks and Open Space Manager.
- The equivalent of one (1) street tree for each lot on residential road frontages (ie with locations adjusted for driveway crossings, lighting, sightlines, utility services and the like) will generally be required to enhance the appearance of the locality.



Significant tree canopies contribute to urban amenity

New street tree planting, Paynes road Kembla Grange

- The location of street trees should take into account overhead and underground services.
- Where street trees are to be installed in areas with hard surfaces such as town and village Centres, suitable grates are to be laid around the tree to protect the roots and enable water infiltration.
- Minimum plant requirements for street trees is 100 litre container size, in accordance with AS 2303: 2018 Tree Stock for Landscape Use.
- Trees to be planted in accordance with the standard detail. Refer to West Dapto Open Space Technical Manual for detail.
- The planting of the street trees should occur, after at least 80 percent of the construction and infrastructure work has been completed for the subdivision.
- Where coal wash forms the subgrade of proposed street tree and verge planting a minimum depth of natural soil must be provided to allow healthy root growth. Refer to West Dapto Open Space Technical Manual for details and typical sections.
- A minimum of 52 weeks establishment period should be applied to all new tree plantings. Longer establishment periods may apply under DA conditions.

Tree Planting in Open Space Requirements

Tree planting is required in open space to provide shade and amenity. Canopy trees should be planted to provide shade to active recreational nodes such as sporting fields, basketball and netball courts, exercise stations, play spaces as well as seating areas.

A planting plan must be prepared as part of all open space submissions. Tree planting should be utilised to define spaces and functions in open space.

- Tree planting must be integrated with pathway networks. Tree planting must be offset from pathways in consideration of the tree's mature height and spread.
- Significant feature tree planting should be integrated into open space with the aim of establishing canopy and shade to amenities, parking and play spaces.
- Minimum plant requirements for amenity trees within open space are 75-200 litre container size.
- Tree planting must be spaced adequately to allow deck mowers to access all turfed areas or grouped together in mulch beds.
- Where coal wash forms the subgrade of proposed open space areas a minimum depth 600mm of natural soil must be provided to allow healthy root growth.

- In lawns, tree pits are required to be backfilled with site soil if good quality or with good quality soil, mixed with a suitable soil conditioner. Trees in lawn areas are to be installed with a mulch ring of minimum 1500mm radius and 75 mm thickness.
- Tree planting locations must be compliant with service authority offset requirements.
- As per the WCC Urban Greening Strategy, provision of canopy cover is of the highest priority. Tree species should be selected to provide the maximum canopy size that fits within the context of the selected location.
- Further guidance on tree planting as required to be advised by Parks and Open Space Manager.

Planting in Natural Areas Requirements

Where remnants of existing vegetation will be retained, environmental weeds should be selectively controlled prior to enhancement planting. Weed-free mulch should be laid evenly to a nominal thickness of 75 mm over the prepared subsoil, except along waterways subject to flooding where erosion control matting or similar materials resistant to water movement are to be used.

- Select plants that are indigenous to the local area and appropriate to the existing vegetative community, and include a range of shrub, ground-covers and grass species. Species selection in natural areas is to be consistent with the recommendations in the Vegetation Management Plan. Plant a mixture of tube stock and plants in pots up to 140 mm, to achieve the maximum survival potential.
- Pioneer species should be used in conjunction with slower more permanent species, as to provide shade and protection during the establishment period.
- Plant at sufficient density (recommended average density of 6 native grasses per m2) with the tree component spaced at about 4 to 6 m centres to achieve substantial cover of the ground surface at the time of the Maintenance Inspection.
- Water and weed the rehabilitation area to ensure the site is well established at the time of the inspection, with plants conditioned to survive dry periods without supplementary watering. An approved temporary fence may be required around rehabilitation areas to deter deer and other pests.
- Further guidance on planting for Natural Areas is provided in Council's Vegetation Management Plan Guidelines or as otherwise advised by Council officers.

Protection of Existing Vegetation

Objectives

West Dapto presents opportunities to preserve remnant vegetation and enhance ecological connectivity.

The planning, design and location of open space should aim to preserve and enhance remnant native bushland and riparian areas. Existing trees are considered a valuable asset in the community.

A subdivision application must incorporate the following requirements:

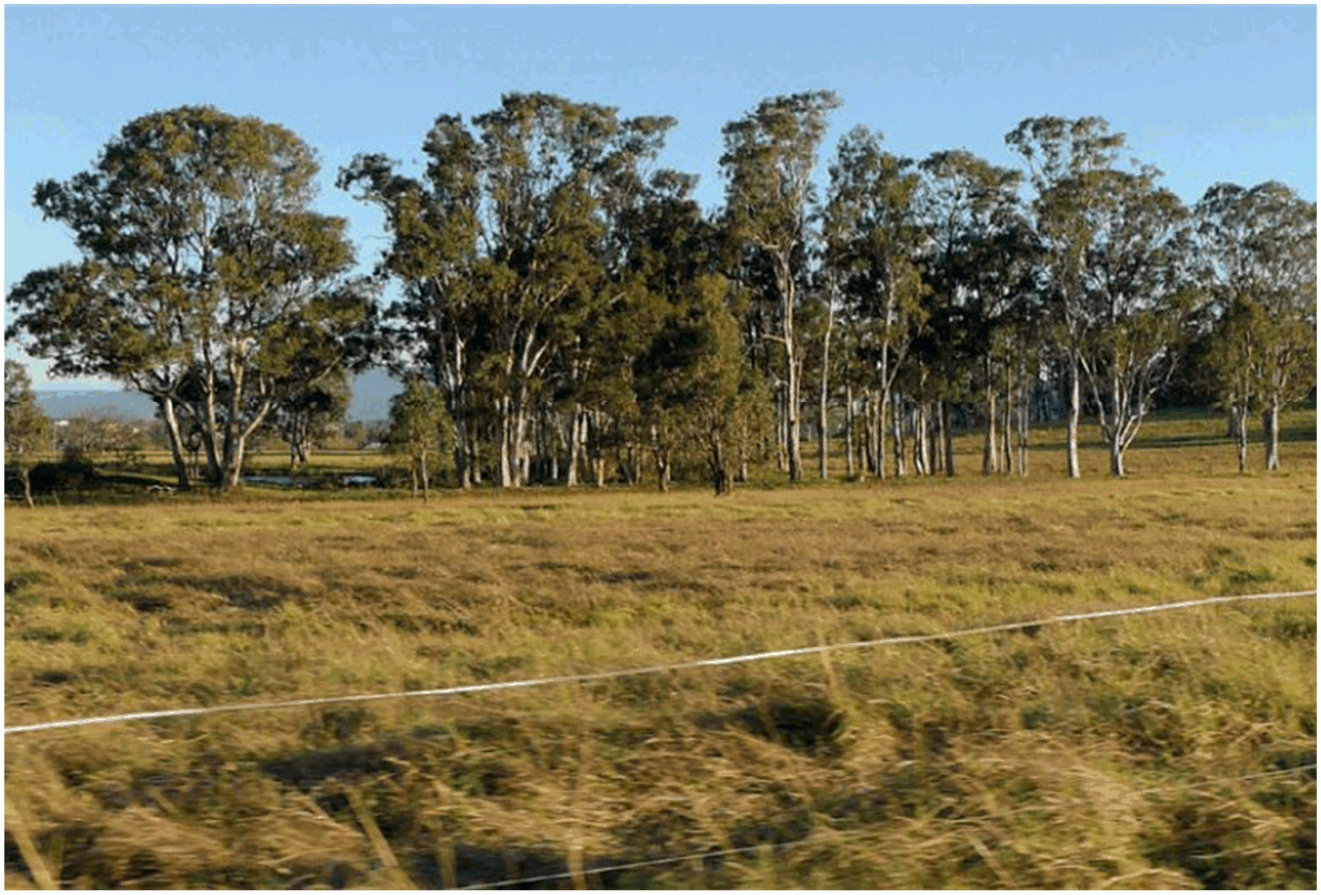
Requirements

- Tree survey of existing trees on the site and trees on adjacent properties, accurately located by a registered surveyor, indicating the trunk location and level to Australian Height Datum (AHD) and an accurate portrayal of the canopy spread,
- The applicant must engage an Australian Qualifications Framework (AQF) Level 5 consulting arborist to prepare an Arboricultural Impact Assessment (AIA) in the initial stages of planning the development to determine which trees are suitable to be retained and integrated into the open space. The suitability of vegetation for incorporation should be based on the tree's health, amenity value and significance of the tree.
- The arborist must assess trees from a public safety risk, where they are located in close proximity to proposed active recreation spaces, pathways and play spaces. In assessing existing remnant/regrowth vegetation the arborist should carry out an AIA to make recommendations for pruning, dead wooding or removal

of hazardous trees. This AIA must address the health, amenity value and Useful Life Expectancy (ULE) rating of each tree.

- Where appropriate an AIA Level 3 assessment may be required;
- Should the land be bushfire prone the landscape plan must be coordinated with the Arborist Report and in accordance with the Planning for Bushfire Protection Guidelines.
- The arborist must provide a Tree Protection Plan (TPP) outlining the specifications for tree protection to be in place during the construction phase including any pruning requirements. All development activity must be in accordance with the Australian Standard 4970 – Protection of Trees on Development Sites.
- Tree protection fencing for retained trees must be installed as per the arborist recommendations prior to the commencement of any excavation or land clearing works.
- The applicant may also be required to have an arborist inspect and report on the tree/s at monthly intervals during construction. This report must be submitted to the Principal Certifying Authority.
- Tree protection details to be as per the Wollongong City Council Civil Specification 2019.

Significant stand of existing vegetation West Dapto Road



4.4 Equal Access

Objectives

Open space should be designed by applying Universal Design principles to promote equal access and connectivity for everyone from the very young to youths and the elderly, families, carers, and people of all abilities.

The design of open spaces should provide equitable access to allow people to access the park in accordance with the Disability Discrimination Act as specified in AS 1428. This will ensure that the design of the open space will eliminate obstacles and barriers that prevent access by people of all ages and abilities and create an inclusive open space that considers as many people's needs as possible.

Open spaces should be easy to navigate, interesting and attractive. They should offer a variety of landscape settings to explore, and provide opportunities to connect with others. Pathways and paved areas must be provided for all weather pedestrian access to key areas and facilities such as lookouts, amenities and play spaces.

Equal Access Requirements

- Points of entry to the park must be compliant with Australian Standard AS1428.1.2009 'Design for Access and Mobility general requirements for access'.
- At least one compliant path of travel must be designed linking to key features or facilities contained within the park such as play spaces, picnic areas and toilets.
- A pathway must link to the park from the Equal Access Parking spaces.

4.5 Material Selection

Objectives

The West Dapto Planning principle for infrastructure is to utilise robust and durable materials with high quality finishes that minimise maintenance requirements and discourage vandalism.

Materials and furniture items within an open space that are difficult to maintain and difficult or costly to replace can have a significant impact on both the aesthetics, function of a park, and the long-term maintenance costs.

Requirements

Open Space infrastructure materials must be:

- vandalism and graffiti resistant
- constructed with low maintenance high quality, durable materials.
- robust and fire resistant
- non-corroding and non-corrosive
- sustainable, with low whole of life costs
- sourced locally where possible (such as site rock)
- comply with relevant Australian standards

Typical materials suitable for use are galvanised steel, stainless steel, aluminium, stone (sourced locally), concrete, recycled hardwood and non-toxic paint.

Refer to West Dapto Open Space Technical Manual for specifications.

Top: Equal access pathway. City of Parramatta

Above: Equal access pathway

High quality, durable seats, East Corrimal

4.6 Open Space Maintenance

Objectives

Open space and park infrastructure must be easy to maintain and financially sustainable. Parks shall not be over-embellished with multiple pieces of bespoke infrastructure. Often the most important elements in parks such as paths, trees, grass, and seats are the simple and long lasting features of parks that appeal to the community. Careful design and planning is required to ensure sustainable ongoing maintenance costs and achieve long lifecycles.

Requirements

- Maintenance access must be provided into open space. Access must be unobtrusive and be separated from pedestrian access points.
- Mass planting in centre medians within roads are not supported unless safe maintenance zones can be provided.
- A minimum of one maintenance access point should be provided at strategic locations along road frontages to provide for maintenance and emergency access.
- A driveway should be formed to create the maintenance access point. A controlled access device such as a removable bollard, gate or lock rail to be installed at each driveway. A 3.5m wide reinforced concrete driveway should be provided as per WCC Civil Specification 2019.
- Where a maintenance access route crosses an internal path, the path must be reinforced to withstand maintenance equipment traversing it.
- Provide for vehicular access to park facilities and areas requiring regular cleaning and ongoing maintenance (toilets, playgrounds, refuse bins, barbecues, mown areas, firebreaks, etc.). Wherever possible all weather access should be provided to these facilities and areas.
- Provide access to stormwater infrastructure such as stormwater detention basins, drainage swales/ channels, stormwater pits, manholes, water quality treatment facilities (eg wetlands, bio retention basins, etc.), and stormwater quality improvement devices (eg GPT's, CDS units, etc.).'
- Feature garden beds in open space should be minimal and be relative to the size, function and service of the public open space. For example, a local park would have minimal to no feature garden beds whereas a neighbourhood park with a civic space may include them.
- A maintenance schedule is required for all open spaces detailing soft and hard landscape features such as areas of turf, mass planting beds, edging, fencing and furniture.

5.0 OPEN SPACE INFRASTRUCTURE DESIGN

5.1 Play Spaces

Objectives

People of all ages and abilities engage in play. Play helps to enhance mental and physical wellbeing. Play happens at our parks, natural areas, beaches, public swimming pools, playgrounds, outdoor exercise stations, skate facilities, youth precincts, public art installations, ball courts, bicycle tracks and many other locations.

The West Dapto Urban Release Area is in a unique position to enable, enhance and promote play opportunities by providing a broad range of quality facilities and infrastructure.

Wollongong City Council has developed a strategy - 'Play Wollongong' which has been developed to guide the future direction of play across the Wollongong Local Government Area (LGA). This strategy focuses specifically on toddlers to 12 year olds. Youth spaces are also required to respond to the natural progression of children to teenagers as outlined in the 'Social Cultural and Recreational Needs Study for the West Dapto New Release Area' Elton, 2007.

Design Principles

Distribution - quality play opportunities must be equitably distributed across the city, including large regional play spaces and smaller local play spaces. Ensure play spaces meet the function, service, size and catchment distance requirements of the park type.

Access - play spaces must be easily accessed by walking and cycling and encourage healthy living and independent access by children.

Engagement - ensure meaningful engagement is undertaken with the surrounding community including children, in relation to play space planning. Work with the local community and engage school children and young people when planning and designing play spaces. Involve children and the broader community in the design of public art features and in accordance with Council's Public Art Policy.

Inclusive and age appropriate design - play spaces are to be inclusive of all ages and abilities and encourage participation in play. Well-designed play spaces provide a range of age-appropriate experiences that can help to foster independence, support social interaction, develop learning and encourage creativity.

Below left:
Play equipment, Bankbook Park Wongawilli

Below right:
Inclusive equipment, Bankbook Park Wongawilli

Informal play spaces - informal play spaces and the provision of natural play elements are to be given priority, recognising the benefits of connecting with nature. Children who are able to access natural play environments regularly are more active and resistant to stress, and play in more imaginative, diverse and creative ways. Natural elements that feature in good play space design include wet/dry creek beds, bridges and tunnels, mounds and slopes, plants and where possible existing trees.

Appropriate risk and challenge - play spaces must provide children with an appropriate level of risk and challenge while complying with relevant safety standards. Play spaces that encourage children to take manageable risks allow them to test their limits.

General Requirements

Playgrounds in parks should be designed, located and constructed in accordance with the following requirements:

- Certification is required that the impact attenuation surfacing and associated landscaping comply with the relevant Australian Standards *AS/NZS 4442:1996* Playground Surfacing Specification Requirements and Test Method.
- Certification is required that the play spaces and play equipment comply with the relevant Australian Standards *AS/NZS 4486.1:1997 Playgrounds and Play Equipment. Part 1: Development, Installation, Inspection, Maintenance and Operation, Standards Australia.*
- Certification is required that the play equipment comply with the relevant Australian Standards *series AS 4685.1, AS4685.2, AS4685.3, AS4685.4, AS4685.5, AS4685.6, AS85.11.*
- Ensure play elements complement and enhance other recreation opportunities in a park. Where possible playgrounds should be linked to other areas of play including open activity areas, natural areas and recreation facilities such as shared paths and basketball courts.
- Ensure play equipment is readily maintainable and approved by WCC. A list of preferred Council suppliers can be provided to assist with the selection of suitable equipment.
- A minimum of five-year manufacturer's warranty is required for any off the shelf equipment.
- Custom playground equipment is permitted in neighbourhood playgrounds only unless approved by WCC.
- Playground design should achieve a balance between carer supervision and independent play. Carer involvement in the play of young children is essential to reduce the risk and severity of accidents. However, older children need to be able to play without constant adult supervision, to maximise opportunities for social development.
- Fencing of play spaces is not encouraged. The location of play spaces should be carefully considered to design out the need for fencing. Where there is no alternative for the location of a playground, a safety fence is permitted between playgrounds and a main road, a water body with standing water, a shared pathway, when play elements are less than 20m from the road frontage, bikeway or water body.
- CCA treated timber must not be used in the construction of play equipment, fencing and furniture within playgrounds.
- The installation of water play elements requires specific involvement and approval of Council during the concept development stage to undertake risk analysis and to plan for sustainable water use.
- Incorporate natural shade and seating and other park furniture.

Playground Surfacing

Surfacing of playgrounds should comply with the following Council requirements.

- Grade the site to produce a gentle fall (maximum 2 percent) towards the perimeter of the playground to enhance drainage, particularly away from fall zones and areas of high traffic or activity. A shallow swale or low bund may be required at strategic locations around the playground to divert overland flow.
- Typical drainage treatment will include the installation of a robust plastic agricultural drain fitted with a filter sock around the outer edge and below the under surfacing area, with disposal to the stormwater system.
- Construct an extruded 200 x 200mm reinforced concrete edge around the perimeter of the playground under surfacing and fill the entire area with an appropriate impact attenuation

Wet pour surface treatment under swings. 'Brickworks' Bulli

Inclusive play features, Beltana Park Googong Queanbeyan

material, in accordance with AS/NZS 4422. The edge must be set back at least 2.5 m from any item of play equipment to provide adequate circulation and maintenance space.

- All features within 1.0 m of the proposed playground such as seats should be incorporated within the boundary of the surfacing by at least 0.5 m, to enhance the aesthetics of the playground and for ease of maintenance of the park.
- Impact attenuation should be provided over the entire fall zone and circulation space around play equipment, as specified in the AS 4685 series, and/or by the equipment manufacturer.
- WCC does not support the use of sand as soft fall due to poor performance, hygiene and high maintenance requirements.
- Solid impact attenuation surfacing such as wet pour synthetic surfacing should be installed under swings, basket swings, slippery dip exits, fireman's poles, and at the entrance and exits of flying foxes. Coverage should extend the length and width of a flying fox unit.
- All finished grass and impact attenuation surfaces should be flush with the concrete edge and internal solid surfacing if applicable, to avoid trip hazards.

Shade

The siting of playgrounds and infrastructure such as seating should take into account the relationship to existing mature vegetation. Advanced stock of suitable tree species should also be planted to provide future shade around playgrounds. More permanent shade structures such as shade sails are often required over larger play elements in neighbourhood playgrounds.

Shade structures are not desirable within local playgrounds with a preference for shade from existing vegetation or supplementary advanced planting of shade trees.

Natural shade to play spaces, 'Melaleuca Park' Jordan Springs Sydney

5.2 Sportsfields

Objectives

The location and design of sportsfields is intended to encourage, promote and facilitate recreational pursuits in the community involving organised competitive sporting activities and games as well as informal recreation. Sportsfields of the West Dapto Urban Release Area must provide for the active (formal) sporting needs of the new population with the provision of sporting facilities such as AFL, soccer, rugby and cricket.

Sportsfield design and location must accommodate flooding and water management without compromising the open space and recreation functions. Sportsfields should be located outside the 10% Annual Exceedance Probability (AEP) flood extent. The fields should be available for play within 3 days after the rain event.

An internal and external pathway network for pedestrians and cyclists must be provided ensuring connectivity within the park and externally to residences and public transport.

The adjacent proposed residential housing must encourage passive surveillance by orientating the dwellings to overlook the open space and deter anti-social behaviour.

Requirements

Standard of Construction - sportsfield construction and layout must be in accordance with the Transport Canberra and City Services (TCCS) publication – 'Design Standards for Urban Infrastructure, 24 - Sportsground Design.'

Sportsfield design principles - the sporting fields are to be planned in consideration of the specific requirements of the relevant sport code such as field size, posts, nets, line markings and safety, in addition to the following points:

- Gradient of fields to be no greater than 2 percent slope
- Orientation of the fields are to be between north and 15 degrees east of north depending on the particular code to be catered for.

Fencing - Sportsfields should be fenced in accordance with the West Dapto Technical Manual, typically with a barrier fence separating road easement and active fields.

Scoreboard - a structure for a scoreboard is required.

Goal Posts - Galvanised steel construction, with in ground sleeves.

Neighbourhood Park – West Epping Park, City of Parramatta. Image sourced from City of Parramatta

Tree planting - sportsfield design must include significant shade tree planting with at least 30 percent of the off field areas of the park provided with natural shade.

Shelter - protection from dominant winds to improve spectator amenity must be provided wherever possible.

Utilities – sportsfields must be provided with all required utilities such as sewer, drainage and water and power connections.

Public amenities - an amenity block is required for Sports Field provision. Toilets with disabled access, showers and change facility must be provided as it is expected people will visit and stay in the park for extended periods. The number of cubicles and size of change rooms is subject to an objective assessment of potential demand.

Passive surveillance - the majority of the park should be road frontage with activated edges to encourage passive surveillance on the frontages. In addition, the park design must include the provision of pathways and shared pathways within the park boundaries to improve passive surveillance within the park.

Signage - park signage must be as per the West Dapto Urban Release Area Open Space Technical Manual to define entries.

Emergency Access – sports park design must include provision for compliant emergency access.

Car parking - provide car parking within the park to facilitate off street parking for visitors.

Any new sportsfield application needs to be accompanied by an assessment of future visitor parking demand (prepared by a suitably qualified transport consultant), and must include the provision of public car parking to facilitate off street parking for visitors.

As part of the visitor demand assessment the applicant needs to:

- Undertake a site-specific on-street car parking capacity survey to establish the number of available on-street and off-street 'public' car parking spaces within a 250 metre radius of the facility.
- Establish the projected weekend sportsfield car parking demand based on surveys of similar existing facilities during peak weekend operation (Saturday and Sunday during winter sport season).
- Provide details of public transport links (proximity of bus and rail stations).
- Provide details of pedestrian and cycling routes. Additional car parking using the criteria above, taking into account any reasonable reductions based on the availability of public transport and pedestrian/cyclist accessibility (maximum of 10 percent).

Integrated perimeter control and tree planting. Towradgi

Standard Dimensions for Sportsfields

(Note: spectator area excluded).

SPORT	PITCH DIMENSION	RUN OFF AREA	ROTATION AREA/ SUBSTITUTION BENCH
AFL	177x 155m	6m from pitch perimeter	5 x 5m
CRICKET	138 x 119m	6m from pitch perimeter	6 x 2m
FOOTBALL	110 x 68m	6m from pitch perimeter	5 x 5m
RUGBY UNION	144x 69m	6m from pitch perimeter	5 x 5m
RUGBY LEAGUE	122x 69m	6m from pitch perimeter	5 x 5m
TOUCH FOOTBALL	76x 50m	6m from pitch perimeter	5 x 5m

Table 2
Sourced from Gold Coast Planning Policy II:
Land Development Guidelines Section 6 - Open Space Requirements

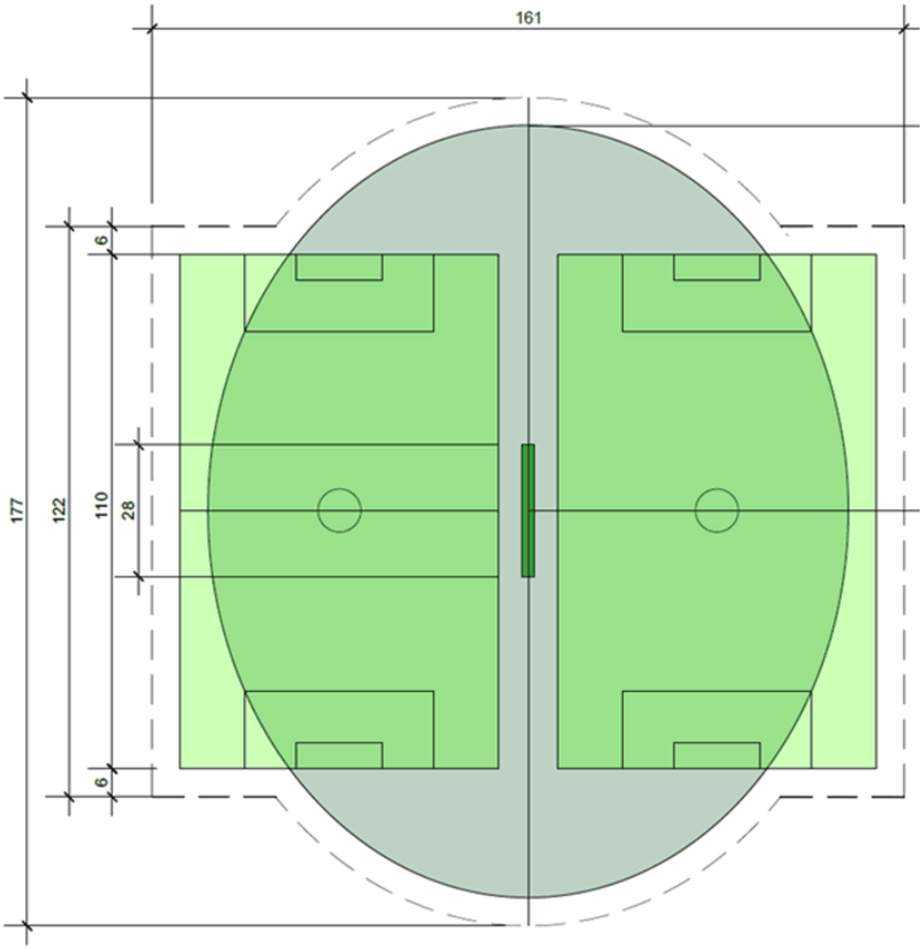


Figure 9
Typical layout multi-sportsfield layout for Cricket, AFL, and Soccer: sourced from Transport Canberra and City Services (TCCS) publication – 'Design Standards for Urban Infrastructure, 24 - Sportsground Design

- Car park design must be in accordance with relevant civil design standards - AS2890 series.
- Disabled car parking must accord with AS2890.6 with the number of spaces provided in accordance with BCA rates. These spaces must be located as close to the entrance of facilities as possible and be linked by an accessible path of travel as per AS1428.1.
- Car park design must include provision for buses.
- Car parking should not visually dominate the landscape and always incorporate substantial shade tree planting.
- Car parking must be linked to the pedestrian path networks within the park.
- A suitable number of bicycle racks to further encourage cycling must be provided. These facilities must be provided as 'Class C' bicycle facilities with adequate weather protection and good passive surveillance.

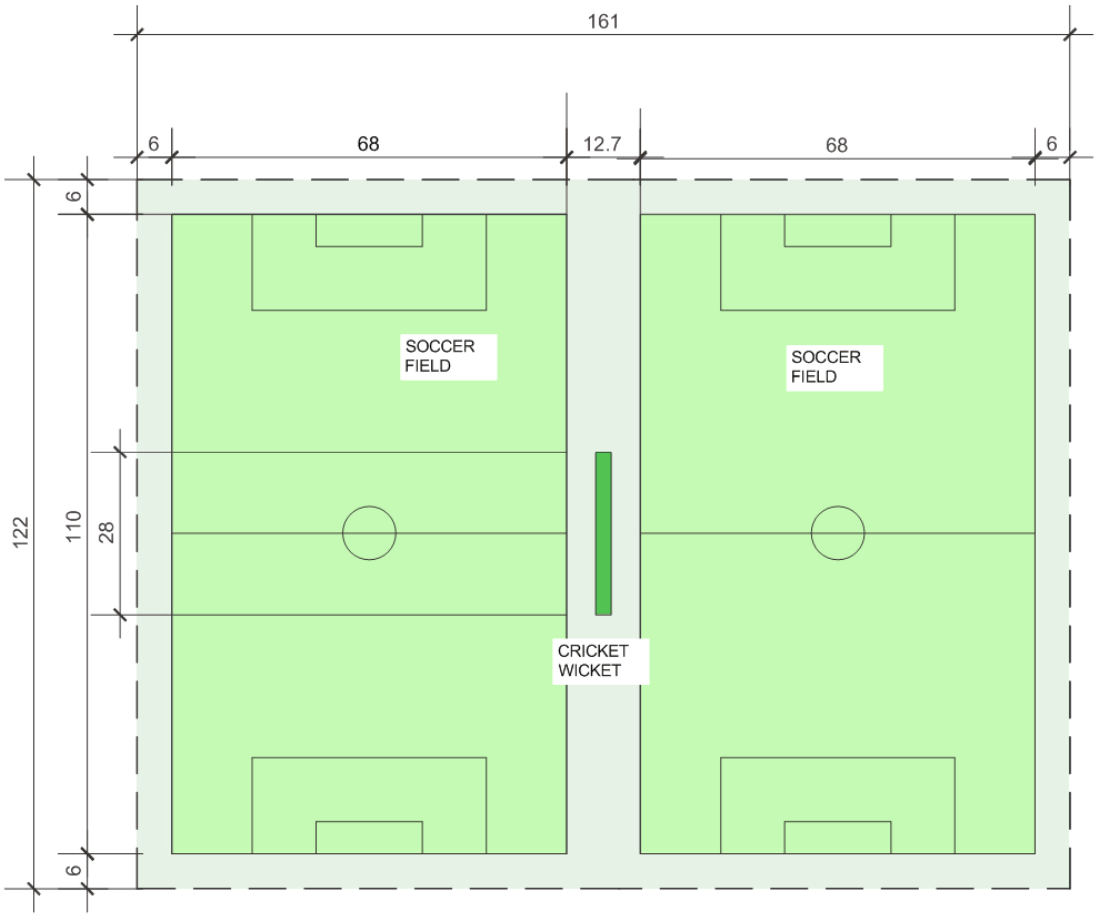
Pathway networks - entry points and paths to internal key destinations such as sports fields and amenities must provide equitable access in accordance with the Disability Discrimination Act. The pathway network should use different widths, path finishes and detailing to establish a clear hierarchy

Perimeter control - the park perimeter is to be furnished with a suitable barrier to define vehicle entry points, including maintenance and emergency access points.

Water supply – Sportsfields are to be provided with a compliant water supply to allow the provision of water for visitors and maintenance of sportsfields. In particular:

- Field irrigation water supply is required for sports grounds for maintenance. Explore opportunities for recycled water for sportsfield irrigation.

Figure 10
Typical layout for dual use – Soccer and Junior Cricket Transport Canberra and City Services (TCCS) publication – 'Design Standards for Urban Infrastructure, 24 - Sportsground Design



- Bubblers and water filling stations are required near play spaces and sportsfields where visitor use is high.

Lighting – sportsfields should comply with the appropriate Australian Lighting Standards, in particular:

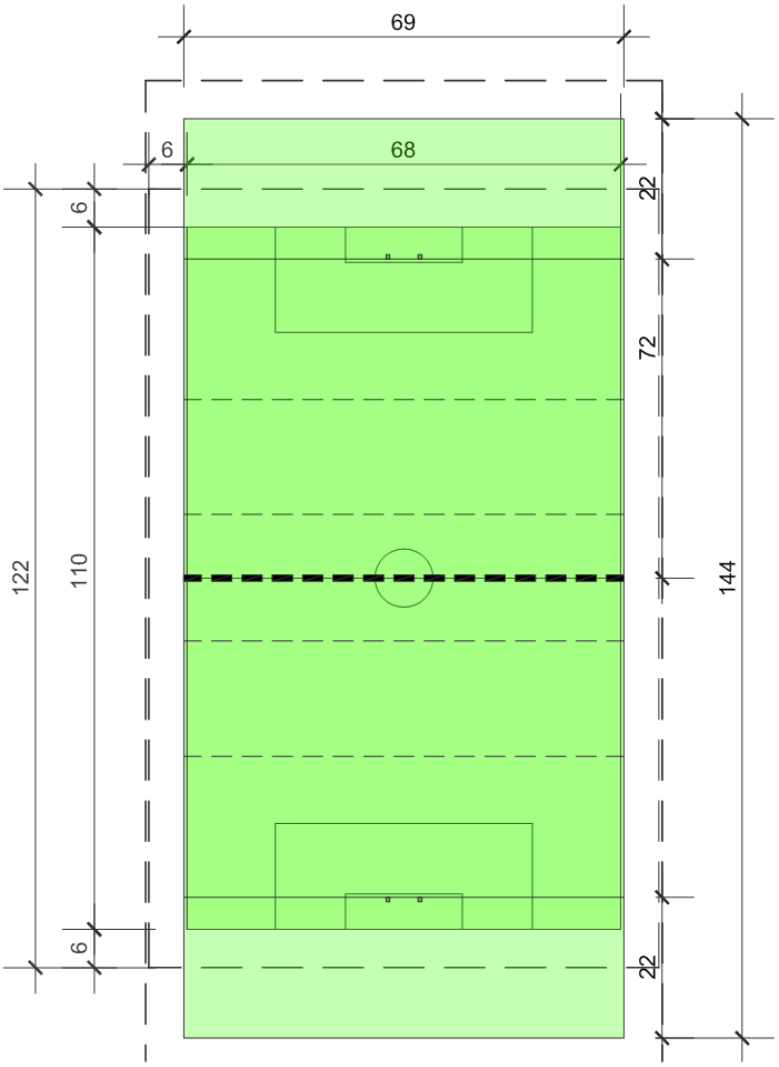
- Lighting to be provided to facilitate evening sports training and competition on sporting fields and pathway networks linked to car parking areas.
- Lighting design should consider illumination and spill requirements for functions, and the siting of light standards to enable free movement of specified mowing equipment.

Waste Requirements - consideration must always be given to the location of bins so that emptying can be undertaken as efficiently as possible, in particular:

- Bins should be located as close as possible to entrances and or road frontages of parks or high activity areas such as BBQ or picnic facilities.
- Bins should be located near a road or the perimeter of the open space to allow the bins to be serviced without the need to drive the collection trucks into the park.

Turf specification for fields – Kikuyu (Pennisetum clandestinum) installed as per West Dapto Open Spaces Technical Manual.

Figure 11
Typical dual use layout for Rugby and Soccer



5.3 Open Space Frontages

Objectives

Good design of park perimeters is essential to activate the park and enable passive surveillance. The majority of the park should be road frontage to allow for passive surveillance.

Parks should have active edges with the provision of pathways or shared pathways to enable passive surveillance.

Requirements

- The majority of park perimeters must be surrounded by a road network with footpath or shared pathways with defined entry points.
- Neighbourhood parks must be located along a major road with additional smaller order roads leading to car parking. Seventy-five percent (75%) of the neighbourhood park must have road frontage. No boundary to be less than thirty (30) metres.
- Local parks should have direct residential frontage with four road frontages.
- Residential dwellings should be oriented to allow passive surveillance.
- All park perimeters should be provided with a suitable barrier to define vehicle entry points including emergency and maintenance access.
- Street trees should be provided to the perimeter of all parks.
- Signage across Council's parks must be consistent and of a high standard. Messages should be consolidated to reduce visual clutter. Refer to West Dapto Urban Release Area Open Space Technical Manual.

5.4 Pathways

Objectives

All neighbourhood and local parks must be linked to the shared pathway network. Walking and cycling is a very important component of active transport in the West Dapto transport system to achieve a sustainable, healthy and active community. Creating attractive walking routes will contribute greatly to the health and vitality of communities.

A hierarchy of internal pathways should be developed to connect the park perimeter pathways to key features and facilities within the open space. At least one internal path should be Equal Access connecting to the main entry point and linking to key facilities in the park such as sportsfields, picnic areas, toilets and play areas.

Pathways should link to shared pathways in riparian areas. Walking and running trails are permitted in natural areas subject to careful route mapping in consideration of high conservation areas, natural landform, existing gradients, and points of interest. Trails should minimise impacts on existing landform and vegetation and other biodiversity values.

Tree planting should be integrated with pathway networks to provide shade and amenity.

Below left: Open space frontage treatment, Penrith NSW

Left right: Internal pathway networks, Stuart Park Wollongong

Requirements

- All paths to be designed in accordance with WCC Civil Specification 2019.
- All concrete pathways shall have a minimum of 1500mm width.
- The selection of planting adjacent to paths should be in consideration of Safety in Design Principles and not provide places of concealment.
- Trees should be offset from pathways to allow sufficient area for the root zone in consideration of the species and mature size.

Shared Pathways

Objectives

Active transport is achieved with the provision of convenient, connected, direct and attractive shared pathway networks between residences, schools, town and village centres, community facilities, parks and public transport nodes. The aim is to increase participation in all forms of cycling and walking by the development of safe, connected networks of shared pathways.

Site analysis of open spaces should map existing shared pathway and footpath networks. The parks need to connect to shared pathway networks to create safe and easy access to the park by bike, scooter or walking.

Neighbourhood parks should integrate the shared pathway network. The shared pathway network could be integrated into transmission easements, riparian areas and open space to create convenient pedestrian and cycle links that are safe, scenic and direct.

Shared path bridges are planned as part of the West Dapto Section 94 Plan on major riparian corridors to allow direct linkages and maximise accessibility between precincts and land uses.

Requirements

Shared pathway networks must provide both connectivity within the proposed subdivision, and form part of the wider context of the West Dapto Urban Release Area active transport network.

- A site analysis should be undertaken mapping any existing or proposed shared path networks within the park's catchment area prior to commencement of shared pathway route planning.

Below: Shared pathway, Squires Way Wollongong

Bottom: Shared pathway adjacent to riparian area, Cordeaux Road Mt Kembla

- Shared pathway networks can be integrated into the riparian corridors to provide an off road cycle network.
- Utilisation of the riparian corridors can create pedestrian and cycle links that maximise accessibility between open spaces. Shared pathways should be located where possible outside the 10 percent Annual Exceedance Probability (AEP) flood extent.
- For any shared pedestrian footpath/ cycleway, a minimum 2.5 metre width is required and widened to 3 metres if the shared footpath/cycleway is adjacent to any embankment or structure.
- Fencing must be provided where required with safety fencing ie cycle rails.
- Where possible incorporate a level 0.6m shoulder (maximum cross fall of 2.5%) along both sides of a pathway. No planting should occur in this shoulder to create a safe and level run off area.
- All pedestrian footpaths or shared pathways / cycle ways should be designed in accordance with the requirements of Australian Standard AS 1428-2001. The maximum gradient for such pathways should be one in 14 with handrails, or 1 in 20 without, wherever practicable. The pathway should be constructed of concrete, except where varied by Council.
- Shared pathways should be designed in accordance with RTA NSW Bicycle Guidelines. These comprehensive guidelines assist in the planning and construction of high quality bicycle transport facilities in NSW including on-road and off-road facilities, intersection treatments, parking, line marking and signage. This document is to be read in conjunction with Austroads Guides part 6A: Pedestrian and Cyclist Paths, which prevails where there are differences between these two sets of guidelines.
- Provide end of trip facilities such as bubblers, water bottle filling station, seating and picnic facilities within parks.
- Provide bicycle parking at all parks.

Trails

Objectives

A trail is a component of the active transport network that is compatible with natural areas. Trail networks can facilitate activities such as walking, jogging and on trail cycling. The trail networks within a natural area should be planned around the high conservation areas, natural landform, existing gradients, and points of interest. Trails should minimise impacts on existing landform and vegetation and other biodiversity values.

Trails can also provide access to undertake maintenance in a natural area.

Requirements

- Trail construction materials can vary dependent on site conditions and anticipated uses.
- All walking trails should be in accordance with Australian Standard 2156.2:2001 - Walking Tracks Infrastructure Design. This standard specifies requirements for the structural design of walking track structures, to protect natural and cultural assets.

Concrete pathway adjacent to riparian area, Wongawilli

- Trail heads or trail access points must be visible. Trails should have good lines of sight.
- As part of the trail route design the applicant will be required to undertake a comprehensive risk assessment following CPTED principles.
- A hierarchy of trails should be determined with variable pathway widths dependent on function (with a minimum of 1.5m width). The width of a trail should respond to not only the hierarchy but also respond to natural features and vegetation.
- Trails should be designed to ensure that they are not significantly damaged in a storm event with a hard wearing surface preferred unless there is significant existing vegetation which may be impacted.
- Trails in natural areas, should incorporate long sweeping bends and meanders, with crests and gentle rises and falls, to create interest and assist drainage.
- Raised walkways and minor footbridges are permitted in natural areas in low-lying areas and areas of high environmental sensitivity. Materials for raised walkways and bridges must be durable, hardwearing and slip resistant. Structural components should be corrosion resistant such as galvanised steel and Fibre Reinforced Plastic (FRP). All boardwalks and pedestrian bridges to be designed in accordance with Australian Standard 2156.2:2001 - Walking Tracks Infrastructure Design.

Off Road Cycling

Objectives

Open space designs should provide a safe and fun environment to allow for cycling. Mountain biking is a rapidly growing recreational activity in NSW and the riparian corridors of West Dapto provide a unique opportunity for both a formal shared pathway network and for on trail off road cycle network.

Trail networks for off road cycling within a natural area should be planned in consideration of high conservation areas, natural landform, existing gradients and points of interest. Trails should minimise impacts on existing landform, vegetation and other biodiversity.

Planning, design and management of off road cycling trails can minimise environmental impacts, provide a quality experience for riders to enjoy and appreciate open space, and minimise conflict between park users.

Requirements

- The Australian Mountain Bike Trail Guidelines for trail planning, design and construction should be utilised to create a sustainable mountain bike network. Off road bike tracks must be designed and constructed so that water flows are managed and riders and other users are contained on the tracks. This is crucial to reduce erosion, sediment travel, track widening and proliferation, vegetation damage, and associated maintenance requirements.

Left: Off road cycling trails, Mt Kosciuszko

Below: Off road cycling trails, Falls Creek Victoria

5.5 Car Parking

Objectives

Car parks should be located in areas which have natural surveillance from adjoining residential areas. Car parking within the park should not visually dominate and always incorporate substantial shade tree planting.
Car parking should be separated from dedicated play spaces so there is no conflict between vehicles and pedestrians.

Requirements

- Car park design within open space must comply with relevant civil design Australian Standards.
- Car parking within the park should not dominate the development and provide shade to a minimum of 50 percent of parked vehicles. This should be achieved by the provision of medians and planting beds within the car parks to allow for shade tree planting. Appropriate soil volumes must be provided in consideration of proposed stocking rate.
- Planting beds must have sufficient deep soil area for the trees to grow. The minimum dimension of the planting bed is 2.4 metres by 5.5 metres (one car space). If an elongated bed design is required, the minimum width of available soil is 1.5m.
- Pedestrian and vehicular movement is to be clearly separated by use of design devices such as kerbs, bollards and or fencing.
- Car parking must be linked to the pedestrian path networks of the park.
- Trees in car parks should be long-lived large canopy species that do not excessively drop branches or soft fruit that may damage vehicles.
- Car parking should incorporate water sensitive urban design principles.

Car Park and integrated shade planting, Bald Hill Wollongong

5.6 Public Art

Objectives

Public art as defined in the WCC Public Art Strategy & Guidelines is 'a broad term that refers to a range of sculptural installations in the public realm. Public art can be enduring in the form of iconic, stand-alone work and integrated artistic elements. Ultimately, public art embraces its environment, and helps create places that inspire investigation and interaction, and are enjoyable and meaningful in their own right'.

Public art can enhance open spaces by:

- creating a sense of place,
- enhancing and enriching our experience in a public space by representing the local history of the area,
- increasing amenity and activating the open space,
- providing a medium to educate on the culture and heritage of an area.

Public art is permitted in neighbourhood and district parks only, due to the long term maintenance costs of the work.

Requirements

Public artwork and design proposals must be submitted to be assessed by the Public Art Advisory Panel and comply with the following requirements to be considered for approval:

- The artwork should not portray or depict material in a way which discriminates against or vilifies a person or section of the community on account of race, ethnicity, nationality, gender, age, sexual preference, religion, disability, mental illness or political belief.
- The artwork must principally include the work of artists and art-forms or designers and should not contain advertising or promotional material for any other product or service.
- The artwork must be the original work of the submitter and must have obtained all necessary clearances and approvals for subjects or materials featured in the work.
- The artwork should not employ sexual appeal in a manner which is exploitative and degrading of any individual or group of people.
- The artwork should not present or portray violence unless it is justifiable in the context.
- The artwork should not use language which is inappropriate in the circumstances.
- Public art should be located offline from pathways to ensure they do not create a hazard.
- Items should not have any sharp edges that could be a hazard to people.
- Artworks should be designed to prevent finger and head entrapment.
- A maintenance report is required to be prepared by the artist at the end of the project addressing the following:
  - a description of the artwork (including digital images and the date of completion);
  - artist/artist team contact details;
  - completed list of construction drawings;
  - a maintenance schedule
  - an agreement relating to decommissioning of an artwork once it has reached its intended lifespan, has been damaged or destroyed, and is no longer safe;
  - the method of construction, the types of materials used and details of the fabrication company (if relevant);
  - any specific instructions or products to be used when cleaning and maintaining the artwork.

Public art Bald Hill Stanwell Park

BMX Pump track (Barden Ridge). Image sourced from Sutherland Shire Council

5.7 Skateboarding, Scooting, & Bmx

Objectives

Parks need to cater to the needs of both young and older children with the provision of facilities for skateboarding, scooting, roller blading, and BMX riding.

This section does not relate to the provision of formal skate facilities but to features and elements where skating, scooting and roller blading can occur without conflict with other open space users. BMX riding activities can be accommodated in separate BMX and pump tracks.

Requirements

All concrete pathways can be used for skateboarding, scooting and roller blading.

- Hard landscape elements such as concrete steps, ramps, retaining walls, and steps that are not intended as skate facilities should integrate skate deterrent devices.
- Skating, scooting and roller blading provisions should be located offline from where young children are playing. Surface treatment changes such as unit pavers can be integrated to define skate area.
- Skate specific forms and typical furniture such as wedge boxes and fun boxes can be integrated adjacent to pathway networks to address the needs.
- For design guidelines for BMX facilities refer to BMX (Sports Dimension Guide) - Department of Local Government, Sport and Cultural Industries (Gov of WA).

Right: Skate feature, Holborn Park Berkeley

5.8 Park Furniture

Objectives

Open space furniture selection should be appropriate to the size, function and service of the open space. Parks should not contain an excessive amount of park furniture that results in an unsustainable maintenance cost to the community. For example, a local park would have minimal furniture whereas a neighbourhood park with a greater intensity of use may have a variety of park furniture such as multiple seating options, barbecues, and picnic tables with shelters, drinking fountains and bike racks.

The required provision of furniture and amenities within the park hierarchy is detailed in the West Dapto Open Space Technical Manual – Furniture.

Requirements

- All specifications for park furniture are detailed in the West Dapto Urban Release Area Open Space Technical Manual. Below are some examples of requirements needed.
- Seats should be provided at regular intervals and at points of interest such as play spaces and sporting fields. Seats should be offset from the trail so as not to affect the path of travel. Refer to Open Space Technical Manual for seat specification.
- Seats are to be constructed on an extended concrete pad to allow for wheelchairs, prams, walkers etc. Seats are to be positioned with a continuous accessible path of travel where possible.
- Tree planting should be positioned to complement seat positions to maximise shade.
- Picnic nodes (picnic table with shelter) should be located adjacent to places of special interest, and to complement, and enhance other recreational opportunities in the park. The picnic node must have accessible pedestrian paths from adjoining car parks and roads.
- Within a neighbourhood park, electric barbeques are generally provided as part of a picnic node and must be covered by a shelter.

Picnic shelter, Sheaffes Road Kembla Grange

5.9 Lawn Areas

Objectives

Grass areas provide opportunities for formal and informal recreation in open space. Grass areas should be as large as possible to create functional and flexible spaces to suit a large array of recreational activities.

Requirements

- Informal grass areas for ball sports or unorganised sport should be a minimum dimension of 60m long x 40m wide.
- Lawns should generally be kept clear of furniture elements such as signs, seats, lights, bins.

- Trees in lawns should be spaced to allow ease of mowing and be planted with a maintained 1.5m radius mulch ring where no edge is specified.
- The gradient of lawn areas proposed for informal kick about areas should have a slope of less than 6 percent and greater than 2 percent to allow for surface drainage and safe ball play.
- The maximum slope of turfed areas in public open spaces is to be to be 25 percent to ensure the safety of individuals carrying out maintenance. Areas with slopes steeper than 25 percent must be treated as a mass planting bed and may need stabilisation with a geo fabric.
- Stones, sticks and roots should be removed from all soil profiles.
- Turf areas should have a minimum of 100mm depth of top soil.
- For lawn species and construction details refer to West Dapto Open Space Technical Manual.

5.10 Mass Planting Beds

Objectives

Mass planting beds are defined as a mulched area that is densely planted. Mass planting beds in open space should be minimal and be relative to the size, function and service of the public open space. For example, a local park would have minimal to no mass planting beds whereas focal areas of a neighbourhood park with a civic space may benefit from appropriately sized mass planting beds.

In riparian zones mass planting beds will form part of the re-establishment of the original riparian vegetation community and therefore may be of considerable size dependent on the order of the stream being revegetated.

Although mass planting beds can be an important amenity improvement in the right location, the priority for open space upgrades should always be the establishment of canopy trees, groups of trees and feature trees.

All vegetation established in or around any open space shall be located to maximise passive surveillance opportunities, maintain clear lines of sight and avoid the creation of concealment areas.

Requirements

- Areas with slopes steeper than 25 percent must be planted as a mass planting bed or constructed with materials specifically designed to stabilise the slope.
- All planting areas are to be prepared to a minimum depth of 300mm and free of weed species. This may require the importation of planting mix or a mixture of weed free site soil and soil conditioner.
- If planting areas are required, the garden beds should not be narrower than 750mm for grasses only, and 1500mm for a mix of trees and grasses.
- Planting beds should have hard and robust masonry construction edges installed. The edging should be straight, or with long sweeping curves with no acute angles, which would require hand mowing.
- Planting beds should comprise a mix of native canopy trees, groundcovers and grasses.
- Plants shall comply with AS 2303:2018 be healthy, of good form and be true to species and size. They must be free from pests and disease, and shall not be root bound.
- Advanced trees and grasses are to be planted in good quality soil and humus. The planting hole shall be twice the width and the same depth as the plant container.
- Any sites adjoining any natural areas or creek lines with native vegetation must use locally indigenous species (no cultivars) in the landscape plan and must have regard to any impacts of water flows and flooding.
- Planting selection should be based on a weeds risk assessment to prevent the dispersal of inappropriate species into natural areas.
- Mulch for all planting areas shall be hardwood mulch. Mulch is to be free of weed material and seed, debris and foreign matter. The contractor shall spread a 75mm thickness of approved mulch on all mass planting beds and 75mm thick mulch ring around all trees in lawn areas. The stems of all plants shall be kept free of mulch to protect the stem from possible rot.

5.11 Water Supply

Objectives

Open spaces must be provided with a water supply to allow the provision of water for maintenance of landscape areas as well as provision of water for bubblers. Taps should be provided in a park to allow the cleaning of infrastructure and the maintenance of turf and planting areas.
Bubblers and water filling stations are also required near play spaces and active recreation nodes where it is expected that people stay longer.
Water supply for irrigation of sportsfields should be obtained from sustainable sources such as recycled or harvested water supplies.

Requirements

- A minimum size of 25mm water service connection is required at the park boundary with a water meter and at least one vandal proof water tap.
- Taps should be located near the edge of the landscaping and turf to be maintained. The tap should not interfere with maintenance activities such as grass mowing.
- Taps to be placed in fifty (50) metre intervals.
- Water supply connections should be located within twenty five (25) metres of a maintenance vehicle access point.
- All water provided from Council's reticulated water supply system shall be metered and all irrigation systems shall comply with the back-flow prevention requirements of AS3500 Plumbing and Drainage - Part 1. Locate water supply connections and back-flow prevention devices away from public access points adjacent to other park infrastructure or within landscape beds where possible.
- Bubblers should be provided in parks in key locations, on shared pathway networks and near play spaces and active recreation nodes where visitor use is high.
- A dog drinking bowl must be added to bubblers in proposed dog parks.

5.12 Fencing And Barriers

Objectives

Wherever possible, the need for fencing should be designed out of open space proposals. However, there may be special circumstances where fencing or barriers may be required, such as along road frontages of a park to prevent illegal vehicle access to open space or natural areas, or to provide protection from potential hazards such as permanent water bodies.

As detailed above, play space design should avoid the need for fencing by careful planning and placement of the play environment wherever possible.

The type of fence or barrier to be provided in open space should be consistent with the park type and existing site characteristics. Fencing must be robustly constructed and made from durable materials with high quality finishes that minimise maintenance requirements.

Requirements

- Fence rails and the tops of bollards should be generally installed following the overall slope of the land, without minor dips and bumps.
- Vehicle barriers are to be installed along the perimeter of natural areas, along road frontages and near public entrances and facilities. Refer to the West Dapto Technical Manual for a range of appropriate fence types.
- Barrier materials to control and define the entry points into natural areas should be as simple and robust as possible, such as quarry sawn sandstone 'logs', timber railing fences, bollards, or galvanised pipe and timber posts as detailed in the Open Space Technical Manual.
- Designated access gates to be provided for emergency and maintenance vehicles as detailed in the Open Space Technical Manual.
- Ensure that fencing adjacent to riparian areas does not result in the undesirable obstruction of the free flow of floodwaters, or obstruct the connectivity and movement of fauna along riparian corridors.

- Fencing is required where there is a danger of children gaining access to high risk areas (eg around stormwater drain head walls, outlets and stormwater quality improvement devices) or where the drop height exceeds 1.0m. Fencing to be installed in accordance with stormwater design best practice and relevant standards. Refer to the West Dapto Urban Release Area Open Space Technical Manual for a range of appropriate fence types.
- A safety fence is permitted when play elements are less than 20m from the road frontage, shared pathway or water body.

5.13 Retaining Walls

Objectives

Wherever possible, the need for retaining walls should be designed out of open space proposals. Retaining walls will only be permitted in special circumstances such as to achieve accessible paths of travel or to retain the natural ground levels around significant vegetation.

Requirements

- Retaining walls over 1000mm high are to be designed and certified by an experienced chartered structural engineer and will require safety fencing.
- Retaining walls must be constructed with low maintenance high quality, durable materials. In this regard, masonry and stone walls are preferred as retaining structures.
- Boulder walls may only be constructed where natural stone is a feature of the site and the retaining walls are less than one metre in height.
- Timber retaining walls are not acceptable.

Retaining Wall, Bulli

5.14 Dog Parks

Objectives

The term 'dog park' is generally given to designated fenced dog off leash areas that contain a variety of landscape features and/or equipment that offer different activities and experiences for dog owners and their dogs. They are defined areas which offer a safe and controlled environment for dogs to play, socialise, interact and exercise with other dogs and their owners. Dog parks can contribute to enhancing social connectivity and improving community health. The provision of dog parks may also reduce impact on sensitive natural habitats by the creation of purpose built facilities.

The Companion Animal's Act 1998 states that dogs under effective control of a companion person are allowed in open space. Under the Act, dogs are not allowed within 10m of children's play equipment and in areas specifically prohibited by Council.

Dog parks must be located where people want to go, where people will feel safe, where natural surveillance is achieved through passing cars and/or foot traffic, and a site that is not within 50 metres of residential houses.

The design and detailing of dog exercise embellishments should blend in and complement the landscape quality of the space.

Requirements

- Minimum area required for a fenced dog park is 0.25 to 1.0 hectares.
- Dog parks must not be placed adjacent to children's playgrounds.
- Dog parks cannot be co-located with formal sportsfields.
- Dog parks could be considered in some drainage areas where there are less competing uses, such as a large detention basin.
- The site must have car parking options.

Dog exercise areas should have the following features as a minimum:

- The installation of double gate systems to allow people to enter/exit the facility easily with their dogs not being able to run away. The entry point must be treated with a hard surface such as concrete;
- The installation of two entrance points to allow people to enter/exit without conflict if encountered;
- provision of a 1.2m high perimeter fence with tree planting to create natural shade around the perimeter;
- seating for visitors;
- waste bins at each entry point;
- a maintenance access gateway;
- a water service to allow for the provision of water for dogs and owners with water fountains and dog bowls;
- regulatory signage;
- open ball play area;
- dog agility equipment.

Dog exercise equipment

5.15 Waste Collection

Objectives

Bins should be located as close as possible to entrances and or road frontages of parks, or high activity areas such as BBQ or picnic facilities. Bins should be located near a road or the perimeter of the open space to allow the bins to be serviced without the need to drive the collection trucks into the park.

Bins shall not be provided in natural areas.

Requirements

- Consideration must always be given to the location of bins so that emptying can be undertaken as efficiently as possible.
- Provide a dispenser for dog waste bags on all bins at neighbourhood parks.
- Bins generally should be positioned offset from a pathway network on a concrete base with a minimum dimension of 1.2 x 1.2m in close proximity to either an entry point or an area of high activity.
- 240 litre size wheelie bins to be used with or without enclosure, depending on type of park.
- Refer to the West Dapto Open Space Technical Manual for specifications for waste bins.

5.16 Transmission Easements

Objectives

Transmission easements primary function is the distribution of power, however they can provide important links between the open space networks. Transmission easement areas should be accessible to the public where possible with the integration of pedestrian/cycle linkages.

Site analysis of open spaces should map existing shared pathway and footpath networks and plan to integrate a safe and easy access to the park by bike, scooter or walking through the transmission easement where possible.

Permitted uses and requirements for treatment of transmission easements vary. Professionals involved with the development, planning, design and integration of transmission easement in open space must consult with electricity service providers.

A general guide of permitted activities is as follows:

- grazing;
- water storage dams, subject to sufficient clearances from conductors and towers;
- non-metallic fences up to three metres in height. Metallic fences, or fences incorporating metallic materials, must be suitably earthed and sectionalised, and are subject to approval by electricity service providers;
- dog exercise could be considered in transmission easement areas where there is good access and parking.

Requirements

The following guidelines apply:

- Pedestrian paths should connect to adjacent open space pathways and shared pathway networks;
- At least one key path must be provided for each transmission easement area;
- When a more complex path network is proposed the design should use different widths to establish a clear hierarchy. Minimum clear path width of 1500mm.

5.17 Signage

Wollongong City Council follows the guidelines of the NSW Geographical Names Board (GNB) for the assignment of names to parks, sportsgrounds, and natural areas within the Wollongong Local Government Area. Council will consider the naming of parks, sports-grounds, natural areas and general community use lands (including features within those) based on the following:

- names of Aboriginal origin and Indigenous significance to the local area;
- botanical reference native to the area;
- historical or cultural significance to the local area;
- geographical relevance of the immediate area;
- a person's name or
- a group – charitable, social/cultural community.

It is acknowledged that the GNB's primary directive is to give precedence to the use of names of Aboriginal origin associated with the feature or a name with an historical background in the area of the feature. Council will utilise these long standing practices wherever possible.

Signage across Council's parks needs to be consistent and of a high standard. Messages should be consolidated to reduce visual clutter. Refer to the West Dapto Open Space Technical Manual for specifications.

Below and bottom: Small interpretive signage examples, Endeavour Drive, Wollongong

Below: Large interpretive signage 'Purrungully' West Dapto

6.0 SUBMISSION REQUIREMENTS

Requirements for submission of Landscape Concept plans to Wollongong City Council when seeking approval for a subdivision development application, which contains open space:

- **Site Analysis plan** - shows relationship of the open space to the development as well as its relationship to the surrounding open space network and original neighbourhood or precinct plan. Connectivity must be shown to shared pathway networks and linkages to key destinations such as town and village centres, community facilities, schools and public transport.
- **Open Space inventory** - assessment of the existing and planned recreational facilities in the surrounding neighbourhood precinct.
- **Landscape Plan** - Refer to Chapter E6: Landscape for Lodgement of a Landscape Plan. A statement from both a registered landscape architect and civil engineer that the proposed open space design complies with the West Dapto Open Space Design Manual
- **Arboricultural Impact Assessment (AIA) report** - to cover existing vegetation. Arborist report must correlate the cut and fill plans with proposed trees to be retained and removed.
- **Flooding impacts on proposed open space** – mapping of flood impacts on proposed open space. For example sportsfields are to be located outside the 10 percent AEP flood extents and are available year around for competition play except during the flooding event.
- **Formal and Informal recreation** - concept designs must demonstrate the achievement of an equal split of active (formal) and passive (informal) play.
- **Vegetation Management Plan** – a VMP must be provided to cover riparian areas and areas of remnant / regrowth vegetation.

7.0 DEFINITIONS

Active (formal) open space
As defined by Greater Sydney Commission 'Active open space is land set aside for the primary purchase of formal outdoor sports for the community. Active open space supports team sports, training and competition'.

Passive (informal) open space
Is land set aside for parks, gardens, linear corridors, conservation bushland and nature reserves. These areas are made available for informal recreation, play and physical activity. Examples of passive (informal) recreation are cycling, exercise stations, running, walking, play spaces, sitting and picnicking.

Consulting Arborist
An arborist qualified to be consulted in the preparation of subdivision documentation must have achieved an AQF Level 5 (or equivalent) qualification.

Dog park
The term 'dog park' is generally given to designated fenced dog off leash areas that contain a variety of landscape features and/or equipment that offer different activities and experiences for dog owners and their dogs.

Landscaped area
A landscape area is a part of a site used for growing plants, grasses and trees which does not include any building, or hard paved area.

Natural areas
Natural areas are reserves created to protect the ecological biodiversity and habitat values of the land, the flora and fauna of the land, and other ecological values of the land. Natural areas include riparian environments and remnant, regrowth and restored bushland. Natural areas protect the aesthetic, heritage, recreational, educational and scientific values of the land. The management of the natural area protects and enhances the values and quality of the land and facilitates public enjoyment of the land with measures directed to minimising or mitigating any disturbance caused by human intrusion.

Public Art
Is defined in the WCC Public Art Strategy & Guidelines 'Public art is a broad term that refers to a range of sculptural installations in the public realm. Public art can be enduring in the form of iconic, stand-alone works and integrated artistic elements. Ultimately, public art embraces its environment and helps create places that inspire investigation and interaction, and are enjoyable and meaningful in their own right'.

Remnant vegetation
Any patch of native vegetation around which most or all of the native vegetation has been removed.

Shared pathway
A concrete or paved path, which is a shared pedestrian/cycleway with a minimum width of 2.5 metres designed in accordance with the requirements of Australian Standard AS 1428-2001 and WCC Civil Specification 2019.

Trail
A trail is usually a path or track to facilitate activities such as walking, jogging and on trail cycling. Trail construction materials can vary from compacted natural ground or compacted gravel to asphalt and concrete.

Tree Protection Zone
The Tree Protection Zone (TPZ) is defined as the optimal distance from the trunk of a tree that should be maintained free of development and construction activity in accordance with AS4970-2009 in order to protect the tree and keep the tree viable.

Urban Greening
Is strategically increasing the quality and quantity of all vegetation in open green spaces and on all land types in an urban setting with a particular emphasis on the increase of canopy cover.

Universal Design is the process of designing for everyone. It is the "design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation and specialised design", Ron Mace, 1997.

Vegetation Management Plan (VMP)
A VMP is a map-based report to assist the landowner to manage a site to ensure that biodiversity on the site is protected, maintained and enhanced.

NOTES

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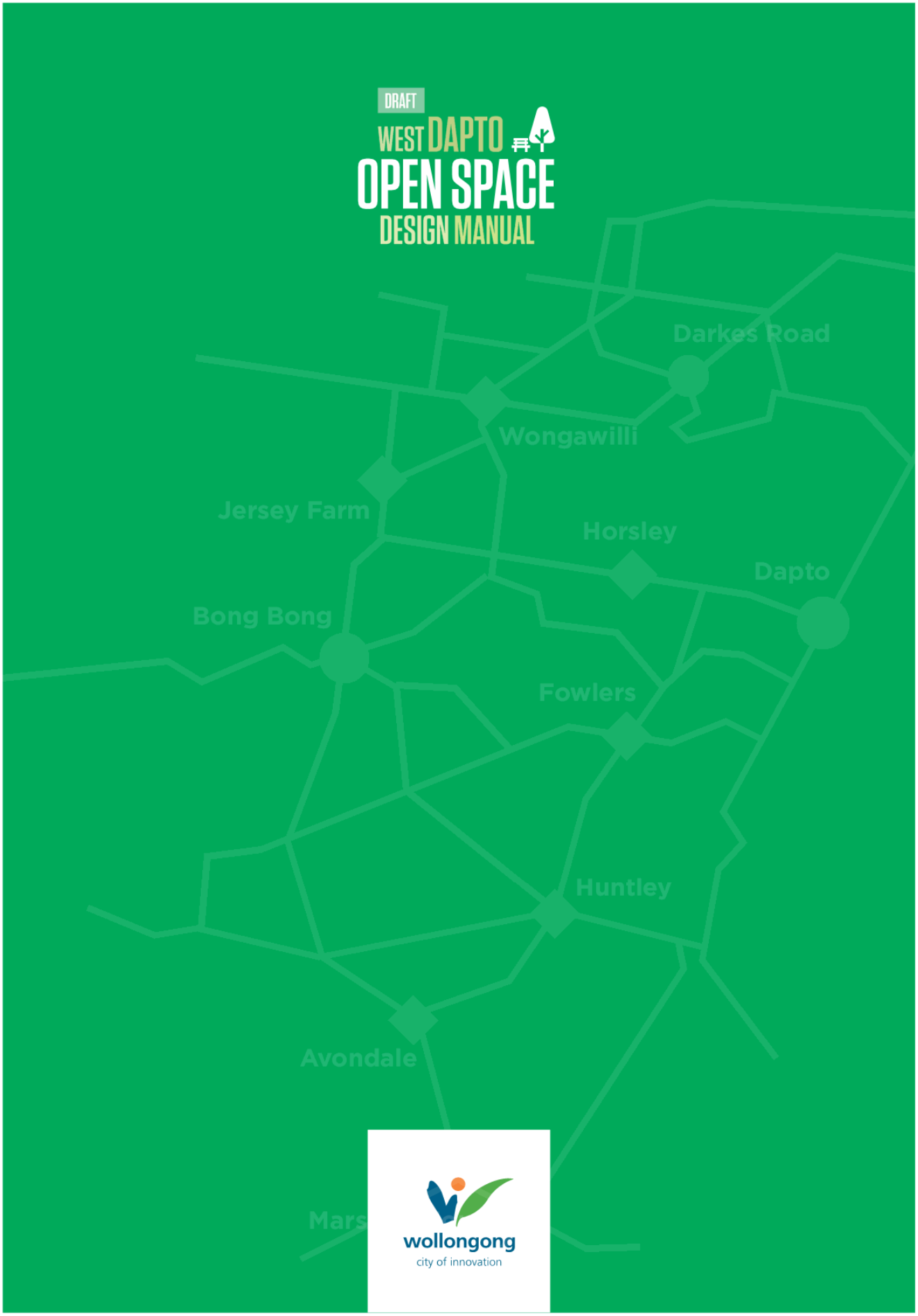
WEST DAPTO OPEN SPACE DESIGN MANUAL



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WEST DAPTO OPEN SPACE TECHNICAL MANUAL

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Document Revision Status

Author	Revision No.	Review	Date Issued
D. Pollock	Draft A	A. Goldie	2/4/19
D. Pollock	EMC Draft	A. Goldie	7/6/19
D. Pollock	Draft for Council	A. Goldie	20/6/19

OPEN SPACE TECHNICAL MANUAL

INTRODUCTION

This manual will be a controlled document that will be updated regularly in line with the changes in maintenance requirements, construction technology, and advances in environmentally sustainable design as experienced by the managing authorities.

Professionals involved with the development, planning and design of open space within the West Dapto Urban Release Area (WDURA) should in all cases also consider the specific qualities, technical requirements and existing site features of each design. The Open Space Technical Manual establishes a series of generic design materials, finishes, and performance standards to be used in open space design. Site specific character and constraints will also influence the design to give each individual space a particular character.

This manual provides technical specifications to ensure that all elements proposed in developments integrate quality design and apply consistent standards of infrastructure within open space that are required to adhere to and facilitate the delivery of, the West Dapto Vision and in line with Council's open space requirements.

Enquiries regarding this document may be directed to the Council's Landscape Architecture Section on telephone number (02) 4227 1111.

The following tables provide a list of the various infrastructure required to be provided in open space to achieve a consistent level of treatment to the type of park and associated service level of maintenance.

OBJECTIVES

Maintenance Costs

Open space and park infrastructure must be easy to maintain and financially sustainable. The level and nature of infrastructure required or considered appropriate will depend on Councils determination of the open space hierarchy, function and service (refer to tables below). Careful design and planning is required to ensure sustainable ongoing maintenance costs and achieve long lifecycles.

Materials and furniture items within an open space that are difficult to maintain and difficult or costly to replace can have a significant impact on the aesthetics, function, and the long term maintenance costs of a park. Materials should be hard wearing, and vandalism and graffiti resistant.

Durability

The West Dapto Planning principle for infrastructure is to utilise robust and durable materials with high quality finishes that minimise maintenance requirements and discourage vandalism.

Tree planting

The tree planting specifications detailed in Table 5 below recognises the importance of establishing street trees as part of the Urban Greening of the West Dapto Urban Release Area. Street trees improve the amenity and quality of city streets in measurable ways such as reduction of dust, glare and temperature extremes. In addition, trees improve streetscapes in more subtle ways that improve the visual quality of the street which is frequently reflected in higher property values.

Due to the importance of the streetscape, it is vital that correct stock is selected and correct methods of planting are applied, as per the details and specifications contained within this document. The tree species list also reflects Council's policy of a preference for local native species.

Amenity and Security

Streets and open spaces must be safe, convenient and comfortable pedestrian spaces that cater to the needs of all users. The design of the open space should provide equal access for all users, such as pedestrian crossovers, and the choice of paving and street furniture should meet slip resistance and access codes. Design for pedestrian amenity should maximise the actual and perceived sense of safety in open space. Active use of all spaces and passive surveillance of streets and open space should be encouraged, particularly at night, in line with Safer by Design principles and in accordance with Crime Prevention Through Environmental Design (CPTED).

Codes and Standards

All infrastructure construction works, including hard and soft landscape material and workmanship must be in accordance with the relevant Australian Standards and Building Codes of Australia, and Wollongong City Council Standard Engineering drawings where applicable.

The Open Space Technical Manual outlines the soft and hard landscape treatments for inclusion in the Landscape Plans and other information in support of a Development Application for a subdivision in The West Dapto Land Release Area (WDURA).

HOW TO USE THIS MANUAL

The following tables provide a list of the various infrastructure to be provided in the park hierarchy to achieve a consistent level of amenity provision and associated service level of maintenance.

OPEN SPACE HIERARCHY PARK TYPE & INFRASTRUCTURE

		TABLE 1 – PARK FURNITURE					
PAGE	ITEM	LOCAL PARK	NEIGHBOURHOOD PARK	NATURAL AREA	TRANSMISSION EASEMENT	DOG PARK	TOWN CENTRES
11	**S1** Seat	X	X	X	X	X	
12	**S2** Bench	X	X	X	X	X	
13	**S3** Seat						X
14	**S4** Bench						X
15	**S5** Picnic Setting		X				X
16	**PS1** Picnic Shelter	X	X				
17	**PS2** Picnic Shelter	X	X				
19	**PS3** Large Picnic Shelter		X				
21	**PS4**- BBQ Shelter		X (optional)				
22	**BBQ**		X (optional)				
23	**GB1** – Bin Post Mount	X				X	
24	**GB2** – Bin Enclosure		X				X
25	**TAP**	X	X			X	X
26	**BU1** - Bubbler	X				X	
27	**BU2/BU3** Equal Access Bubbler		X				X
28	**BR** – Bike Rack	X	X				x
29	**B1** – Timber Bollard		X	X	X		
30	**B2** – Stainless Steel Bollard		X				X
31	**B3** – Removable Bollard	X	X				X
32	**B4** – Sandstone Log	X	X	X			

OPEN SPACE HIERARCHY PARK TYPE & INFRASTRUCTURE							
		TABLE 2 - OPEN SPACE FENCING REQUIREMENTS					
PAGE	ITEM	LOCAL PARK	NEIGHBOURHOOD PARK	NATURAL AREA	TRANSMISSION EASEMENT	DOG PARK	TOWN CENTRES
33	**F1 -** Single rail timber barrier.	X	X	X			
34	**F2 -** Vehicle access control			X			
35	**F3 –** Sports Field Fencing		X				
40	**F4 –** Play Space fencing						
41	**F5 –** Safety Fencing		X				
42	**F6 –** Dog Park Fence					X	
44	**G1 -** Boom Gate	X	X	X			

OPEN SPACE HIERARCHY PARK TYPE & INFRASTRUCTURE							
		TABLE 3 – PATHWAY & PAVEMENT REQUIREMENTS					
PAGE	ITEM	LOCAL PARK	NEIGHBOURHOOD PARK	NATURAL AREA	TRANSMISSION EASEMENT	DOG PARK	TOWN CENTRES
45	Decomposed Granite Path			X			
46	Raised Walkways		X	X			
47	Asphalt Pathway			X			
48	Broom Finished Concrete Pavement	X	X	X	X	X	X
49	Coloured Honed Concrete Pavement		X				X
50	Unit Paving		X				X
51	Softfall	X	X			X	X

OPEN SPACE HIERARCHY PARK TYPE & INFRASTRUCTURE

		TABLE 4 – PARK SIGNAGE					
PAGE	ITEM	LOCAL PARK	NEIGHBOURHOOD PARK	NATURAL AREA	TRANSMISSION EASEMENT	DOG PARK	TOWN CENTRES
53	**PS1 –** Park Name/ Ordinance	X	X	X		X	X
54	**PS2** – Trail Marker	X	X	X		X	X
55	**PS3** – Small Interpretive Sign	X	X	X			X
56	**PS4** – large Interpretive Sign		X	X			X

OPEN SPACE HIERARCHY PARK TYPE & INFRASTRUCTURE

		TABLE 5 – LANDSCAPE DETAILS				
PAGE	ITEM	LOCAL PARK	NEIGHBOURHOOD PARK	NATURAL AREA	DOG PARK	TOWN CENTRES
58-59	Tree Species List	X	X		X	X
60	Street Tree Planting Detail	X	X		X	X
61	Tree Planting with Mulch Ring	X	X		X	X
62	Street Tree Planting in coal wash	X	X	X	X	
63	Tree Planting With Edging	X	X		X	X
64	Mass Planting Detail	X	X	X		X
65	Turf Detail	X	X		X	X

PARK FURNITURE

S1 - Seat

LOCATION:

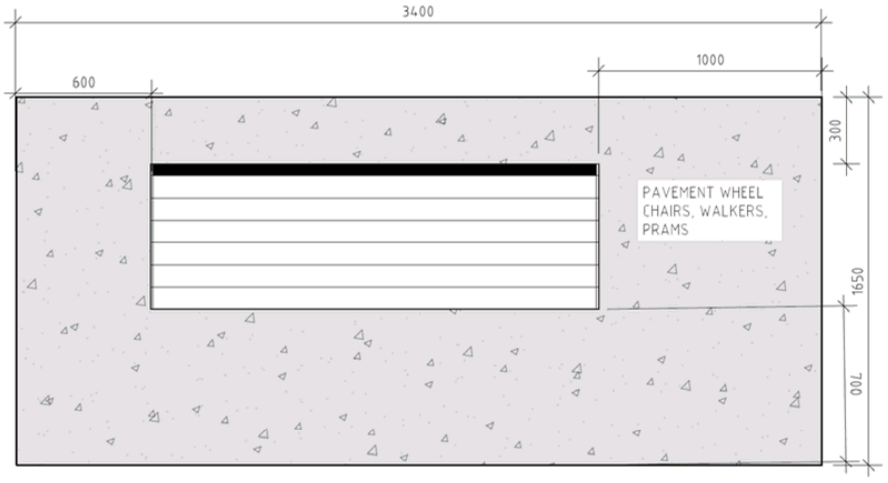
- Natural Areas, Dog Park, Transmission Easements, Local Parks, Neighbourhood Parks.

INSTALLATION:

- Concrete base slab. 3.4m x 1.65m

SPECIFICATION:

- Model: Gossi Park 'Parkway Seat' © or approved equal with armrests with skate guards.
- Frame: Die Cast legs: Powder Coated in standard Dulux colour range (Citi Pearl)
- Batten: Clear anodised aluminium planks, cast aluminium frame.
- Leg type: flange leg surface mounted
- Size:1800m long



S1 SEAT
PLAN NTS

PARK FURNITURE

S2 – Bench

LOCATION:

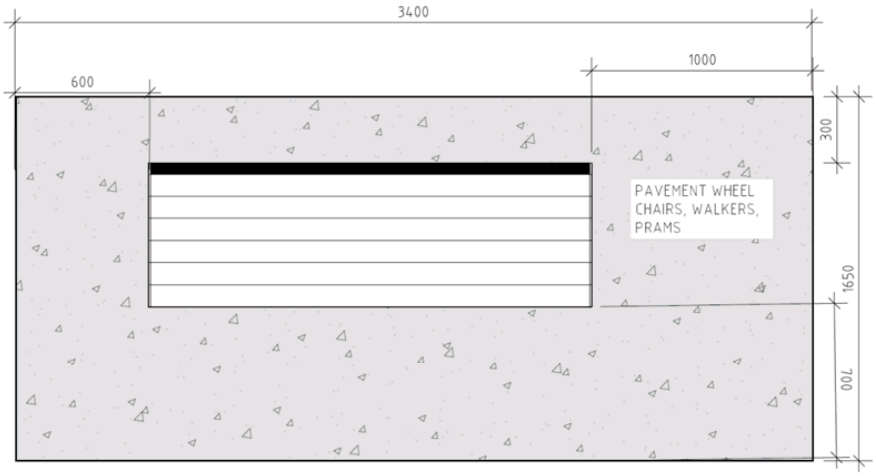
- Natural Areas, Local Parks, Neighbourhood Parks.

INSTALLATION:

- Concrete base slab. 3.4m x 1.65m.

SPECIFICATION:

- Model: Gossi Park 'Boulevard Bench' © or approved equal fitted with skate guards.
- Frame: Die Cast legs, Powder Coated in standard Dulux colour range (Citi Pearl).
- Batten: Clear anodised aluminium planks, cast aluminium frame, cast aluminium frame.
- Leg type: flange leg surface mounted.
- Size:1800mm length.



S2 BENCH
PLAN NTS

PARK FURNITURE

S3 Seat

LOCATION:

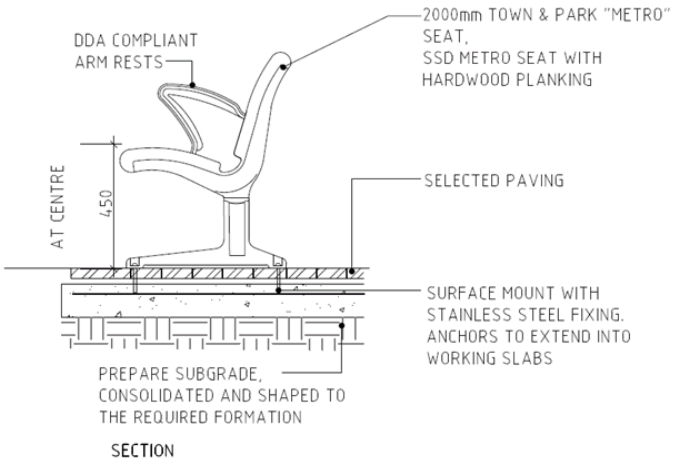
- Town, Village Centres.

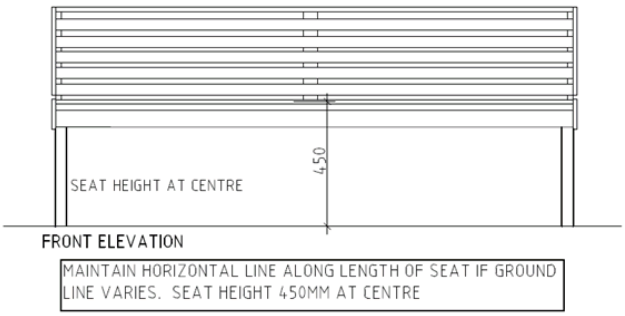
INSTALLATION:

- Surface mounted on unit pavers on concrete base slab.

SPECIFICATION:

- Model: Town and Park Metro Seat with armrests and skate guards by Stoddart © or approved equal.
- Frame: Cast aluminium.
- Battens: oiled Forest Stewardship Council (FCR) certified hardwood timber planks or approved equal.
- Size: 2000mm length.
- Leg type: leg foot surface mounted.





S3 SEAT
SECTION & ELEVATION NTS

PARK FURNITURE

S4 Bench

LOCATION:

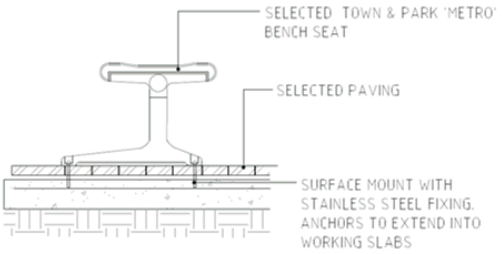
- Town Centres, Village Centres.

INSTALLATION:

- Surface mounted on unit pavers on concrete base slab

SPECIFICATION:

- Model: Town and Park Metro Bench by Stoddart © or approved equal with and skate guards.
- Frame: Cast aluminium frame.
- Batten: oiled Forest Stewardship Council (FCR) certified hardwood timber planks or approved equal.
- Leg type: leg foot surface mounted.
- Size: 2000mm long.



S4 BENCH SEAT
SECTION NTS

PARK FURNITURE

S5 Picnic Setting

LOCATION:

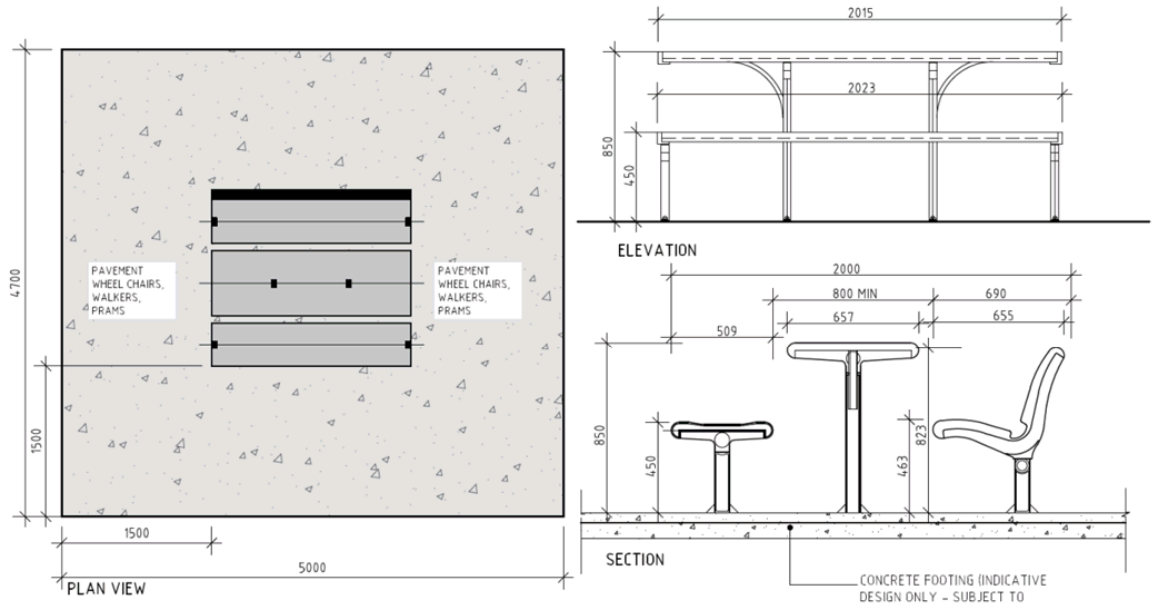
- Town Centres, Neighbourhood Parks

INSTALLATION:

- Unit pavers or coloured concrete base slab. 4.7m X 5m

SPECIFICATION:

- Model: wheelchair accessible Town and Park 'Metro' picnic setting by Stoddart © or approved equal. One (1) 'Metro' Seat and one (1) 'Metro' bench.
- Frame: Cast aluminium frame.
- Table Battens: Clear anodised aluminium planks.
- Seat Battens: oiled Forest Stewardship Council (FCR) certified hardwood timber planks or approved equal.
- Leg type: surface post.
- Size: 2000mm long.



S5 PICNIC SETTING

PLAN, ELEVATION, SECTION NTS

PARK FURNITURE

PS1 Picnic Shelter

LOCATION:

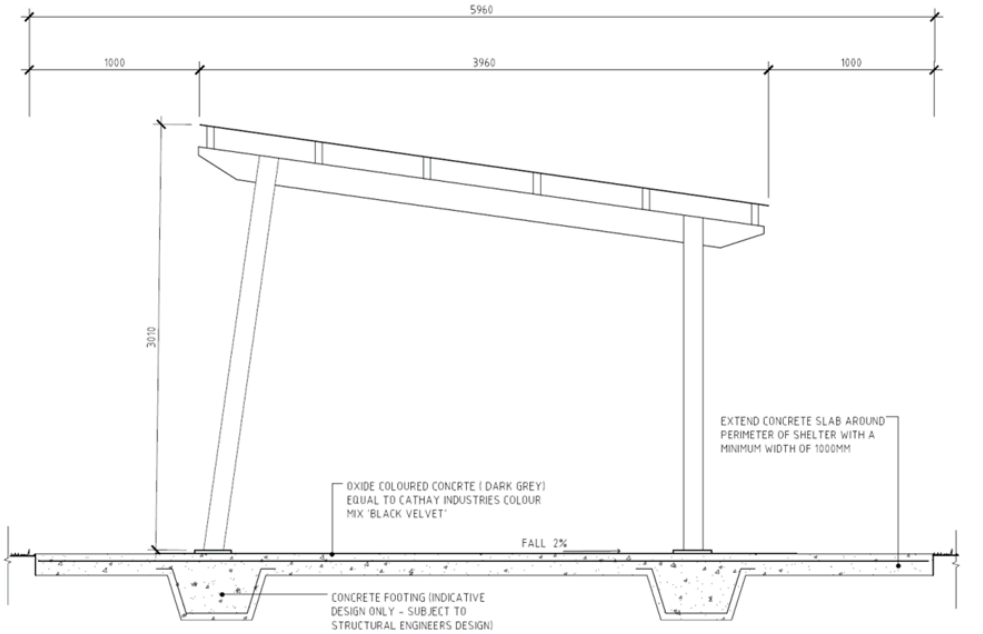
- Local Parks, Neighbourhood Parks

INSTALLATION:

- Surface mounted on oxide coloured concrete (dark grey) 5.96m x 5.8m

SPECIFICATION:

- Tathra Shelter by Precinct © or approved equal.
- Size: 3800mm X 3960mm
- Posts: Extruded aluminium posts 125 x 125 x 5mm powder coated
- Frame: Class 2 F27-Hardwood roof frame with exterior grade stained coating
- Roofing: Pre-cut Colorbond, custom orb roof sheeting - Ultra grade (Surfmist)
- No guttering or downpipes.
- Fixing: Stainless steel brackets and fixings.
- Picnic setting: Wheelchair accessible' 'Bridgewater' table setting with cast aluminium legs by Precinct © or approved equal. Picnic setting: cast aluminium frame with aluminium battens.



PS1 PICNIC SHELTER
SECTIONAL ELEVATION NTS

PARK FURNITURE

PS2 Picnic Shelter

LOCATION:

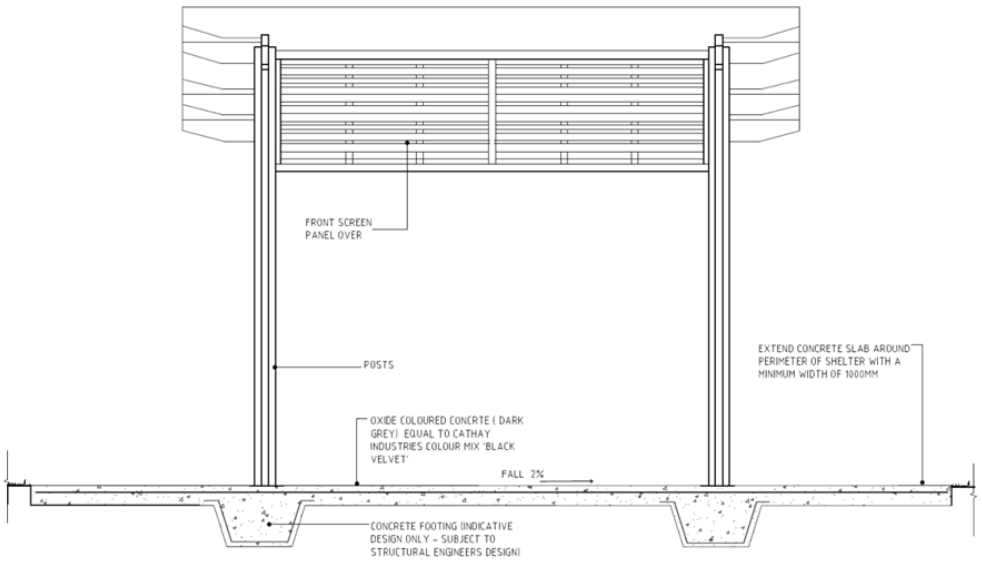
- Local Parks, Neighbourhood Parks

INSTALLATION:

- On oxide coloured concrete (dark grey) 6.m X 6m

SPECIFICATION

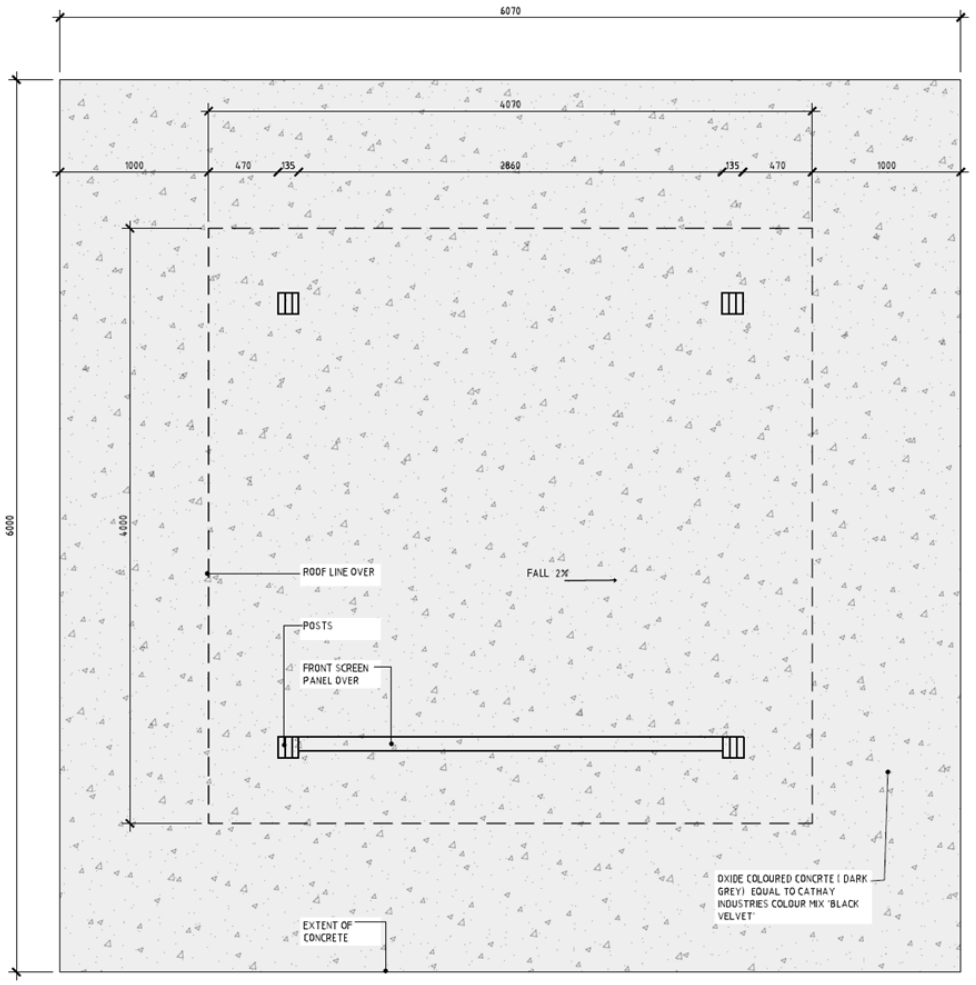
- Skillion roof shelter Peninsula Series (K302) by Landmark © or approved equal
- Size: 4000mm x 4000mm
- Posts: Class 2 F27-Hardwood, factory exterior grade stained coating triple leaf posts.
- Roof frame: ACQ treated, factory exterior grade stained F27 hardwood timber roof frame
- Roofing: Pre-cut Colorbond, custom orb roof sheeting - Ultra grade (Surfmist)
- No guttering or downpipes.
- Fixing: All remaining brackets and fixings are stainless steel **G316** including Stainless steel anti vandal fastenings.
- Picnic setting: Wheelchair accessible' San Remo' by Landmark © or approved equal.



PS2 PICNIC SHELTER

ELEVATION NTS

PARK FURNITURE



PS2 PICNIC SHELTER
PLAN NTS

PARK FURNITURE

PS3 Large Picnic Shelter

LOCATION:

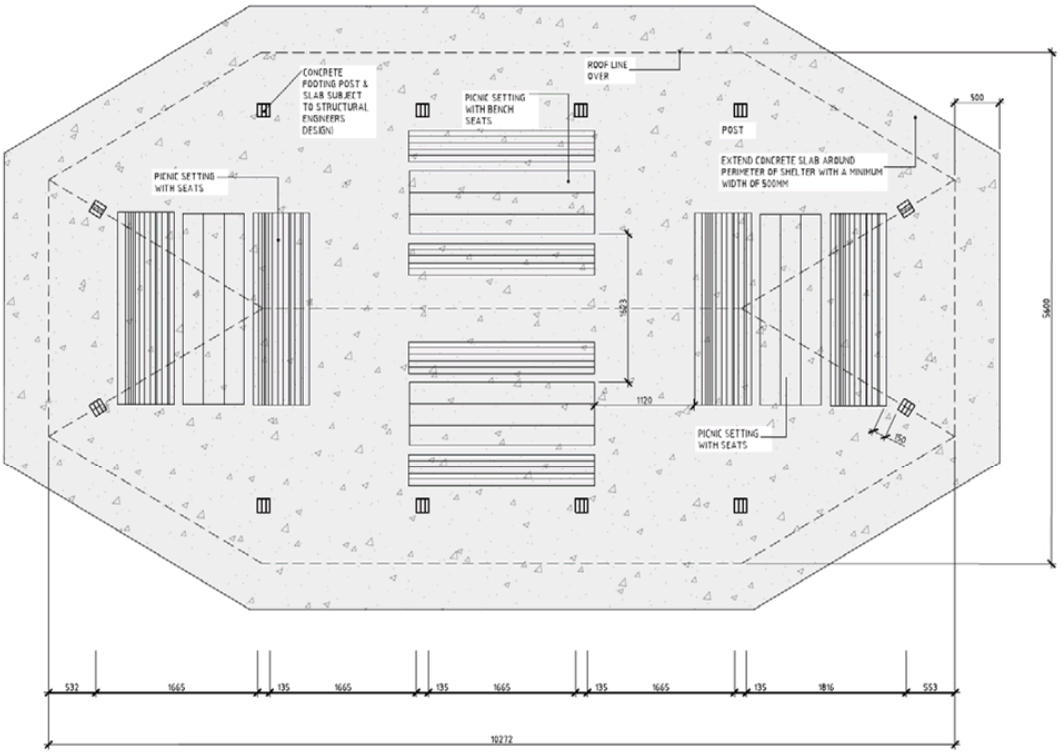
- Neighbourhood Parks.

INSTALLATION:

- Oxide coloured concrete (dark grey)

SPECIFICATION:

- Large picnic shelter with gable roof 'Mulgrave' by Landmark © or approved equal. Product Code K504 10m x 5m
- Posts: Class 2 F27-Hardwood timber dual leaf posts with factory exterior grade stain.
- Roof Frame: ACQ treated, hardwood timber roof frame with factory exterior grade stain.
- Roofing: Pre-cut Colorbond, custom orb roof sheeting - Ultra grade (Surfmist).
- No guttering or downpipes
- Fixing: All remaining brackets and fixings are stainless steel G316 including Stainless steel anti vandal fastenings.



PS 3 PICNIC SHELTER
PLAN NTS

PARK FURNITURE

PS3 Picnic Setting

LOCATION:

- In PS3 Large Picnic Shelter

INSTALLATION:

- Surface mounted.

SPECIFICATION:

- Wheelchair accessible x 4 San Remo' by Landmark or approved equal.
- Frame: aluminium powder coated table and seat frames (Powdercoat: APO Grey).
- Table battens: Aluminium anodised table boards (Clear Finish).
- Bench seat Batten: ACQ treated hardwood timber bench boards with exterior grade stain.
- Leg type: surface post

PARK FURNITURE

PS4 Barbecue Shelter

LOCATION:

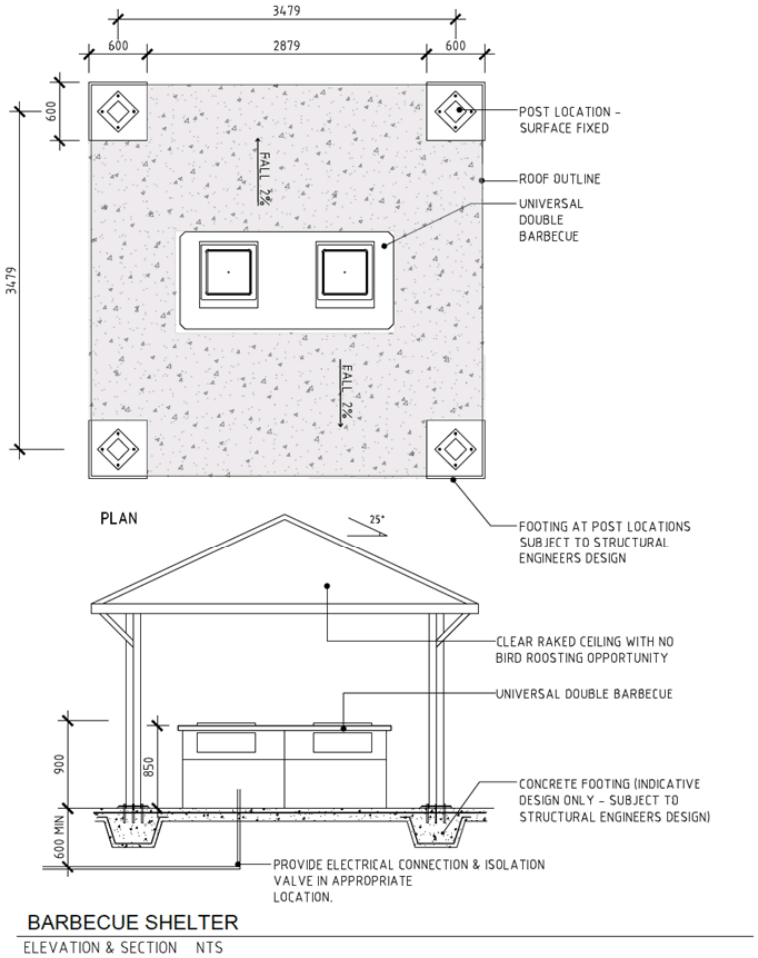
- Neighbourhood parks

INSTALLATION:

- Oxide coloured concrete (dark grey)

SPECIFICATION:

- Barbecue shelter with gable roof 'Tilba' by Precinct © or approved equal
- Size: 4000x 4000mm
- Posts: Class 2 F27-Hardwood timber posts with exterior grade stain.
- Roof Frame: ACQ treated hardwood timber roof frame with exterior grade stain.
- Roofing: Pre-cut Colorbond, custom orb roof sheeting - Ultra grade (Surfmist).
- No guttering or downpipes
- Fixing: All remaining brackets and fixings are stainless steel.



BARBECUE SHELTER
ELEVATION & SECTION NTS

PARK FURNITURE

Barbecue

LOCATION:

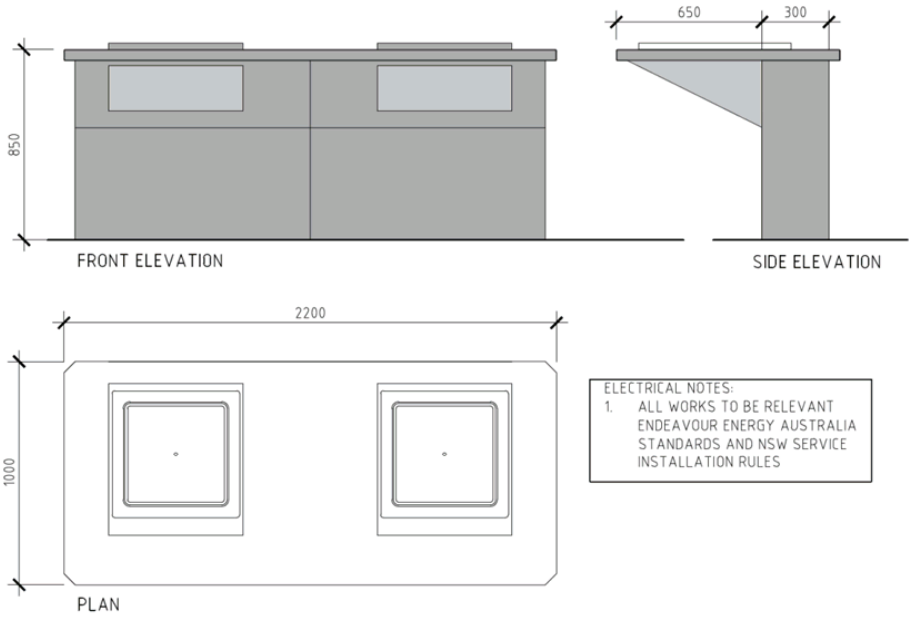
- Neighbourhood parks where need has been demonstrated.

INSTALLATION:

- within Barbecue shelter on oxide coloured concrete (dark grey)

SPECIFICATION:

- Stoddart Town and Park Metro Double Barbeque © or approved equal. CODE: SPTP.BBQ.W.S.SM.DBL.800.D01
- Note: All service locations to be conducted prior and supplies to be continuous with no underground (hidden) connections points. All work to be relevant Endeavour Energy and Australian Standards and NSW Services installation rules.



UNIVERSAL BARBECUE

ELEVATION & PLAN NTS

PARK FURNITURE

GB1 Garbage Bin Post Mount

LOCATION:

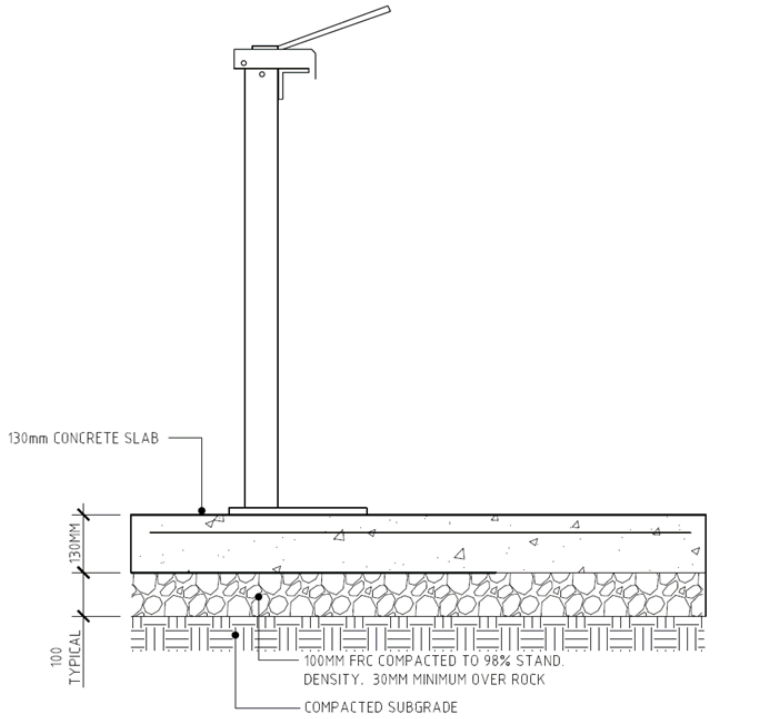
- Local Park, Neighbourhood and Dog Park

INSTALLATION:

- Surface mount on oxide colour concrete pad (dark grey) 1.2m x 1.2m offset from a path in close proximity to either an entry point or an area of high activity.

SPECIFICATION:

- 240 Litre Modular post lock system. Product code: 383 by Draffin Street Furniture© or approved equal.
- Finish: Hot dip Galvanised Finish. 2.5mm TK RHS Upright, 5.0mm TK Mild Steel Angle and Channel, 8.0mm TK Mild Steel Top Arm.



GARBAGE BIN POST MOUNT
SECTION NTS

PARK FURNITURE

GB2 Garbage Bin Enclosure

LOCATION:

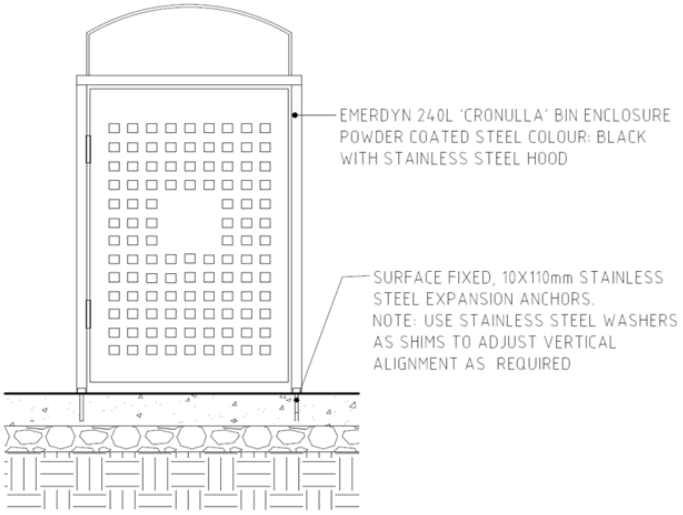
- Town Centres and Neighbourhood Parks

INSTALLATION:

- Surface mount on oxide colour (dark grey) concrete pad minimum 1.2m x 1.2m offset from a path in close proximity to either an entry point or an area of high activity. Ensure that enclosure is installed plumb with bin opening facing pathway.

SPECIFICATION:

- Emerdyn© 'Cronulla' EM 224 240 litre bin enclosure with hood or approved equal.
- Materials: galvanised steel body, stainless steel chute and hood, custom perforation, powder coated black.



240L BIN ENCLOSURE

SECTION NTS

PARK FURNITURE

TAP

LOCATION:

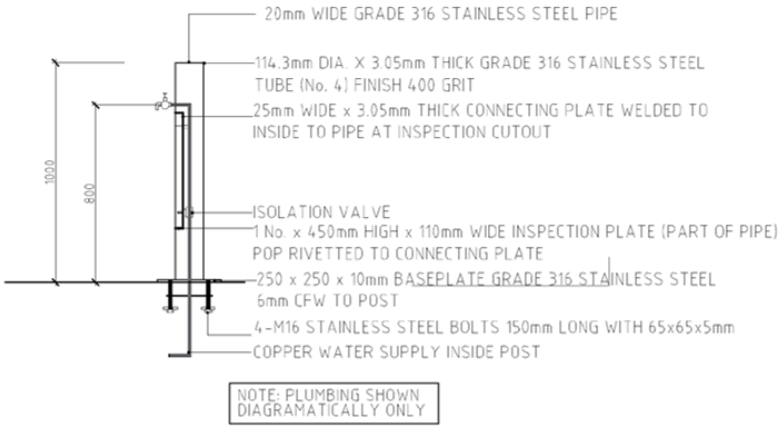
- Dog Park, Local and Neighbourhood Parks.

INSTALLATION:

- Installed in close proximity to Barbecue and picnic shelters.

SPECIFICATION:

- Vandal proof hose cock fitted on 316 stainless steel pipe finish 400 GRIT with inspection plate.
- Fixed on a stainless steel base plate.



TAP IN STAINLESS STEEL PIPE

SECTION NTS

PARK FURNITURE

BU1 BUBBLER

LOCATION:

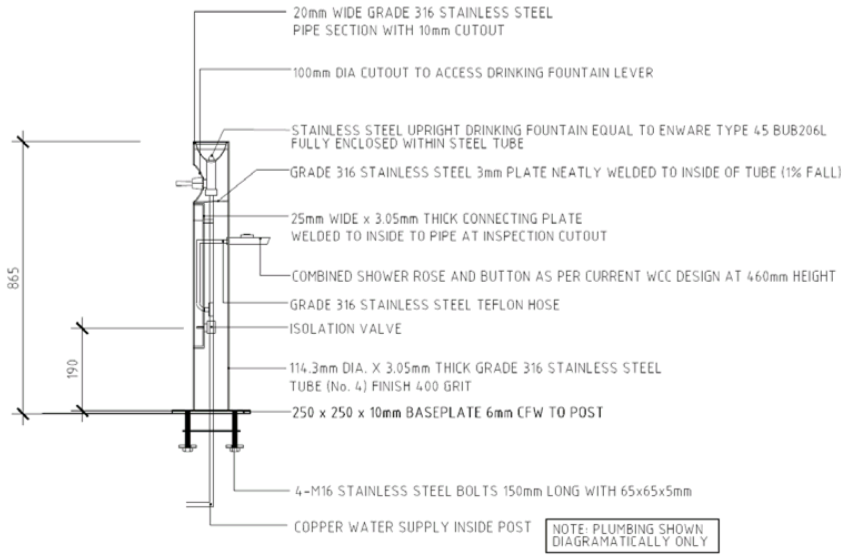
- Dog Park and Local Parks.

INSTALLATION:

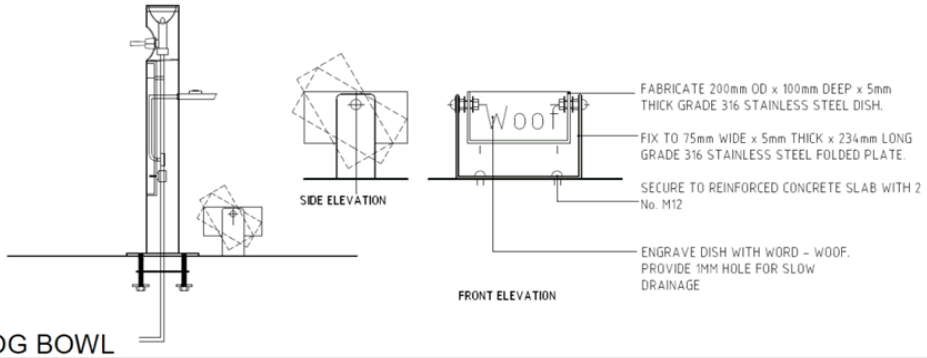
- Located in area of high activity in association with picnic shelter and or nodes of park furniture of play features

SPECIFICATION

- Encat © pipe style or approved equal.
- Materials - Marine grade 316 stainless steel frame, electro polished mirror finish.
- Features - bottle filling tap and dog bowl.



WATER FOUNTAIN & DOG BOWL
SECTION NTS



DOG BOWL
SECTION NTS

PARK FURNITURE

BU2 - Equal Access Bubbler

LOCATION:

- Town Centres

INSTALLATION:

- In area of high activity.

SPECIFICATION:

- 'Prospect' drinking fountain by Botton & Gardner © or approved equal. Conforms to the Australian disabled access standard. Product code PDF.316.DB.BT.WC
- Materials: marine grade 316 stainless steel frame, electro polished mirror finish.
- Features: bottle filling tap. Self-draining and levelling dog bowl. Perforated grate covering the drainage sump.

BU3 - Equal Access Bubbler

LOCATION:

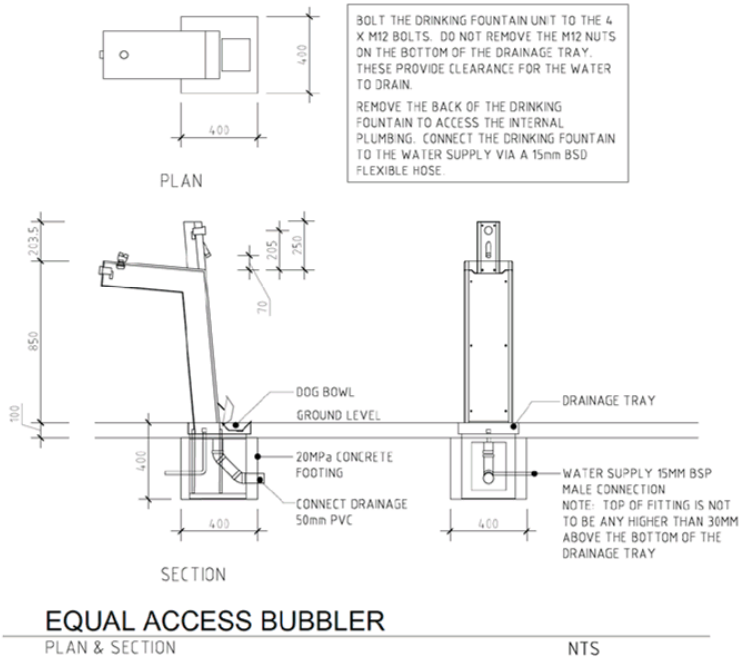
- Neighbourhood Parks

INSTALLATION:

- In area of high activity in association with picnic shelter and nodes of park furniture.

SPECIFICATION:

- 'Aquafil drinking fountain, bottle refill station with dog drinking bowl' by Civiq © or approved equal. Conforms to the Australian disabled access standard.
- Materials: marine grade 316 stainless steel
- Features: bottle filling tap and dog bowl.



PARK FURNITURE

BR - BIKE RACK

LOCATION:

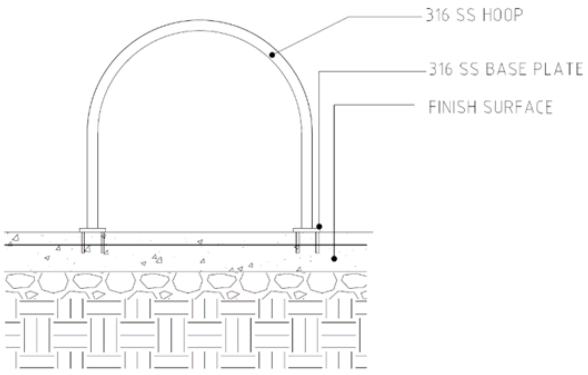
- Local, Neighbourhood, and Civic Parks.

INSTALLATION:

- Surface mount on concrete base slab.
- Three grouped together.

SPECIFICATION:

- Single Hoop Bike Rail AS Urban © or approved equal.
- Material: 50mm dia polished 316 stainless steel
- Fixing: 316 Stainless steel M8 chemical Anchor. Surface mounted spaced at 1200mm centres in accordance with AS2890.3 Part 3 Bicycle Parking Facilities unless otherwise directed by WCC.



BIKE HOOP FIXED IN SITU
TYPICAL SECTION AND ELEVATION nts

PARK FURNITURE

B1 –Timber Bollard

LOCATION:

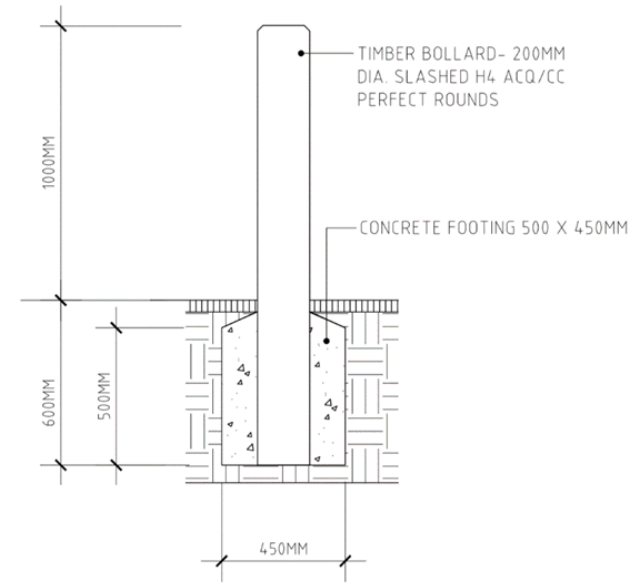
- Natural Areas, Local and Neighbourhood Parks.

INSTALLATION:

- Within mulched areas adjacent to natural areas. If located in grass install in concrete strip.

SPECIFICATION:

- Dome topped timber 200mm dia. Bollard. H4 ACQ treated Slash Pine timber.
- Height: 1000mm spaced at 1500mm centres
- Finish: Two coats of exterior grade stain that protects against staining, sun deterioration and damage, water and fungal damage and provides stabilisation of the timber.



TIMBER BOLLARDS
SECTION NTS

PARK FURNITURE

B2 – Stainless Steel Bollard

LOCATION:

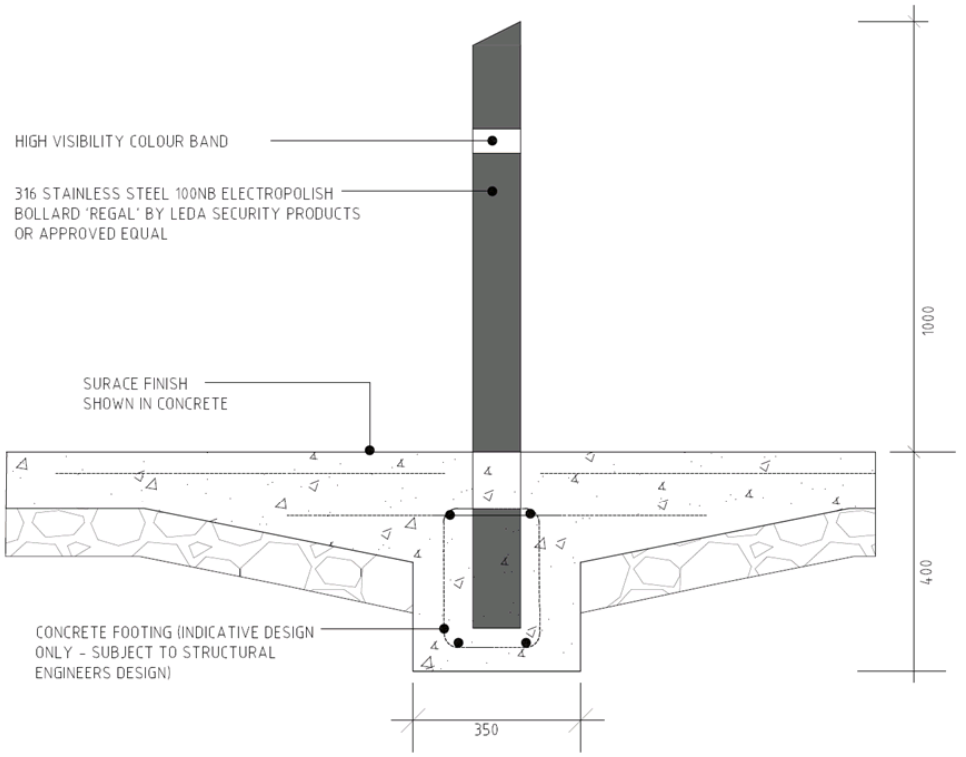
- Neighbourhood Parks and Town Centres.

INSTALLATION:

- Within pavement.

SPECIFICATION:

- 316 Stainless steel mitre top 100mm dia with 5mm wall thickness by Leda Security Products © or approved equal.
- Height: 1000mm x 140mm dia. spaced at 1500mm centres
- Finish: Milled with high visibility reflective band.



STAINLESS STEEL BOLLARD

SECTION NTS

PARK FURNITURE

B3 – Removable Bollard

LOCATION:

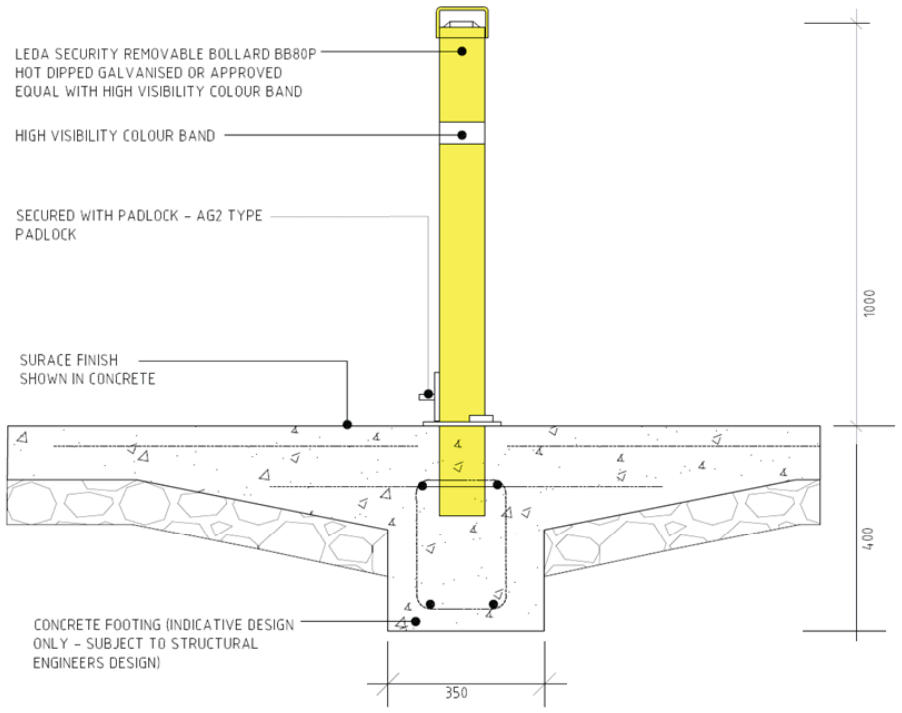
- Local, Neighbourhood and Town Centres.

INSTALLATION:

- Installed within pavement of vehicle access points

SPECIFICATION:

- Hot dipped galvanised electrostatically powder coated in industrial yellow with reflective tape. Removable bollard BB80P by Leda © or approved equal.
- Materials: 80NB (88.9) x 10.4mm extra heavy duty galvanised pipe.
- Height: 1000mm x 80mm dia. spaced at 1500mm centres



HOT DIPPED GALVANISED REMOVABLE BOLLARD

SECTION NTS

PARK FURNITURE

B4 – Sandstone Log

LOCATION:

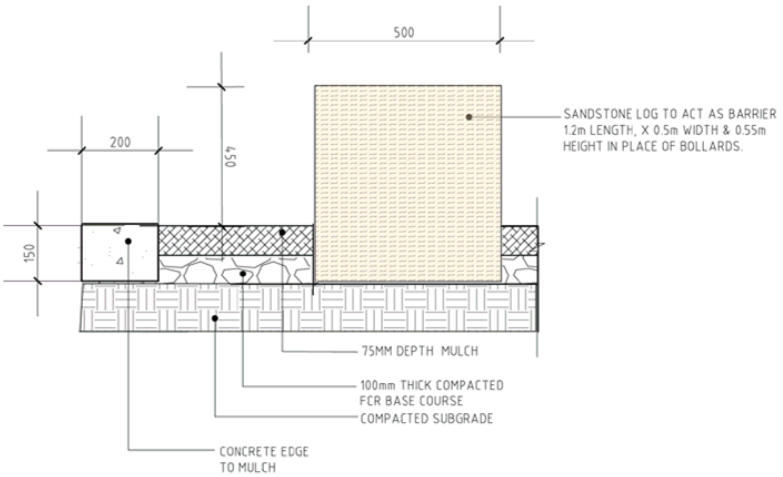
- Natural Areas, Local and Neighbourhood Parks.

APPLICATION:

- Restriction of vehicle access to natural areas within mulched zones. Informal seating in play spaces.

SPECIFICATION:

- Quarry sawn sandstone 'log' shapes.
- Dimensions: approximately 550mm high and 1200mm long
- Material: sandstone 'logs' by Bundanoon Sandstone © or approved equal.
- Finish: 2 sides diamond sawn, 4 sides quarry sawn, grey in colour. 500mm x 550mm x 1200m



SANDSTONE LOG

TYPICAL SECTION NTS

OPEN SPACE FENCING REQUIREMENTS

F0 – General Fencing Requirements:

DESIGN

- The contractor shall be responsible for the design compliance, strength and durability of the finished fence and the fence elements.

DESIGN COMPLIANCE

All fencing shall be designed and constructed in accordance with all relevant regulations and standards, including but not limited to:

- National Construction Code NCC (formerly Building Code of Australia)
- AS1170.0 Structural design Actions – General Principles
- AS1170.1 Structural design Actions – Permanent, Imposed and other actions
- AS1170.2 Structural design Actions – Wind Actions
- AS1428.1 Design for access and mobility – General requirements for access
- AS1725.1 Chain link fabric fencing – Security fencing and gates – General requirements
- AS1725.4 Chain link fabric fencing - Cricket net fencing enclosures
- AS1725.5 Chain link fabric fencing – Sports ground fencing - General requirements

DESIGN LOADING

All fencing shall be designed to accommodate all relevant design loadings as set out in the following:

- AS1170.1 Permanent, Imposed and other actions –
- In particular, Table 3.3, Minimum Imposed Actions for Barriers. Categories C3 and C5 are typically most used by Council. Refer below.
- AS1170.2 Wind Actions
- Other reasonably expected loadings due to climbing, vandalism etc. – i.e. must be fit for purpose.

TABLE 3.3

MINIMUM IMPOSED ACTIONS FOR BARRIERS

Type of occupancy for part of the building or structure		Specific uses	Top edge			Infill	
			Horizontal	Vertical	Inwards, outwards or downwards	Horizontal	Any direction (see Note 2)
			kN/m	kN/m	kN	kPa	kN
A	**Domestic and residential activities**	All areas within or serving exclusively one dwelling including stairs, landings, etc. but excluding external balconies and edges of roofs (see C3)	0.35	0.35	0.6	0.5	0.25
		Other residential, (see also C)	0.75	0.75	0.6	1.0	0.5
B, E	**Offices and work areas not included elsewhere including storage areas**	Light access stairs and gangways not more than 600 mm wide	0.22	0.22	0.6	N/A	N/A
		Fixed platforms, walkways, stairways and ladders for access (see Note 1)	0.35	0.35	0.6	N/A	N/A
		Areas not susceptible to overcrowding in office and institutional buildings also industrial and storage buildings	0.75	0.75	0.6	1.0	0.5
C	**Areas where people may congregate**						
C1/C2	Areas with tables or fixed seating	Areas with fixed seating adjacent to a balustrade, restaurants, bars, etc.	1.5	0.75	0.6	1.5	1.5
C3	Areas without obstacles for moving people and not susceptible to over-crowding	Stairs, landings, external balconies, edges of roofs, etc.	0.75	0.75	0.6	1.0	0.5
C5	Areas susceptible to over-crowding	Theatres, cinemas, grandstands, discotheques, bars, auditoria, shopping malls (see also D), assembly areas, studios, etc.	3.0	0.75	0.6	1.5	1.5
D	**Retail areas**	All retail areas including public areas of banks/building societies, (see C5 for areas where overcrowding may occur)	1.5	0.75	0.6	1.5	1.5

Extract from AS1170.1

DESIGN LIFE

- All fencing is to be designed with due consideration to the site exposure classification (refer appendix A) and other site conditions for a service life of 20 years, with little to no maintenance.

WARRANTIES

- The Contractor shall provide with their quotation the warranties offered for their work. This shall include warranties offered with regard to protective coating systems for materials and workmanship.
- Minimum Warranty shall be 10 years on all protective coatings and workmanship

INSTALLATION

SITE WELDING

- On-site welding shall not be undertaken.
- Site cutting and drilling is to be avoided to maintain protective coating.
- Repairs to cut or damaged material which compromise the protective coating are to be repaired in accordance with protective coating manufacturer specification.

VANDALISM

- The fencing shall be designed and installed such that opportunities for vandalism are minimised. This may include the burring or bending of bolt threads after installation to prevent the unauthorised removal of nuts, use of anti-tamper screws etc.

POST HOLES

- The top surface of footings is to be a trowelled concrete finish 10mm above the level of the existing surface and shaped to fall away from the post.

MATERIAL SPECIFICATION

- All materials and workmanship shall be in accordance with the following:
    - AS1450-2007 Steel tubes for mechanical purposes
    - AS1397-2011 Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
    - AS/NZS 1163-2009 Cold-formed structural steel hollow sections
    - AS4680-2006 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
    - AS1111.1-2015 ISO metric hexagon bolts and screws – Product grade C –Bolts

- AS1111.2 ISO-2015 metric hexagon bolts and screws – Product grade C –Screws
- AS1604.1-2012 Specification for preservative treatment – Sawn and round timber
- AS1725.1-2010 Chain link fabric fencing – Security fencing and gates – General requirements

FITTINGS, FIXTURES AND BRACKETS

- All fittings, fixtures, brackets etc. shall be constructed of the same material as the fence proper wherever possible, with consistent protective coating system (including colour).
- Dissimilar metals shall be electrically isolated via neoprene washers, bushes etc.
- All fittings such as hinges, locks, latches etc. are to be Heavy Duty and suitable for the site exposure and require nil maintenance.

PROTECTIVE COATING SYSTEM

- Refer to fence types for specific requirements of protective coating systems.
- Generally, the Contractor is to provide details of the proposed system at the time of quotation and a 10 year warranty on materials and workmanship.
- Cut or damaged materials which compromise the protective coating are to be repaired in accordance with protective coating manufacturer specification.
- Any damage to the galvanised elements including where the thickness of the galvanising has locally been reduced to less than the relevant requirement of AS/NZS 4680 shall be repaired in accordance with Section 8.2(a) of AS/NZS 4680, using an approved two-pack epoxy zinc rich primer meeting the requirements of a Type 2 product of AS 3750.9.

OPEN SPACE FENCING REQUIREMENTS

F1 – Single Rail Timber Barrier

LOCATION:

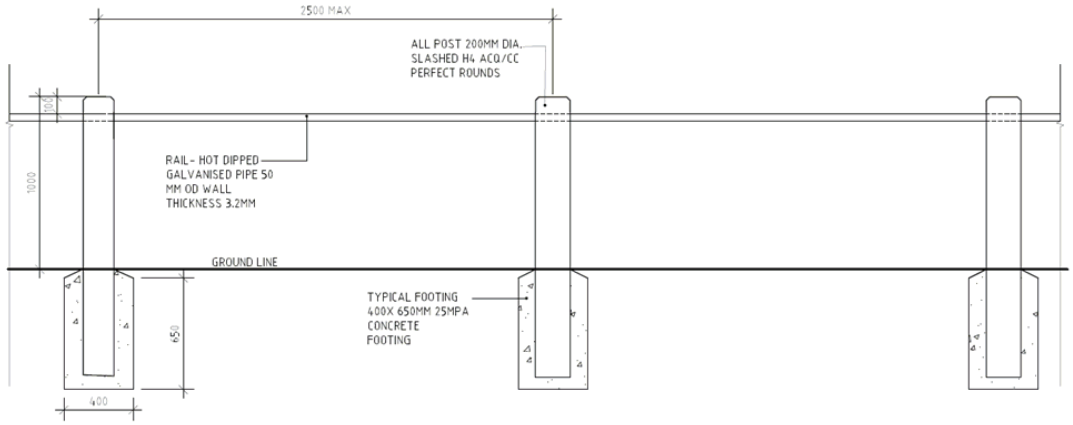
- Natural, Local, and Neighbourhood Parks.

APPLICATION:

- Restriction of vehicle access in open space.

SPECIFICATION:

- ACQ treated Slash Pine timber post with hot dipped galvanised pipe rail.
- Height: 1000mm
- Material: H4 ACQ treated Slash Pine post with galvanised pipe top rail.
- Finish: Two coats of exterior grade stain that protects against staining, sun deterioration and damage, water and fungal damage and provides stabilisation of the timber.



F1 FENCE

SECTION & ELEVATION NTS

OPEN SPACE FENCING REQUIREMENTS

F2 – Vehicle Access Control

LOCATION:

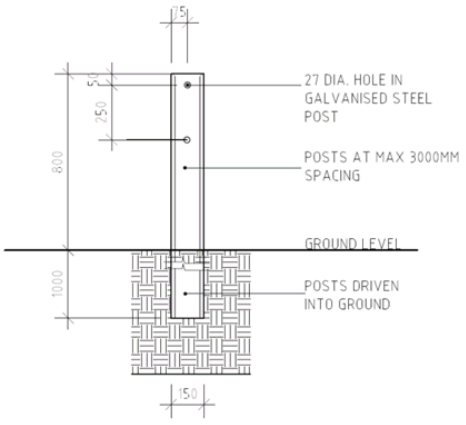
- Natural, Local, Neighbourhood Parks.

APPLICATION:

- Restriction of vehicle and motor bike access to natural areas in open space.

SPECIFICATION:

- Galvanised steel post and steel cable by Ingal © or approved equal. The distance from the ground to the bottom steel cable is 500mm.
- Height 800mm
- Twin 19mm diameter cables pass through pre-punched holes in each post Hot dipped galvanized (HDG500) for improved durability
- Rigid C posts driven into the ground. Posts are at 3m centres



F2 FENCE

SECTION & ELEVATION NTS

OPEN SPACE FENCING REQUIREMENTS

F3 – Sports Field Fencing

LOCATION:

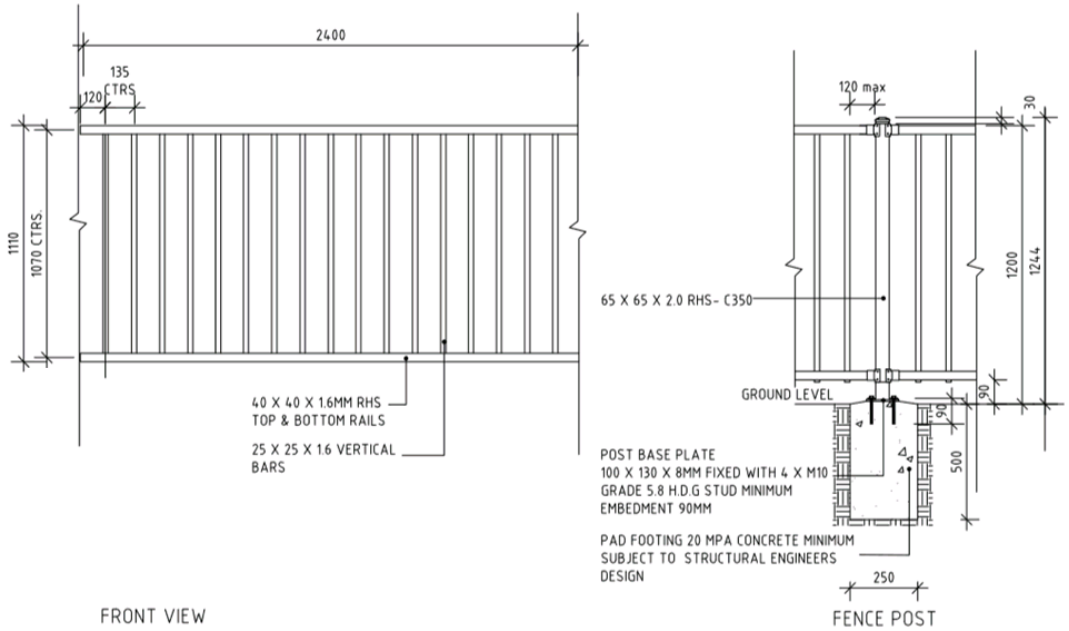
- Neighbourhood Parks.

APPLICATION:

- Installation of fencing to sports fields

SPECIFICATION:

- Incorporate one or more self-closing single pedestrian access gates, and lockable maintenance/emergency vehicle access gates
- HDG500 in accordance with AS4680
- Height 1244mm
- Consideration for drain holes required during the hot-dip galvanising process
- All fixing screws to be Class 3 (or better)
- Expansion joints are to be provided in the fence rails at maximum spacing of 9m.
- All Brackets etc. shall have protective coating to match fence
- Expansion joints shall accommodate longitudinal movement whilst maintaining structural integrity, e.g. provide internal spigots at joints.



F3 FENCE

SECTION & ELEVATION NTS

OPEN SPACE FENCING REQUIREMENTS

F4 – Play Space Fencing

LOCATION:

- Local and Neighbourhood Parks

APPLICATION:

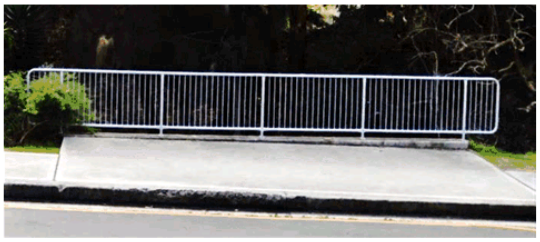
- Installation of fencing to play spaces where identification of risk to children such as proximity to a road or water body.

SPECIFICATION:

- Height: 1100mm
- All elements are to be manufactured from pre-galvanised steel tube, zinc coated inside and outside to AS 1450-2007 and AS 1397-2011, 100g/m2 minimum average coating thickness.
- All powder coating to comply with AS5405 – A minimum warranty of 10 years shall be provided
- All welding to be silicone bronze
- All fixing screws to be Class 3 (or better)
- All Brackets etc. shall have protective coating to match fence
- Expansion joints are to be provided in the fence rails at maximum spacing of 9m.
- Expansion joints shall accommodate longitudinal movement whilst maintaining structural integrity, e.g. provide internal spigots at joints.
- Unless otherwise specified the fence must be raked to follow the ground contour.
- The bottom of picket to ground level clearance is to be 100mm minimum and 150mm
- maximum
- Where ground clearance exceeds 150mm, the panels are to be stepped or raked to achieve the foregoing level of clearance. Stepped panels must be a minimum length of 1200mm. After stepping or raking, in-fills are to be fitted rigidly beneath panels where the ground clearance still exceeds 150mm. This practice should not be utilised in covering designated waterways where such installation would obstruct the natural flow of water.

OPEN SPACE FENCING REQUIREMENTS

F5 – Safety Fencing



LOCATION:

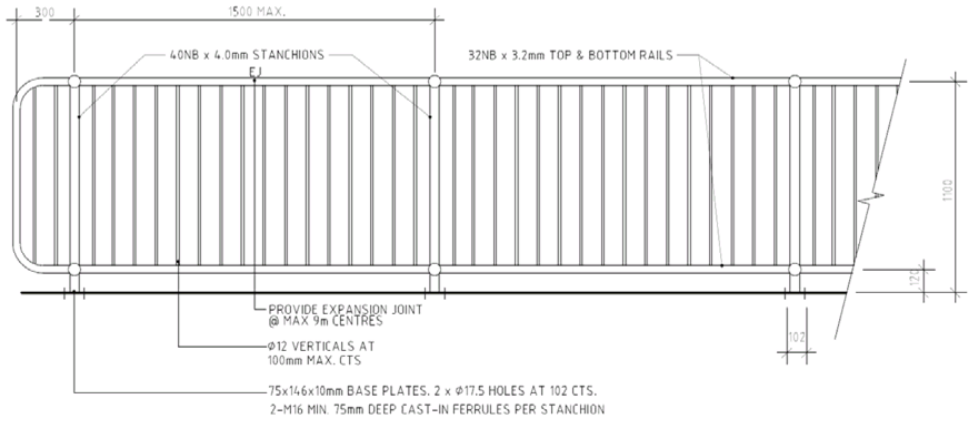
- Natural Areas, stormwater infrastructure, Local and Neighbourhood Parks

APPLICATION:

- To restrict access to high risk areas (eg around stormwater drain head walls, outlets and stormwater quality improvement devices), or where the drop height exceeds 1.0 m.

SPECIFICATION:

- All materials to be Grade C250LO in accordance with AS/NZS 1163.
- Minimum thickness of pipe to be 3.2mm.
- Height: 1100mm.
- HDG500 in accordance with AS4680.
- Consideration for drain holes required during the hot-dip galvanising process.
- All nuts, bolts and washers to be hot dip galvanised in accordance with AS4680.
- Bolts to be Grade 4.6 to AS1111, installed snug tight, minimum size M12.
- Expansion joints are to be provided in the fence rails at maximum spacing of 9m.
- Expansion joints shall accommodate longitudinal movement whilst maintaining structural integrity, e.g. provide internal spigots at joints.



TYPICAL EXPANSION JOINT DETAIL

F5 FENCE

SECTION & ELEVATION NTS

OPEN SPACE FENCING REQUIREMENTS

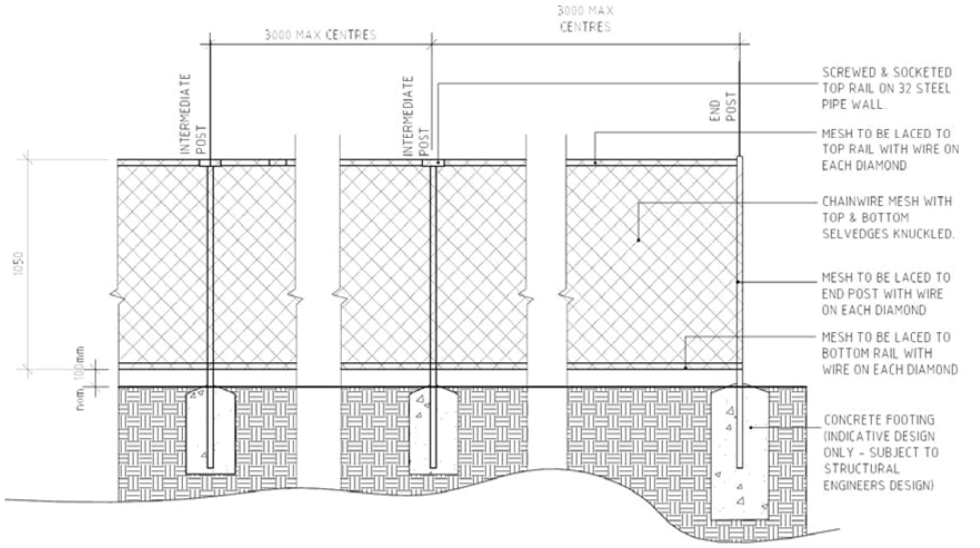
F6 – Dog Park Fence

LOCATION:

- Dog Park boundaries

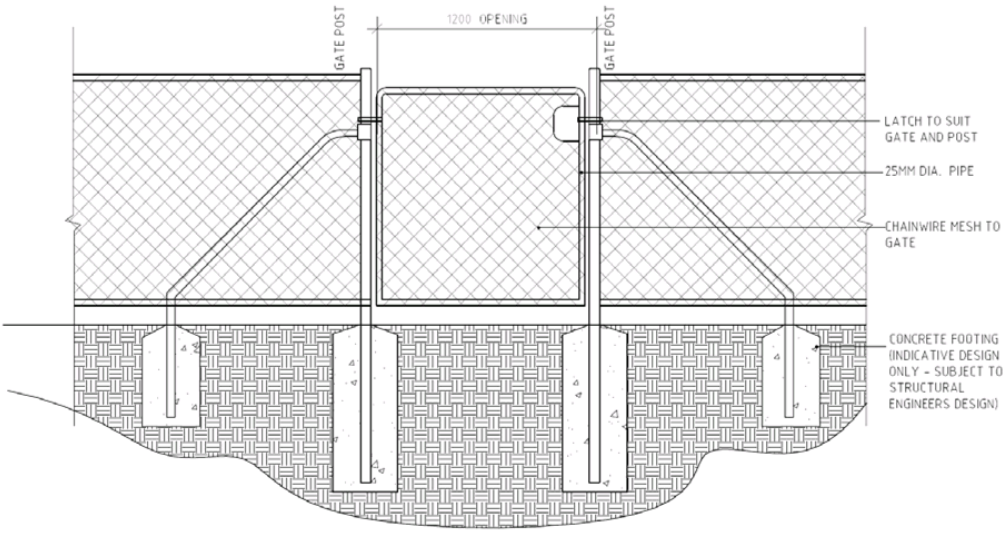
SPECIFICATION:

- Height: 1150mm
- Incorporate one or more self-closing single pedestrian and dog access gates, and lockable maintenance vehicle access gates. Provision of concrete threshold pavement at all gate entries due to high pedestrian activity.
- Black PVC coated chain mesh fence with galvanised pipe top and bottom rails.
- Min thickness of pipe to be 3.6mm in accordance with AS1725.1
- Chain link and fencing construction to comply with AS1725 – 2003 and AS1163 grade (C250LO)
- Galvanising:
  - Wire: Heavy galvanised coating W10Z/HG (240g/m2)
  - Pipe: HDG500 in accordance with AS4680
- All nuts, bolts and washers to be hot dip galvanised in accordance with AS4680
- All powder coating to comply with AS5405 – A minimum warranty of 10 years shall be provided
- All items welded or cut on site must be primed followed by galvanising or black paint.
- Panel dimensions to be 1050mm height by 3000mm length maximum.
- Chain link fabric is to be 3.15mm PVC coated galvanised 50 pitch. Chain link fabric is to be finished with knuckled top and bottom selvedge.
- Post footings shall be in accordance with AS1725.1
- Above ground concrete finish is to be domed with steel trowel finish to eliminate water lying at base of posts and is to be completed at time of original concrete pour. Ends of the support cable wire are to be firmly secured to all terminal posts.



F6 FENCE

SECTION & ELEVATION NTS



F6 FENCE- ENTRY GATE

SECTION & ELEVATION NTS

OPEN SPACE FENCING REQUIREMENTS

G1 – Boom Gate

LOCATION:

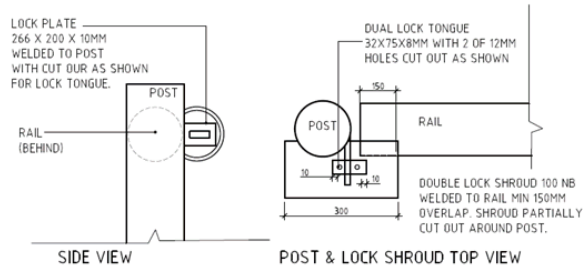
- Local parks, Neighbourhood Parks, natural areas, transmission easements.

APPLICATION:

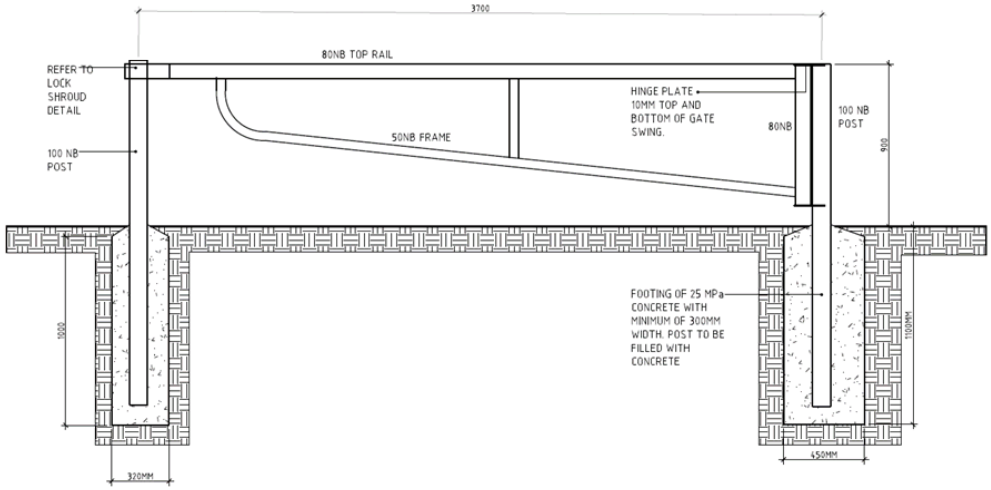
- Boom gate to be used for maintenance access. Minimum distance of eight (8) metres is required as a threshold to the gate for service vehicles.

SPECIFICATION:

- 5mm gauge hot dipped galvanised steel.
- Construction and installation as shown below



MAINTENANCE ACCESS GATE- POST & LOCK SHROUD
SIDE & TOP VIEW NTS



MAINTENANCE ACCESS GATE
TYPICAL ELEVATION NTS

PATHWAY & PAVEMENT REQUIREMENTS

Decomposed Granite Path

LOCATION:

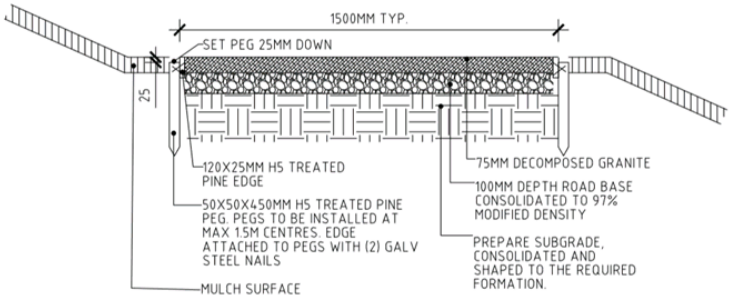
- Natural Areas, Local and Neighbourhood Parks.

APPLICATION:

- Walking trails within natural areas only.

SPECIFICATION:

- 75mm stabilised compacted decomposed granite pathways with timber edges refer to detail.



DECOMPOSED GRANITE PATH
TYPICAL DETAIL NTS

PATHWAY & PAVEMENT REQUIREMENTS

Raised Walkways

LOCATION:

- Natural Areas, Local and Neighbourhood Parks.

APPLICATION:

- High use walking trails within natural areas that are low lying or boggy.

SPECIFICATION:

- Fibre reinforced polymer (FRP) walkway decking with FRP or galvanised steel support structure.

PATHWAY & PAVEMENT REQUIREMENTS

Asphalt Pathway

LOCATION:

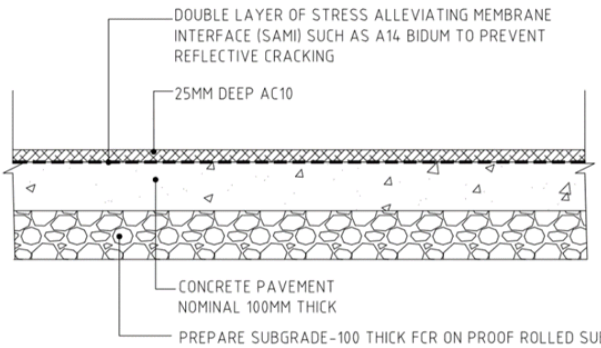
- Natural Areas, Local and Neighbourhood Parks.

APPLICATION:

- High use walking trails requiring unobtrusive, flexible, and semi permeable surfaces adjacent to existing vegetation.

SPECIFICATION:

- Asphalt AC10 as shown below



ASPHALT
TYPICAL SECTION NTS

PATHWAY & PAVEMENT REQUIREMENTS

Broom Finished Concrete Pavement

LOCATION:

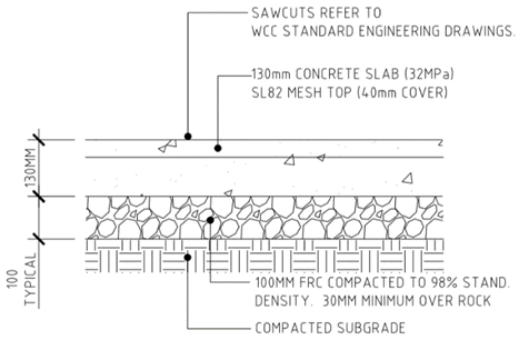
- Natural Areas, Local and Neighbourhood Parks.

APPLICATION:

- Paths and high use walking trails within natural areas.

SPECIFICATION:

- Slip resistance: P4.
- Approved oxide colour can be considered.
- Refer to Wollongong City Council Standard Engineers Drawings 2019 for further details on jointing.



BROOM FINISH CONCRETE

TYPICAL DETAIL NTS

PATHWAY & PAVEMENT REQUIREMENTS

Coloured Honed Concrete Pavement

LOCATION:

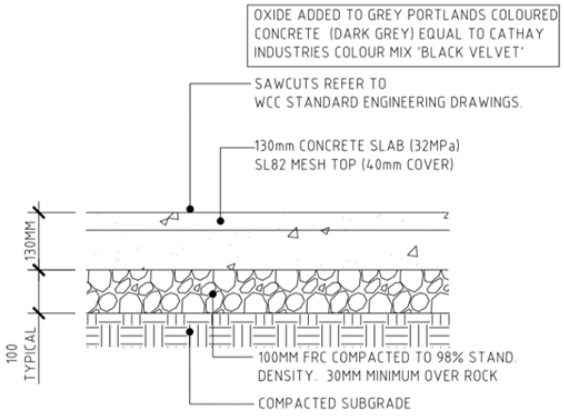
- Neighbourhood Parks, Town Centres

APPLICATION:

- Paving within open space that require a high finish or coloured to reduce surface staining.

SPECIFICATION:

- Slip resistance: P4.
- Refer to Wollongong City Council Standard Engineers Drawings 2019 for further details on jointing.
- Refer to detail below.



OXIDE CONCRETE

TYPICAL DETAIL NTS

PATHWAY & PAVEMENT REQUIREMENTS

Unit Paving

LOCATION:

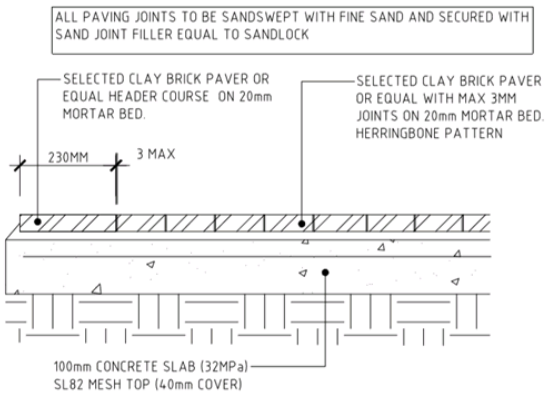
- Neighbourhood Parks, Town Centres

APPLICATION:

- Paving within open space that require a high finish. Town and village centres treatment to footpaths.

SPECIFICATION:

- As shown below



BRICK PAVING ON CONCRETE SUBGRADE

TYPICAL DETAIL NTS

PATHWAY & PAVEMENT REQUIREMENTS

Softfall to play spaces/ fitness stations

LOCATION:

- Local, Neighbourhood Parks.

APPLICATION:

- Softfall to play spaces and fitness equipment

SPECIFICATION:

- As per AS 4685 series.
- Colour: CBSR Rubber with a 50/50mix if Mid Blue and Mid Green
- Construct an extruded 200 x 200mm reinforced concrete edge around the perimeter of the playground under surfacing and fill the entire area with an appropriate impact attenuation material, in accordance with *AS/NZS 4422*. The edge must be set back at least 2.5 m from any item of play equipment to provide adequate circulation and maintenance space.

PARK SIGNAGE

Park Signage Guidelines

The Landscape Plan should incorporate a signage strategy to provide locations for park naming signage, walking trail markers and interpretive signage. A standard Blank Council PS1 Park name sign shall be provided at the park's primary public access point(s). Any sites of special interest in the park, such as heritage sites should have interpretive signage (PS3 or PS4).

Park naming signage infrastructure can be installed at completion of the park construction. The final naming of the park and associated graphics can be determined when the Park naming has been approved in accordance with the WCC Management Policy *'Naming of Community Facilities and Parks (including sports grounds and natural areas)'* May 2017 and the name is gazetted.

Interpretive Signage

Interpretive signage should be developed as part of the Heritage Interpretation Plan for the development site. The interpretive signage should use both text and images to reference the European and Aboriginal history of the site and its significance to the history of West Dapto.

The location and proposed type of all signage should be indicated on the submitted Landscape Plan.

The details of images and text proposed for any interpretive signage must be provided to Councils Heritage Officer for written approval. We would recommend the text to be limited between 200- 300 words.

PARK SIGNAGE

PS1 – Park Name Sign

LOCATION:

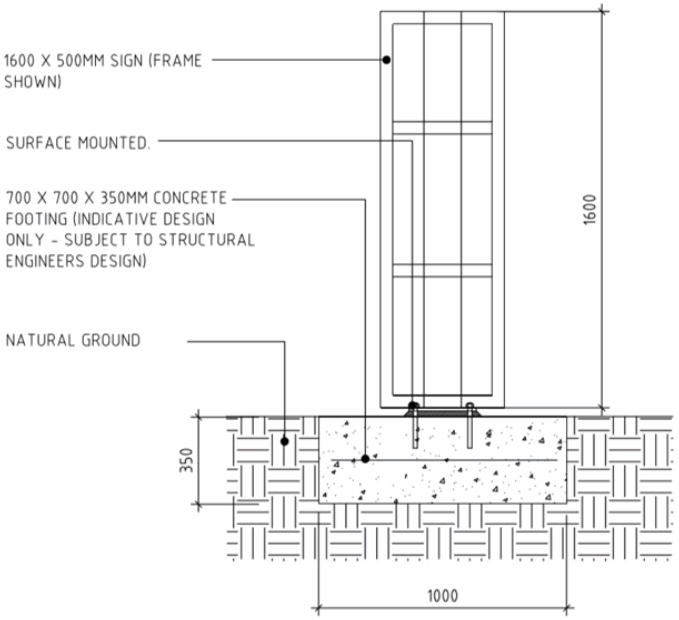
- Local and Neighbourhood Parks

APPLICATION:

- Installed at major entry points to park to maximise pedestrian exposure to information.

SPECIFICATION:

- Galvanised steel frame fixed with aluminium composite panel top sheets. Steel frame painted in black.
- Vinyl graphics prepared by WCC. Rear panel of the sign can also be utilised for the display of intrepretive information.



PARK SIGNAGE
SECTIONAL ELEVATION NTS

PARK SIGNAGE

PS2 – Trail Marker

LOCATION:

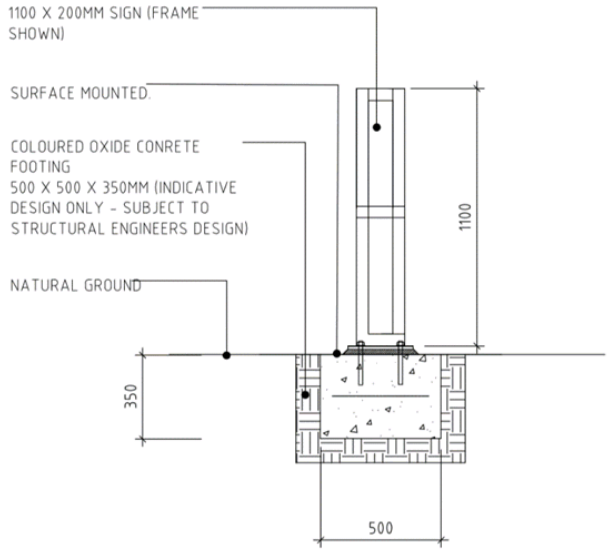
- Local,Natural Areas and Neighbourhood Parks

APPLICATION:

- Track marker installed at track junctions and secondary entry points and along tracks at strategic locations.

SPECIFICATION:

- Galvanised steel frame fixed with aluminium composite panel top sheets. Steel frame painted in black.
- Vinyl graphics prepared by WCC.



TRACK MARKER
SECTIONAL ELEVATION NTS

PARK SIGNAGE

PS3 –Small Interpretive Sign

LOCATION:

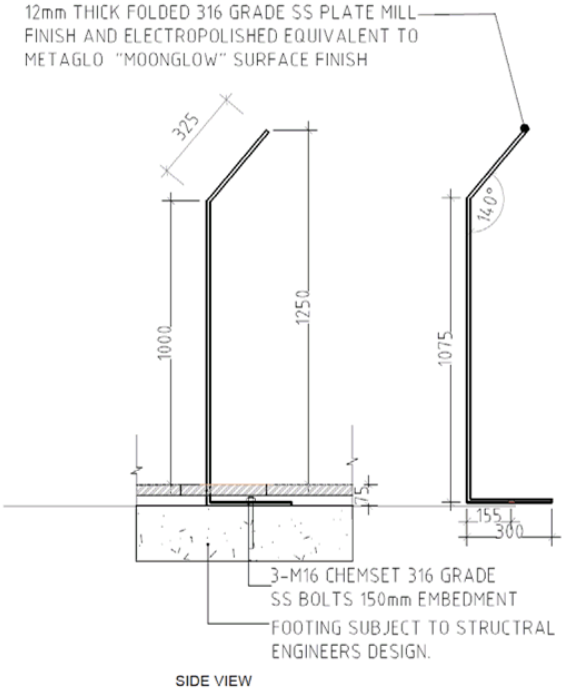
- Local and Neighbourhood Parks

APPLICATION:

- Small format signage to display interpretative information.

SPECIFICATION:

- Stainless steel plate with milled finish.
- The details of images and text proposed for any interpretive signage must be provided to Councils Heritage Officer for written approval. Vinyl graphics prepared by applicant.
- Recommend maximum word count for text (200-300)



SIDE VIEW

SMALL INTERPRETATIVE SIGN

SECTIONAL NTS

PARK SIGNAGE

PS4- Large Interpretive Sign

LOCATION:

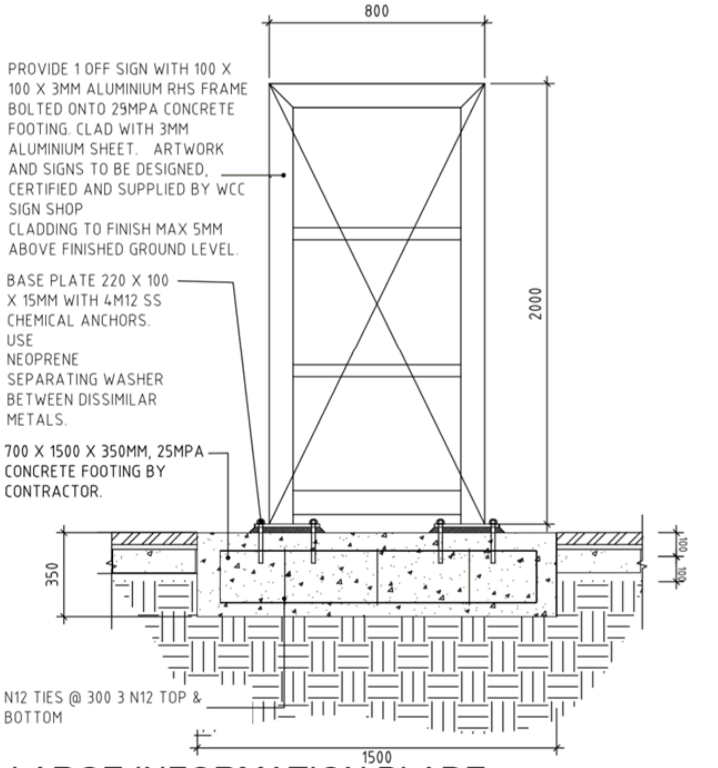
- Local and Neighbourhood Parks

APPLICATION:

- Large format signage to display interpretative signage.

SPECIFICATION:

- Galvanised steel frame fixed with aluminium composite panel top sheets. Steel frame painted in black.
- The details of images and text proposed for any interpretive signage must be provided to Councils Heritage Officer for written approval. Vinyl graphics prepared by the applicant.



LARGE INFORMATION BLADE

SECTIONAL ELEVATION NTS

LANDSCAPE DETAILS

Tree planting Guidelines

TREE SELECTION CRITERIA

Trees are to be selected in accordance with AS2303:2018. Tree Stock for Landscape Use. All stock is to be inspected for Myrtle rust (*Uredo rangelii*) prior to delivery to site. No transactions should be conducted if the nursery is not compliant with the Nursery Industry Myrtle Rust Management Plan.

STREET TREE LAYOUT

The limitations to the positioning of street trees on footways immediately behind the kerb line are listed below:

CLEARANCE NEEDED

- Street intersection 10m from intersection kerb line
- Telegraph pole 5m from centre of pole.
- Storm water inlet 2m from edge of inlet
- Major underground service junction 3m from edge of junction box
- Bus stops - no trees planted along length of stop.
- Traffic lights - 10m from pole of traffic lights.
- Driveways - 4m from vehicle crossing

TREE PLANTING SPECIFICATION

SOIL TYPES

Soil mixes to be used as the growing medium in tree pits as minimum all soils must comply with AS4419 – Soils for Landscaping and Garden Use.

MAINTENANCE

Newly planted street trees require deep watering once a week for a minimum of 52 weeks from Practical Completion. At each watering the guards should be checked and repaired or tightened as necessary.

LANDSCAPE DETAILS

Indicative Tree Species List

Indicative species list only with additional species as recommended by Park and Open Space Manager.

STREET TREES

Exotic

Pyrus ussuriensis - Manchurian pear.

Zelkova serrata 'Green Vase'

Acer negundo 'Sensation'

Fraxinus pennsylvanica 'Urbanite'

Pistacia chinensis - Pistachio

Ulmus parvifolia – 'Todd 'Chinese Elm

Lagerstroemia indica x L. fauriei - 'Sioux' Crepe Myrtle

Lagerstroemia indica

Geijera parvifolia

Hibiscus tiliaceus 'Rubra'

Native

Tristaniopsis laurina - Water Gum

Melaleuca linariifolia – Snow in Summer

Waterhousia floribunda - Waterhousia

Waterhousia floribunda 'Amaroo'

Lophostemon confertus - Brushbox

Elaeocarpus reticulatus - Blueberry Ash

Elaeocarpus eumundii - Quandong

Bracychiton acerifolium - FlameTree

Backhousia myrtifolia - Grey myrtle

Ceratopetalum apetalum- Coachwood

Syzygium leuhmanii - Weeping Lily Pily

Acmena smithii var. - Minor Lily Pily

Alphitonia exclesa - Red Ash

Callistemon 'Kings Park' - Kings Park Bottlebrush

Glochidion ferdinandi - Cheese Tree

LANDSCAPE DETAILS

TREE PLANTING IN OPEN SPACE

Ficus macrophylla - Moreton Bay Fig

Ficus obliqua - Small leaf fig

Ficus rubiginosa - Port Jackson Fig

Ficus coronata - Sand Paper Fig

Araucaria cookii - Column Pine

Fraxinus pennsylvanica 'Urbanite'

Zelkova serrata 'Green Vase'

Acer negundo 'Sensation'

Podocarpus elatus - Illawarra Plum

Waterhousia floribunda - Waterhousia

Melaleuca decora – Feather Honeymyrtle

Melaleuca styphelioides – Prickly Leaf Paperbark

Livistona australis - Cabbage Tree Palm

Ulmus parvifolia 'Todd' - Chinese Elm

Lophostemon confertus - Brushbox

Lagerstroemia indica - Crepe Myrtle

Syzygium leuhmanii - Weeping Lily Pily

Alphitonia exclesa - Red Ash

Backhousia citriodora - Lemon Ironwood

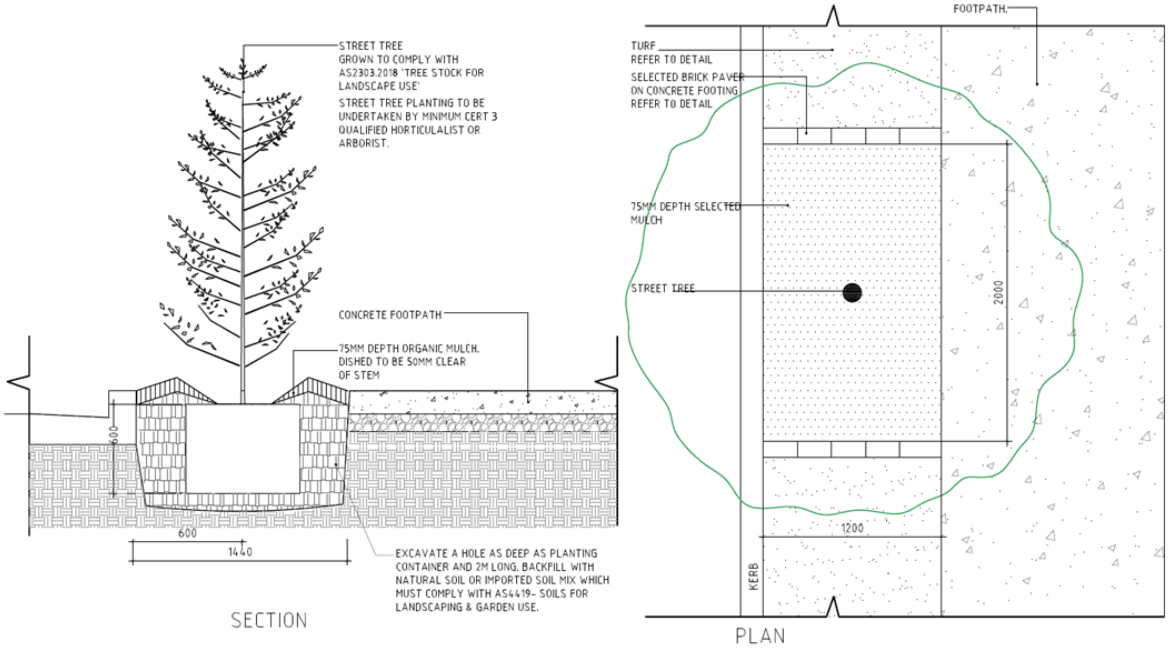
Callistemon 'Kings Park' - Kings Park Bottlebrush

Glochidion ferdinandi - Cheese Tree

Polycias elegans - Celery Wood

LANDSCAPE DETAILS

Street Tree Planting Detail

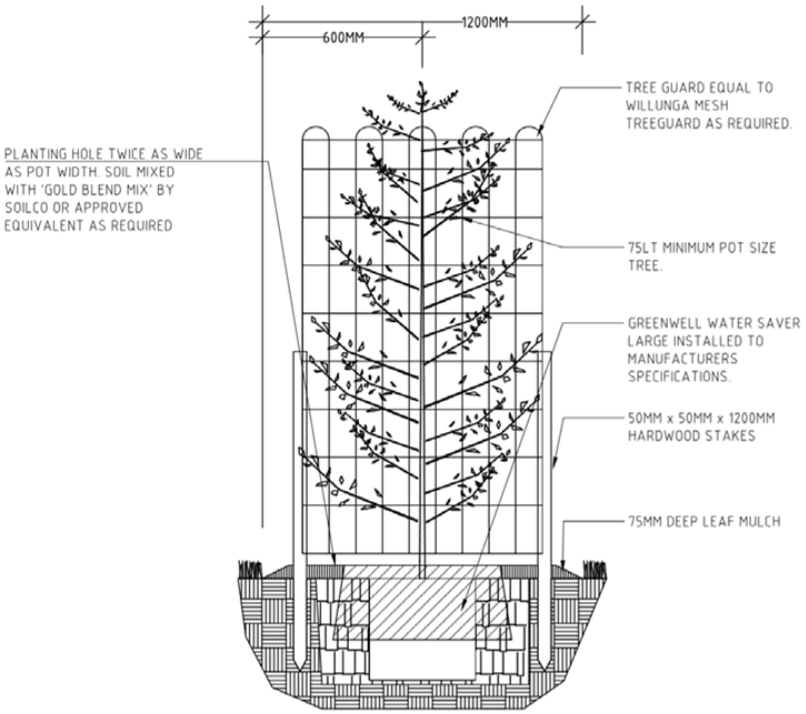


STREET TREE IN NATURAL GROUND

PLAN & SECTION NTS

LANDSCAPE DETAILS

Tree Planting in Lawn Areas with Mulch Ring



TREE PLANTING IN MULCH RING

SECTION NTS

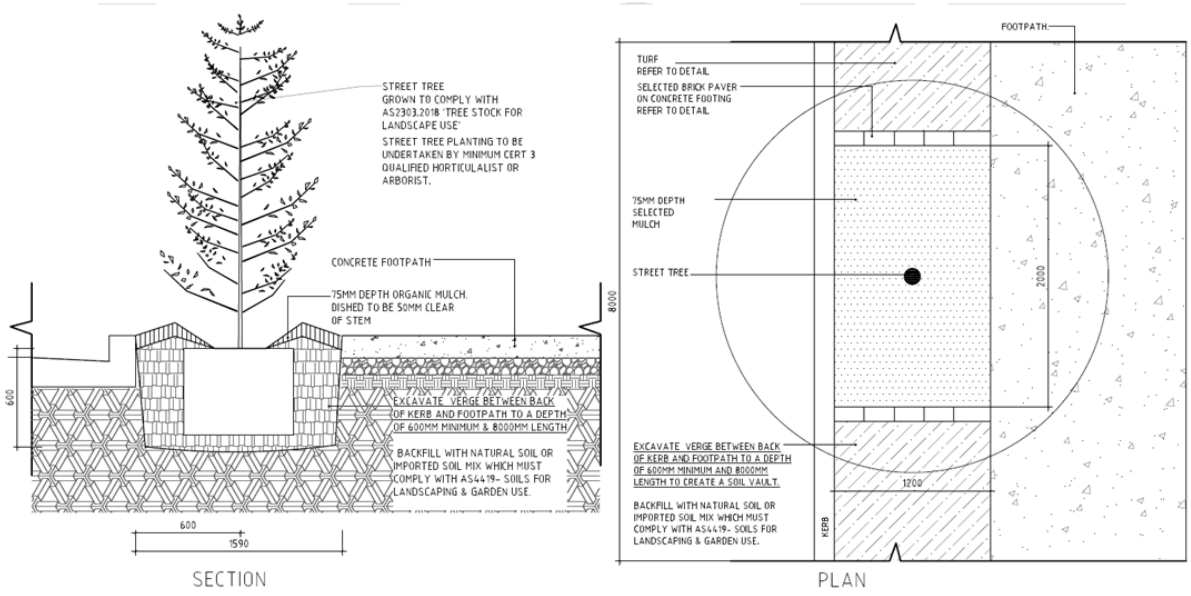
LANDSCAPE DETAILS

Street Tree Planting in Coal Wash

TREE PLANTING IN SITES WHERE COAL WASH IS PRESENT

To ensure the establishment of trees and ensure their long term health and life expectancy it is required that a minimum top soil depth be established in streetscapes and open space. A minimum depth of 600mm of top soil must be installed in all open spaces to establish street tree planting beds and turf areas.

Refer to the following details for street tree planting.

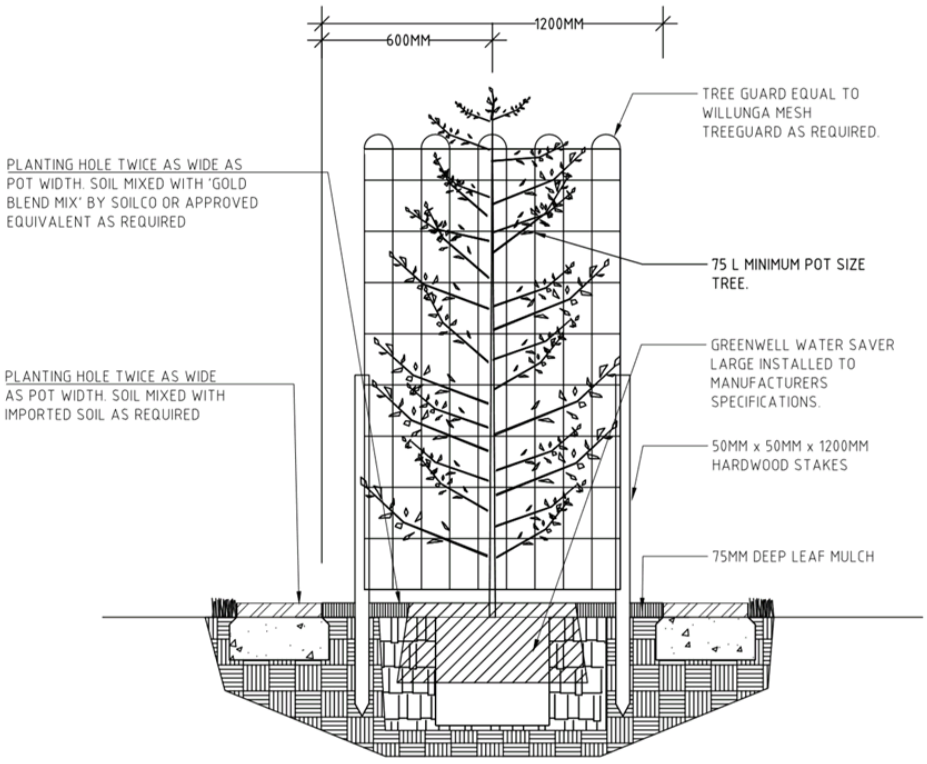


STREET TREE IN COAL WASH

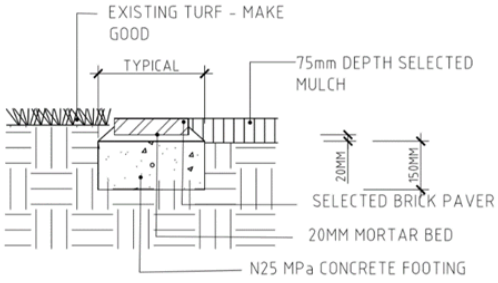
PLAN & SECTION NTS

LANDSCAPE DETAILS

Tree Planting with Edge Detail



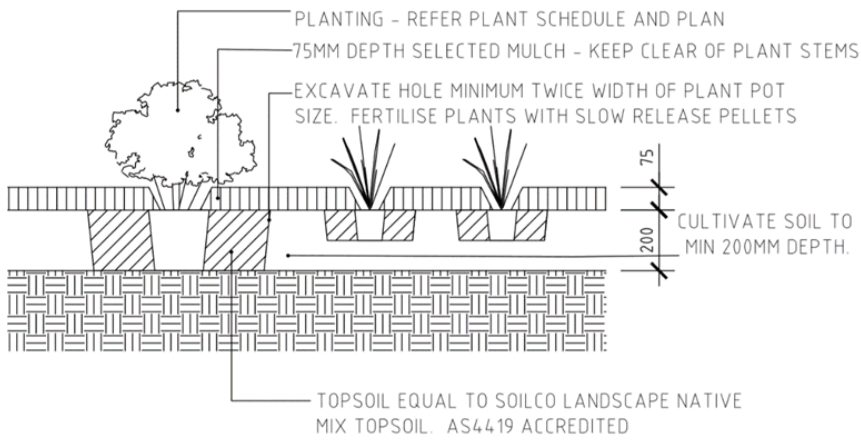
TREE PLANTING IN EDGING
SECTION NTS



BRICK PAVER -TREE PIT EDGE
TYPICAL DETAIL NTS

LANDSCAPE DETAILS

Mass Planting Detail

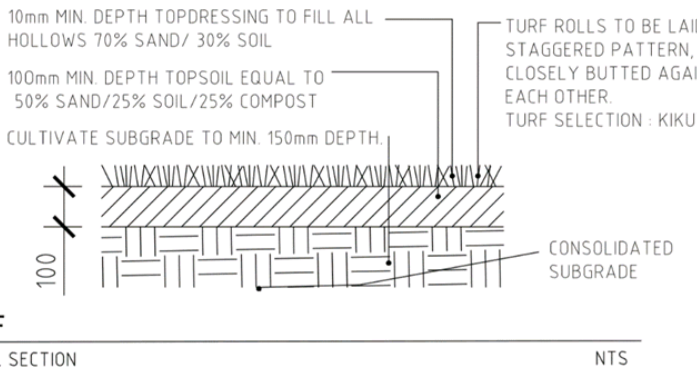


MASS PLANTING
TYPICAL DETAIL NTS

LANDSCAPE DETAILS

Turf Detail

Turf Species to be Kikuyu for Open Space areas, and Buffalo adjacent to Natural Areas



TURF
TYPICAL SECTION NTS

File: CST-080.04.012 Doc: IC19/386

ITEM 2 PUBLIC EXHIBITION OF THE DRAFT LAKE ILLAWARRA COASTAL MANAGEMENT PROGRAM

Preparation of a Coastal Management Program for Lake Illawarra commenced in 2015 in partnership with Shellharbour City Council and with assistance from the NSW Office of Environment and Heritage. The purpose of the Coastal Management Program is to provide strategic direction and specific actions to maintain the ecological, social and economic values of Lake Illawarra.

A draft Lake Illawarra Coastal Management Program has been prepared in accordance with State Government requirements. This report recommends the draft document be placed on public exhibition for a period of six weeks in order to seek community feedback prior to its finalisation and submission to the NSW Minister of Environment for certification.

RECOMMENDATION

1 The draft Lake Illawarra Coastal Management Program be endorsed for public exhibition for the period 31 July until 11 September 2019.

2 A further report be provided to Council detailing the submissions from the public exhibition process, and recommending the draft Lake Illawarra Coastal Management Program being forwarded to the NSW Minister of Environment for certification.

REPORT AUTHORISATIONS

Report of: Chris Stewart, Manager City Strategy
Authorised by: Mark Riordan, Director Planning and Environment - Future City and Neighbourhoods (Acting)

ATTACHMENTS

1 Draft Lake Illawarra Coastal Management Program
2 Indicative Costings Table for Coastal Management Program Implementation

BACKGROUND

Management of Lake Illawarra

From 1988 to 2014, Lake Illawarra and its immediate surrounds was managed by the Lake Illawarra Authority (LIA). In July 2014, the LIA was disbanded and its responsibilities were transferred to Wollongong City Council, Shellharbour City Council and a number of state agencies.

Wollongong City Council subsequently resolved to enter into a Memorandum of Understanding (MOU) with Shellharbour City Council for the environmental management of Lake Illawarra. Under the MOU the Councils (in part) committed to:

- Establish the Lake Illawarra Estuary Management Committee (LIEMC)
- The development and implementation of a strategic management plan for the Lake
- Pursuing grant opportunities and encouraging collaboration between the two Councils
- A dedicated budget for the preparation of the strategic management plan, appointment of a Project Coordinator, monitoring and evaluation activities and implementation of activities that are of mutual benefit to the Councils

The MOU was signed in April 2015.

Development of the draft Lake Illawarra Coastal Management Program

The development of the draft Lake Illawarra Coastal Management Program (CMP) began in 2015 in accordance with the relevant legislation at the time. However in 2016 the NSW Government repealed the *Coastal Protection Act 1979* and passed the *Coastal Management Act 2016*. The new legislative required the development of a CMP which identifies coastal management issues and provides a business plan for all proposed actions.

The Coastal Management Manual was released in 2018 which prescribes a five stage process for developing a CMP. The framework was applied to the existing draft CMP and reviewed by the OEH. Tidal inundation mapping and risk assessment were identified as key gaps which have now been addressed

An outline of the development process is provided in Table 1 below along with a description of the actions undertaken to date.

TABLE 1 - Process for development of a CMP in accordance with the Coastal Management Manual and actions for Lake Illawarra CMP development.

Stage #	Description	Actions for Lake Illawarra CMP	Status
1	Identify the scope of the CMP	The draft Lake Illawarra Information Synthesis Report was finalised in June 2019. This report provides a review of existing information about the Lake and collates the understanding of threats to estuary health. A separate Scoping Study was also prepared at this stage to chart progression towards finalisation of a Lake Illawarra CMP.	Complete
2	Determine risks, vulnerabilities and opportunities	The draft Lake Illawarra Community Uses, Values, Threats and Opportunities Report (Values Report) was finalised in June 2019. This report consolidated the knowledge of key stakeholders and the community, to augment the information contained in the Synthesis Report. Seventeen threats to estuary health, including coastal hazard risks, were identified and assessed. Potential management actions to address these threats were also identified.	Complete
3	Identify and evaluate options	All potential management actions identified in the draft Synthesis Report and the draft Values Report in addition to those identified through an audit of existing management regimes were collated, reviewed and refined. They were then subject to a detailed multi criteria environmental benefit analysis as well as a cost-benefit analysis to determine the proposed management actions. 37 management actions under nine overarching strategies have been included in the draft CMP from 212 potential actions.	Complete
4	Prepare, exhibit, finalise, certify and adopt the CMP	The CMP is currently at this stage. The final draft CMP has been reviewed by relevant staff at Wollongong City Council and Shellharbour City Council, as well as stakeholders from State Agencies who are responsible for supporting actions in the CMP. The draft CMP has also been reviewed by the LIEMC, whose members include elected officials, community representatives, and Aboriginal representatives.	In Progress

Stage #	Description	Actions for Lake Illawarra CMP	Status
		If both Shellharbour and Wollongong Councils approve the draft CMP for public exhibition, it will undergo one more round of stakeholder and community input before being finalised and reported back to Council for approval to be sent to the State Environment Minister for certification. Following certification by the State Minister the CMP will be reported to both Wollongong and Shellharbour Councils for adoption.	
5	Implement, monitor, evaluate and report	Once the plan is certified Wollongong and Shellharbour Councils will facilitate implementation of the CMP through budgetary processes using both specific staff resources and existing elements of the IP&R framework of both Councils to undertake, track and measure the success of actions in the CMP. Integration into the IP&R Framework would be considered through the Asset Management Planning process within the Resourcing Strategy. Actions from the CMP align with both Wollongong's and Shellharbour's Community Strategic Plans and will be included in the Resourcing Strategy. The Lake Illawarra CMP shall be implemented over the next 10 years and will be eligible for revision after five years.	Pending

Supporting Documents

The draft Lake Illawarra CMP is supported by the following two documents developed during the CMP preparation process:

- Lake Illawarra Information Synthesis Report
- Lake Illawarra Community Uses, Values, Threats and Opportunities Report

The Synthesis Report was prepared in Stage 1 of the CMP development process. It provides a summary of the current scientific knowledge about the Lake including physical, chemical, and biological processes and looks at how the nature of the Lake is changing due to the permanent opening. It outlines the impacts of human influences on the Lake, in particular catchment development and climate change. An audit of past estuary management activities was carried out and is included in the Synthesis Report, as well as a preliminary list of threats and values. The list of threats and values was derived from past management activities alone and had no input from the community.

The Values Report details the community engagement that was conducted in stage two of the CMP development process and the outputs from that engagement. This includes an updates list of Lake values and threats that was informed by the community. It describes in much more detail the uses and values of the Lake as well as highlighting management opportunities. The Values Report details the assessment undertaken and provides a finalised list of threats to the Lake and their level of risk over time. This was used to develop the management strategies in the draft CMP.

Contents of the Draft Lake Illawarra Coastal Management Program

The draft Lake Illawarra CMP provides strategic direction and specific actions to address threats to the Lake and to maintain ecological, social and economic values, to achieve ecological sustainability for Lake Illawarra over the long term. Table 2 outlines the structure of the draft CMP and provides an overview of the contents.

TABLE 2 - Overview of contents of Lake Illawarra CMP

#	Chapter Title	A Brief Summary
1	Introduction and Strategic Context	This chapter introduces Lake Illawarra, its catchment, why a CMP is needed and where it covers. It outlines the coastal management process in NSW and all relevant legislation. This chapter also details how the CMP will be integrated into existing strategies and plans, including the IP&R framework. It also introduces the Synthesis and Values Reports and other supporting documentation as well as outlining the consultation that has taken place during the development of the CMP.
2	Lake Illawarra's Processes, Values and Threats	This chapter provides a summary of the Synthesis and Values Report. The objectives of this CMP have a strong focus on ecological health, as this underpins the social, public amenity and economic value associated with the Lake. The chapter also provides a table of threats to the Lake with associated risk assessment for the present day and future time frames (2040-2050 and 2070-2100+).
3	Selecting Management Actions	A set of specific management actions are included under each strategy, these actions are designed to reduce the likely occurrence and/or the frequency of the identified threats. The draft CMP contains 37 actions in total selected based on a multi-criteria cost benefit analysis from a total of 212 potential actions compiled from previous Lake Illawarra management plans and community input. Actions include activities such as monitoring and data collection, planning and development controls, physical rehabilitation works and education and awareness programs.
4	Strategy Implementation Plan	Implementation details for each action are included in this chapter. The actions are detailed in action plan tables which include: • A description of the action • Information on implementation • Indicative cost • Proposed timeframe for implementation • Responsibility for implementation • Supporting organisations • Performance measures.
5	Action Maps	Maps showing the location relevant to actions are provided in this chapter. Together these maps cover the entire foreshore region of Lake Illawarra and highlight locations relevant to each action. Only actions with a spatial element have been mapped and it should be noted that new or unknown locations may arise over the life of the plan.
6	Business Plan	The Business Plan is an in depth budget that outlines the cost of each action, broken into three timeframes over the life of the Program (Year 1, Years 2-5 and Years 6-10). It also shows the potential funding sources of each action and how it is aligned with the Councils' IP&R Framework.
7	Monitoring, Reporting and Reviewing	This chapter outlines how the CMP will be evaluated and reported on by both Wollongong and Shellharbour Councils. This is essential to understanding the success of the actions in reducing threats to Lake Illawarra. Also addressed is the water quality monitoring program currently being undertaken in Lake Illawarra and how it will proceed into the future.

PROPOSAL

A Project Management Team (PMT) with representatives from Wollongong City Council, Shellharbour City Council and the NSW Office of Environment and Heritage (OEH) has overseen the preparation of the draft Lake Illawarra CMP.

Council support is sought to place the draft Lake Illawarra CMP on public exhibition for six weeks. As the draft CMP is applicable to both Wollongong and Shellharbour Councils, the exhibition process will be coordinated between the two councils. The following activities have been agreed upon by relevant communications and media staff from Shellharbour and Wollongong City Councils and will be undertaken to support and facilitate community feedback:

- Staff from the two councils collaborate on preparation of a media release, which may include preparation of a short video.
- A media briefing session co-hosted by the Lord Mayor of Wollongong and the Mayor of Shellharbour, to include a brief presentation on the draft Lake Illawarra CMP.
- Presentations to Neighbourhood Forum 7 and Neighbourhood Forum 8, Tallawarra Community Reference Group and the Aboriginal Advisory Committee.
- Two community drop-in sessions be held, one within the Wollongong LGA at the Dapto Ribbonwood Centre and the other within the Shellharbour LGA.
- A social media and print media campaign to inform the community of the opportunity to provide feedback.
- Preparation of Frequently Asked Questions to be placed online.
- Information posted on the Have Your Say Website and the Councils' Websites about the draft Lake Illawarra CMP and a series of FAQ's addressing current community concerns specific to the Lake such as cockles and dredging.
- Environmental Strategy staff available to respond to customer enquiries.

Feedback from the public exhibition will be reviewed and the draft CMP will be updated where appropriate. It is anticipated that the updated draft CMP will be presented to the LIEMC seeking their recommendation to Council in November 2019. Letters of support from stakeholders listed as responsible and/or supporting in the Draft Lake Illawarra CMP will be sought at this time.

Further reports will be submitted to both Councils, including a submissions report and updated draft CMP, in late 2019 to early 2020. Once the Draft Lake Illawarra CMP is endorsed by both Councils it will be sent to the NSW Minister for Environment for Certification. Adoption by Wollongong City Council and Shellharbour City Council will subsequently be sought once the CMP is certified.

CONSULTATION AND COMMUNICATION

Community engagement activities associated with development of the CMP have been ongoing since 2017. To date they have included:

- Drop-in sessions for the Aboriginal and wider community
- Pop-up stalls in local shopping centres and at various locations around the Lake
- Community surveys both online and hard copy
- Letters mailed to over 1,500 foreshore residents inviting feedback
- Various presentations to interest groups and attendance at meetings.

The PMT has been responsible for reviewing stakeholder input to date.

The LIEMC is made up of elected officials from Wollongong City Council and Shellharbour City Council, State Government Agency representatives, independent scientific advisors, community representatives from both Wollongong and Shellharbour as well as Aboriginal representatives. The LIEMC has provided

input into the development of the CMP and has most recently reviewed the preliminary draft document (including participation in a workshop), providing feedback to the PMT.

Internal workshops to review draft versions of the Lake Illawarra CMP were held for relevant Wollongong and Shellharbour Council staff in 2018 and 2019. Comments from both workshops, as well as the LIEMC workshop were collected and assessed by the PMT before being incorporated into the draft Lake Illawarra CMP, where determined appropriate.

PLANNING AND POLICY IMPACT

This report contributes to the delivery of Our Wollongong 2028 goal 'We value and protect our environment'. It specifically delivers on the following:

Community Strategic Plan	Delivery Program 2018-2021	Operational Plan 2018-19
Strategy	3 Year Action	Operational Plan Actions
1.1.2 Manage and effectively improve the cleanliness, health and biodiversity of creeks, lakes, waterways and oceans	1.1.2.1 Protect and conserve the health and biodiversity of our waterways and coast	Prepare and implement priority actions of the Coastal Management Plan for Lake Illawarra

Ecological Sustainability

A strategic approach to the long term management of Lake Illawarra is a prudent investment in the ecological sustainability of this important natural resource. The CMP aims to ensure that threats to the health and viability of the Lake are managed appropriately through the delivery of effective and targeted actions. It is crucial that the development and corresponding impacts to the Lake and its surrounds are planned and managed to sustain the Lake for future generations to value and enjoy.

RISK ASSESSMENT

The NSW Coastal Management Manual 2018 has a mandatory requirement that a draft CMP must be subject to a period of public exhibition not less than 28 calendar days. If public exhibition is not undertaken, the CMP will not be certified. Without a certified CMP the risks to Wollongong City Council and the community include:

- Councils and agencies will be ineligible to apply for government grants for infrastructure and environmental improvement projects.
- A continuation of piecemeal management of Lake Illawarra will result in poor estuary health, leading to loss of ecological value, recreational amenity and commercial opportunity (eg fishing and tourism).
- The uncoordinated management of lake infrastructure and environmental assets.

The draft Lake Illawarra CMP recommends a management approach that will decrease these risks and encourage the coordinated management of the Lake.

FINANCIAL IMPLICATIONS

The preparation of the draft Lake Illawarra CMP is jointly funded by Wollongong City Council and Shellharbour City Council (in a 2:1 ratio) as well as by the NSW OEH. The costs of carrying out the public exhibition of the draft CMP are incorporated in the project budget.

The full implementation of the draft Lake Illawarra CMP is estimated to cost more than $37M over 10 years. More information regarding the cost of each action as well as the indicative cost to Wollongong City Council is provided in the 'Indicative Costings Table for CMP Implementation' - Attachment 2. This table breaks down the indicative project costs to Council over three timeframes; Year 1 (2021/22 financial year), Years 2-5 (2021/22 – 2024/25) and Years 6-10 (2025/26 – 2030/31). Expenditure to implement the CMP is subject to all the usual Council financial and planning processes and is not in any way committed through the CMP development process.

A Working Group will be established to provide advice to the Project Management Team regarding the likelihood of the actions in the draft Lake Illawarra Coastal Management Program being appropriately funded and delivered by Council. This advice will be used to develop appropriate funding strategies and Council delivery programs for the 10 year life of the CMP.

Existing staff resources from the two Councils and OEH are expected to facilitate the delivery of some actions in the Strategy Implementation Plan, with the Councils, state agencies and other stakeholders responsible for funding and implementation. Once a CMP is certified, grant funding will be expected to supplement stakeholder funding.

CONCLUSION

Finalisation and implementation of a Lake Illawarra CMP will assist Council in the coordinated management of threats to the values of Lake Illawarra and will promote collaboration between Local Government, State Agencies and the community. A CMP becomes a powerful management tool once certified by the State Minister. It will guide the allocation of Local and State Government funding for the next 10 years. All public authorities are required to have regard to the CMP when carrying out their functions. CMPs have a strong emphasis on implementation within the Internal Planning & Reporting framework, this includes performance auditing powers to ensure that programs are appropriately implemented.

It is recommended that Council support the public exhibition of the Draft Lake Illawarra CMP for a period of six weeks to seek community feedback prior to its finalisation and submission to the NSW Minister of Environment for certification.

Lake Illawarra
Coastal Management Program
Draft Report

June 2019

wollongong
city of innovation

Shellharbour
CITY COUNCIL

Clarity from complexity

Lake Illawarra Coastal Management Program (2019-2029)

Prepared for:	Wollongong City Council and Shellharbour City Council
Prepared by:	BMT Eastern Australia Pty Ltd

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Document:	R.N20606.003.05.CMP.docx
Title:	Lake Illawarra Coastal Management Program (2019-2029)
Project Manager:	Verity Rollason
Authors:	Verity Rollason, Michelle Fletcher, Paul Donaldson
Client:	Wollongong City Council and Shellharbour City Council
Client Contact:	Kristy Blackburn
Client Reference:	

Synopsis: **This Coastal Management Program outlines implementation details for recommended actions for managing Lake Illawarra over current and future timeframes.**

REVISION/CHECKING HISTORY

Revision Number	Date	Checked by		Issued by	
0	September 2017	VPR		VPR	
1	January 2018	PEH		VPR	
2	February 2018	VPR		VPR	
3	April 2018	VPR		VPR	
4	March 2019	VPR		VPR	
5	June 2019	VPR	V.Rollason.	VPR	V.Rollason.

DISTRIBUTION

Destination	Revision										
	0	1	2	3	4	5	6	7	8	9	10
WCC and SCC	PDF	PDF	PDF	PDF	PDF	PDF					
BMT File	PDF	PDF	PDF	PDF	PDF	PDF					
BMT Library											

Acknowledgement to Country

Wollongong City and Shellharbour City Councils would like to show their respect and acknowledge the traditional owners of the Land, of Elders past and present, and extend that respect to other Aboriginal and Torres Strait Islander people.

Acknowledgement

The preparation of this CMP was overseen by a project management team consisting of Kristy Blackburn (WCC & SCC) Philomena Gangaiya (WCC), Tuesday Heather (SCC) and Danny Wiecek (OEH).

Glossary of Terms

Bacteriological	The science and study of bacteria (single-celled microorganisms which can live as independent organisms or, dependently, as parasites).
Biodiversity	The variety of wildlife (both plants and animals) and habitats.
Brackish water	Water with higher salinity than fresh water and lower than seawater.
Breakwater(s)	A man-made structure built offshore to protect coastal areas such as harbours, anchorage etc. from offshore waves.
Climate change	The long-term change (decades or longer) in pattern of weather, and related changes in oceans, sea level, land surfaces and ice sheets.
Contaminant	Substances or groups of substances that are toxic, likely to bio-accumulate and/or give cause for concern.
Dredging	An underwater excavation activity intended to remove sediments and debris. Often used to keep navigable pathways within waterways.
Ebb tide delta	Deposit of marine sediment (usually sand) at the seaward outlet of a tidal creek by ebbing (outgoing) tidal currents.
Ecosystem	A community of living organisms and the surrounding nonliving environment interacting as a system.
Entrance management	Includes artificial opening of entrances, managing the configuration, height or location of the beach to enable entrance opening at a level lower than the natural range.
Entrance training	Deployment of man-made structures designed to constrain river discharges to a desired location.
Erosion	The removal of land by natural forces such as waves, tidal currents and / or littoral currents.
Estuarine macrophytes	Vegetation that can grow emergent, submerged or floating within the water of estuarine environments e.g. saltmarsh, mangroves and seagrass.
Estuary	The section of a river affected by tidal activity where fresh water from the river mixes with salt water from the ocean.
Flood tide delta	Deposit of marine sediment (usually sand) within a coastal embayment that has formed at the landward side of a tidal inlet by rising (or flood) tidal currents.
Foreshore	The section of the shore between the low and high tidal limits.
Geomorphology	A branch of physical geography encompassing the formation of the earth's surface, distribution of land, water etc.
Groundwater	Water that is located beneath the earth's surface accumulated from rain, rivers and marine water that penetrates the ground through soils and rocks where it is then stored.
Inundation (estuarine)	Rising waters caused by a combination of catchment flood waters (from rainfall) and oceanic waters (from tides and high sea levels that occur during storms).
Littoral current	A current flowing parallel to and near the shore, usually generated by breaking waves at the shoreline. Also known as longshore currents.
Littoral transport	Transportation of non-cohesive sediments (usually sand) along the shore by littoral or longshore currents. Also termed longshore sediment transport.

Glossary of Terms

Marine debris	Solid man-made material which is disposed of directly or indirectly into the marine environment.
Marine pest	Introduced (or non-native) plant, animal and other kingdoms that have (or could have) a detrimental impact on the marine environment.
Midden	Aboriginal place of significance where debris from eating shellfish and other food has accumulated over time. Often found on headlands, beaches and dunes, around estuaries, swamps and along the banks of rivers, creeks and lakes.
Ocean waves	Waves occurring in the ocean that have been generated from wind blowing over the ocean surface over long distances (known as the fetch). Swell or incident waves on the coast typically have a wave period of 8 to 10 seconds, with large storm waves having periods of 12 seconds or greater.
Physico-chemical	Relating to physics and chemistry, or physical chemistry
Physiochemical	Of or pertaining to both physiology and chemistry, or physiological chemistry.
Wind waves	While most waves are generated by wind, the term “wind waves” is associated with small, short period (3-5 second) waves that are generated locally within a small fetch. Wind waves can be generated on smaller water bodies such as lakes, lagoons, or tidal inlets.
Riparian vegetation	Vegetation located along the banks of a body of water, usually rivers.
Scour	Localised loss of soil often present around a foundation element.
Sea level rise	A long-term increase in mean sea level, usually associated with climate change and increase in temperature in particular.
Sedimentation	The settling of particles (e.g. sand or mud) out of the water column onto the bed of a waterbody.
Sediment cores	A cylindrical sample of soil for tests and examination. Sediment cores are retrieved by sampling soil deposits using a long narrow metal tube.
Siltation	The process by which water becomes dirty and/or polluted as a result of fine mineral particles being suspended in the water.
Stakeholders	Persons or organisations with an interest or concern in a given matter.
Surface water	Natural water sources found on the earth’s surface such as rivers, wetlands, oceans and lakes.
Terrestrial pests	Introduced (or non-native) plant, animal and other kingdoms that have (or could have) a detrimental impact on the terrestrial environment.
Tidal currents	Currents caused by the incoming (flood) or outgoing (ebb) tide (see Tide). Tidal currents are typically the main current within estuaries, particularly in the entrance area where tidal currents transport marine sediments (sand).
Tide	The periodic rise and fall of the water of oceans, seas, bays, etc., caused mainly by the gravitational interactions between the Earth, Moon and Sun.
Tributary	A stream or river that flows into a larger stream or lake.
Wetland	Areas of land that are partly saturated by water, including marshes, swamps etc.

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1 Introduction and Strategic Context

1.1 Purpose of the Lake Illawarra Coastal Management Program

Wollongong City and Shellharbour City Councils (WCC and SCC) with the assistance of the NSW Office of Environment and Heritage (OEH), resolved to prepare this Lake Illawarra Coastal Management Program (CMP), to provide the strategic direction and specific actions to address the threats to the Lake and to maintain the ecological, social and economic values of the Lake. The Lake Illawarra CMP shall thereby achieve ecological sustainability for Lake Illawarra over the long term.

The Lake Illawarra CMP has been prepared in accordance with the mandatory requirements for CMPs specified in the *Coastal Management Act 2016* (the CM Act) and accompanying NSW Coastal Management Manual (OEH, 2018).

This CMP outlines the strategic aims for managing the Lake and gives effect to specific actions to mitigate the threats and issues identified for the Lake that are to be implemented over the next 5 to 10 years. Clear details for how actions will be implemented, funded, monitored, and reviewed are given in this CMP. The CMP is an operational document for this community to take action to manage, preserve, improve, promote and rehabilitate our Lake.

1.2 Introduction to Lake Illawarra

Lake Illawarra (the Lake) is a large estuary system located approximately 80km south of Sydney and 10km south of Wollongong, shown in Figure 1-1 and Figure 1-2. The Lake catchment covers an approximate area of 240 km^2, with a lake surface area of around 35 km^2 and an average depth of 2.1 m (OEH, 2012). The Lake is a highly modified wave dominated barrier estuary with a shallow flat bottomed bed.

The Lake and its catchment span both the Wollongong and Shellharbour Local Government Areas (LGAs) (refer to Figure 1-1). Predominantly the Lake is co-managed by Wollongong City Council (WCC) and Shellharbour City Council (SCC), with support from State agencies such as the Office of Environment and Heritage (OEH), and Department of Industry – Lands and Water (Crown Lands) (herein referred to as “DOI – Crown Lands”). Most notably, DOI – Crown Lands now manages the Lake Illawarra entrance management works.

The Lake is a highly valued natural resource within the Illawarra region, and is immensely valuable from an ecological, social and economic perspective. Lake Illawarra is considered one of the more complex estuary systems on the NSW south coast in terms of balancing the existing modified environment with the community’s aspirations for use and enjoyment of the Lake, past and present industrial uses in the catchment, and increasing residential development pressures. Management of the Lake across the two councils and various agencies further increases the political, financial, resourcing, social and other challenges of managing this important Lake.

In its previously natural condition, the entrance was typically narrow, shoaled and intermittently closed, opening in response to elevated water levels following rainfall events. Between 2000 and 2007, in conjunction with channel dredging, the entrance breakwaters were constructed to keep the Lake continuously open to the ocean. The entrance breakwaters have resulted in major geomorphic, hydrodynamic and ecological changes to the Lake. Lake Illawarra supports numerous protected

species and endangered ecological communities, including a number of migratory species. The gently sloping foreshores provide habitat for extensive areas of coastal saltmarsh, while the shallow subtidal areas support extensive seagrass.

The Lake is also highly valued and heavily utilised by the community, particularly for recreation such as fishing, sailboarding, boating, swimming, kayaking, and picnics, cycling and walking along the foreshores. Economically, the Lake supports tourism industries relating to its recreational opportunities. There is a significant general commercial fishing effort in Lake Illawarra with the overall catch dominated by sea mullet, blue swimmer crab, dusky flathead and school prawns.

The Lake contains areas of cultural significance from both the long history of Aboriginal use of the estuary, and non-indigenous development and use of the Lake over the last 100 years. The Lake provided more than just a food source for the Aboriginal people of the Illawarra region. The Traditional occupants of the land of the Illawarra region, the Yuin people not only utilised the natural environment for survival and protection, but also had a spiritual connection to the Lake and the surrounding land. The significance of this site to the Yuin people stretches for thousands of years into the past, and its importance to the Aboriginal community continues today.

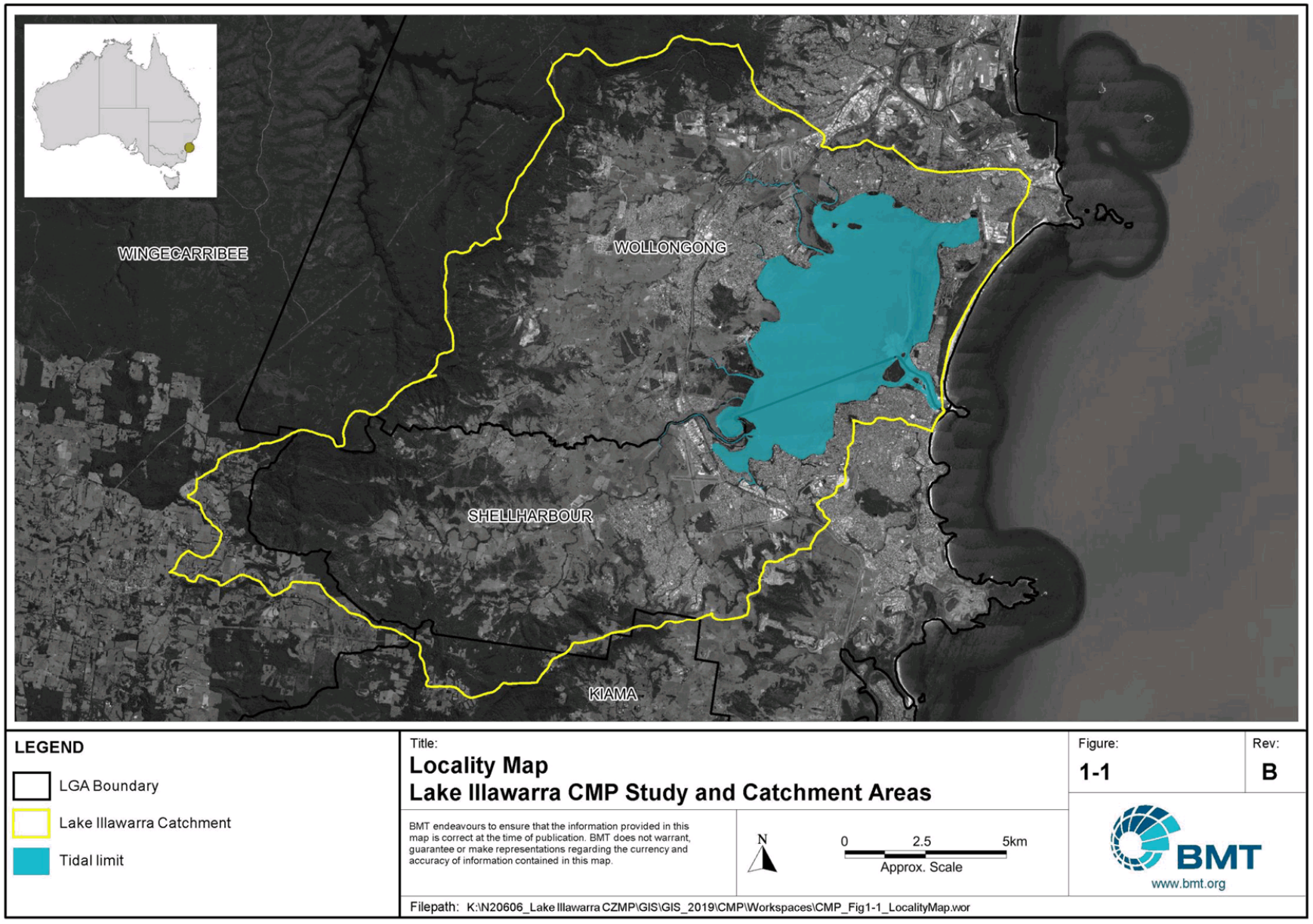
The pressures on the natural resources of Lake Illawarra are significant and include both natural coastal hazards as well as those brought about by human use of the foreshore and catchment. Population growth and growing residential development needs, tourism and recreational activities as well as climate change impacts all place pressure on the Lake.

1.3 Area Covered by this CMP

This CMP covers the entire Lake Illawarra estuary and catchment as it affects the estuary. That is, as shown in Figure 1-1, the CMP covers:

- up to the upstream tidal limits of the tributaries to the Lake (namely Macquarie Rivulet, Mullet, Brooks, Duck and Horsley Creeks);
- downstream to the entrance channel (including the entrance training works and extending out to the ebb tide delta);
- all foreshore (and backshore) areas of the Lake, and
- considers the influence of the wider catchment area of the Lake insofar as activities pose a high threat to the estuary system (see Figure 1-1 and Figure 1-2). The CMP applies only to the Lake Illawarra catchment area that forms part of both the Shellharbour and Wollongong LGAs.

This Lake Illawarra CMP encompasses all four coastal management areas defined in the CM Act, as outlined further in Section 1.5.2.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WOLLONGONG
SHELLHARBOUR
KIAMA
LEGEND
LGA Boundary
Lake Illawarra Catchment
Tidal limit
Title:
Locality Map
Lake Illawarra CMP Study and Catchment Areas
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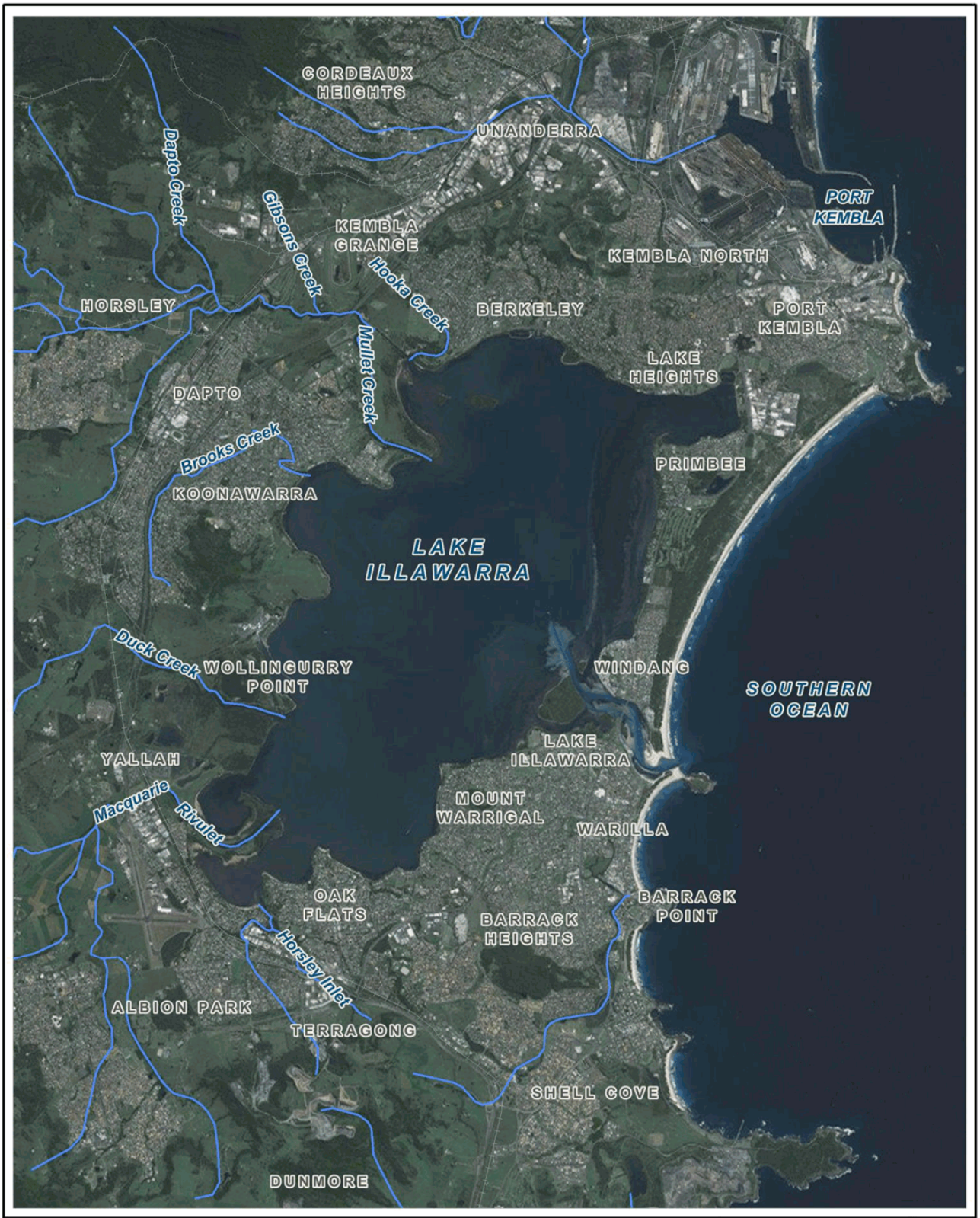

Title:
Lake Illawarra and Waterways

Figure: **1-2**

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1.4 Who is the CMP for?

While the estuary and its catchment are partitioned into two separate LGAs, the natural processes occurring within the estuary, their associated values, threats and opportunities are largely cross-jurisdictional. The estuary and its catchment are a holistic system and need to be managed as such by all stakeholders responsible for the Lake, and its catchment insofar as it affects the Lake. The CMP is a guiding document for those involved in managing the Lake, and who are variously responsible for implementing the actions in this CMP for the benefit of the community and the environment.

The majority of the actions are the responsibility of WCC and SCC. For WCC and SCC, issues and associated management responses are likely to be similar across both LGAs, meaning that there are significant advantages to managing the estuary in a coordinated and integrated manner. Pooled funds and resources are also likely to be more efficiently used, without the need for duplication. Both councils agreed to collaborate in preparing this CMP with support from OEH, and this CMP aims to provide the judicious management of the Lake and its surrounds into the future.

OEH is also a key stakeholder, having contributed financial and technical support to developing this CMP, and can assist with funding many CMP actions through the NSW Coastal Management Program.

DOI – Crown Lands who, on behalf of the Ministerial Corporation, manage the Lake waterbody, land on foreshore and some associated infrastructure, are responsible for some actions within the plan.

A range of other stakeholders have responsibilities in this plan, ranging from directly implementing actions, to providing financial, technical or other support to this CMP, including: the NSW Marine Estate Management Authority (MEMA), the NSW Department of Primary Industries Fisheries (DPI Fisheries), Department of Planning and Environment (DPE), Roads and Maritime Services (RMS), NSW National Parks and Wildlife Service (NPWS), Sydney Water Corporation, Illawarra Local Aboriginal Land Council (ILALC), as well as developers, tourism operators, recreational fishers, residents, visitors and the general public.

1.4.1 Land Tenure and Ownership

Prior to July 2014, the Lake Illawarra Authority (LIA) had primary responsibility for managing the Lake, including most of its assets, and sections of foreshore and public lands in conjunction with W and SCC. Through joint funding arrangements from the State Government and Councils, the LIA delivered significant asset improvements to all foreshore lands around the Lake.

When the LIA was disbanded, LIA land and assets were transferred back to the State Government and to local Councils. Figure 1-3 provides information on which public lands and assets each Agency is responsible for. The remainder of the Lake foreshore is privately owned and managed. The entrance islands are either managed by WCC or SCC, and Hooka and Gooseberry are managed by NPWS. The change in ownership and management arrangements, from one overarching management body to several, means that a well-considered and supported CMP is vital to achieve effective and coordinated management responses for the Lake. Management Strategy 4.2 “Improve Planning and Management Arrangements for the Lake” outlines several actions which aim to achieve such coordination.

This CMP has considered the obligations under the Native Title Act 1993 and Aboriginal Land Rights Act 1983 and proposed management actions will be undertaken accordingly. The entire CMP study area is included in the Native Title Claim (NC2017/003 South Coast People, registered 31/1/2018). No determinations regarding this Claim have been made to date.

It is noted that relevant authorisations and appropriate tenure arrangements may need to be obtained for actions on public land under the Crown Land Management Act 2016 which commenced 1 July 2018.

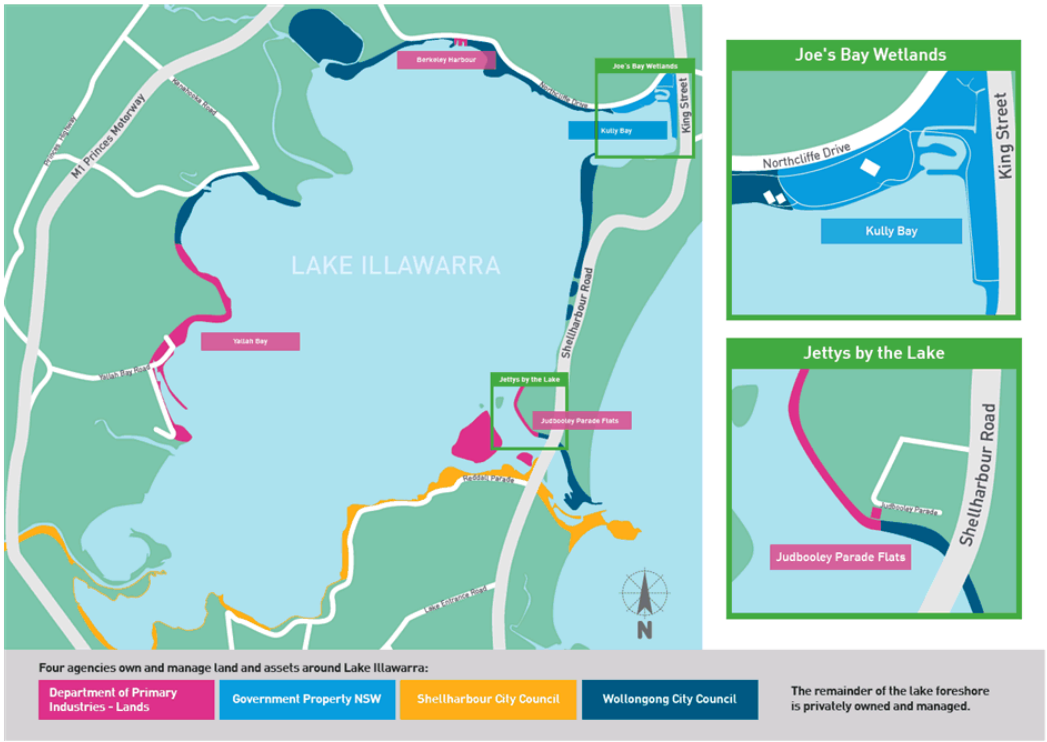


Figure 1-3 Management responsibility of Public lands and assets

1.5 Coastal Strategy Statement and Objectives

This CMP sets the long-term strategy for the coordinated management of Lake Illawarra. In particular, the CMP aims to:

- protect and enhance the natural processes and environmental values of Lake Illawarra including natural character, scenic value, biological diversity and ecosystem integrity and resilience,
- support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety,
- encourage and promote plans and strategies to improve the resilience of the Lake to the impacts of an uncertain climate future including impacts of climate change,

- ensure co-ordination of the policies and activities of WCC and SCC and public authorities relating to Lake Illawarra and to facilitate integration, and
- support public participation and greater public awareness, education and understanding of Lake processes and management actions.

1.5.1 Objectives

In accordance with the CM Act, this CMP shall give effect to the management objectives for the four coastal management areas that exist within Lake Illawarra and its catchment. The coastal zone is defined in the CM Act as comprising four coastal management areas. The CM Act provides the definition and objectives for each of the management areas. *The State Environmental Planning Policy (Coastal Management) 2018* (CM SEPP) provides development controls for each of the management areas, and statewide mapping of the areas. The four coastal management areas as defined by the CM Act are, in order of priority:

- coastal wetlands and littoral rainforest area;
- coastal vulnerability area;
- coastal environment area; and
- coastal use area.

These new definitions of coastal zones have been adopted by the NSW Government to enable targeted management of the diverse environments occurring throughout the coast. The overall aim of this approach is to balance social, economic and environmental interests by promoting a coordinated approach to coastal management (DPE, 2016).

Through the implementation of the actions in this CMP, it is intended that threats to Lake Illawarra will be eliminated, reduced, mitigated or otherwise managed to a tolerable level; and that the values of the Lake will be preserved and enhanced. It is expected that the management objectives identified in the CM Act for the coastal management areas will be achieved by addressing the threats and values identified for Lake Illawarra. The values and threats identified for Lake Illawarra are detailed in Sections 2.3 and 2.4 respectively.

The CM Act states under Part 1, Section 3 "*the objects of this Act are to manage the coastal environment of New South Wales in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State*". It also sets out 13 objects of the CM Act that must be considered and promoted when preparing a CMP. The 13 objects of the CM Act and the location where they have been incorporated in this report are outlined in Table 1-1.

Table 1-1 Objects of the CM Act and their Consideration within this Report

CM Act Part 1	Objects of the CM Act	Action section in this CMP
Section 3a	to protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience.	4
Section 3b	to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety.	4.2, 4.5
Section 3c	to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone.	4.6
Section 3d	to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies.	4
Section 3e	to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making.	4.2, 4.8
Section 3f	to mitigate current and future risks from coastal hazards, taking into account the effects of climate change.	4.3, 4.7, 4.8
Section 3g	to recognise that the local and regional scale effects of coastal processes, and the inherently ambulatory and dynamic nature of the shoreline, may result in the loss of coastal land to the sea (including estuaries and other arms of the sea), and to manage coastal use and development accordingly.	4.3, 4.7, 4.8
Section 3h	to promote integrated and co-ordinated coastal planning, management and reporting.	4
Section 3i	to encourage and promote plans and strategies to improve the resilience of coastal assets to the impacts of an uncertain climate future including impacts of extreme storm events.	4.8
Section 3j	to ensure co-ordination of the policies and activities of government and public authorities relating to the coastal zone and to facilitate the proper integration of their management activities.	4.2
Section 3k	to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions.	4
Section 3l	to facilitate the identification of land in the coastal zone for acquisition by public or local authorities in order to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone.	4.5, 4.8
Section 3m	to support the objects of the *Marine Estate Management Act 2014*.	4

1.5.2 Coastal Management Areas in the CMP Area

This Lake Illawarra CMP encompasses all four coastal management areas defined in the CM Act. Mapping of the coastal wetlands and littoral rainforest area; coastal environment area and coastal use area has been completed by DPE (2017) as reproduced in Figure 1-4. Detailed description and the management objectives for each coastal management area as taken from the CM Act are provided in Appendix A. It should be noted that development for the purpose of environmental works, undertaken by or on behalf of public authorities, on land identified as "coastal wetlands" or "littoral rainforest" within the Coastal Wetlands and Littoral Rainforests Area Map may be carried out without further development consent if they are consistent with this CMP.

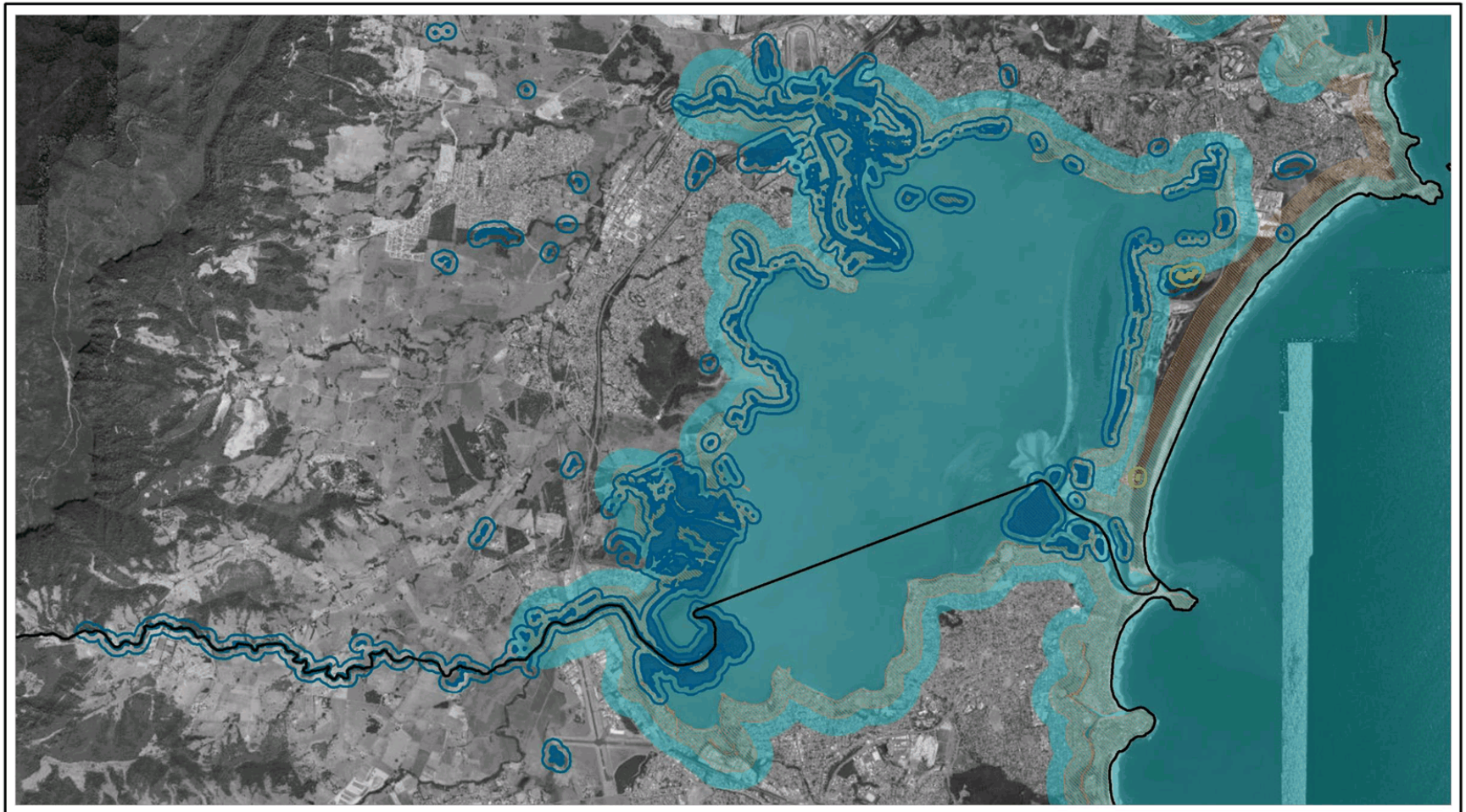
1.5.2.1 Coastal Vulnerability Area

While DPE (2017) does not currently provide mapping of the coastal vulnerability area in NSW including for Lake Illawarra, it is recognised that Lake Illawarra is subject to coastal hazards and that the scope of this CMP also covers managing coastal vulnerability. Lake Illawarra is subject to coastal hazards including foreshore erosion, inundation due to catchment rainfall and/or elevated ocean water levels, and ongoing changes in mean and tidal water levels due to entrance opening and sea level rise (also termed tidal inundation).

Inundation relating to catchment rainfall coincident with storm event elevated ocean water levels is already managed through the NSW floodplain risk management framework, and is therefore not repeated by this CMP. Existing actions in place to manage flooding include the preparation of Flood Studies and Floodplain Risk Management Plans for the Lake (refer Section 1.9) and major tributaries, and clauses in the Local Environmental Plans (LEPs) and planning provisions in the Development Control Plans (DCPs) of Shellharbour and Wollongong LGAs.

While it is not the intent of this CMP to pursue a planning proposal to adopt a coastal vulnerability area at this time, it is noted that suitable mapping is presently available to do so. This mapping will be used to inform land use planning for the Lake. Cardno (2010, 2012) modelled coastal inundation due to storm event elevated ocean water levels without catchment rainfall at present and at 2050 and 2100 including sea level rise. The inundation mapping provided by Cardno (2012) represents the water level during periodic ocean storm events, which is then applied around the foreshore using a simple water height approximation (or 'bath tub') approach. The Cardno (2012) modelling is discussed and mapping provided in Appendix Section A.1.2.

The University of Wollongong has completed mapping of the tidal inundation hazard in Lake Illawarra that is projected to occur due to both the increasing tidal range in the Lake since permanent opening of the entrance, and sea level rise. Kumbier et al (2019) investigated the mean high water spring (MHWS) and high high water solstice spring (HHWSS) tidal water levels at present, 2040, 2070 and 2100. Discussion and model output from the tidal inundation assessment by Kumbier et al (2019) is provided in the *Lake Illawarra Information Synthesis Report* (BMT, 2019a). The tidal inundation modelling was used to assess the risks from tidal inundation and then incorporate risk assessment findings into the threat assessment that supports this CMP, and to develop and augment management actions in this CMP to treat inundation risks. Further details regarding the tidal inundation risk assessment are contained in Appendix C of the *Community Uses, Values, Threats and Opportunities: Lake Illawarra* Report (BMT, 2019b).



LEGEND

- Littoral Rainforests
- Proximity Area for Littoral Rainforests
- Coastal Wetlands
- Proximity Area for Coastal Wetlands
- Coastal Environmental Area
- Coastal Use Area
- LGA Boundary

Title:

Coastal Management Areas for Lake Illawarra (excluding Coastal Vulnerability)

Figure: **1-4**

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1.6 Timeframes Covered by this CMP

This CMP has been prepared for a 10-year period from 2019 to 2029. However, the CMP considers a range of timeframes and planning horizons both in completing the risk assessment for known threats to the Lake, and in terms of the management actions to address these threats both now and into the future. For certain threats that we know are likely to change over time, the following future timeframes were considered:

- 2040-2050, where 20 years from present (i.e. 2040) is a regularly applied "short(er)" planning timeframe, and 2050 is and was a commonly applied timeframe for strategic planning purposes;
- 2070-2100+, where 50 years from present (i.e. 2070) is a regularly applied planning timeframe, 2100 is and was a commonly applied timeframe for strategic planning purposes, and consideration of timeframes beyond 2100 is also given because processes such as sea level rise will continue for many hundreds of years regardless of climate change mitigation actions.

Coastal vulnerability assessments such as storm event coastal inundation and tidal inundation were based on deterministic models with set timeframes, specifically:

- Present, 2050 and 2100 timeframes were investigated for coastal inundation modelling for storm events (ocean water levels) by Cardno (2010, 2012); and
- Present, 2040, 2070 and 2100 timeframes were investigated for tidal inundation modelling by University of Wollongong (Kumbier et al, 2019).

The level of risk to built and natural assets due to coastal and tidal inundation have been investigated for existing and future timeframes, and the existing and future risk levels were then used to develop the management actions detailed in this CMP.

In all cases, management actions were developed as a priority for threats considered to be high or very high at the present timeframe. Management actions were also developed for future high and very high threats where the future threat is well accepted and requires planning intervention now in order to adequately manage the future threat. This is particularly the case for climate change related risks. For example, planning to enable migration of species with sea level rise into currently suitable / available land areas needs to commence now to secure these suitable land areas into the future.

1.7 The Coastal Management Process in NSW

In 2016, the NSW Government passed the *Coastal Management Act 2016* (CM Act), which repeals the *Coastal Protection Act 1979*. The Act became operational in April 2018 along with several other components of the NSW Governments new Coastal Management Framework. This framework also includes the State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP), and a Coastal Management Manual (OEH, 2018). The new Coastal Management Framework is outlined in Figure 1-5.

A CMP is a strategic and operational document that may be prepared under the CM Act for managing a part of the coastal zone. As noted in Section 1.5.1, the coastal zone is now defined as comprising four coastal management areas (namely coastal wetlands and littoral rainforest, vulnerability, environment, and use, in order of priority). A CMP must identify the area covered by the program,

and what coastal management areas are covered within that area, such as described for Lake Illawarra in Section 1.3.

A CMP must meet the mandatory requirements as set out in the CM Act, and any further requirements specified in the Coastal Management Manual and CM SEPP. The CM Act states that a CMP must:

- identify the coastal management issues affecting the areas to which the program is to apply;
- identify the actions required to address those coastal management issues in an integrated and strategic manner;
- identify how and when those actions are to be implemented, including those to be implemented by local councils under Chapter 13 of the *Local Government Act 1993* (that is, through the councils' IP&R Frameworks), those to be implemented under environmental planning instruments and development control plans under the *Environmental Planning and Assessment Act 1979* and those to be implemented by public authorities (other than the local council);
- identify the costs of those actions, proposed cost-sharing arrangements and other viable funding mechanisms for those actions to ensure the delivery of those actions is consistent with the timing for their implementation under the CMP; and
- if the local council's local government area contains land identified within the coastal vulnerability area and beach erosion, coastal inundation or cliff instability is occurring on that land, include a coastal zone emergency action subplan.

This CMP contains the above mandatory requirements, and has also been prepared in accordance with the Coastal Management Manual available from OEH (2018). Consultation with OEH has been undertaken throughout the preparation of the CMP to ensure the CMP meets the requirements of the Coastal Management Manual.

The Coastal Management Manual (OEH, 2018) specifies 5 stages of preparation of a CMP. Figure 1-6 below briefly explains these stages, and highlights how the companion documents developed as part of preparing the Lake Illawarra CMP are aligned with this 5 stage process.

1.7.1 Legislation

The legislation and policies governing the management of Lake Illawarra and its catchment are complex. Legislation pertaining to the management of Lake Illawarra aims to ensure present actions, procedures, and changes to the Lake's management are in line with values that will aid its health into the future. A comprehensive overview of legislation relating to the management of Lake Illawarra was conducted as part of *Lake Illawarra Information Synthesis Report* (BMT, 2019a) which is contained in Appendix B.

Each piece of legislation covers a specific aspect of managing the Lake's environment. Each legislation is administered by a specific state agency. The agencies are also responsible for preparing policies, management rules and compliance action under their legislation. As an example, an object of the *Fisheries Management Act 1994* is to conserve fish stocks and key fish habitat. DPI Fisheries achieves this through establishing rules around fishing activity, policies to protect fish habitat and conducting compliance action in respect of these rules.

NSW Coastal Management Framework

Environmental Planning & Assessment Act 1979 (EP&A Act)

Is the principal legislation regulating land use in NSW, which provides for environmental planning instruments, which establish development controls

The EP&A Act also includes provides for the determination of development applications, and includes enforcement and compliance powers in respect of unauthorised development.

Coastal Management Act 2016 (CM Act)

Sets the State framework and objects for managing the NSW coastal zone, which is now defined as comprising four coastal management areas (CMAs).

Establishes the NSW Coastal Council, to provide independent advice to the Minister.

Sets the minimum requirements for preparing and implementing a Coastal Management Program (CMP).

Marine Estate Management Act 2017 (MEM Act)

Brings a closer link between marine estate and coastal management. The marine estate is define to include all features of the coastal zone (including estuaries). An object of the CM Act is to support the objectives of the MEM Act.

Section 9.1 Directions (Coastal Management)

Applies to planning authorities preparing Planning Proposals under section 9.1 of the EP&A Act.

Planning Proposals can be amended in conjunction with preparation and implementation of CMPs.

Proposed land use changes must be consistent with the CM Act and CM SEPP

State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP)

Identifies and maps the coastal zone, comprised of the following four CMAs: Coastal Wetlands and Littoral Rainforest Area (CWLRA), Coastal Vulnerability Area (CVA); Coastal Environment Area (CEA); and Coastal Use Area (CUA).

Sets development controls for each four CMA, as defined by the CM Act.

Marine Estate Management Strategy (2018)

Details how the Marine Estate Management Authority (MEMA) will achieve its vision for the NSW marine estate over the next 10 years.

The Strategy is underpinned by an evidence based statewide NSW marine estate Threat And Risk Assessment (TARA), completed by MEMA.

NSW Coastal Management Manual 2018 (the Manual)

Provides guidance to local councils on preparing CMPs.

Part A outlines the mandatory requirements in the CM Act, and the essential elements councils are required to follow in preparing a CMP.

Part B describes the process for completing each of the five stages of preparing a CMP in detail.

Coastal and Estuary Grants Program

Provides financial and technical support to local governments assisting in management of the coastal zone.

Assistance provided for both: coastal and estuary planning; and implementing works (identified within a certified CMP)

Coastal Management Programs (CMPs)

Set the long-term strategy for coordinated management of the coast, with focus on achieving the objects of the CM Act.

CMPs are prepared by local councils in consultation with their communities and relevant public authorities.

CMPs are implemented by councils through their Integrated Planning & Reporting (IP&R) framework.

Figure 1-5 NSW Coastal Management Framework

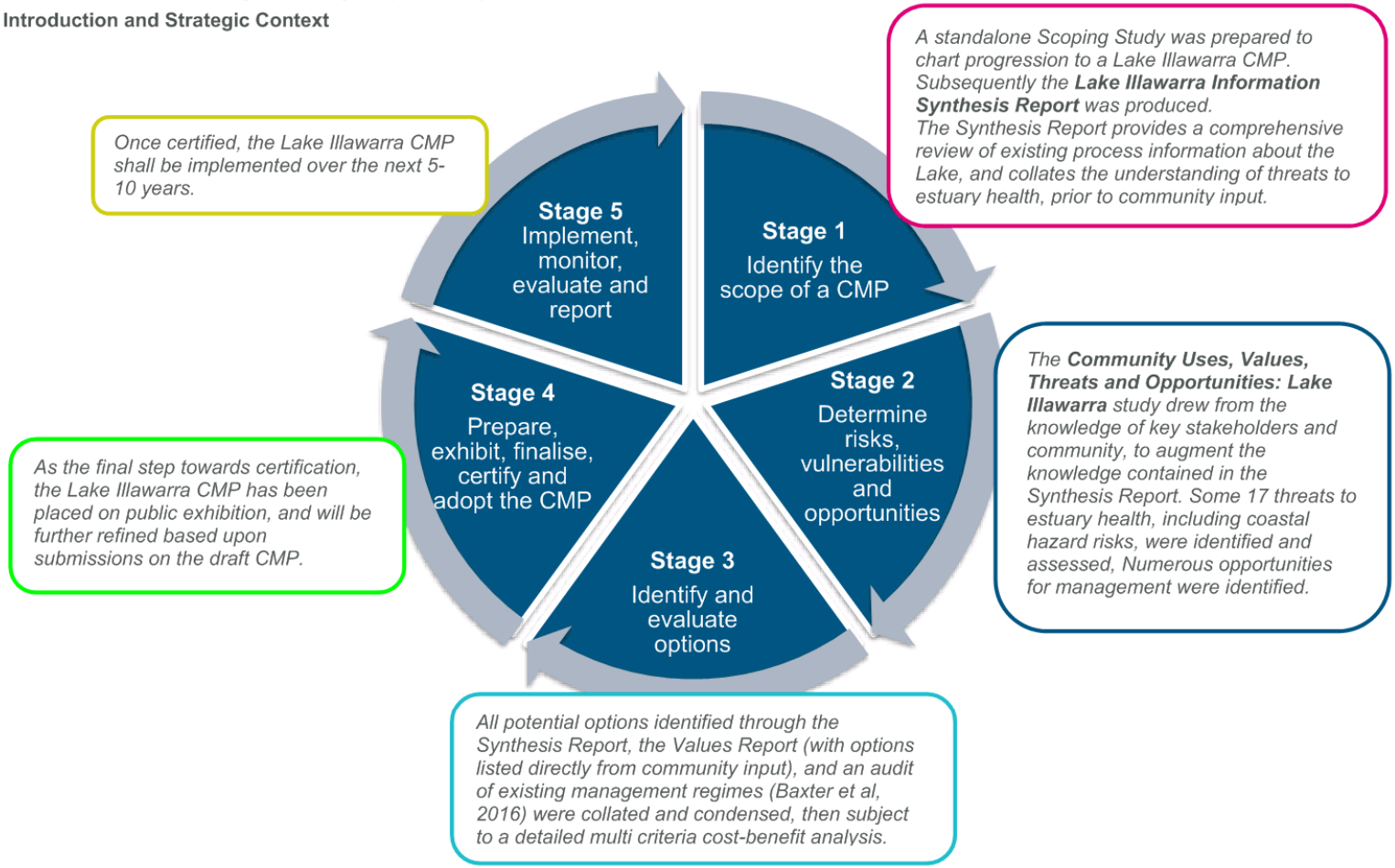


Figure 1-6 Alignment between the 5 Stage Process for CMPs and Lake Illawarra CMP and companion documents

1.7.2 Integration with the Marine Estate Management Strategy

To reduce social conflict and improve effective management of coastal and marine resources beyond existing marine parks, the NSW Government introduced the *Marine Estate Management Act 2014* (Beeton et. al. 2012). The Act provides for strategic and integrated management of the whole marine estate. The marine estate includes all marine waters, estuaries and coastal areas, as well as the State's six marine parks.

The NSW Government also established a new advisory Marine Estate Management Authority (MEMA). MEMA has undertaken a statewide Threat and Risk Assessment (TARA) to consider and prioritise the social, economic and environmental threats to community benefits of the marine estate. The Marine Estate Management Strategy has been prepared to allow a holistic approach to dealing with the cumulative threats to the marine estate. The nine management initiatives in this plan correspond to the cumulative threat categories identified through the statewide TARA process.

Consistency between the Marine Estate Management strategy and CMPs is an essential element listed in the Coastal Management Manual (OEH, 2018). A cross reference between the Priority Regional Threats for the Central Region and the threats identified for Lake Illawarra is included as Appendix D. Management measures identified within the Marine Estate Management Strategy that address key threats to Lake Illawarra have been incorporated within this CMP.

Although the statewide MEMA threat and risk assessment was undertaken at a much broader scale than Lake Illawarra, information from the MEMA background reports has been integrated into the Synthesis Report and the Values Report.

1.7.3 Emergency Action Sub-Plan

As noted above, inundation relating to catchment rainfall coincident with storm event elevated ocean water levels is already managed through the NSW floodplain risk management framework. Emergency elements of the coastal inundation risk are also already adequately managed through existing emergency action planning processes across both Councils in relation to the floodplain risk management plan, as follows:

- Lake Illawarra Floodplain Risk Management Plan (Cardno, 2012)
- Illawarra Flood Emergency Sub Plan (NSW SES, 2017)
- Illawarra South Coast Regional Emergency Management Plan (Illawarra South Coast Regional Management Committee, 2019)
- Illawarra Local Emergency Management Plan (Illawarra Local Emergency Management Committee, 2017)

The above existing processes are considered to satisfy the requirement in the CM Act for an emergency action sub-plan to manage coastal vulnerability in Lake Illawarra (i.e. inundation risks arising from catchment rainfall and/or elevated ocean levels during storms). It is considered repetitious and potentially confusing to prepare a second set of emergency actions for coastal inundation risks through this CMP process.

In relation to other elements that comprise coastal vulnerability or hazard under the CM Act, tidal inundation risks and foreshore erosion risks (including within the entrance channel) are not considered to be of a nature requiring emergency actions, because these hazards tend to progress slowly over time rather than only in relation to storm events. Therefore, no additional actions to those already outlined for flood risk in existing processes are considered necessary to address the other elements comprising coastal vulnerability and risk in Lake Illawarra.

1.7.4 Proposed Amendments to Coastal Management Areas

This CMP does not propose any amendments to the existing mapping of coastal management areas currently gazetted with the CM SEPP. Suitable mapping does exist to prepare a coastal vulnerability area for the Lake, however both WCC and SCC have considered and decided not to pursue the option of a Planning Proposal to gazette a coastal vulnerability area for Lake Illawarra at this time.

Clause 12 of the CM SEPP only applies to coastal vulnerability areas where mapping for that area has been gazetted under the SEPP. Regardless, Clause 15 of the CM SEPP applies to all land within the coastal zone, and states that "*development consent must not be granted to development on land within the coastal zone unless the consent authority is satisfied that the proposed development is not likely to cause increased risk of coastal hazards on that land or other land*".

The existing coastal inundation (storm event and tidal inundation) and other relevant estuary hazard information is already part of existing council development assessment processes. The existing coastal hazard information is suitable to guide proponents in preparing development applications and to guide the councils in providing consent or conditions regarding the potential coastal risk to proposed developments.

1.8 Integrating the CMP with Each Council's IP&R Framework

A mandatory requirement for this CMP under the CM Act is to establish the links and alignment between management strategies in the CMP and objectives and strategies in the Community Strategic Plan (CSP) of both WCC and SCC.

The Integrated Planning and Reporting (IP&R) framework is a legislative requirement for Councils under the *Local Government Act 1993*. IP&R considers the longer term future of an area and is based around a CSP which reflects the community's aspirations and needs for the future. The IP&R framework therefore consists of four layers of plans:

- the Community Strategic Plan,
- the Resourcing Strategy is a 10-year plan describing the resources a council will use to achieve the objectives and strategies detailed in its CSP,
- the Delivery Program is a four-year program outlining the commitments and key partnerships required and measures to monitor success in achieving the Strategies, and
- the Operational Plan outlines in more detail the individual Actions that Council will undertake in a financial year in order to meet the commitments made in the Delivery Program.

In accordance with the CM Act, this CMP needs to align with the IP&R Framework of both WCC and SCC. This aims to mainstream coastal management into councils' overall service delivery and asset management responsibilities. It is also likely that integrating actions from the CMP into the service delivery and asset management processes of the Councils will improve implementation of CMPs.

Generally, the operational plan and delivery program will be updated on a yearly basis (as the delivery program is a rolling four-year program), and it is at this stage that actions from the CMP can and should be incorporated into these documents.

The alignment between this CMP and the strategies and objectives in the CSPs of both SCC and WCC are detailed in Table 6-1. This will assist with the process of incorporating CMP actions into the Councils' delivery programs and operational plans.

1.9 Supporting Documents for this CMP

This CMP is supported by two companion documents.

- The *Lake Illawarra Information Synthesis Report* (the Synthesis Report) (BMT, 2019a) which collates and reviews a wide range of data, reports, plans and policies from over the past decade or more, and is reproduced in Appendix B. Topics reviewed included: physical setting, geomorphology, entrance management works, hydrodynamics, water quality, estuarine ecology, catchment influences, estuary health, community and cultural values, and climate change impacts. Existing and planned controls that apply to the Lake were also reviewed. Information gaps with respect to the estuary environment and management were identified, and a preliminary list of key values and threats was also prepared for the report.
- A *Community Uses, Values, Threats and Opportunities: Lake Illawarra* study (the Values Report) (BMT, 2019b) compiled the community consultation activities, information and outcomes undertaken as part of the CMP process, in addition to outlining the uses, values, threats and risks associated with the Lake. A detailed risk assessment was completed as part of the Values Report which identified the threats listed with accompanying risk rating. The Values Report is provided in Appendix C.

A number of previous studies have supported the preparation of this CMP, in addition to the above companion documents. These studies are listed below for reference.

- *Lake Illawarra Coastal Zone Management Study* (incomplete Draft, LIA 2013), from which substantial information and mapping for issues, threats and management actions has been drawn into this CMP.
- *Lake Illawarra Coastal Risk Assessment* (BMT WBM, 2013), provides details regarding actions to address of coastal inundation to Lake Illawarra within the Shellharbour LGA.
- *Wollongong Coastal Zone Management Plan: Management Study* (BMT WBM, 2017) provides details regarding actions to address of coastal inundation to Lake Illawarra within the Wollongong LGA.

- *Shellharbour Coastal Zone Management Plan Final Draft* (BMT WBM, 2016), which details coastal management actions for the open coastal zone including Warilla Beach and Windang Island.
- *Lake Illawarra Floodplain Risk Management Plan* (Cardno, 2012) and associated documents (flood study and floodplain risk management study), which provide details regarding flooding and inundation relating to catchment rainfall, with and without elevated ocean levels, and actions to manage flooding risks in Lake Illawarra, and which were used to derive flood planning levels and planning provisions in the LEPs and DCPs of WCC and SCC.
- *Lake Illawarra Estuary Management Study and Strategic Plan* (WBM Oceanics, 2006), which formed the precursor to this CMP and the 2013 draft CZMP document.

1.10 Consultation During Development of the CMP

Consultation with councils, public authorities and the community have been undertaken in accordance with a communication and engagement strategy prepared for this project. The strategy and the outcomes of the consultation undertaken to date were documented in the Values Report, Appendix C. This has included consultation with the councils, state agencies and other stakeholders. A list of the identified target stakeholders for this CMP is provided in Table 1-2.

Table 1-2 Target Stakeholders

Category	Stakeholders
Key Council Staff from WCC and SCC	• Engineers • Infrastructure • Planning • Parks • Environment • Senior Management • Councillors • Asset Managers • Service Managers
State Government and other agencies and businesses	• Office of Environment and Heritage • Roads and Maritime Services • Local Lands Services • DOI - Crown Lands • DPI Fisheries • Sydney Water • University of Wollongong • Department of Planning • Illawarra Local Aboriginal Lands Council • NSW Commercial Fishers • Tourism operators • Illawarra Business Chamber • Golf Club/ Yacht Club/ Bowls Club

Category	Stakeholders
	• Aishs Seafood • Futureworld Eco - Technology Centre
Community Groups	• Aboriginal Knowledge Holders and Traditional Custodians • Land care / coast care/ bushcare groups/ bush restoration teams • Rowing/ Sailing/ Yacht/ Canoe/ Dragon Boat/ Motor Boat Clubs • Recreational Fishing Clubs and Recreational Fishing Alliance of NSW • Conservation Volunteers Australia • Landcare Illawarra • Neighbourhood Forums • Scout Groups • Save the Lake • Seabird Rescue • APRA – Caravan park residents association • Shellharbour City Council Aboriginal Advisory Committee • Wollongong City Council Aboriginal Reference Group
Residents	• Foreshore landholders (1500) including caravan park residents. • Wider Catchment (90,000) • Visitors • Aboriginal Community

1.10.1 Community Support

The actions and strategies in the CMP have been developed to target the threats identified and to preserve the values of the Lake. Community consultation undertaken for this CMP, detailed in the Values Report (see Appendix C), indicated the following aspects to be most valued about Lake Illawarra (with over 70% of respondents valuing these aspects), shown in Figure 1-7.

- Water quality, which was the most valued aspect of the Lake,
- Views / How the Lake Looks
- Native wildlife
- Access to Lake Foreshore
- Recreational Facilities, and
- Healthy Vegetation in the Lake.

The highest threats identified during the preparation of this CMP (and described in more detail in Section 2.4, and the Values Report, Appendix C) were:

- Water pollution
- Catchment development, and
- Entrance channel changes.

Opportunities for action identified by the community were also directly utilised in developing all actions in the CMP. The CMP will be placed on public exhibition to further demonstrate the community's acceptance for actions in the CMP.

See section 2.3 for how threats were identified.

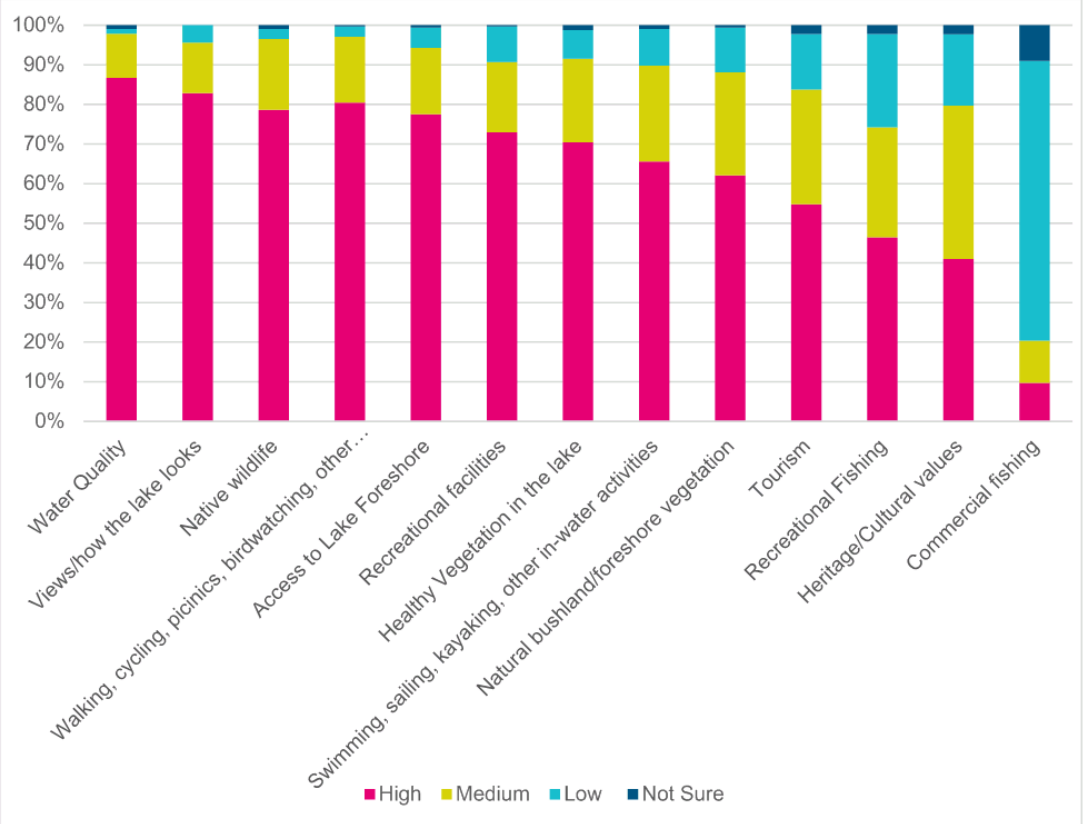


Figure 1-7 Community and Stakeholder Perception of Values Associated with the Lake

2 Lake Illawarra's Processes, Values and Threats

2.1 Chapter Overview

This chapter provides a summary of the Synthesis Report and Values Report that were produced as supporting documentation for this CMP. The objectives of this CMP have a strong focus on ecological health, as this underpins the social, public amenity, and economic values associated with the Lake. The summary of estuary processes below demonstrates the valuable environmental aspects of the Lake, that support its recreational, cultural and economic values.

2.2 Summary of Estuary Processes and Other Influences on Lake Illawarra

2.2.1 Physical character

Lake Illawarra is a large, shallow coastal lake, and is classified as a wave dominated barrier estuary system. From east to west, the Lake is situated between the wide, long coastal barrier system of Windang Peninsular that extends from Windang to Port Kembla (Perkins Beach) and largely impounds the estuary from the ocean; and the steep western backdrop of the Illawarra Escarpment. The Lake is fringed by low lying land, with extensive tidal flats on its eastern margin as part of Windang Peninsular and where Macquarie Rivulet and Mullet Creek flow into the estuary along its western margin.

The main waterbody of the Lake is elongated in a general southwest - northeast direction. It has a surface area of around 35 km^2 and an average and maximum water depth of 2.1 and 3.2 m respectively (LIA 2013; Sloss, 2005). The average Lake water level is around 0.2 m above sea level (OEH, 2012). The Lake Illawarra catchment covers an area of 240 km^2 (OEH, 2012). The current land uses across the catchment are illustrated in Figure 2-1. Other characteristics of the catchment are summarised in Section 2.2.6, with further details in the Synthesis Report.

A number of major watercourses, small creeks and drainage lines drain into the Lake, with the five major tributaries being: Macquarie Rivulet; Mullet Creek; Brooks Creek; Duck Creek; and Horsley Creek.

The Lake is now permanently open to the sea via an artificially trained entrance channel between twin breakwaters, with the entrance channel positioned between Windang Island and Windang Beach. Prior to construction of the artificially trained entrance, Lake Illawarra was classified as an Intermittently Closed and Open Lake and Lagoon (ICOLL), with the entrance channel shifting from south to north around Windang Island.

2.2.1.1 Ambulatory nature of shorelines

The ambulatory and dynamic nature of the shoreline and how it may affect the study area has been considered in the CMP through using the understanding of coastal processes to inform management response. For example, the entrance channel shoreline is in a state of change as a result of the permanent entrance opening and a consideration of this aspect has resulted in this being identified as a high risk, with management actions to reduce this risk outlined.

2.2.2 History of Management of Lake Illawarra

During the 1980s, a combination of high catchment sediment and nutrient loads, climate variations (i.e. drought periods) and natural processes (such as the Lake's frequently closed entrance condition) resulted in poor water quality, algal blooms, seagrass dieback and significant community concern regarding the Lake's management and health. In response to the declining health and environmental condition of the Lake, the LIA was formed by the NSW Government in 1988, previously the Lake was managed by WCC, SCC and other agencies. Over the next 20+ years, the LIA managed Lake Illawarra and undertook numerous foreshore rehabilitation projects as well as algal harvesting, bank stabilisation and the construction of several gross pollutant traps and artificial wetlands around the Lake. The LIA worked collaboratively with WCC and SCC in delivering environmental and infrastructure initiatives.

Sediment and nutrient loads into the Lake continued to increase in line with ongoing development in the catchment, reducing the Lake's water quality. In an attempt to manage poor water quality by increasing tidal flushing, the Lake was substantially modified by the staged construction of a permanent trained entrance, which was completed under the LIA between 2000 and 2007. It was also intended that a permanently trained entrance would bring other social and environmental benefits, particularly building from improved water quality.

The LIA was disbanded in July 2014 and its responsibilities transferred to WCC, SCC, DOI - Crown Lands, and Property NSW.

Foreshore land around the Lake is variously under the ownership and management of WCC, SCC, DOI – Crown Lands, Property NSW or private landholders (including industry such as EnergyAustralia who own the foreshore land of Tallawarra Power Station).

Berkeley Nature Reserve (BNR) lies within Lake Illawarra and is actively managed by the NSW National Parks and Wildlife Service (NPWS). BNR comprises two small islands: Gooseberry Island (6.1 ha) & Hooka Island (2.0ha). The boundary of BNR extends to the mean high water mark of each island. BNR is of international and national significance for its biological values, and regional significance for its cultural heritage and landscape values.

In 2005, a book titled "Lake Illawarra – An Ongoing History" was prepared by Joseph Davis for the LIA. This book contains a wealth of information and history regarding the Lake and should be referred to for further history of the Lake.

2.2.3 Entrance Channel Dynamics

The permanent opening of Lake Illawarra to the ocean has resulted in significant geomorphic, hydrodynamic and ecological changes. Lake water levels are permanently influenced by the diurnal cycle of ocean tides (MHL, 2013), and Lake waters are now permanently saline. The hydraulic efficiency of the entrance tidal inlet has increased significantly in association with the increased tidal prism within the Lake (MHL, 2013). Tidal range in the Lake is increasing at approximately 8mm/year, resulting in increased tidal scour (MHL, 2013).

The increased hydraulic capacity of the entrance channel has caused the migration of shoals and tidal channels, resulting in changed patterns in scour, erosion and sedimentation. The substantial impacts throughout the entrance channel are summarised below.

Significant amounts of sediment have been scoured from within the entrance channel since 2007. The marine flood tidal delta at the western end of the channel has grown significantly, extending westwards into the Lake's central mud basin (Baxter and Daly, 2010; MHL, 2013). MHL (2013) measured a net annual westward movement of marine sand into the Lake of approximately 1000 m^3/year (MHL, 2013). Bathymetry changes between 2008 and 2016 also illustrate accretion of the ebb tide delta seaward of the breakwaters (BMT, 2019a).

East of Windang Bridge, the channel has migrated northwards, with significant scouring and deepening of the channel occurring along its northern margin along the Windang foreshore, and deposition and shoaling along the southern margin of the channel. The entrance scouring and erosion has significantly undermined assets along the Windang foreshore, including the boardwalk (which has since been replaced), boat ramp, power supply infrastructure, sections of footpath, lighting and other park infrastructure, pylons supporting the northern portion of Windang Bridge, areas of Aboriginal Cultural significance, shorebird habitat and open public space. sections of footpath, lighting and other park infrastructure. The three groynes and a section of rock revetment have experienced significant scour at their ends and toe.

Entrance shoaling and sediment deposition along the southern margin of the channel has resulted in reduced amenity and functioning of the swimming areas near the secondary tidal channel adjacent to Reddall Reserve, with the swimming area frequently chocked with sediment. Nesting habitat for shorebirds has also been affected.

West of Windang Bridge, local erosion has also occurred within the channels and on the western side of Bevans and Cudgeree Islands (MHL, 2013). Foreshore erosion is also occurring along Picnic Islands, as well as significant movement of shoals either side of Windang bridge and along the Windang foreshore west of the bridge, due to ongoing channel adjustments. Secondary tidal channels have developed near to the southwest of the main tidal channel, westward of Bevans Island. In contrast, sedimentation is occurring in the popular swimming area on the western side of Berageree Island, which has caused community concern.

Substantial losses of seagrass have been observed throughout the entrance channel due to the expansion of the flood tide delta and scouring of shoals.

Such morphological changes will continue over the next 100 years or more as the entrance channel equilibrates to the new hydraulic regime.

2.2.4 Water Quality

Different aspects of water quality are important for each of the different uses and ecosystem functions relevant to Lake Illawarra. Recreational activities (such as swimming) require water that is not contaminated by human specific bacteria, viruses and other disease or infection causing pathogens, and chemical contaminants. For ecosystem function and estuary health, water quality indicators are related to turbidity, chlorophyll *a* and nutrients, although even in a completely pristine state, these

indicators would be highly variable, fluctuating in response to natural events such as high rainfall runoff and entrance breakouts (which occurred prior to the permanent entrance opening). Water quality to support estuary health is directly impacted by chemical contaminants and increased sediment and nutrient loads from catchment development (in terms of both the development process and the ongoing land use that contributes to poor water quality and increased quantity), stormwater, groundwater contamination, litter and marine debris, illegal vehicle access to foreshore areas, sewage overflows, residential land uses, industrial land uses and discharges, agriculture, foreshore development, tree removal and park management practices.

In the past, the condition of the Lake was considered poor, with mass algal blooms frequently occurring (WCC, 2015). Based on monitoring since the entrance was permanently opened, WCC (2018) has found seasonal variability of water quality indicators such as chlorophyll-*a*, ortho-phosphorus and dissolved oxygen, and variability in water quality and estuary health indicators across the Lake. The data shows consistency in the water quality of the Lake across the monitoring program's duration despite seasonal extremes and anomalies (WCC, 2018a).

Prior to entrance opening, the north-eastern and south-western sections of the Lake consistently experienced significant nutrient enrichment when compared to the middle reaches, entrance, and main body of the Lake (LIA, 2006 and WCC, 2018a). Since entrance opening, this trend has continued as these regions are more enclosed and have lower rates of tidal flushing, allowing accumulated nutrients to remain, rather than be flushed out to sea with the tide, demonstrating that catchment impacts have a major influence on water quality in the Lake.

2.2.5 Ecology

The Lake provides habitat for fringing protected communities such as coastal saltmarsh, swamp oak floodplain forest, littoral rainforest and extensive areas of seagrass. The three main communities of estuarine vegetation (saltmarsh, seagrass and mangroves) provide essential habitat, food supply and nutrient cycling. This in turn supports fish assemblages and wildlife, contributes to good water quality and provides scenic qualities. A number of protected species rely on the Lake, such as Black Necked Storks and Pied Oystercatchers.

Estuarine vegetation is highly variable around the Lake and over time. Estuarine vegetation has been removed for land reclamation and foreshore development, with works including bridge construction, open water reclamation, shoreline hardening and dredging undertaken in and around Lake Illawarra over the past 100 years, by both public and private land managers. Grazing animals, 4WDs and other vehicles, BMX and other bikes, informal walking tracks, and mowing and other inappropriate park management practices have and continue to impact upon fringing estuarine vegetation and riparian vegetation further upstream in the tributary creeks.

These pressures occur in addition to the permanent entrance opening and sea level rise. In response to the permanent opening of the Lake, areas of mangrove are reported to have been increasing, with signs that some of the newly established saltmarsh areas could be outcompeted by mangroves (Baxter and Daly, 2010; Williams and Wiecek, 2017). However, the driving factor for a potential loss of saltmarsh over time is likely to be the increasing tidal range due to the permanent opening. This

change in tidal range has and will be enhanced by sea level rise over time, with further impacts upon saltmarsh and mangroves to be expected.

Seagrass is particularly important for supporting fish within the Lake, as it provides a food source and shelter for different fish during different stages of their life cycles. Within the Lake, seagrass can and has been impacted by boating activities, particularly from anchors and moorings. Seagrass is protected under Part 7 Division 4 of the *Fisheries Management Act 1994* (FM Act). The FM Act sets out provisions to protect marine vegetation (mangroves, seagrass and seaweeds whether alive or dead) from 'harm'. 'Harm' under the FM Act means gather, cut, pull up, destroy, poison, dig up, remove, injure, prevent light from reaching or otherwise harm the marine vegetation.

Since the permanent opening of the Lake, there is also evidence that seagrasses on the flood tide delta entering the Lake are being smothered by sand (e.g. see Wiecek et al., 2016). Seagrass is also being lost in other areas due to increased flow velocities and scour, most notably, along the channel margins that are experiencing scour. While it is understood that seagrass can naturally vary in distribution throughout the Lake, reducing human impacts will assist in nurturing seagrasses to thrive in the Lake.

Reduced estuarine vegetation combined with poor water quality will directly impact on native fauna of the Lake, including fish.

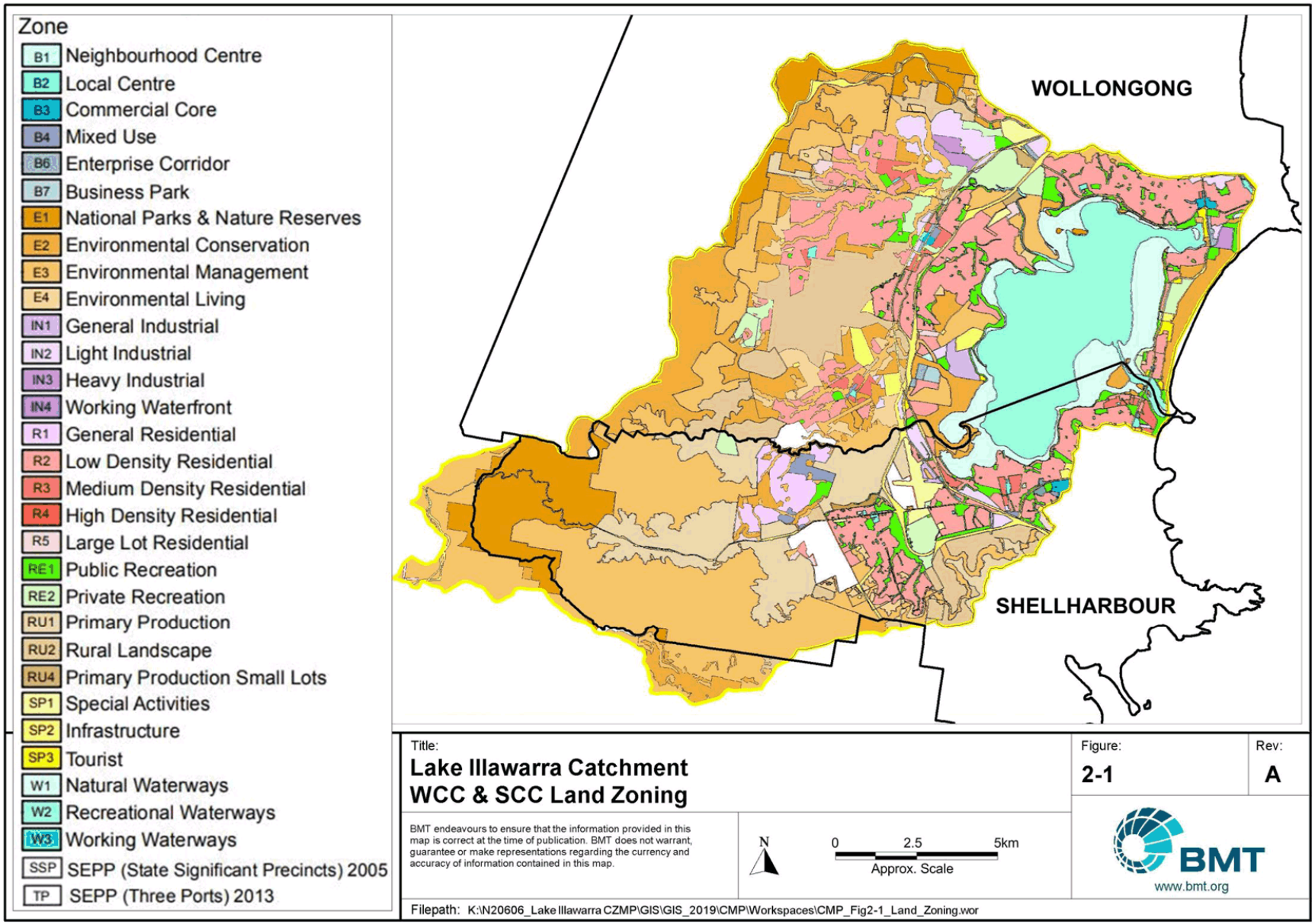
2.2.6 Influence of Population, and Growth and Changing Demographics

Today the catchment is about 60% cleared land, including urban, industrial and rural land uses, see Figure 2-1. The urban population in both Wollongong and Shellharbour has and is continuing to grow.

A large portion of the Lake's western catchment is planned to be converted to residential land. The Calderwood development in the Shellharbour LGA has already significantly advanced in the five years since October 2013. Another major development is in West Dapto, which proposes to add about 19,500 households to the catchment over the next 50 years (WCC, 2018b). The Illawarra Shoalhaven Regional Plan (DPE, 2015) states that by 2036 the population of the Illawarra-Shoalhaven region is forecast to increase by 60,400 people from 2016, taking the total population to 463,150. West Dapto has a projected population increase of almost 60,000 once fully developed. Forecast for population growth in SCC is an increase in 17,000 people between 2016 and 2036 - mainly driven by development of greenfield sites in the Lake catchment. Overall, the WCC population is forecast to increase by 43,604 people between 2016 and 2036, equivalent to approximately 20% growth across the period.

Ongoing catchment development is being felt in the Lake as poor water quality (through increased pollutant loads and water quantities both during and after development) (WCC, 2018a). The increased population in the region will also result in an increase in demands for recreational and potentially commercial usage of the Lake. This may have implications on overall estuary health and issues such as recreational opportunities, access and amenity, bank erosion, damage to ecological habitats, and private encroachments onto public land, particularly public foreshores.

Industrial land uses of the past and present have left a legacy of contamination, which through groundwater and surface water runoff can transport contaminated water and sediments into the Lake.


Zone
B1 Neighbourhood Centre
B2 Local Centre
B3 Commercial Core
B4 Mixed Use
B6 Enterprise Corridor
B7 Business Park
E1 National Parks & Nature Reserves
E2 Environmental Conservation
E3 Environmental Management
E4 Environmental Living
IN1 General Industrial
IN2 Light Industrial
IN3 Heavy Industrial
IN4 Working Waterfront
R1 General Residential
R2 Low Density Residential
R3 Medium Density Residential
R4 High Density Residential
R5 Large Lot Residential
RE1 Public Recreation
RE2 Private Recreation
RU1 Primary Production
RU2 Rural Landscape
RU4 Primary Production Small Lots
SP1 Special Activities
SP2 Infrastructure
SP3 Tourist
W1 Natural Waterways
W2 Recreational Waterways
W3 Working Waterways
SSP SEPP (State Significant Precincts) 2005
TP SEPP (Three Ports) 2013
WOLLONGONG
SHELLHARBOUR
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Lake Illawarra Catchment
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The Lake is frequently utilised for recreational activities such as fishing, sailboarding, boating, swimming and picnics. There are some 75,000 recreational fishers in the Illawarra, many of whom utilise Lake Illawarra (West *et al.*, 2015). Boat ramps, jetties, wharves and picnic facilities support these uses in the Lake, as well as the associated commercial industries of tourism and fishing. There is a significant general commercial fishing effort in Lake Illawarra with the overall catch dominated by sea mullet, blue swimmer crab, dusky flathead and school prawns.

The Lake contains areas of cultural significance, from both the long history of Aboriginal use of the estuary, and non-indigenous development and use of the Lake over the last 100 years.

2.2.7 Climate Change

Climate change poses a significant threat to the NSW Marine Estate, including the Lake Illawarra estuary system. As previously noted, it is recognised that Lake Illawarra is subject to coastal hazards including storm inundation and tidal inundation. Climate change, particularly sea level rise, will escalate the threat presented by inundation.

Sea level rise will result in an increase in the Lake's water level as the Lake is hydraulically connected with the ocean through the permanently open entrance. When combined with tides, this may result in the foreshores of the Lake and tributaries becoming inundated on a frequent basis with the daily tidal cycle. Hydrodynamic modelling of tidal inundation was recently completed by Kumbier et al (2019) that considered the combined impact of sea level rise and the ongoing increase in the Lake's tidal range that is occurring as a result of permanent entrance opening. The model outputs were incorporated into the risk assessment conducted in the Values Report for this CMP and summarised in Section 2.4.

A higher lake water level due to sea level rise also exacerbated storm event based inundation during rainfall and or ocean water level events. Coastal inundation mapping was completed on the WCC side of the Lake by Cardno (2010) using a hydrodynamic approach. For the entire Lake, Cardno (2012) completed coastal inundation mapping including current and future conditions with sea level rise using a simple water height approximation (or 'bath tub') approach. Further discussion of these hazards is provided in the Synthesis Report (BMT, 2019a) in Appendix B.

2.3 Estuary Values of Lake Illawarra

A comprehensive account of Lake Illawarra's uses and values was developed from the combination of output of surveys and discussions with the community with the existing scientific information for the Lake, as detailed in the Values Report (see Appendix C). Values identified for Lake Illawarra are summarised in Table 2-1 below.

It should be noted that recreational hand gathering of cockles has been increasing in Lake Illawarra over recent years, especially over the summer of 2018 to 2019. While recreational hand gathering was not identified as a threat at the time the Synthesis Report and Values Report were initially prepared, given the recent exponential increase in hand gathering effort and local community concern over this activity, actions to align and assist with DPI Fisheries management of this matter have been included in this CMP.

Tourism is a key value in the Lake. Tourism values are underpinned by the environmental health and recreational opportunities offered by the Lake. The CMP is focussed on maintaining or improving environmental health and recreational amenity, and in this manner, can support a healthy tourism industry in the Lake. Conversely, other mechanisms of the Councils and State Government exist to develop and promote tourism opportunities, and are therefore not replicated by this CMP.

Table 2-1 Community Values associated with Lake Illawarra (from the Community & Stakeholder Survey)

Value	Key points	Highly Valued*
Water quality	Good water quality is highly valued because it underpins all natural processes and human uses in the Lake.	89%
Views / How the Lake Looks	Views of the water and a natural vegetation backdrop undoubtedly contribute to the Lake's high aesthetic value, although community opinion varies as to the ratio of vegetation to waterway in views.	81%
Native wildlife	Native wildlife is supported by a healthy lake ecosystem and catchment habitats, and supports the biodiversity and productivity of the Lake. The community values native wildlife for birdwatching, nature conservation and its aesthetic value.	80%
Access to Lake Foreshore	8 boat ramps, 13+ jetties/wharves, and foreshore access supports in-water activities (see below). Foreshore parks/reserves support foreshore activities (see below).	78%
Recreational Facilities	As above, plus picnic, shelter and playground facilities, the bicycle shared pathway, and walking tracks. Some infrastructure is aging and doesn't meet peak demand.	73%
Healthy Vegetation in the Lake	Saltmarsh, seagrass and more recently mangroves provide essential habitat, food supply and nutrient cycling. This in turn supports fish abundance, wildlife and good water quality, which also supports scenic and recreational values.	71%
Foreshore Activities	Popular activities include walking, bike riding, picnics, barbeques, bird watching, bushwalking, bush regeneration, and are supported by Access to the Lake Foreshore and Recreational Facilities (see above).	69%
In-water Activities	Popular activities include swimming, kayaking, sailing, boating, as supported by Access to the Lake Foreshore and Recreational Facilities (see above).	65%
Natural bushland / Foreshore vegetation	Riparian vegetation and catchment bushland supports wildlife, as well as filtering water of nutrients and pollutants before it enters the creeks and Lake. The community appreciates the natural beauty provided by riparian vegetation, with a small segment noting foreshore trees impede their views.	64%
Tourism	An exact dollar value on the contribution of Lake Illawarra to the tourism economy is not possible, however, the natural and recreational values noted above for the Lake contribute directly to attracting visitors to the local area.	51%
Recreational Fishing	This popular activity includes boat based and shore based line and trap fishing, and hand gathering.	45%
Heritage / Cultural Values	Lake Illawarra remains strongly significant in Aboriginal culture. It supported established campsites of the Yuin people and a diverse and sustainable source of food and fresh water for some 20,000 years prior to European settlement. 'Official' European settlement of the Illawarra region commenced in 1816. It has profoundly impacted the Lake: positively toward the way we value the Lake today; and negatively due to the displacement of the Aboriginal people from their land and waterways, introduction of foreign plants and animals, land clearing for dairy and cattle farming, cedar cutting, and landscape changes from coal mining.	40%
Commercial Fishing	Commercial fishing contributes ~ $1M annually at first point of sale, plus further lifecycle economic value. It is permitted under an "Estuary General" licence covering Wollongong to Ulladulla. Commercial fishers primarily use mesh and haul netting and crab traps, and dominantly catch sea mullet, blue swimmer crab and dusky flathead.	8%

** Refers to the percentage of respondents who classified the value as "high" in surveys conducted for the Values Report (see Appendix C for full report).*

2.4 Threats Identified for Lake Illawarra

Threats relate to activities that directly or indirectly impact upon the values and benefits associated with the Lake Illawarra estuary. Risk is often characterised by a reference to potential events and consequences, or a combination of these (ISO 31000:2009). In the context of this study, a threat may include a driver (issue, activity or process) that results in a detrimental impact(s) or consequences(s) to the values or benefits of the study area. For example, stormwater runoff (driver) may result in a detrimental impact to water quality (value).

The Lake Illawarra catchment is in a period of significant land use change, with new residential developments underway. This is in parallel to the ecosystem response to permanent changes to the entrance condition and tidal hydraulics of this already highly dynamic lake system. It is also a period of transition in governance in response to the disbanding of the LIA and transition to management by SCC, WCC, and the state government (DOI - Crown Lands, Property NSW) with respect to the entrance management works and foreshore lands. Considerable effort has been expended by the former LIA, SCC, WCC and OEH and other researchers to identify, document and manage the environmental, social and economic values and issues associated with Lake Illawarra.

Through the course of preparing the Synthesis Report and Values Report, a list of threats to the condition and values of Lake Illawarra were identified. Refer to Section 5 of the Synthesis Report (BMT, 2019a) for further details on threats. The threats were then assessed through a risk rating process that considered the frequency of the threats, and the environmental, social and/or economic consequences of the threats across both present day and future timeframes. How the level of threat may change over time due to such influences as population growth, urban development and climate change has also been assessed for the medium term (2040-2050, or 20-30 years from present) and long term of away (2070-2100+, or 50-100 years from present) in Table 2-2.

Some risks can be expected to escalate over time, particularly where the threat is affected by urban development and climate change. Other threats may remain similar over time. Understanding how the threats will change over time is important in designing management actions for the next 10 years of the CMP, and determining and then managing the long term intent for the Lake.

For the purposes of this CMP, current and future threats with potentially high consequence but with a very low probability of occurring within the study region were not included for assessment (e.g. tsunami). For this CMP risk assessment events with a probability of out to 1% AEP (1 in 100 years) were determined to be a sufficient extent for consideration.

It is also recognised that a disengaged community can threaten the success of implementing the CMP and managing the Lake. Many actions in the CMP to treat the direct threats involve education and involvement of the local community, and this is in recognition of the importance of the community to the success of implementing the CMP and managing the Lake.

The final prioritised list of threats and their level of present and future risk is provided in Table 2-2. The development of objectives and management actions for this CMP has focused on the treatment (reduction, elimination, mitigation) of these priority threats.

Table 2-2 Identified Threats Impacting Lake Illawarra

Threat	Risk Rating			Brief Description
	Present Day	Future: 2040-2050	Future: 2070-2100+	
Water pollution	Very High	Very High	Very High	Water quality conditions in estuaries fluctuate as a function of natural processes and human pressures. Water quality in Lake Illawarra is influenced by: urban runoff that discharges into creeks and stormwater outlets connected to the Lake; groundwater flow (in some cases contaminated); tidal exchange with the ocean; mixing of salt, fresh and brackish water; and contamination from sediments. Considering the current rate of urban development, future population growth plans and the increase in tourist visitation forecast for the Lake Illawarra region, it is anticipated that water pollution will continue to be a high risk into the future. Key drivers such as catchment pollution, stormwater runoff and sewage overflows will persist and increase in severity with regional growth if not adequately managed.
Catchment development	Very High	Very High	Very High	Catchment development results in the mechanical disturbance of undeveloped land in addition to an increase in impervious surfaces. This in turn may reduce water quality, increase water quantity, disturb and fragment habitats and increase the demands on community spaces and facilities. Further substantial development is planned for the Lake Illawarra catchment. When forecast population growth and urban development plans for the region are considered, and then combined with climate change, catchment development is likely to remain a very high risk over the medium to long term if adequate management action is not taken.
Changes due to Entrance Channel Opening	Very High	Very High	Very High	Entrance training works to keep the Lake permanently open to the ocean has caused significant geomorphic, hydrodynamic and ecological changes to the Lake. The water level of the Lake has dropped but the tidal range has been increasing, and this is expected to continue as the entrance channel continues to evolve (scour and migrate) in response to the increasing tidal velocities in the channel from a permanently open entrance. The East Coast Low event in June 2016 caused erosion to occur from floodwaters, locally generated wind waves, tidal current and swell wave action within the entrance. In addition to the 2016 storm, the Lake margins in and around the entrance channel continued to respond to the changing tidal regime (increased tidal prism and velocities) introduced through the entrance training works. Areas within the entrance channel continue to erode and at an increasing rate. This has already impacted the boardwalk, areas of Aboriginal Cultural significance and continues to threaten shorebird habitat, open public space and other assets within the entrance channel. Sea level rise will exacerbate the risks associated with entrance channel opening. As the Lake is hydraulically connected with the ocean, sea level rise will directly increase the mean lake water level. The combination of sea level rise and ongoing increase in the tidal range of the Lake will result in low lying foreshores becoming permanently inundated by the end of the century and beyond.

Threat	Risk Rating			Brief Description
	Present Day	Future: 2040-2050	Future: 2070-2100+	
Loss of estuarine vegetation	High	High	High	Estuarine vegetation such as saltmarsh, mangroves and seagrass communities provide habitat and food for a range of fish species, birds, mammals, insects and invertebrates. Lake Illawarra has extensive areas of vegetation considered to be of significant natural value that in turn support the biodiversity and productivity of the Lake. If not managed, increased catchment development and population will continue to place pressure on estuarine vegetation through clearing for development and recreation. Increased water temperatures due to climate change could exacerbate this threat by enhancing conditions for weed infestation.
Wetland degradation	High	High	High	Coastal wetlands occur in specific environmental niches and are sensitive to water quality change and mechanical disturbance. At Lake Illawarra, some areas of wetland that have high ecological potential are being degraded by human activities. If not adequately managed, this threat is likely to increase in the future due to the increased population forecasts and urban development for the region.
Litter, plastics and marine debris	High	High	High	This includes rubbish and litter reaching the Lake through stormwater, direct dumping and fishing waste. Long term pollution from degraded plastic results in possible toxic chemical pollution, and the increasing presence of plastic micro beads and disintegrating synthetic fibres compounds this threat. Plastics in these forms can significantly negatively impact on fish and other marine animals. It is anticipated that the threat of litter, plastics and marine debris will present the same level of risk across the short, medium and long term future timeframes. Management actions and education will improve some of the general population's behaviours regarding littering however this improvement is likely to be offset by the notable population increase expected in the Illawarra region.
Contaminated sediments	High	High	High	Contaminated sediments are known to occur within Lake Illawarra, with particularly high concentrations being measured in sediments amongst some saltmarsh areas, and generally within the tributaries. Contaminated sediments can release pollutants into the water column and degrade water quality. Generally, the contaminants are a threat to lake ecology through bioaccumulation in fish and other species, which in turn poses a risk to human health. Where sediments remain undisturbed and continue to be overlain by new, clean sediments, the risks from the contamination would progressively reduce. Conversely, if sediments are scoured during flood events, contaminants could be released. Until an appropriate method to rehabilitate contaminants from sediments is implemented, they will continue to present the threat of releasing pollutants into the Lake into the future. Therefore, the risk from contaminated sediments has been assumed to remain high into the future.

Threat	Risk Rating			Brief Description
	Present Day	Future: 2040-2050	Future: 2070-2100+	
Inappropriate / degraded / insufficient infrastructure	High	High	High	There is a range of coastal infrastructure within and around the Lake that have been constructed both historically and recently to improve amenity, access and other human use aspects of the Lake. There remains uncertainty about who owns and is responsible for the management and upkeep of infrastructure and this exacerbates this risk. In addition, inappropriate infrastructure occurs and is most prevalent within the entrance channel. As sea level rise and climate change impacts are observed, changes in estuary water levels and associated tidal regimes will continue to put existing infrastructure at risk. Ongoing urban development and population growth will increase usage and demands for infrastructure into the future. Therefore, the threat of inappropriate, degraded and insufficient infrastructure will continue to be high.
Loss of tangible and intangible cultural heritage	High	High	High	This threat relates to known and unknown sites and places as well as less tangible aspects such as cultural fishing, cultural resource use, places, stories and traditions. Concerns have been raised around the costs of licences and regulations associated with access and restrictive catch, a lack of open space adjacent to the Lake available for cultural activities and loss of tangible cultural heritage due to factors such as coastal development and rising sea levels. Aboriginal cultural heritage sites and places will continue to be impacted into the future due to sea level rise that will endanger sites in low lying areas. For this reason, this threat has been assumed to remain high into the future. Ongoing urban development will also place pressure on these sites, although existing regulatory requirements are intended to prevent or mitigate impacts from development on Aboriginal cultural heritage.
Foreshore development encroaching public land	Medium	High	Very High	Residential areas fringe a large proportion of the Lake's boundary, however areas of public land (Crown land or Council land) usually separate private land from the Lake's foreshore. In some places, private landholders seek to extend their land holdings across the foreshore with action such as mowing, signs and small scale illegal foreshore development (e.g. BBQ areas) on public land. Tidal inundation will continue to squeeze private and public foreshores, and in some areas public foreshore may be lost. This is expected to increase the risks of foreshore development encroaching on public lands, as foreshore lands are reduced and as residents attempt to mitigate unstoppable inundation impacts. Therefore, the risk is expected to increase over time.
Loss of riparian habitat	Medium	High	Very High	Riparian vegetation around the Lake has a range of aesthetic and ecological values. Changes to the extent and condition of various estuarine vegetation communities can occur in response to the health and physical condition of the Lake. Sea level rise and tidal inundation will exacerbate pressures on riparian habitats in locations where they cannot migrate in response to inundation, and this may result in a loss of habitat over time. Therefore the risk of loss of riparian habitats is expected to increase into the future.

Threat	Risk Rating			Brief Description
	Present Day	Future: 2040-2050	Future: 2070-2100+	
Foreshore and bank erosion	Medium	High	High	Erosion threatens a number of foreshore areas across the Lake and embankment areas of inflowing waterways. There are several processes that drive erosion around the Lake margin, including loss of riparian vegetation, mechanical disturbance, stormwater discharge, floodwaters, local wind wave action, tidal currents and ocean swell wave penetrating the entrance channel. Sea level rise, increasing stormwater discharge and changes to the tides and storm swells are likely to escalate the frequency of bank and foreshore erosion. The risk rating for this threat is expected to increase to High across the next 20, 50 and 100 years.
Climate change	Medium	High	High	Climate change and rising sea level will impact the water level within the Lake. This threatening process will mostly certainly increase the loss of saltmarsh areas, the occurrence and levels of inundation of public and built assets and cultural heritage items/places. The threat of climate change will progressively increase in risk rating and severity across the next century. Climate change impacts particularly sea level rise will be linked with several other threats over the 20, 50 and 100 year timeframes including coastal and tidal inundation, foreshore erosion and loss of riparian vegetation.
Park management practices impacting adjacent natural areas	Medium	Medium	Medium	Council Park managers responsible for maintaining the foreshore areas can sometimes have impacts on sensitive areas such as saltmarsh through mowing practices. Increased tourism and population growth in the region will result in added pressure to maintain foreshore areas to a high standard. However, the risk rating for this threat is expected to remain the same (or potentially decrease if adequate management actions and staff training is implemented).
Commercial fishing	Medium	Medium	Medium	Commercial fishing is managed by DPI, and changes to local fishing regulations are beyond the scope of the CMP. There are community concerns regarding the perceived impact on the Lake from commercial fishing, which is in contrast to the known community benefits to the local region from commercial fishing, such as the supply of locally sourced seafood and bait and provision and upkeep of infrastructure (e.g. jetties) by the fishing industry. Regional population growth and increased tourist visitation to the Illawarra region will continue to increase the demands on local commercial fishing, although suitable management measures such as the Fishery Management Strategy are in place to manage this and maintain suitable productivity and protection levels. Therefore, the risk level is expected to remain at medium over time.

Threat	Risk Rating			Brief Description
	Present Day	Future: 2040-2050	Future: 2070-2100+	
Inefficient/ Incorrect Lake management	Medium	Medium	Medium	In July 2014, the Lake Illawarra Authority (whom previously managed the Lake) was disbanded and responsibilities transferred to various state agencies as well as WCC\SCC. Recently the LIEMC was established as a collaborative effort between councils. This ongoing transition of responsibilities poses a threat to longer term Lake management. This threat will continue at the same level of risk (Medium) until the transition of Lake management is finalised. The CMP is an important tool for providing integrated management of the estuary in line with current and future values and needs and will assist with consistent Lake management.
Introduced species	Low	Medium	Medium	Plant and animal (plus fungi) species that are not native to Australia are referred to as introduced species. Since European settlement the Lake Illawarra ecosystem has had to compete with a range of introduced animals and plants. The threat of invasive species is likely to increase to a risk rating of Medium over the medium to long term. As climate change impacts put added pressure on ecological communities and native species, the prevalence of introduced species in the Lake and catchment could increase. This is because native species may be weakened by climate change, allowing for better adapted invasive species to dominate.

3 Selecting Management Actions

3.1 Management Strategies

To better direct management attention towards addressing the identified threats to Lake Illawarra, a set of management strategies were compiled. A total of nine management strategies were identified, and prioritised based upon the risk rating for the threats directly addressed by each strategy, as in Table 3-1 (although it is noted that many of the strategies indirectly address many of the threats). The aim of this approach to developing the strategies was to identify one management strategy for each threat, or group of threats where the management approach would be similar.

A full analysis of how individual actions beneath each strategy directly and indirectly address the threats is provided in Appendix E (Strategies Assessment). Development of the management strategies was also drawn from the community consultation and scientific evaluation as detailed in the Synthesis Report (Appendix B) and Values Report (Appendix C).

3.2 Developing Management Actions

To implement each broad management strategy, a subset of specific management actions was developed using a pool of potential actions identified through various means. Management actions may be designed to reduce the likely occurrence or frequency of a threat, the consequence of a threat or both. The actions may also treat more than one threat, directly or indirectly. The management actions also include monitoring and other data collection actions, which may substantially improve approaches to management in the future by providing better information about the occurrence/frequency and / or consequence of key threats.

There are many aspects of the management of Lake Illawarra that can be targeted through the coastal management framework and there are some aspects that are beyond the reach of this process. Development of management actions was focused on those mechanisms that are available through the CMP process.

In general, management actions may utilise a variety of implementation mechanisms that can act at different levels or on different aspects of the problem. The different types of management actions include:

- Planning and development controls;
- Physical works, such as foreshore protection structures, amenity facilities etc;
- Rehabilitation works;
- Education and awareness programs, and;
- Monitoring programs, data collection and assessments.

A total of 212 potential actions were compiled directly from the audit of the previous management plans for the Lake by Baxter et al (2016), recommendations developed during the Synthesis Report, and from community and agency input listed in the Values Report.

The list of potential actions was initially assessed by determining which of the nine management strategies each action fell within. The actions within each strategy were then distilled by grouping the same or similar actions, or compiling actions with the same or similar intent. Those actions that could not be grouped were either retained as stand-alone actions, or were directly culled through a coarse cost benefit assessment.

This process left a total of 41 management actions for detailed multi-criteria analysis to further refine the actions, as explained in Section 3.3. Appendix E Table E-1 contains the full list of 212 potential actions, the strategy categorisation, and the action each has been rolled up in to, or otherwise, the outcome of the coarse cost benefit filter.

Table 3-1 Management Strategies and Threats Addressed in Prioritised Order

Management Strategies \ Threats	Water pollution	Catchment development	Changes due to Entrance Channel Opening	Loss of estuarine vegetation	Wetland degradation	Litter, plastics and marine debris	Contaminated sediments	Inappropriate / degraded / insufficient infrastructure	Loss of tangible and intangible cultural heritage	Foreshore development encroaching public land	Loss of riparian habitat	Foreshore and bank erosion	Climate change	Park management practices impacting adjacent natural areas	Commercial fishing	Inefficient Lake Management	Introduced species
	Very High	Very High	Very High	High	High	High	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Low
Improve Water Quality																	
Improve Planning & Management Arrangements for the Lake																	
Manage Changes to the Entrance Channel																	
Protect and Rehabilitate Estuarine and Riparian Vegetation																	
Maintain and Improve Recreation and Amenity																	
Protect and Promote Cultural Heritage																	
Manage Foreshore and Bank Erosion																	
Prepare for Inundation Risks																	
Protect and Manage Key Fauna																	

3.3 Multi-Criteria Cost Benefit Analysis

A total of 41 actions were subject to a multi-criteria cost benefit analysis. From this, 36 actions were selected for implementation under the nine strategies, with implementation details provided in Chapter 4.

The multi-criteria cost benefit analysis involved two components, the outputs from which were combined to determine if the action should be implemented in the CMP. The components were:

- Assessment of the ability of the action to mitigate the threats to the estuary, producing a threat mitigation score (see Section 3.3.1), and
- A cost benefit analysis considering seven criteria (see Section 3.3.2), then
- Scores from the above two components were combined to take advantage of actions with high threat mitigation scores and / or high cost benefit analysis scores within the practical financial capabilities of the councils (see Section 3.3.3).

Each step of the assessment is explained in the following section. Based upon this assessment, 36 actions were selected for implementation across the nine strategies. Subsequent to this assessment, an additional action was added taking the total number of actions for implementation to 37. Implementation details for the 37 actions are provided in Chapter 4.

3.3.1 Threat Mitigation Assessment

The potential merit of each action was assessed by determining the influence of the action in mitigating the identified threats to Lake Illawarra. This involved considering the direct or indirect impact of the action on each threat identified for the Lake. The direct or indirect influence could be positive or negative, and was scored as according to Table 3-2.

The influence of each of the 41 actions on mitigating all 17 threats was scored. The scores were then weighted according to the risk level of each threat, as follows:

- Very high threats were given a weighting of 4,
- High a weighting of 3,
- Medium a weighting of 2, and
- Low a weighting of 1.

Each influence score was multiplied by the weighting for that threat, then added to give a cumulative Threat Mitigation Score.

To explain the threat mitigation scoring process, the scoring for Action EV1 “Rehabilitate vegetation along lake foreshores and creek banks” is provided as an example in Table 3-3.

Threat mitigation scores (TMS) for the 41 actions ranged from 59 (Action PM2 “Provide ongoing coordinated management of the Lake”) to -12 (Action RA5 “Undertake dredging of bays within the Lake”). The threat mitigation score provided a clear picture of the likely influence of the various actions on the priority threats, prior to further cost benefit analysis. The influence scores and cumulative threat mitigation score given to each action is provided in Table E-2 of Appendix E.

Table 3-2 Threat Mitigation Potential

Influence	Score
Direct positive	2
Indirect positive	1
No influence	0
Indirect negative	-1
Direct negative	-2

Table 3-3 Example Threat Mitigation Score Process

Action ID	Action Descriptor	Entrance channel changes	Water pollution	Catchment development	Loss of estuarine vegetation	Wetland degradation	Litter, plastics and marine debris	Contaminated sediments	Inappropriate / degraded / insufficient infrastructure	Loss of tangible and intangible cultural heritage	Foreshore development encroaching public land	Loss of riparian habitat	Foreshore and bank erosion	Future climate change	Park management practices impacting adjacent natural areas	Commercial fishing	Introduced species	Cumulative Threat Mitigation Score (TMS) Weighted according to risk rating of threat
Risk Rating		Very High	Very High	Very High	High	High	High	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Low	Very high (x4) High (x3) Medium (x2) Low (x1)
		2=direct positive influence, 1= indirect positive influence, 0 = no influence, -1 = indirect negative influence, -2 indirect negative influence																
Strategy 4: Protect and Rehabilitate Estuarine and Riparian Vegetation (EV)																		
EV1	Rehabilitate vegetation along lake foreshores and creek banks.	1	1	0	2	2	1	1	0	1	1	2	2	1	1	0	1	44

3.3.2 Cost Benefit Analysis

Each of the 41 actions were then assessed for costs and benefits against seven different criteria, namely:

- **Capital Cost** to implement the action initially, with values generally set around the levels at which Councils would need different tendering procedures and approvals before proceeding;
- **Ongoing Costs per annum**, with cut off values generally a quarter to a half of that of the capital cost to implement;
- **Effectiveness**, being the ability of the action to reduce the threat for which the action has been designed or targeted, or otherwise, the provision of important data or knowledge about the target threat by the action;
- **Community Acceptability**, which is based upon general feedback from this locality and other coastal areas regarding the action or type of action;
- **Reversible / Adaptable in the Future**, being the ability for the action to be modified or removed in future, should the situation change and an alternative approach be required. This

is particularly important where influences such as ongoing channel dynamics and climate change may modify the issues or threats and how they can be managed in future.

- **Legal / Approval Risk**, to highlight the legislative and approval requirements (or impediments) to implementing an action within the current legal framework; and
- **Technical Viability**, to highlight where certain actions may or may not be technically feasible or would require significant engineering (or other) investigations and construction / implementation capabilities.

Scoring for the cost benefit analysis followed a "traffic light" colour system, whereby for each action, the criterion was assessed as either:

- **GO**, with a score of 1
- **SLOW**, and proceed with caution, with a score of 0; or
- **STOP**, with a score of -1.

The "traffic light" rating system for the criteria in the cost-benefit analysis is outlined in Table 3-4. Each of the criterion were given equal weighting. The total score for each action was therefore based on a direct addition of scores against each criterion. Scores for the actions ranged from:

- 7 (WQ1, WQ6, PM4, CH1, FB3, IR1, IR2, IR4, IR5, MF1, see full descriptions in Chapter 4), to
- 1 (EV6, RA5, both of which did not pass the selection process, see Table E-2 of Appendix E).

The outcomes of the cost benefit analysis for each action against each criterion is provided in Table E-2 of Appendix E.

Table 3-4 Cost Benefit Analysis Criteria and Scoring System

Outcome	Capital Costs	Ongoing Costs per	Effectiveness	Community Acceptability	Reversible / Adaptable Future	Legal / Approval Risk	Technical Viability
STOP	Very expensive (>$300,000)	Very expensive (>$150,000 p.a.)	Option is unlikely to be effective / substantially reduce targeted threats	Unlikely to be acceptable to community and politically unpalatable; Extensive community education, endorsement by Minister(s) and Council required	Option is irreversible once implemented; Option limits alternatives options in the future	Will require an EIS and/or Govt program to implement; There is a residual risk that approval will not be obtainable for the proposed works / strategy	Is unlikely to be technically viable without substantial engineering (or other) design investigation and capabilities for implementation
SLOW	Moderately expensive ($100,000 - $300,000)	Moderately expensive ($25,000 - $150,000 p.a.)	Option will not necessarily reduce targeted threat(s) but will provide important knowledge / data about the threat OR Option will bring a minor reduction in the targeted threat(s)	Would be palatable to some, not others (~50/50 response); Briefing to Councillors, GM and community education required	Option is reversible or adaptable, but at considerable cost / effort	Will require Govt approvals to be implemented, or assistance through existing Govt program;	Is likely to be technically viable at the site, but would require further investigations to clarify
GO	Limited cost (<$100,000)	Limited cost (<$25,000 p.a.)	Option will be very effective in eliminating / reducing / remediating its target threat(s)	Is very politically palatable, acceptable to community; Minimal education required	Option can be easily adapted for future circumstances or should impacts not occur, option would not negatively impact future generations	No or minimal government approvals required to implement	Is technically viable at the site / location

3.3.3 Overall outcome

The threat mitigation score provided an indication of an action's ability to mitigate more than one threat, directly or indirectly. However, this score does not indicate how costly or viable it is to implement such an action.

The cost-benefit analysis provided an indication of the financial, technical or other constraints or opportunities associated with each action, including the effectiveness of the action in meeting its aims. However, this score does not explain the ability of the action to mitigate the priority threats.

The thresholds described in Table 3-5 were therefore established to determine which actions to implement through this CMP. The aim of setting these thresholds was to sensibly combine the threat mitigation and cost benefit analysis score, but still capture actions that are a very good idea from either a threat mitigation perspective or from a cost-benefit perspective. That is, some actions have a very high threat mitigation score, but may be a little more costly or resource intensive to implement. These actions should still be pursued because of their overall environmental and social benefit. Conversely, there are actions with a lower threat mitigation score, but that are highly efficient and low cost to implement. Indeed, for some such actions, their lower threat mitigation score reflects the fact that the action is specifically targeted to one threat (e.g. MF1 "Monitor and protect shorebird nesting sites on a yearly basis" had a TMS = 17 and CBA = 7). Such actions should certainly be pursued because of how well they are likely to treat the target threat, and at a high benefit to cost ratio.

The thresholds were also set to exclude actions that may have a high threat mitigation score, but are simply too costly and difficult to implement; or likewise, that may be simple and inexpensive to implement, but are unlikely to bring any real benefit to the Lake.

The overall outcome for each action against these thresholds is provided in Table E-2, Appendix E. Based upon the total multi criteria (threat mitigation and cost benefit) assessment, 36 actions resulted. However an additional action, EC5, was later added, to make the total number of actions for implementation 37, across the nine strategies. Implementation details for the selected strategies and actions are provided in Chapter 4.

Table 3-5 Threat Mitigation and Cost Benefit Analysis Thresholds for Selecting Actions for Implementation

Threat Mitigation Score (TMS) + Cost Benefit Analysis (CBA) combination	Implementation Outcome	Explanation
TMS > 30 + CBA ≥ 2	GO	The action has a very high threat mitigation score, even though the cost benefit score is relatively low. The action should be pursued through this CMP, as it has such a high potential for environmental benefit.
TMS >15 + CBA ≥ 4	GO	The action has a lower threat mitigation score, with a high cost benefit analysis score. The action should be pursued because it is relatively easy and inexpensive to implement, and will still have a moderate to high social or environmental benefit. Some actions in this category have a lower threat mitigation score because they focus on only one threat (e.g. MF1 "Monitor and protect shorebird nesting sites on a yearly basis" had a TMS = 17 and CBA = 7). Such actions should certainly be pursued because of how well they are likely to treat the target threat, and at a high benefit to cost ratio.
TMS <15 + CBA ≤ 2	STOP	The action has a low threat mitigation score and a low CBA score, and therefore should not be pursued.
TMS <15 + CBA ≥ 4 or TMS > 30 + CBA ≤ 2	SLOW, for future consideration	The action falls somewhere in the middle: it has a high threat mitigation score, but is simply too costly or difficult to implement, as described by its low benefit to cost ratio; OR, the action has a very low threat mitigation score meaning it is unlikely to bring substantial environmental or social benefit, even though it may be easy and cheap to implement. These actions are tagged as "SLOW" in that they will not be detailed for implementation through this CMP, but they remain available for consideration, should funding or other assistance permit.

4 Strategy Implementation Plan

Implementation details for the CMP actions are provided in the following sections. The details contained in the tables are explained below.

- **Action ID**: a unique identifier for each action, with the first two letters relating back to the parent management strategy, e.g. Action WQ1 under the parent strategy “Improve Water Quality”.
- **Action:** the action name.
- **Details**: further details on how the action should be implemented.
- **Locations**: the sites at which the action should be applied. Where appropriate, the actions have been mapped, to identify the known sites to which an action applies. Actions in the Lake and foreshore area are displayed across 10 maps or zones, as shown in Figure 5-1. The Action Maps are provided in Chapter 5.
- **Indicative costs**: costs have been specified for each action, and for specific elements within an action if known, for example, for sites in the “location” column, or separate items to implement the action. The costs were originally derived from general sources and the Baxter et al (2016) audit, then updated based on the advice of the relevant council departments or agencies where possible.
- **Responsible organisations:** the parties primarily responsible for implementing the action, via financial and other resources, and are listed first (typically this is both Councils).
- **Supporting organisations:** the organisations who may support the responsible party to implement the action, predominately through the provision of technical or project management support, often considered usual business for that organisation, and subject to availability and funding.
- **Timeframe:** a timeframe for implementation of parts or all of an action are specified, using time that is equivalent with the key IP&R documents, as follows:
  - Year 1: to match with the Operational Plan (which typically extends for one financial year)
  - Year 2 to 4: to match with the Delivery Program which is a four-year program (including the Operational Plan)
  - Year 5 to 10: to match with the Resourcing Plan which is a 10 year financial plan.
  - The term “ongoing” is used where an action will need to be repeated regularly. Where possible, the details for repeating the option have been included (e.g. yearly, etc)
  - Where possible, the timing of different phases of an action have been specified.
- **Performance Measure**: a measure of the implementation and / or of the success of implementing the action (or parts of the action). Similar language to that used in Councils IP&R documents has been used, to assist with transferring the CMP actions into IP&R documents.
- **Further Information**: supporting documents or information that may assist with implementation are detailed in this column.

It is important to note that in enacting any of the actions in this CMP, all relevant approvals, permits and licences will be acquired, prior to the works / activities being undertaken (for example, REFs in accordance with the EP&A Act, aboriginal cultural heritage assessments for ground disturbance works, and so on).

In addition to the details provided in the implementation tables,

- The **Business Plan** outlining the costs and potential **funding** for the actions is detailed in Chapter 6,
- The **links between actions in this CMP and the IP&R Framework** of both Councils is provided in Section 6.4.

4.1 Improve Water Quality (WQ)

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
WQ1	**Implement a Risk Based Stormwater Management Framework for the Lake Illawarra catchment** • OEH, in conjunction with both councils, undertake a research project to: o Identify a range of stormwater treatment trains to achieve the new stormwater management targets and reflect contemporary best practices for integrated water cycle management (including a comparison with current or business as usual practices). o Predict life cycle costing of the range of stormwater treatment trains. o Outline opportunities (e.g. riparian corridors) and constraints for siting of stormwater infrastructure o Provide sustainable funding models to assess the viability of the stormwater treatment trains to deliver tailored mechanisms for funding of life cycle costs of assets o Predict (Monetised) co-benefits achieved through contemporary approaches to integrated water cycle management o Develop Step by Step Practice Notes or guidelines on how the *Risk-based Framework* and outcomes of these investigations can be applied to the urban developments in Lake Illawarra.	The Lake Illawarra catchment	$200,000 (OEH – already funded)	OEH Supporting: WCC and SCC	Year 1	The project delivers by the end of year one: • A range of stormwater treatment trains to achieve new targets. • Life cycle cost predictions. • Opportunities and constraints for infrastructure sittings. • Sustainable funding models. • Co-benefit predictions. • Implementation guidelines or similar. WCC and SCC DCPs are updated by the end of year one to reflect the RBF reduction targets.	Council may consider supplementary funding for the planning of the additional treatment train. Councils encourage the use of alternative and feasible technologies to meet targets. It is recognised that to achieve the best results, the management of quantity as well as quality of water will need to be addressed by developers. For further information refer to Section 2.8.12 of the Synthesis Report (BMT, 2019a). Updating DCP may be delayed by the release of the standard template.
	• WCC and SCC update their DCPs and standard conditions of development consent to reflect the Risk Based Framework pollutant reduction targets as 'best practice' for the Lake Illawarra catchment. See WQ4 regarding implementation.	The Lake Illawarra catchment	Staff time	WCC and SCC Supporting: OEH	Year 1-2		

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
	• Where a comprehensive water cycle management plan is required, developers will be required to provide whole of life costings for treatment trains for both the original targets and the Risk Based Framework targets. Within the trial period (1 year), Council will expect the best overall environmental outcomes within reasonable long term asset management planning.	The Lake Illawarra catchment	Staff time	WCC and SCC Supporting: OEH	Year 1-3	Report on number of DAs submitted with two treatment trains. WCC and SCC make a decision re how to best implement the RBF by the end of year 3. DCPs updated accordingly where required.	
	• Outcomes of the OEH research project and Council trial period will be considered by WCC and SCC to inform future application of the targets under the risk based framework, including whether any further DCP revisions are required.	The Lake Illawarra catchment	Staff time + $20 000 for analysis and report preparation	WCC and SCC	Year 3		

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
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. Wherever possible and practical, the Risk Based Framework (see further information) should be implemented to determine the design and upgrade to the existing stormwater network. Upgrades and new devices must also be designed to better manage stormwater quantity, such as by reducing flow rates to reduce erosion and damage to vegetation, in an environmentally sensitive manner. • Audit all stormwater quality management devices in the Lake Illawarra catchment, and determine priorities for upgrade or decommissioning. • Prioritisation of new and retrofitting of existing stormwater quality measures to include cost-benefit and assessment of any potential constraints on effective functioning based on full lifecycle operation. • Identify sites for new devices (including locations recommended here). Prioritisation for new devices may be derived from the Benefit Mapping (Dela-Cruz, et al, 2017, Figure 2-31 in Synthesis Report (BMT, 2019a) • Set aside adequate funds for continued maintenance of new / replaced devices. • Monitor the effectiveness of various devices in different areas/settings, by monitoring the nutrient and sediment loads after devices are installed or upgraded, and above and below device once installed to test performance. The data may also improve the selection of devices for new or replacement sites. The monitoring should link in with the regular monitoring program given by WQ7. • Incorporate the prioritised program of works into the IP&R Plans. • Increase stormwater filtration by rehabilitating native vegetation & weed removal in stormwater channels.	Catchment wide. Locations for new devices identified in previous studies are: Reddall Reserve – 7 existing devices Whyjuck Bay – 2 existing devices Davies Bay – 1 existing device Karoo Bay – 4 Existing devices Kully Bay Wetlands / Warrawong: new SQID ($55,000) Primbee shoreline (various) Nicolle Road drain exiting Korrungulla Wetlands (former Port Kembla Copper site). Monitoring by WCC has not identified elevated metals in groundwater at end of Nicole Road. Stormwater treatment devices were designed, but not implemented by the LIA. Retro fitting of stormwater filtering for N/W Lake i.e. from Berkeley Harbour to Hooka Pt	$100,000 for temporary staff resource shared across Actions WQ1, WQ2, WQ3 and WQ4, to assist with implementation and managing consultancies. $60,000 for consultancy to conduct audit across both LGAs and recommend program of works. $10,000 p.a. for monitoring. Upgrades / new devices estimated at $100,000 - $500,000 each, numbers to be determined through audit.	WCC, SCC. Supporting: OEH, EPA, Property NSW	Year 1: Commence audit Year 2: Complete audit and develop prioritised program of upgrades, new works and decommissioning Years 3 to 10: implement prioritised program of works; and undertake monitoring	• Stormwater audit and renewal program is completed by Year 2. • The prioritised program of works is incorporated into IP&R Plans by Year 3. • Upgrades and new installations commence by Year 4. • Monitoring program for new/upgraded and maintained devices is commenced by Year 4.	The Risk Based Framework = *Risk-based framework for considering waterway health outcomes in strategic land-use planning decisions* (Dela Cruz et al, 2017). OEH is currently developing waterway health objectives and other tools to support implementation of the Risk Based Framework.

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time- frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
WQ3	**Review and prioritise maintenance and cleaning regime for existing stormwater quality devices**, including gross pollutant traps, artificial wetlands and water sensitive urban design features, as informed by actions of WQ2. The maintenance program shall also incorporate any new /upgraded devices implemented through WQ2. Maintenance regimes must also consider efficiencies / new ways to carry out maintenance on specific stormwater quality devices and how the quantity of stormwater can be better managed, to reduce erosion and damage to vegetation from flows from existing stormwater outlets.	All stormwater devices in the catchment, prioritised through review of the program. Known sites include: Reddall Reserve – 6 existing devices, Whyjuck Bay – 4 existing devices Davies Bay – 1 existing device, Karoo Bay – 4 Existing devices Budjong Creek Wetlands Joes Bay Wetland Primbee shoreline	$100,000 for temporary staff resource shared across Actions WQ1, WQ2, WQ3 and WQ4, to assist with implementation and managing consultancies. $30,000 for consultancy to review maintenance needs and develop prioritised program. Estimated $5,000 to $10,000 per device p.a. for maintenance and cleaning.	WCC, SCC.	Year 1: Conduct review of maintenance regime ad develop program for maintenance. Year 3 to 10: Implement the maintenance program, incorporating new devices as they are installed.	• Review of maintenance regime completed and program of routine maintenance created and adopted by Year 1. • Implementation of the maintenance program is commenced by Year 3.	
WQ4	**Design and implement targeted catchment input monitoring as required for developments resulting in a large-scale change or intensification of land use**. The programs should include monitoring of nutrients and sediments in runoff before, during and after development.	At development sites where there will be a large-scale change or intensification in land use.	$100,000 for temporary staff resource shared across Actions WQ1, WQ2, WQ3 and WQ4, to assist with implementation and managing consultancies. Monitoring regimes will be variable and developed on a case-by-case basis	WCC, SCC or Individual developers, depending on development	As required	• Monitoring undertaken for large-scale development projects. • Enforcement occurred where required.	Refer to Section 7.4 for other details regarding monitoring. An example of a large-scale change or intensification of land use for which this action may apply would be the subdivision of a large rural lot for residential development of 50+ lots.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time- frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
WQ5	**Reduce sediment load to the Lake by improving compliance with erosion & sediment controls for development sites**. • Increase amount of staff hours spent on reviewing sediment control. • Increase the number of compliance audits of development sites, which may require additional staff resources. • Audit of sediment and erosion controls to be conducted prior to allowing vegetation clearing and earthworks. • Ongoing audits required throughout the development to ensure sediment and erosion controls are maintained and performing as intended. • Train Council works staff and contractors regarding best practice erosion and sediment control, and ensure this is being implemented on Council work sites. • Work with private certifiers to improve knowledge of best practice. Improve auditing and transparency of the application of sediment and erosion controls on privately certified development sites. • Educate land managers on best practice for erosion control.	All new development sites requiring erosion and sediment controls within the Lake's catchment. Includes private and public work sites.	Additional staff resources required for both Councils: $160,000 p.a. initially for 2 years, ($80,000 each).	WCC, SCC. Supporting: OEH, EPA, DPI Fisheries.	Ongoing	• Increase in staff hours spent on compliance in the field. Number of development sites inspected and the percentage of sites compliant with best practice. • Number of Council work sites inspected and the percentage of sites compliant with best practice.	Local government officers can inspect any construction site under the power of the NSW Local Government Act 1993 Section 191 Power of entry; and 192 Inspection. There are many examples of successful erosion control programs e.g. Get the Site Right – Parramatta River Catchment Group and Love our Lakes – Bega Valley Shire Council.
WQ6	**Reduce the impact of sewer overflows.** • Develop a collaborative relationship between the Councils and Sydney Water to improve gathering and sharing of reports of sewer leaks or overflows (location, severity, frequency). • Improve reporting of leaks and overflows to Sydney Water to assist with prioritising repairs or upgrades. • Identify contacts in Sydney Water and the Councils for record keeping and reporting of leaks and overflows, and sharing of this information as required. • Sydney Water to provide information regarding future upgrade works in the catchment at suitable intervals.	Catchment wide.	Staff time for record keeping and reporting of incidents to/from Sydney Water.	WCC, SCC and Sydney Water Supporting: EPA	Year 1 and ongoing	• Increase in # of incidents that are properly recorded and reported to Sydney Water.	Sydney Water may need to undertake routine maintenance, emergency work and/ or environmental protection work on their infrastructure which is located in a Coastal Wetland area from time to time to ensure infrastructure is operating effectively and the potential for sewer overflows is minimised.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time- frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
WQ7	**Implement existing water quality monitoring program for estuary health**, that measures: • temperature; • salinity; • pH; • dissolved oxygen, • turbidity; • total, dissolved and reactive forms of nitrogen and phosphorus; and • chlorophyll *a* Set up data exchange arrangements with other land managers, and use in analysis and annual summaries of results. An annual summary of monitoring data and analysis of results shall be compiled, with a review of the program and results every 5 years and subsequent changes made if necessary.	Monthly monitoring at 11 sites (see Section 7.4, Figure 7-1), including: • Lake entrance sites - Site2, Site 3 • Lake edge sites – Site 3A, Site 4, Site 5 and Site 6. • In- lake sites – NS1, NS2, NS3, EW1, EW2 Refer to potential contamination sites, Figure 2-27 in Synthesis Report (BMT, 2019a).	$50,000 / year plus staff costs (time) of $4,000 / year	WCC on behalf of WCC and SCC Supporting: OEH	Year 1 to Year 5, then reviewed	Annual summary reports completed, displaying monthly monitoring data and analysis of results. Fiver year review undertaken.	Refer to Section 7.4 for detailed information on the monitoring program. WCC's program follows standard procedures consistent with the MER protocols (refer Roper et al, 2011). Other specific monitoring actions are outlined without other management actions, such as WQ2. All will be consistent in methodology and linked to provide effective management advice.
WQ8	**Undertake water quality monitoring for Recreational Use** in accordance with the NSW Beachwatch sampling protocols. This typically involves sampling for *Enterococci* over the summer period, and as needed on an event-basis.	Monitoring of 4 sites (BW1, BW2, BW3 and ELL see Section 7.4 Figure 7-1), typically over the summer period.	$10,000 / year plus staff costs (time) of $4,000/ year	WCC on behalf of WCC and SCC.	Year 1 to Year 5, then reviewed	Beachwatch data is collected and available to the public during summer, and as needed.	Refer to Section 7.4 for other details.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time- frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
WQ9	**Investigate and manage potential pollution sources including contaminated sites that contribute to poor water quality in the Lake:** • Gather ground and surface water quality monitoring data from active and historical contaminated sites which may have been collected in accordance with EPA Environment Protection Licence conditions, EPA management of Significantly Contaminated Land, EPA/WCC/SCC management of pollution incidents and conditions of consent of Development Applications. • Map the areas of contamination/potential contamination. • Identify data gaps. • Identify which of the areas are currently being managed and which ones there is scope for improved management. • Develop (in consultation with relevant land managers) and implement a ground and/or surface water quality monitoring program targeting potential point source locations, particularly where no historical data is available. • WCC/SCC/EPA undertakes negotiation/enforcement action with site owners for remediation. Any involvement by the EPA would be in accordance with their current legislative responsibilities under the Protection of the Environment Operations Act 1997 and the Contaminated Land Management Act 1997. • Integrate new contamination information with environmental planning and development assessment policy, procedures and tools including DCPs, development assessment procedures, licence agreements, planning certificates and mapping.	Griffins Bay – e.g. from Kemblawarra Industrial area (nutrients and chlorophyll a measured at high levels in Griffins Bay in the past. Metals also possible). Windang Peninsula (from historical uncontrolled emplacement of fill) Haywards Bay (emplacement of fill) Tallawarra Power Station Illawarra Regional Airport (PFAS) Warrawong Tank Trap Woolshed Tannery There may be other potential contamination sources and sites.	$60,000 per annum, plus staff time.	WCC and SCC Supporting: EPA, industries conducting monitoring under licence or other conditions.	Year 2 to 5	• Sources of contamination, and sites that are likely to be the source(s) are identified • The EPA/WCC/SCC has commenced negotiations/enforcement actions with site owners for remediation of runoff (in surface and / or groundwater).	Sydney Water has a database of some contamination report available for the Lake Illawarra area, these report can be supplied to WCC and SCC upon request (with signed data licence agreement). It should be noted that the ground water monitoring associated with the Haywards Bay development emplacement did not consider geotechnical issues and the flow path is interrupted by an impermeable/very low permeability high that stops the contaminant from reaching the last test point. Refer to each Councils contaminated land registers; a constraint may be the standard DCP template.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time- frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
WQ10	**Undertake water quality monitoring of physico-chemical and bacteriological indicators in the Lake catchment.** Review existing programs. Develop a revised program to address the following issues: • Localised pollution incidents that trigger further investigation; • Pre- and post- development indicators; • Link to management actions; and • Link to WQ1. • Add additional monitoring locations to account for future development (e.g. Yallah Bay)	Catchment wide.	$60, 000 / year plus staff time	SCC, WCC Supporting: OEH	Year 1 then ongoing	Program is developed. Annual summary reports completed.	Refer WQ1

4.2 Improve Planning and Management Arrangements for the Lake (PM)

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Timeframe *subject to available funding and resources)*	Performance Measure	Further Information / References
PM1	**Commence integration of key objectives and strategies from the CMP into relevant planning and policy documents of both Councils**, including the following actions: • Update the DCPs and relevant consent conditions to specify vegetation buffers, stormwater treatment measures and nutrient/sediment load reduction targets for development within the Lake catchment consistent with outcomes of WQ1, foreshore setbacks, and/or other relevant planning controls, for long term inundation risks (public and private lands), and the Environmentally Friendly Seawall Guidelines. • Update or produce new POMs for community or crown land to include relevant CMP actions / objectives. • Consider CMP management areas and objectives when revising the LEP. • Review and update both Councils' DA checklists to promote preservation of vegetation, erosion and sediment control, management of nutrient and sediment exports, tidal inundation, and landscaping for new developments. • Review and update local area plans (e.g. the Windang Town Centre Plan) to include CMP actions and reflect CMP objectives where relevant (e.g. bank protection methods, estuarine vegetation management etc). • Work towards the incorporation of actions into regional and state programs and plans. • Develop Council policies as required to implement CMP objectives and actions. • Provide input to RMS when reviewing the NSW Maritime Infrastructure Plan 2019-2024 to have consistency with the proposed Lake Illawarra Waterways Facilities Plan (see RA1) in terms of recreational facilities; and to provide information relevant to speed / usage of boats in key fauna habitat areas. • Provide input to DPI Fisheries when reviewing the commercial fishing status of the Lake regarding benefits or otherwise of commercial fishing being permitted in the Lake.	Catchment wide	Staff time + consultancy assistance (up to $50,000 per activity).	WCC and SCC Supporting: DPE, DOI – Crown Lands, OEH, RMS, Sydney Water.	Year 2 to 10	• Windang Town Centre Plan has been revised to reflect appropriate CMP actions and objectives • The DCPs and relevant consent conditions have been revised to include appropriate environmental controls that support Lake health, including the Environmentally Friendly Seawall Guidelines • The LEPs have been revised to consider the CMP objectives and management areas The DA checklists have been revised to include CMP actions and objectives • # of POMs that are revised or produced that cite CMP actions or objectives	WCC has allocated $25,000 to developing the Windang Town Centre Plan Refer also to the Illawarra-Shoalhaven Regional Plan WCC are working on a new Land Dedication Principles Policy, Shell Harbour are considering a similar one.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Timeframe *subject to available funding and resources)*	Performance Measure	Further Information / References
PM2	**Provide ongoing coordinated management of the Lake**, which will require ongoing support for existing staff resources, to: • Develop governance model, and where possible, establish this through and MOU with the relevant parties • Undertake the project management of implementing the CMP. • Facilitate inclusion of CMP actions into both Councils' IPR Framework documents and business plans. • Develop and deliver a resourcing plan to deliver the CMP • Continue to coordinate the LIEMC and foster collaboration with agency stakeholders and recognise LIEMC as priority platform for relationship building between all agencies. • Compile annual reports on CMP implementation, including checking against performance measures, and reporting against supporting documents • Provide ongoing collaboration between SCC, WCC and other stakeholders on Lake management . • Investigate the formation of an Aboriginal Reference Group to support the LIEMC. • Establish a grant support fund and support the application of grants according to Council processes. • Maintain a successful relationship with the University of Wollongong and utilise student resources where possible.	Catchment and Lake wide	$250,000 p.a.	WCC, SCC	Year 1 and ongoing.	CMP implementation targets are being met on a yearly basis Annual reports on CMP implementation are completed (through the IPR Framework and / or separate report as required) LIEMC meets four times per year.	This action can be linked to PM3 as an avenue to report on outcomes, build relationships, support stakeholder collaboration. The website can be further used for targeted education and marketing, community surveys etc.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Timeframe *subject to available funding and resources)*	Performance Measure	Further Information / References
PM3	**Develop a community engagement and participation strategy** that enhances the community's knowledge of, skills in, and commitment to, protecting Lake Illawarra. The program should aim to provide information on the ecological, cultural and commercial values of the Lake and to facilitate changes in behaviour of individuals and groups which affect specific threats. Various avenues for engagement and participation may be used, such as: • Development of a logo and standard design theme for signage for use by both Councils • Interpretive signage at key locations to promote specific lake values / habitats • Media announcements (Newspaper, radio, TV, website) • Brochures • Field Days / Market activities • Workshops • Activities in local schools; School holiday programs • Programs targeting specific interest groups e.g. Aboriginal Community, Bushcare, fishers. • Formation of local environmental groups or support current groups to provide engagement and participation and / or undertake activities such as water quality monitoring or estuarine vegetation rehabilitation, passive compliance (e.g. using local residents to monitor and report on behaviours such as illegal vehicle access, littering, vegetation damage, illegal fishing, etc) • Promotion of and inclusion in consultation on plans of management affecting the Lake • Regular community surveys to better understand recreational activities, areas used, facilities required, and understanding of environmental issues • Monitoring (attendance numbers, changes in behaviour etc) to determine what activities / approaches are successful (and should be continued) or should be modified • Formation and maintenance of a website that outlines the environmental management of Lake Illawarra. • Annual review of community programs and processes.	Sites previously identified for signage include: Hooker Park and Reddall Reserve Foreshore Area of Davies Bay Koona Bay and Mogurah Point Macquarie Rivulet Purry Burry Point	$80,000 p.a. for a staff member to develop program and $20,000 p.a. to implement program (i.e. for materials, signs, staff and other resources required).	WCC and SCC Supporting: OEH, ILALC, DPI Fisheries, NPWS	Year 1: Develop program Year 2 and on an annual schedule of works: Implement program and monitor success of the different activities	A Community Engagement & Participation strategy specific to the Lake is developed for both Councils Various activities and material / media are completed and prepared on a yearly basis. Surveys and other monitoring activities indicate the success or otherwise of various education activities / approaches.	See also EV3 and PM2 for further education initiatives and collaboration for this CMP. Lake Illawarra Estuarine Education Resource (Meryl McKerrow, 2010) As part of the engagement strategy new and existing platforms should be used including; Let's Chat, Shellharbour Connect, SCC/WCC Council websites and social media platforms. Engagement will include Aboriginal Advisory Committee, Disability Access Inclusion Advisory Committee groups. Landcare may also be involved with this action.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Timeframe *subject to available funding and resources)*	Performance Measure	Further Information / References
PM4	**Establish a Lake Illawarra Asset Management Working Group** that provides coordination services for agencies that manage assets around the Lake Illawarra foreshore. The working group would: • Oversee the development of a framework for the coordinated management of assets around the Lake Illawarra foreshore, including potential cost sharing arrangements; • Oversee a review of existing infrastructure around the Lake Illawarra foreshore and then an audit to determine priorities and service specifications for maintenance, renewal, additional assets or decommissioning as per action RA1; • Facilitate the inclusion of priorities and service specifications arising from the audit into individual agency asset management plans other IP&R systems and forward planning documents as per RA1; • Provide input into the planning, implementation and reporting of relevant asset management actions within the CMP in accordance to Councils IP&R Framework; • Discuss asset management issues of a cross-jurisdictional nature including joint grant applications; • Provide a forum for improved coordination of the management of assets, for example, the development of a Lake Illawarra Boating Plan, an Around the Lake Shared Path as per RA1; or a lake foreshore parks and reserves adaptation plan for tidal inundation (see also IR2); • Provide a forum for exchange of information relating to inundation risk, particularly for forward planning of asset replacement and renewal in areas at risk of tidal or storm event inundation; • Oversee and coordinate management of the entrance channel and associated channel migration issues (refer entrance channel area mapped in Figure 5-2); • Produce an accurate and correct map of Lake Illawarra's public land and assets ownership and management.	Whole of lake and foreshore	Working Group $5,000 p.a. to run plus staff time. Development of a Framework $20,000 Other actions are costed in RA1 and IR2	WCC, SCC Supporting: DOI – Crown Lands and Property NSW	Year 1: Coordinated Management Framework for Lake Illawarra assets endorsed by members of the Working Group. Year 1: Undertake review and conduct Audit. Year 2: Develop priorities and service specifications for agencies to incorporate into Asset Management Plans and other IP&R documents. Years 2-3: develop Boating Plan. Years 3 to 10: Implement prioritised programs	• The Lake Illawarra Asset Working Group meets at least 4 times a year. Years 1-10. • Joint Management Framework for Lake Illawarra assets endorsed by members of the Working Group by end of year 1. • Review and audit undertaken by end Year 1. • Priorities and service specifications developed by end Year 2. • Agency Asset management plans and other IP&R documents updated by end of Year 3	This action links to RA1 action "manage foreshore and recreational waterway infrastructure", IR1 "Update Asset Management Plans to identify tidal inundation risk timeframes for asset" and IR2 Whole of Lake Foreshore Adaptation Plan.

4.3 Manage the Entrance Channel (EC)

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
EC1	**Investigate Options to Manage Erosion and Accretion Changes in the Entrance Channel and Implement Management Solutions** This study shall investigate the hydrodynamics, sediment transport, erosion and sedimentation patterns occurring in the channel, and develop management options to address any built, environmental and cultural heritage issues, using a cost benefit analysis to assess options. The preferred solution(s) shall then be implemented. Options for managing entrance channel erosion and accretion include: • soft methods such as sand nourishment, dune repairs, dredging of marine sand for reuse on eroded areas or nearby beaches e.g. Warilla); • hard structures e.g. revetments or groynes; or • strategic retreat • other options e.g. retreat (e.g. erosion on island foreshore where no assets) or limiting ongoing tidal velocity and tidal prism increase. These methods have different environmental and long-term impacts, and may affect the ability to implement other methods in future (e.g. permanent structures are difficult to change once implemented). This must be considered when selecting an erosion control approach. The potential impact on cultural heritage sites from erosion and / or the management action selected must also be considered. Erosion control methods need to optimise environmental outcomes as well as being technically, economically and socially feasible. Changes to the entrance channel affect the entire lake water quality and ecology. *Note: emergency management and other works may be required for some assets, to ensure public safety before the options study is completed*	**Investigation Area:** Entrance Channel (and adjacent coastal or lake zones as required to inform study). The entrance channel is defined as the area between the eastward margin of the ebb tide delta and western margin of the flood tide delta and adjoining lands. Areas in the channel known to be experiencing erosion: • northern shore of the entrance channel between along Windang Foreshore Park and Windang Beach Tourist Park • northern point of Reddall Reserve • northern shore of Picnic Island • Bevans Island, Berageree Island, swimming lagoon wall, southern training wall and the Windang Bridge. Areas in the channel known to be experiencing sedimentation (deposition / accretion): • Flood tide delta (drop over) entering the Lake waterbody • Some sections of the southern foreshore of the Lake (e.g. swimming areas of Reddall Reserve)	Lake entrance processes and management options study: ($460,000, already programmed). Stage 2 detailed options investigation and design (including cost benefit analysis): $0.5 - $1M. Implement actions to address foreshore erosion, channel scour and accretion - $2-5M; longer term actions to control tidal velocity / prism / range increase: $10-20M.	WCC, SCC, DOI – Crown Lands Supporting: OEH, DOI – Crown Lands, DPI Fisheries	Year 1-2: Conduct investigation Year 3-4: Conduct Options Assessment Year 5-10: Implement preferred options	Study of issues and potential management responses for the entrance channel is completed Preferred actions are implemented Preferred actions are monitored as being effective and environmentally sensitive	Should the preferred action involve dredging of marine sand, and the sand not be required for remediating erosion elsewhere in the channel, that SCC would seek to re-use this sand to nourish Warilla Beach (in accordance with the Shellharbour CZMP), with monitoring for effectiveness and adverse / positive effects on surfing conditions and amenity.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
EC2	**Undertake small scale works (e.g. beach scraping, re-shaping etc) to maintain swimming areas**. This action allows for dredging and / or beach scraping/re-shaping to improve the recreational amenity of swimming areas in the channel.	Swimming areas of Reddall Reserve.	$50,000 - $150,000 per event.	WCC, SCC Supporting: DOI – Crown Lands, RMS, OEH, DPI Fisheries	As required	Access and amenity is restored to swimming and other waterway amenity areas.	Needs to be consistent with EC1.
EC3	**Undertake dredging in the entrance channel, as required to maintain navigation** • Undertake dredging when needed to manage sedimentation and improve navigability, and provided dredging is consistent with the preferred solution derived in Action EC1. • Reuse dredged marine sand on nearby beaches (e.g. Warilla, Perkins Beach) and suitable lake foreshores. • Monitor the success of the dredging in terms of longevity of navigation, effectiveness /longevity of nourished beaches, adverse / positive impacts on surfing breaks / sand bars, and beach amenity.	**Entrance Channel only** such as: • secondary tidal channel opposite Reddall Reserve • Flood tide delta	$2 million (per event, estimate based on dredging conducted in 2007)	WCC, SCC, DOI – Crown Lands Supporting: RMS, OEH, DPI Fisheries	As required	The dredging campaign has had positive outcomes for navigation and for beach nourishment	Needs to be consistent with Action EC1. If the sand is not required for remediating erosion elsewhere in the channel, SCC would seek to re-use this sand to nourish Warilla Beach (in accordance with the Shellharbour CZMP)
EC4	**Monitor changes to the entrance channel.** Topographic and bathymetric surveys (using ALS or other efficient method) should be undertaken regularly (every 1-2 years), and the data analysed to determine the trajectory of erosion and accretion patterns occurring in the entrance channel (e.g. bank erosion / accretion and channel migration, deepening or filling), since construction of the breakwaters, and in relation to any further structural works (such as completed through EC1). This action will inform EC3.	Entire entrance channel area, from entrance shoals in the surf zone east of the breakwaters to the drop over inside the Lake.	Drone surveys ~$10,000 to establish, then $5,000 per repeat.	WCC, SCC Supporting: OEH, DOI –Crown Lands	Year 1, then every 2 – 5 years or after major storm events	A topographic and bathymetric survey is completed and analysed for changes in the entrance channel at least every 5 years	Subject to statewide priorities, OEH can commission the surveys and share this data with the Councils (and other agencies as needed).

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
EC5	**Monitor, maintain and if required, upgrade existing entrance channel infrastructure, with any works to be informed by EC1-EC2 and EC4.** Infrastructure includes but is not limited to: • training works • breakwaters • groynes • revetments.	Entrance Channel	$150,000 - $240,000 pa	DOI – Crown Lands Supporting: WCC, SCC, DPI Fisheries and OEH,	Ongoing	Ensure entrance infrastructure is fit for purpose, structurally sound and safe for use.	

4.4 Protect and Rehabilitate Estuarine and Riparian Vegetation (EV)

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
EV1	**Rehabilitate vegetation and manage public access along foreshores and banks of the Lake, its tributaries, islands and broader low-lying areas**. This shall require: • a site inspection to confirm known and identify new rehabilitation sites; and • prioritisation and preparation of a detailed implementation program and action plan for locations, detailing: – rehabilitation using endemic species, in accordance with best practice, and in line with community values; – weed and pest control in accordance with regional pest plans; – fencing / access restrictions for sensitive areas, with educational signage to explain activities and damage caused by informal access, mowing, tree lopping etc; – permanent public access arrangements, i.e. provision of new / repaired access ways, boardwalks, shared cycleways etc, designed to limit damage to sensitive areas, which may include keeping people on paths; – potential impact on cultural heritage sites associated with degraded habitat and / or rehabilitation works; – Support for and assistance from volunteer Landcare groups (e.g. Budjong Creek Landcare, Bushcare, Aboriginal Bush Regeneration groups. Support includes funding, technical advice, training, and equipment. • Continue to fund and implement Council restoration programs in the Lake and catchment.	**Action to cover Lake foreshores, island foreshores, creek banks and broader low-lying areas around the Lake and tributaries, including coastal wetlands and littoral rainforest areas as defined in the State Environmental Planning Policy (Coastal Management) 2018 if required, and including such areas as:** • Picnic Island ($10,000); Berageree Island, Pelican View Reserve ($10,000); Bevans Island, Cudgeree Island ($5,000), Hooker Park, Boonerah Point Reserve, Whyjuck Bay. • Karoo Bay, Moureendah Bay, Oaky Creek. • Burroo and Koona Bay, northern bank of Horsley Inlet upstream of Slaters Bridge, Macquarie Rivulet. Shared cost for Horsley, Oaky and Macquarie Rivulet: $65,000 p.a. • Duck Creek (wetlands and riparian corridor, under control of EnergyAustralia) ($500,000); Nijong Bay. • Yallah Bay, Tallawarra Point, Boomberry Point. • Mullet Creek, and Purrah Bay ($500,000, including formal access to reduce uncontrolled damage); Kanahooka foreshore including Brooks Creek. • Fred Finch Park (Hooka Creek, Hooka Point Park and Hooka Creek wetland). • Berkeley Boat Harbour, Tuggerah Bay. • Wollamai Point ($20,000 p.a.); Lake Heights foreshore, Minnegang Creek, Creek adjacent to Kully Bay Oval. • Kully Bay Wetland; Griffins Bay ($200,000, inc. formal access/boardwalk).	Bushland weed control and rehabilitation works typically ~ $2,000-$10,000 per hectare; small scale foreshore access paths typically $5,000 - $20,000.	WCC, SCC; Energy Australia (for their lands only), Property NSW, DOI - Crown Lands Supporting: OEH, DPI Fisheries, NPWS, LLS, CVA, ILALC, NSW Biodiversity Conservation Trust	Year 1 and ongoing (new works and / or upkeep)	Number of hectares of estuarine and riparian vegetation managed / protected.	See also the Purry Burry Point to Heritage Park Site Restoration Plan (2013), Berkeley Nature Reserve POM, Picnic Island Reserve POM; Pelican View POM, Boonerah Point Vegetation Management Plan, Judbooley Parade Landscape Master Plan and POM, Generic POM for the Community Land of WCC, and other relevant community or crown land Plans of Management. This action will also benefit water quality as revegetation throughout the catchment reduces sediment run off into waterways.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
	• In conjunction with revegetation works, some bank reshaping and erosion control works may be required, particularly on tributaries and creek banks and foreshores • Support the implementation of the POM for the Berkeley Nature Reserve. • Advocate for appropriate creation of biodiversity stewardship sites and consider possible dedication of biodiversity stewardship sites in the Lake catchment. • Support where appropriate increased conservation outcomes and increased vegetation and biodiversity management actions that are proposed in future biodiversity certification applications in the Lake catchment • Assess parks and sports grounds fringing the Lake for areas suitable for native vegetation. This can increase habitat, connect corridors of vegetation as well as adding shade trees to sports field perimeters. • Action includes all important fringing / riparian vegetation, e.g. Swamp Oak Floodplain Forest.	• Korrungulla Wetland. • Foreshore from Purry Burry Point to Cudgeree Bay, Windang Peninsula. • **Natural Areas Restoration Program** for 3 areas within the WCC LGA: Lake Projects West, North and East ($190,000 p.a. over Years 1 to 3, already committed). • This shall require facilitation of work on private lands.					Landcare, MEMA and CVA may also be involved with this action.
EV2	**Undertake targeted action to control damage to foreshore and lake vegetation, including seagrasses,** caused by: • 4WDs and other vehicles, • bikes (including BMX), • boating activities, • unfenced stock, • mowing practices, • tree damage and removal, • pedestrians, • illegal structures (e.g. land reclamation, seawalls, boat ramps (formal or informal), BBQs, seating, fencing, private signage),	Action is relevant lake wide, with known areas outlined below. • Foreshore between Jettys by the Lake and Oaklands Village, Windang • Whyjuck Bay • Mogurah Point, and Yangar Point (restrict access to reduce vegetation clearing, mowing and excessive access, Oak Flats foreshore, Davies Bay and Karoo Bay. • Koona Bay (south eastern side), Burroo Bay, Kurrura Point. • Macquarie Rivulet coastal wetlands (CM SEPP) area (issues with cattle, 4WDs and other vehicles); Koonawarra Bay	Depending on physical barrier selected, cost may range from $10,000 to $100,000. Additional staff resources for compliance $80,000 p.a. (shared across both councils).	WCC, SCC, DPI Fisheries. Supporting: DOI – Crown Lands, OEH, NPWS, RMS, LLS.	Year 1 and ongoing	• Number of hectares of vegetation managed (on private and public land).	See also the Purry Burry Point to Heritage Park Site Restoration Plan (2013), Berkeley Nature Reserve POM, Picnic Island Reserve POM; Pelican View POM, Boonerah Point Vegetation Management Plan, Judbooley Parade

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
	• hand gathering (e.g. cockles etc). Actions may include: • Prioritise and prepare detailed implementation program for mapped locations. • Bollards / fencing / gates etc to restrict illegal access (provided they are low key from a visual perspective). • Signs to explain estuarine habitat values. • Signs or other impediment to replace vegetation removed. • Removal of illegal structures (in consultation with landowners). • Improved surveillance and compliance (through additional staff resources). • Develop a policy for mowing practices on public foreshore lands, and educate Council works staff regarding the policy. • Monitor the success of the different approaches for reducing access and damage and modify future approaches accordingly. • Managing impacts on cultural heritage sites from vegetation damage and / or access. • This may include negotiating voluntary acquisition of critical lands with sensitive habitats.	• Brooks Creek Delta (southern end, issues with bike jumps and other activities). • Koonawarra Bay (North), Purrah Bay. • Hooka Creek, Hooka Point and Berkeley foreshore. • Park east of Wollamai Point • Primbee Bay (BBQs, ramps, seats), Griffins Bay. • Purry Burry Point saltmarsh community (issues with 4WDs), and foreshore southward to Windang Note: there may be new areas identified in the future where similar rehab works need to occur, consistent with best practice and that have minimal disturbance, e.g. in the coastal wetlands and littoral rainforest areas. Tidal inundation may increase the prevalence of illegal / ad hoc structures where foreshore areas are being slowly and permanently reduced in size.					Landscape Master Plan and POM, Generic POM for the Community Land of WCC, and other relevant community or crown land Plans of Management. Target areas: where problems have occurred; and where new view conflicts may arise due to mangrove growth (see medium priority areas from Williams and Wiecek, 2017). MEMA may be involved with this action.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
EV3	**Prepare and deliver an information program for the Lake Catchment** on: • mowing and gardening around sensitive foreshore vegetation; • the legalities of building of structures (BBQs, seating, boat ramps, seawalls, land reclamation, fences, etc); • environmentally friendly designs, habitat rehabilitation options, and planning and approval requirements for foreshore structures and works; • illegal access and dumping; • the importance of undertaking appropriate and ongoing Pest and Weed Management activities; • threatened flora and fauna species, migratory birds and EECs that the Lake supports, and; • vegetation damage and removal. Information can include: • the importance of estuarine vegetation for ecological function, bank protection and water quality; • the natural increase in mangroves in the Lake since lake opening; • surveillance and reporting methods and prosecution / fines for offences. Activities could include • Identifying Lake users associated with threatening activities that have a representative organisation or individual, or another means through which they can be reached as a group, with aim to facilitate partnerships to increase community engagement & participation. • Develop partnerships that aim for understanding of community needs & use negotiation to reach agreement. • field days, brochures, and / or workshops, and signage at relevant locations. • Training for Council staff. Audiences may include: • foreshore land owners, council works staff, landscapers/ builders, and via high schools and general community. • DA officers and building certifiers etc. who approve or design foreshore works (for education regarding foreshore structures).	Catchment wide.	$20,000 to develop program, plus $10,000 p.a. for staff time and resources to implement.	WCC, SCC. Supporting: OEH, CVA, LLS, DPI Fisheries and NPWS.	Year 1 and ongoing	Information program is developed by end Year 2 and incorporated into PM3. At least 2 successful partnerships established annually with Lake user groups & relevant activities / programs developed & delivered through those groups.	This action links with PM3. Target areas: where problems have occurred; and where new view conflicts may arise due to mangrove growth (see medium priority areas from Williams and Wiecek, 2017). Council/ other organisations Communication Policies. Lake Illawarra Estuary Management Education Program. Developed by WCC and Dep't of Education 2010. Ocean Watch, Landcare and CVA may also be involved with this action.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
EV4	**Prepare and implement an estuarine macrophyte mapping and monitoring program**. • Undertake estuarine macrophyte mapping for the entire lake, to determine the current coverage and distribution of mangroves, saltmarsh and seagrass. • Determine changes in distribution and coverage of macrophytes, by a comparison with the previous mapping. • Monitor areas identified as high and medium priority for conservation of saltmarsh in foreshore prioritisation maps (see Appendix F) for 2 years. If it can be shown mangroves are having an impact on saltmarsh, work with relevant stakeholders to determine best strategies to minimise ongoing impacts. • Repeat lake wide estuarine macrophyte mapping and analysis every 5 years.	Lake wide. For comparison of mangroves and saltmarsh, focus on Medium and High Priority areas identified in the Foreshore Prioritisation Maps (as per mapping by Williams and Wiecek (2017), in Figure 7-2, Section 7.4)	$25,000 per mapping episode, $10,000 for area specific macrophyte monitoring.	WCC, SCC Supporting: OEH, DPI Fisheries	Year 1 and ongoing	Estuarine macrophyte mapping and analysis completed by Year 2. Area specific monitoring completed by Year 4. Estuarine macrophyte mapping and analysis repeated by Year 6 and Year 10.	This action links with EV5. Refer to guidance in *Assessing estuary ecosystem health: Sampling, data analysis and reporting protocols* (State of NSW and OEH, 2016). MEMA may also be involved with this action.
EV5	**Develop and implement a program to enhance opportunities for estuarine vegetation migration**. • Build on previous work to identify areas that could be modified or managed to permit migration and colonisation by saltmarsh. Previous work is illustrated in Figure 7-2, and in Figure 7-3 with respect to tidal inundation projections, as a starting point of priority areas. • From EV4, add areas where action is required to manage saltmarsh retreat. • Implement actions to allow saltmarsh migration or manage retreat, e.g. by: land repurchase, MOUs with landowners, removal of physical barriers (e.g. walls, paths) and levelling land.	Potential areas for migration are identified in the Foreshore Prioritisation Maps, based Williams and Wiecek (2017) mapping in Figure 7-2, and Figure 7-3, in Section 7.4.7).	Staff time or consultancy ($25,000) to develop and progress action program to achieve security of migration areas into the future. Additional $ to implement actions.	WCC, SCC. Supporting: OEH, DPI Fisheries, DPE.	Year 2 to 10	Areas are identified and program is prepared by end Year 5. Number of locations where modifications have been made to promote migration or manage retreat.	This action links to / follows on from EV4. Refer to Section 7.4.7, and recommendations by Williams and Wiecek (2017). MEMA may also be involved with this action.

4.5 Maintain and Improve Recreation and Amenity (RA)

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
RA1	**Manage foreshore and waterway recreational infrastructure** in accordance with available Transport and Recreation Asset Management Plans, informed by Plans of Management and approved recreation masterplans. 1. Prepare in consultation with Transport NSW and the RMS, the Lake Illawarra Waterways Facilities Plan that prioritises boating facility upgrades based on factors including but not limited to user demand, existing facilities and available navigational access. 2. Undertake a review of existing information on recreational infrastructure (i.e. established hierarchies, recommendations from maintenance programs for existing facilities, user needs now and into the future with population growth, tidal inundation (see IR1) etc, ownership and responsibility (connection with IR2), costs and other resources) and prepare a comprehensive audit and risk assessment to inform next actions (upgrades, renewals, replacements, strategic retreat etc). 3. Consider the provision of additional facilities during the audit (e.g. BBQs, picnic shelters, drinking water stations, toilets, fitness equipment, fish cleaning stations, lighting, dog bags, BMX / skate parks etc). 4. Establish service specifications for priority existing foreshore assets for inclusion in Agency and Council asset management plans and other IP&R documents based on the audit, including ongoing maintenance, upgrades / renewal, replacement, additions to or decommissioning of existing assets. 5. Develop priorities for new assets and improved assets to be incorporated into relevant WCC, SCC, Property NSW and DOI – Crown Lands planning documents for future budget consideration. 6. Upgrades, maintenance and new infrastructure should be designed to be environmentally and fish friendly.	**Works currently programmed include:** • Reddall Reserve Foreshore Renewal ($250,000) • Skiway Park renewal of carpark etc ($1,000,000) • Renew Deakin Reserve carpark and facilities (estimated $250,000) • Lake Cycleway renewal: Lake Heights to Berkeley Boat Harbour ($120,000) • Primbee to Windang: Shared path renewal along Windang Road ($100,000) • Windang foreshore repairs to boardwalk, retaining structures and boat ramp ($500,000) Future work locations are to be determined by the audit (2) and Lake Illawarra Boating Plan (1).	Maintenance: $5,000 per item for an estimated 25 sites p.a. (total of $125,000 p.a.) Programmed upgrades of $2.22 million. Independent audit: $60,000 ($20,000 to DOI – Crown Lands and $40,000 to WCC/SCC). Lake Illawarra Waterway Facilities Plan: $50,000. Future upgrades determined through the audit are estimated at a total of $740,000 per year based on current programmed works, to be confirmed through the course of this action.	WCC, SCC, DOI – Crown Lands, Property NSW Supporting: RMS, DPI Fisheries	Year 1-2: Undertake review and conduct Audit. Year 2-3: Develop prioritised program. Incorporate into forward planning documents, existing Asset Management Plans and other IP&R documents. Years 2-3: develop Boating Plan. Years 4 to 10: Implement prioritised program and asset management plans.	Review and audit undertaken by end Year 2. Prioritised program developed and incorporate new assets into planning documents by end Year 3. Asset management plans and other IP&R documents updated by end of Year 3 Boating Plan for Lake Illawarra developed by end Year 3. Prioritised Program and asset management plans are implemented by end Year 10. Yearly maintenance of assets is under-taken.	Ownership of some land and assets around Lake Illawarra is fragmented. Refer to Land Tenure map for current status of land ownership and responsibility for this action This action links to action PM4 "Establish a Lake Illawarra Asset Management Working Group. The action also links with IR1 "Update Asset Management Plans to identify tidal inundation risk timeframes for asset". Transport NSW may also need to be involved in this action. Links to EC actions

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
RA2	**Construct new sections of shared pathway to complete the pathway linkage around the Lake.** • Remove and rehabilitate informal / degraded tracks as new sections are completed. • Consider disabled access and facilities, bubblers / drinking stations, and lighting when designing new shared pathway sections. • The shared pathway will not be extended through sensitive environmental and / or cultural areas and its siting will accommodate current and future site constraints including tidal inundation.	**Works currently programmed include:** • Feasibility and constraints mapping for an Around the Lake Shared Path Plan ($120,000). • Koona Bay (future stages, design $50,000; Kanahooka St to Shearwater Blvd likely on-road construction $350,000) *Note: location not mapped as preferred siting for this path is yet to be determined.* Listed below (but not mapped) are locations for shared paths requested by the community for future consideration, but that are not currently in SCC or WCC Infrastructure Delivery Programs: • *Community request a shared pathway link from Macquarie Rivulet to Tallawarra Power Station (so that cyclists do not need to use the highway with 100km speed limit). As part of this, investigate providing shared pathway to Haywards Bay.* • *Kanahooka Point to Purrah Bay;* • *Shared path bridge over Mullet Creek, from Purrah Bay to Currungoba Peninsula* • *Currungoba Peninsula / Koong Burry Bay foreshore, linking to Hooka Park and crossing of Hooka Creek.*	Programmed works: $520,000. Future works are estimated at $100,000 to $1,000,000 per path including design costs, depending on style and length.	WCC, SCC, Private Developers through s94 provisions. Supporting: DOI – Crown Lands, RMS, DPI Fisheries, Property NSW	Year 2: develop Around the Lake Shared Path study. Year 1 to 10: implement upgrades and extensions to cycleway.	Pathway alignments determined by end Year 2. Prioritised program for new path construction developed by Year 3.	While formal access paths will also be constructed through action EV1, sites listed under this action and RA2 are primarily for community and recreational use. This action links to RA3 – public right of way.
RA3	**Investigate the opportunities of public access along the foreshore and amend the acquisition layers of the relevant Council Local Environmental Plans if applicable.** As part of development applications or rezoning proposals, negotiate with land owners regarding public and private foreshore ownership and allow public access along private foreshore sections as opportunities present themselves.	Apply to areas as appropriate.	Staff time	WCC and SCC Supporting: DOI – Crown Lands, OEH	Year 5 to 10	Length (m) of foreshore where public access is achieved.	Some properties are already designated for acquisition, specific to the Wollongong LEP. Linked to RA2 and objectives around improving public access to the foreshore.

4.6 Protect and Promote Cultural Heritage (CH)

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
CH1	**Protect and promote cultural heritage in and around the Lake and its catchment.** Employ a Cultural Heritage Officer to work on Lake Illawarra with assistance from Federal or State funding processes. This person will work with the Aboriginal and non-indigenous community to further cultural awareness activities, such as: • Develop and implement a Conservation Management Plan for Lake Illawarra to achieve conservation and protection of Aboriginal heritage sites recognised as being at risk. Protection of eroding heritage sites is also captured by Action FB1. • Undertake a strategic review of foreshore infrastructure to consider the heritage and cultural significance of sites such as the Tank Trap and Dix's Wharf. • Support trials in cultural burning, assisting in monitoring and evaluation and supporting follow up reporting of outcomes. • Build cultural links with other strategies when implementing the CMP. This could include education materials, signage, provision of facilities, rehabilitation works, etc. • Encourage suitable cultural tourism ventures in and around the Lake. • Implement the re-naming / shared naming of sites of cultural significance around Lake Illawarra to name of relevant Aboriginal origin. • Organise a 'festival of the Lake' event that celebrates the areas cultural and ecological values. • Develop an Illawarra Events Strategy which integrates compulsory cultural recognition of the Lake and its values into key community events. • Support the continuation of the Lake Illawarra Arts Trial around the entire lake foreshore.	Lake wide	$100,000 p.a. for additional staff resource. $20,000 p.a. for operating costs. Costs for heritage protection works included with FB1.	WCC, SCC Supporting: OEH, ILALC, LLS, NPWS.	Year 1 and ongoing		Dance hall on Gooseberry Island (managed by NPWS under the Berkeley Nature Reserve Plan of Management) is an example of a non-indigenous heritage site. Unknown what heritage protection works will be required over the 10 year life of the plan, therefore costings for this have not been included in the business plan. Fire and Rescue and RFS may also need to be involved with this action. This action links to PM3.

4.7 Manage Foreshore and Bank Erosion and Sedimentation (FB)

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
FB1	**Undertake a bank condition assessment and determine and implement erosion control measures.** • Undertake a bank condition assessment of lake and tributaries to the tidal limit (and beyond if resourcing allows) to map foreshores experiencing erosion. • Identify the likely causes of erosion (e.g. stormwater outflow, wind waves, tidal currents). • Prioritise the sites based on their severity, risks from ongoing erosion (e.g. to public safety, nearby seagrasses etc), and feasibility and cost of controlling erosion / management action. • Determine feasible and appropriate erosion control measure that also optimise environmental outcomes. • Concept designs for remedial action should preference the use of revegetation, or otherwise utilise the environmentally friendly seawall guidelines for engineered solutions and aim to improve habitat connectivity and protection of cultural heritage. Potential disturbance of cultural heritage needs also be considered in designs. • Monitor success or otherwise of remedial action. • Provide bank condition assessment and outcomes to relevant land management authorities including DOI – Crown Lands to assist them in managing their assets.	A bank condition survey of entire Lake foreshore and tributary creeks to the tidal limit is required to identify current sites of erosion (see actions details and further information). *While it is noted that foreshores are variously in public and private ownership, identifying all sites allows state agencies to work with private land owners to achieve consistent remediation outcomes.*	$70,000 for consultancy for bank condition assessment (allocation of $15,000 to DOI – Crown Lands and $55,000 to WCC/SCC) (survey, identification of causes, prioritisation and erosion control recommend-ations). $5,000 p.a. for monitoring. $20,000 to $200,000 per site for erosion control works, depending on requirements.	WCC, SCC Supporting: OEH, DOI Lands & Water, DPI Fisheries, LLS	Year 1: Conduct bank condition assessment Year 2 onwards: begin implementing erosion control works. Monitor low risk sites for change in erosion risks. Year 3 and ongoing: monitor effectiveness of erosion control measures.	Bank condition assessment and report is completed by Year 2. # of sites where erosion control is implemented. # of sites where monitoring demonstrates remedial works are effective.	Due to the lapse of time and the focus on using revegetation to manage many erosion issues (see EV1), the mapping by OEH and LIA of eroding sites is no longer current, and therefore requires updating. The bank condition survey could be teamed with Action FB3, depending on time constraints and methods used.
FB2	**Implement Environmentally Friendly Seawall Guidelines or similar for new and upgraded foreshore protection works.** This action aims to improve the environmental performance and outcomes for foreshore protection works when the renewal of existing or construction of new infrastructure is required, where appropriate and feasible to do so. The Environmentally Friendly Seawall Guidelines or similar should be used in upgrade designs, to improve the environmental benefits of existing structures.	Locations include: • Oaklands Village to Jettys by the Lake. • Skiway Park • Illawarra Yacht Club structures	$50,000 to $150,000 per site, depending on requirements.	WCC, SCC, DOI – Crown Lands Supporting: OEH, DPI Fisheries	Year 2 onwards	# of sites upgraded by Year 5.	EC1 will provide information for the entrance channel.

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Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
FB3	**Undertake a bathymetric survey of the entire Lake and tributaries up to the tidal limit.** Survey should be conducted along transects used previously in the tributary creeks. Methods such as marine-based LiDAR should be considered. Survey should be compared with previous surveys, to determine if and where sedimentation / erosion is occurring on the Lake or creek bed. Survey to be completed every 10 – 20 years. Senior Management Team in both Councils to be informed when complete.	Entire Lake waterbody and all tributary creeks up to the tidal limit (Future surveys can capture beyond the tidal limit).	$50,000	WCC, SCC Supporting: OEH	Year 5	A whole of lake and tributary bathymetric survey has been completed and analysed against historical data	

4.8 Prepare for Inundation Risks (IR)

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
IR1	**Update Asset Management Plans for all publicly owned and managed assets to clearly identify asset at risk from inundation over future timeframes, including tidal inundation.** This involves notation of the risk of periodic and permanent inundation on asset management registers for roads, stormwater infrastructure, sewer and water infrastructure, community facilities including parks and reserves, cycleways, jetties, boat ramps, entrance training walls and other waterway infrastructure, environmental assets such as saltmarsh, coastal wetlands, etc. When asset managers progress a refurbishment or replacement of the asset, the inundation risk can then be factored into the redesign / relocation / alternatives of the asset. The asset management plan notation should trigger an options assessment for replacement or major upgrade, to determine a preferred approach that manages inundation risk as well as improving the asset. Novel solutions to relocate, raise or retrofit the asset should be considered. The feasibility and viability of asset relocation including impacts upon upstream and surrounding land need to be investigated. The assessment should identify an inundation response that is suitable to the expected lifespan of the asset and its interdependencies with other assets. Consideration of asset interdependencies should link back to strategic planning, floodplain risk planning and/or adaptation plans for the region. For example, raising of a roadway will need to consider both the servicing of residents and the effect of road raising on flood/inundation behaviour. Asset management plan updates should incorporate findings of Action IR2, when available. Asset management is an important vehicle for implementing adaptation actions in a cost effective and timely manner. Implementing replacement or retrofit actions to manage inundation at the time of asset renewal avoids both the costs of not fulfilling the asset life before inundation reaches an unacceptable level, or the potential costs of maladaptation where action is taken too early. Frequent inundation of assets, such as roads, buildings etc.is also costly in terms of wear and tear and clean up. This action is also a key avenue for capturing asset maintenance activities or refurbishments that are exempt from planning controls or approvals.	All assets affected by tidal inundation over future timeframes (refer Asset Risk Registers and Risk Maps in the Values Report).	Staff time (or $10,000 per agency / council for minor consultancy) to update asset management plans.	WCC, SCC, DOI – Crown Lands, Property NSW, Sydney Water, RMS, NPWS Supporting: OEH, DPI Fisheries	Year 2-4	All agency asset management plans are updated	The extent and risks from tidal inundation are contained in the Values Report (Appendix C) and Kumbier et al (2019) tidal inundation modelling report. This action links to Action IR2 Whole of Lake Foreshore Adaptation Plan and Action IR5 Investigate novel solutions to manage inundation risks to assets. Cost-benefit assessments should be factored into any management strategies.

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
IR2	**Prepare whole of Lake Foreshore Adaptation Plan for public (community and environmental) lands**, which will involve adaptation planning for all foreshore parks and reserves, including their associated assets such as cycleways, jetties, boat ramps, to provide a holistic approach to managing and adapting to tidal inundation risks. The action involves assessment and selection of adaptation actions for parks /reserves around the entire Lake Illawarra foreshore, considering tidal inundation and current and future usage demand, to determine: • parklands that are more resilient, or can be reconfigured to retain their useability over time; • parklands that are feasible to protect; • land areas that will need to be transitioned from open space to fringing habitat; • land that needs to be secured for future relocation of larger assets such as the cycleway, • land that needs to be secured for future foreshore and wetland habitat migration (linking with Action EV5); • a program of asset raising for jetties and boat ramps (which by their very nature need to be next to or in the waterway) provided access to the asset can be maintained. Outcomes of the adaptation plan should then be fed into masterplans / POMs for the parks, to facilitate implementation of adaptation actions. As required, the outcomes of this action could also be fed into asset management plans (see Action IR1). This action requires collaboration and consolidation for managing foreshore community / recreational and environmental lands, which can be facilitated through Action PM4 Establish a Lake Illawarra Asset Management Working Group. This action aims to recognise that tidal inundation has a very different and detrimental consequence on community recreation reserves and assets compared with storm inundation because it is effectively permanent, with the community losing access and enjoyment of precious and rare foreshore land.	All parks, reserves, sports grounds, and associated assets, particularly those with high usage / demand including but not limited to: Reddall Reserve Fred Finch Park (inc. sports grounds) Shared Path / Cycleway (entire lake) Judbooley Parade Foreshore Windang Foreshore Hooka Park Skiway Park Koona Bay Reserve Koonawarra Bay Lakeside Drive Reserve William Beach Reserve Lake Illawarra Foreshore	$80,000 for an adaptation plan for the park and reserve network around the Lake. Incorporating outcomes into POMs / Masterplans to occur as and when they are updated. Incorporating outcomes into Assets Management Plans to occur through existing costings for Action IR1.	WCC, SCC, DOI – Crown Lands and Property NSW. Supporting: OEH, DPI Fisheries, RMS, NPWS	Year5 -7	An adaptation plan has been prepared. POMs / Masterplans and asset management plans incorporate findings of the plan when they are updated.	The extent and risks from tidal inundation are contained in the Values Report (Appendix C) and Kumbier et al (2019) tidal inundation modelling report.

Strategy Implementation Plan

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
IR3	**Incorporate tidal inundation mapping into strategic land use planning documents**, for example as a foreshore building line / buffer / setback in the LEPs, DCPs and council policy. Tidal inundation risks are different to storm inundation risks in that the tidal inundation water level occurs so frequently as to be considered permanent (e.g. daily high tides), and the existing land use can no longer be supported. This is a different impact than for storm events where the inundation occurs very infrequently (once in 20 years+) and many land uses can continue between events. And in this case, land use planning controls for flooding will not fully manage tidal inundation risks, and additional controls are needed. The planning controls would apply to both public and private land to enable the continued provision of: • public right of way and access to the foreshore, • land for fringing habitats, and • new public assets on community land and infrastructure (i.e. that would not be in existing asset management plans). Areas that are impacted by inundation should not be eligible for land use intensification.	All land affected by tidal inundation.	$20,000 for consultancy to develop foreshore building line and / or other appropriate controls. Staff time to implement.	WCC and SCC Supporting: DPE, OEH	Year 2 to 4	Planning controls have been amended to include appropriate provision for tidal inundation	Land affected by tidal inundation is illustrated in the Kumbier et al (2019) tidal inundation modelling report.
IR4	**Undertake water level and condition monitoring for all lake inundation events** (i.e. tidal, ocean anomaly, rainfall), to: • Record the frequency and details of events, based on review of existing lake water level gauge data, and • Record assets affected and impacts / condition after each event or yearly, as required. Asset condition monitoring should prioritise public foreshore assets that are expensive, have a long lifespan, and / or are highly important to the community, include natural assets. This action provides invaluable information to demonstrate the occurrence of coastal inundation, and for developing triggers for site specific management actions into the future.	Key foreshore assets following inundation events including "king high tides" and ocean water level anomaly events.	$10,000 p.a. for water level and asset condition monitoring;	WCC and SCC Supporting: OEH	Year 1 and ongoing	Water level recording is maintained. Asset condition impacts after inundation events is recorded and used in AMPs	The extent and risks from tidal inundation are contained in the Values Report (Appendix C) and Kumbier et al (2019) tidal inundation modelling report.

Strategy Implementation Plan

Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
IR5	**Investigate novel solutions to manage inundation risks to assets such as stormwater, sewer, and water; cycleways, roads and bridges, etc.** This action aims to provide novel and innovative solutions to asset replacement where relocation is not viable. Certain assets by their very nature must be located on low-lying high risk lands, for example sewer and water pump stations and stormwater outlets. This action would involve: • Literature review identifying the latest technologies and success of their implementation worldwide; • Challenges and opportunities defining the viability of solutions in the Lake Illawarra context, including physical processes of inundation in the Lake and interdependencies and connectedness of assets; • Research and development of novel solutions, for example – Bunding around pump stations, – Floating cycleways / roads / arterial roads, – Bridge designs that allow for habitat migration, – Stormwater pump systems and backflow devices, – Legalities and practicalities of handover/ acquisition / repurchase of private land to council / state once permanently inundated; and • Recommendations for suitable solutions and / or further research / case studies in the Lake Illawarra context.	Whole of lake	$30,000 plus partnership (i.e. in-kind contribution or ARC grant) with a private consultancy and/or research organisation to fund for example a PhD or post doctorate position.	WCC and SCC Supporting: OEH	Years 5-10	A report is produced (e.g. PhD thesis, post-doctoral thesis, scientific report etc) on viable novel solutions to inundation risks for asset replacement specific to Lake Illawarra.	

4.9 Protect and Manage Key Fauna (MF)

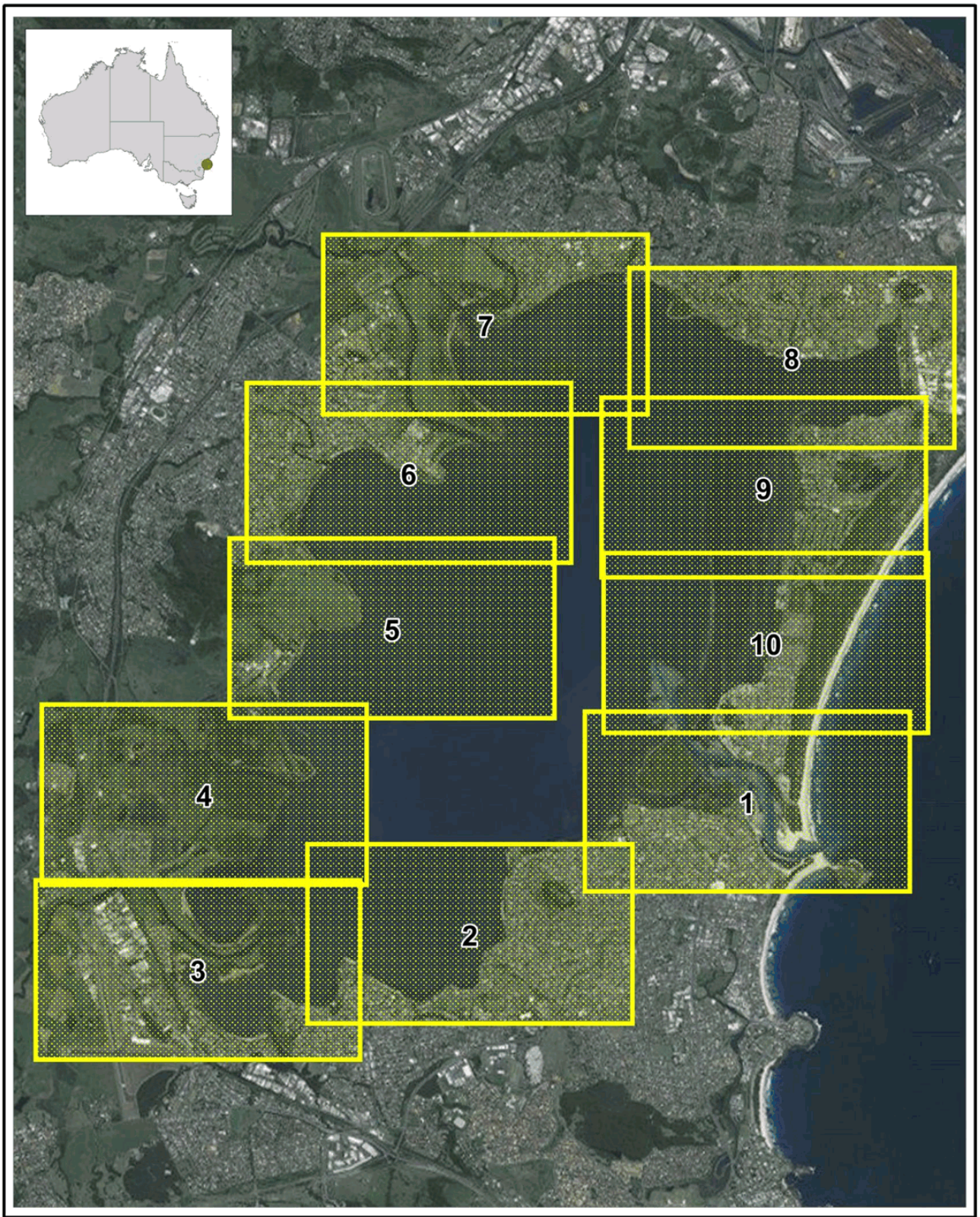
Action ID	Action Details	Locations (see Action Maps also)	Indicative Cost *(subject to available funding)*	Responsibility, Supporting Organisations / Programs	Time-frame *(subject to available funding and resources)*	Performance Measure	Further Information / References
MF1	**Develop and implement a fauna management program including shorebirds fish and other fauna**. This may include but is not limited to the following actions where Council works with stakeholders to: • Identify, monitor and protect shorebird habitat, foraging, breeding and nesting sites on a yearly basis (refer to Figure 2-20, pp. 52 of the Synthesis Report (BMT, 2019a)) and assist OEH/NPWS in managing the public through education and exclusion works, and / or pest management (e.g. fox control) that may be required; • Survey recreational fishers on a regular basis (e.g. every 5 years), to gather data on fish species distribution and numbers in the Lake. • Undertake periodic scientific fauna surveys (e.g. every 2-3 years) to better understand fish and other fauna assemblages, distribution and numbers in the Lake. • Advocate for and investigate conducting a study on cockle biomass, to assess for the sustainability of cockle harvesting in the Lake and assist in the development of a harvest strategy for the species. • Analyse the data sources (i.e. recreational fishers, fauna surveys, commercial fishing data) to identify trends in fauna assemblages. • Where a change or impact on fauna health is identified, determine causes and develop and implement actions to mitigate the change / impacts, where possible. • Councils to assist in distribution of agency education material concerning fishing and fauna management.	Lake Wide, including: • Entrance Channel (various, as nesting sites change year to year)	$15,000 to develop fauna management program. $50,000 for staff and resources to implement actions, e.g. shorebird habitat monitoring, recreational fishing surveys, data management. $20,000 (consultancy) per ecological survey and analysis.	WCC, SCC. Supporting: OEH, NPWS, DPI Fisheries, RMS, local businesses to support survey distribution where appropriate.	Year 1 and ongoing	Fauna management program is developed by end Year 2. Number of successful shorebird hatchlings per year. Number of surveys returned.	Links to education programs in PM3 and EV3. Local bird clubs could be engaged to help do counts e.g. Illawarra Birders whom already do regular bird counts at various Lake Illawarra sites and share information with agencies. . Refer to survey method guidance in *Assessing estuary ecosystem health: Sampling, data analysis and reporting protocols* (State of NSW and OEH, 2016). Protection of fauna is done under the general biosecurity duty obligations of the *Biosecurity Act 2015.*

5 Action Maps

The following chapter contains a series of maps covering the entire foreshore region of the Lake and displaying locations for CMP actions where applicable. A key plan displaying the coverage of each map is provided in Figure 5-1 as an overview to the zone maps.

The Action maps display the known locations for which various actions in the CMP shall be applied and should be read in conjunction with the implementation details provided in Chapter 4.

Not all actions have been mapped, only those actions for which mapping is useful or relevant (e.g. Action PM1 is not mapped as it is not location specific and applies catchment wide, whereas specific areas known to require rehabilitation through action EV1 have been mapped). Not all locations at which an action may apply have been mapped, as new or unknown locations may arise over the life of the plan (for example, there may be new rehabilitation areas identified in future for action under EV1).



Title:
Lake Illawarra Management Actions - Map Key

Figure: **5-1**

Rev: **A**

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Approx. Scale

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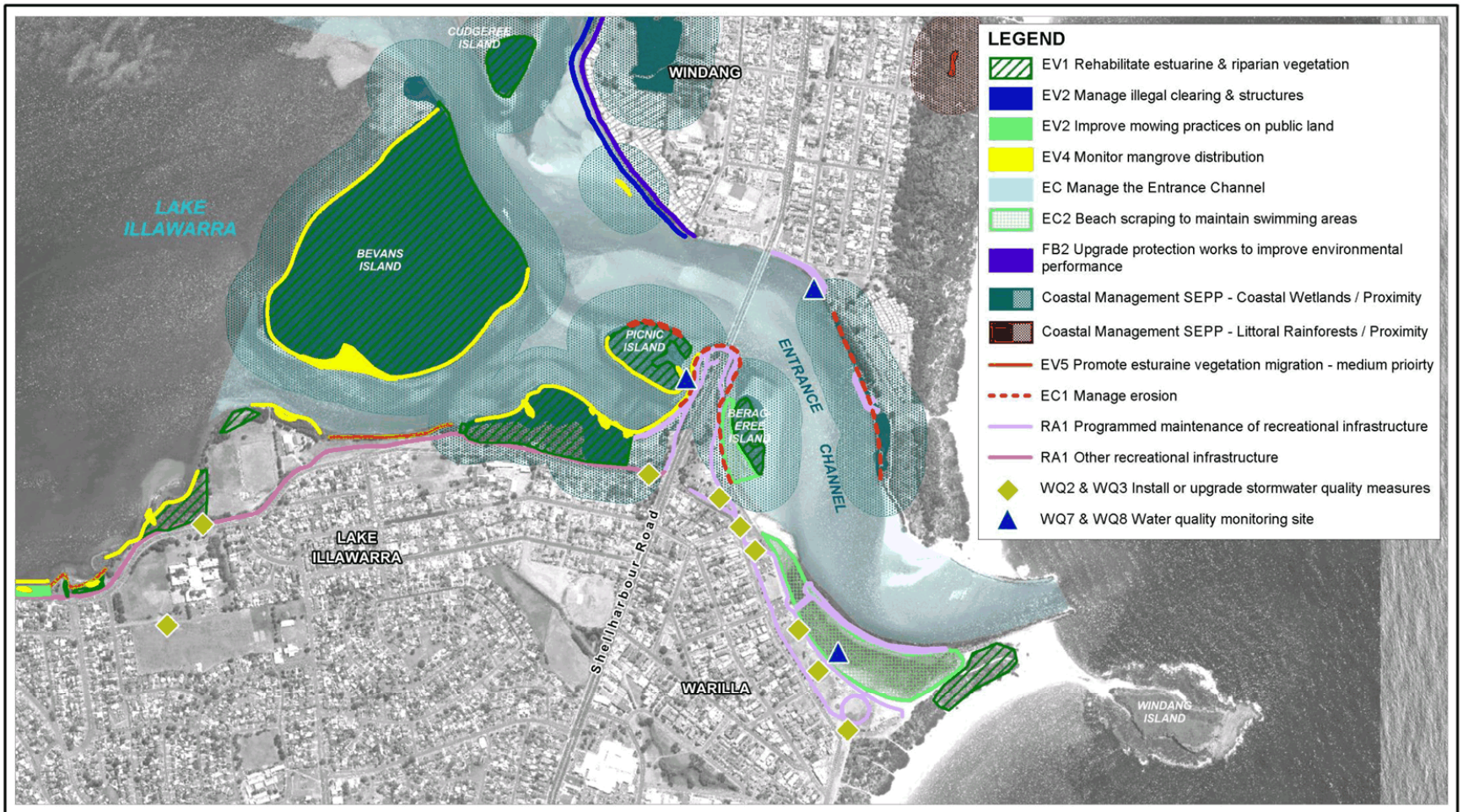

Title:
Lake Illawarra Management Actions - Zone 1

Figure: **5-2**

Rev: **C**

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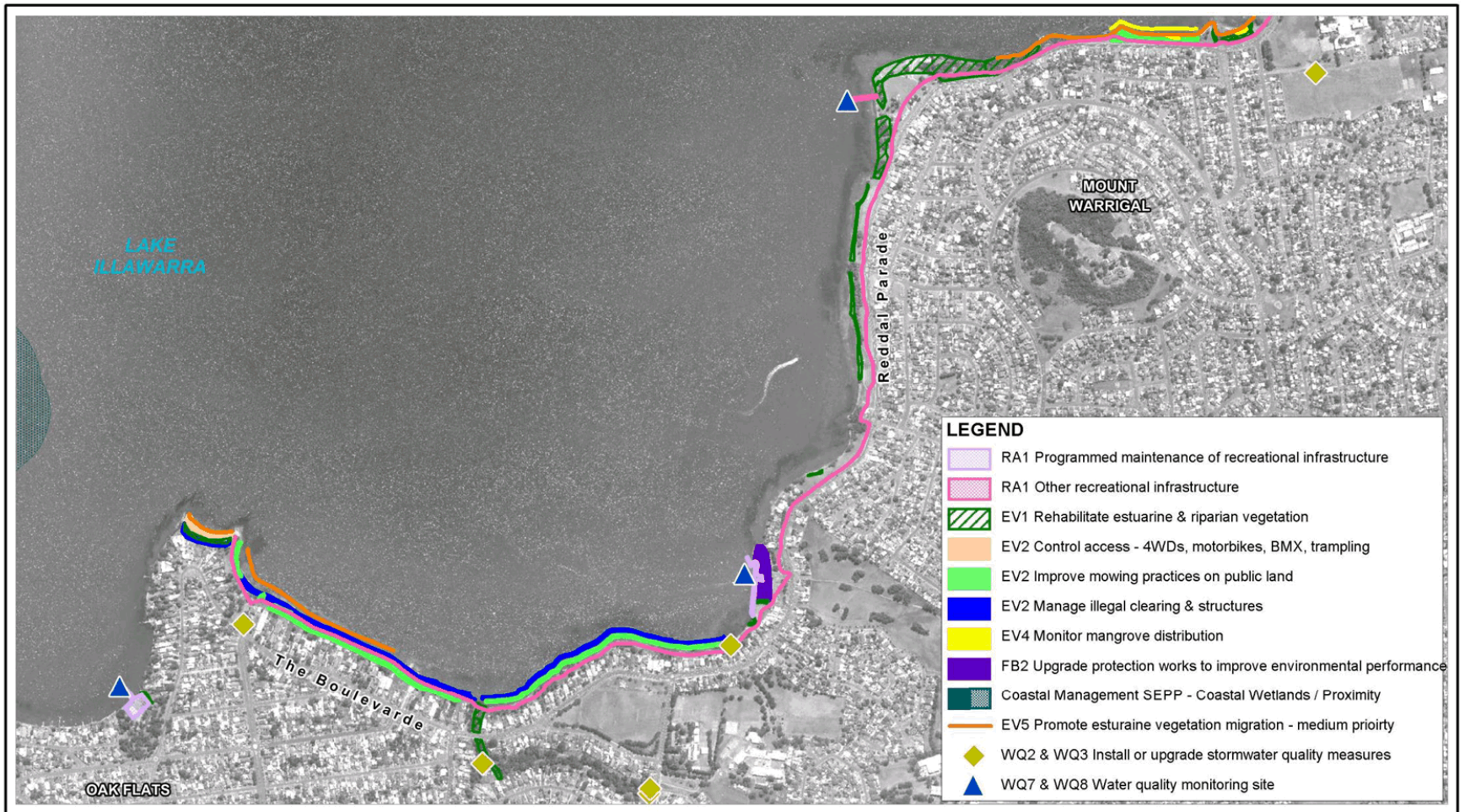

Title:
Lake Illawarra Management Actions - Zone 2

Figure: **5-3**

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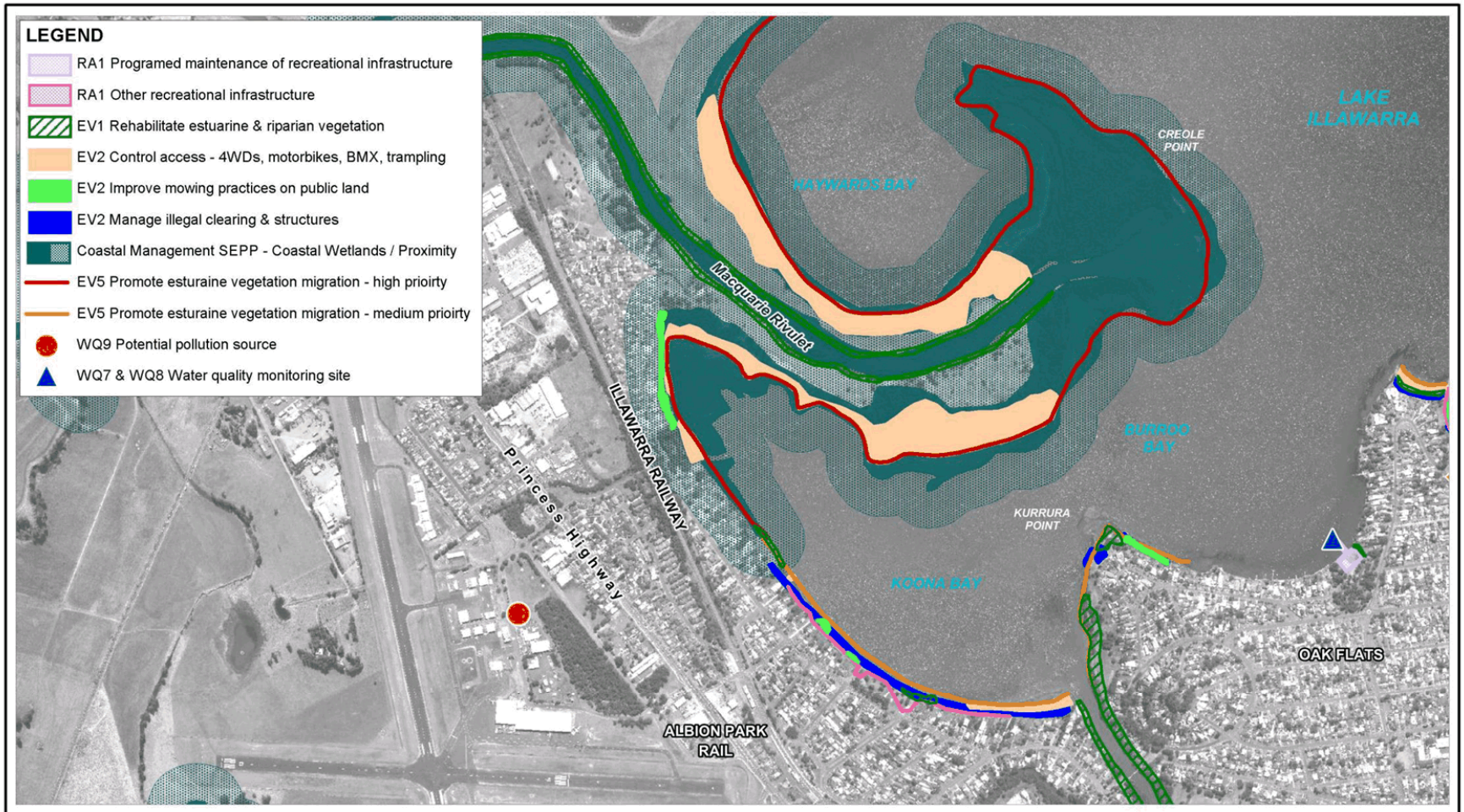

Title:
Lake Illawarra Management Actions - Zone 3

Figure: **5-4**

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Title:
Lake Illawarra Management Actions - Zone 4

Figure: **5-5**

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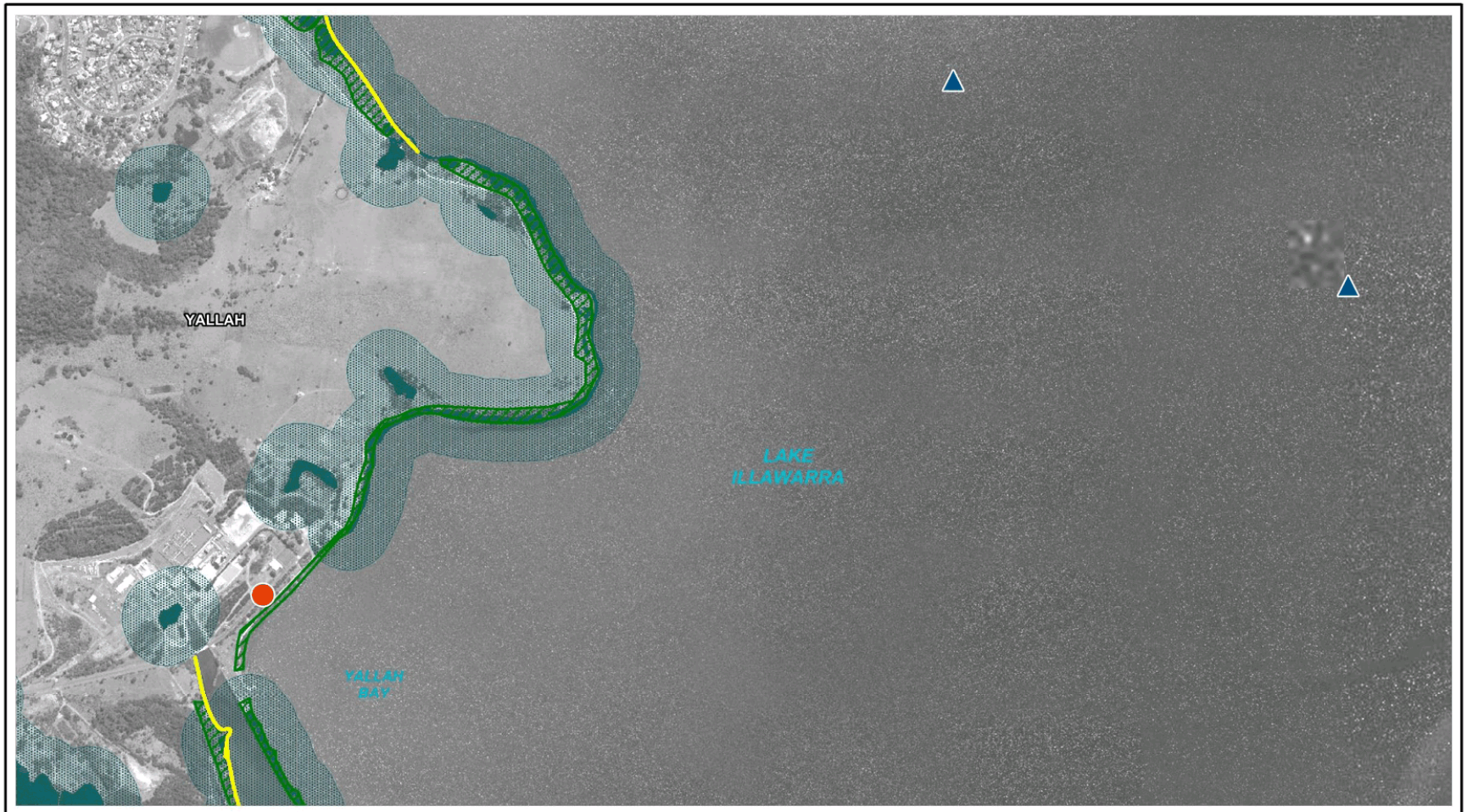

LEGEND

- EV1 Rehabilitate estuarine & riparian vegetation
- EV4 Monitor mangrove distribution
- Coastal Management SEPP - Coastal Wetlands / Proximity
- WQ9 Potential pollution source
- WQ7 & WQ8 Water quality monitoring site

Title:
Lake Illawarra Management Actions - Zone 5

Figure: **5-6**

Rev: **C**

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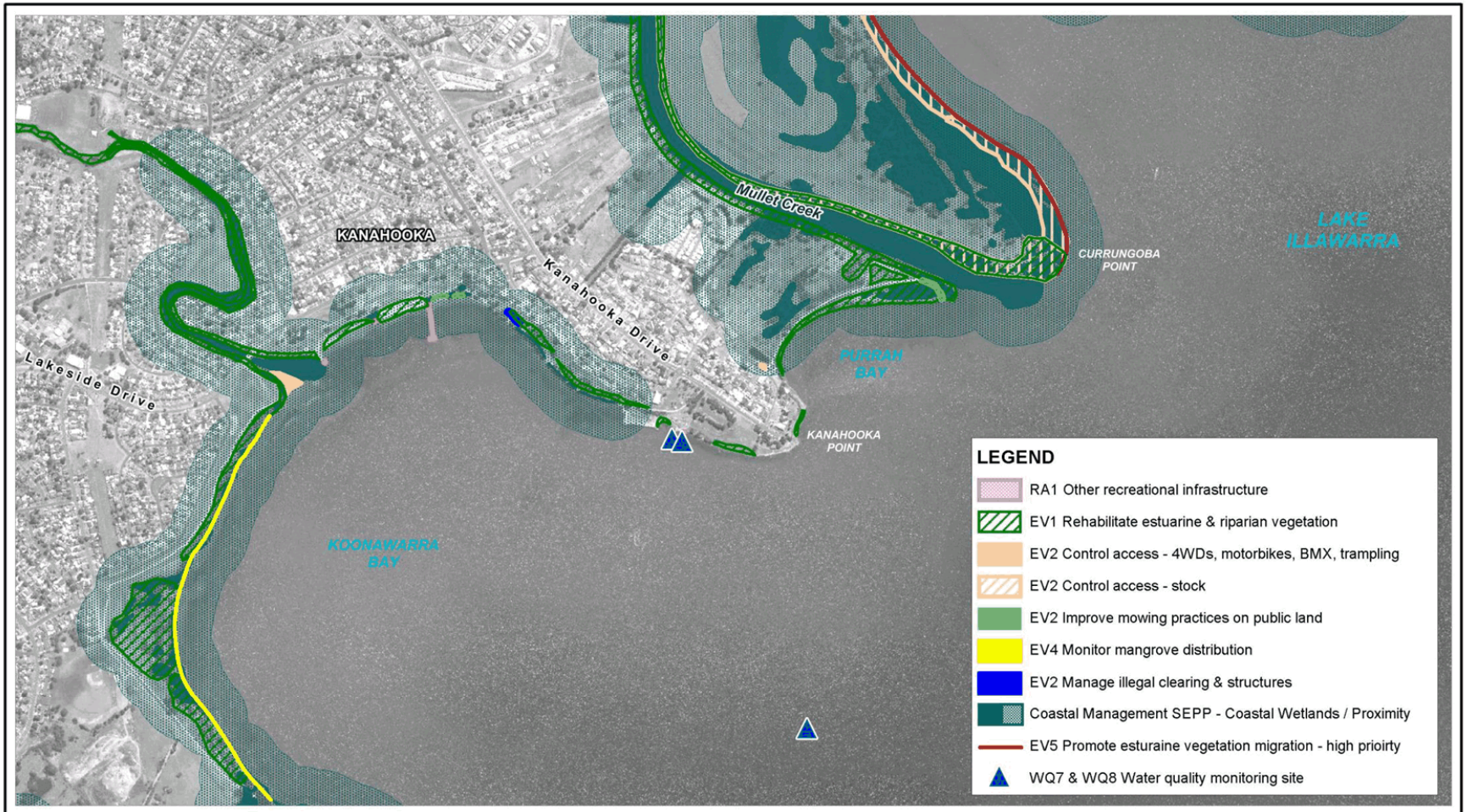

Title:
Lake Illawarra Management Actions - Zone 6

Figure: **5-7**

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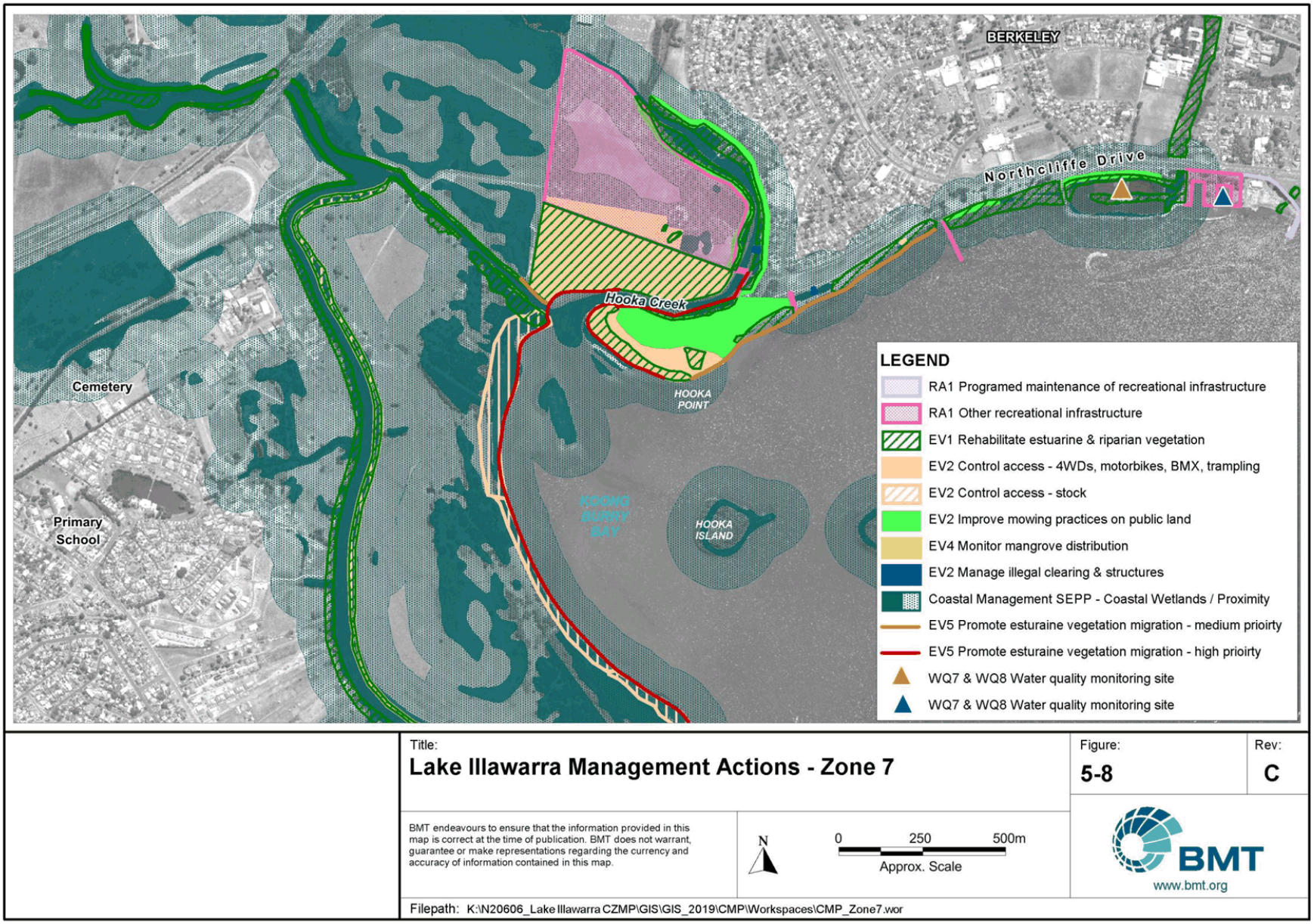

Title:
Lake Illawarra Management Actions - Zone 7

Figure: **5-8**

Rev: **C**

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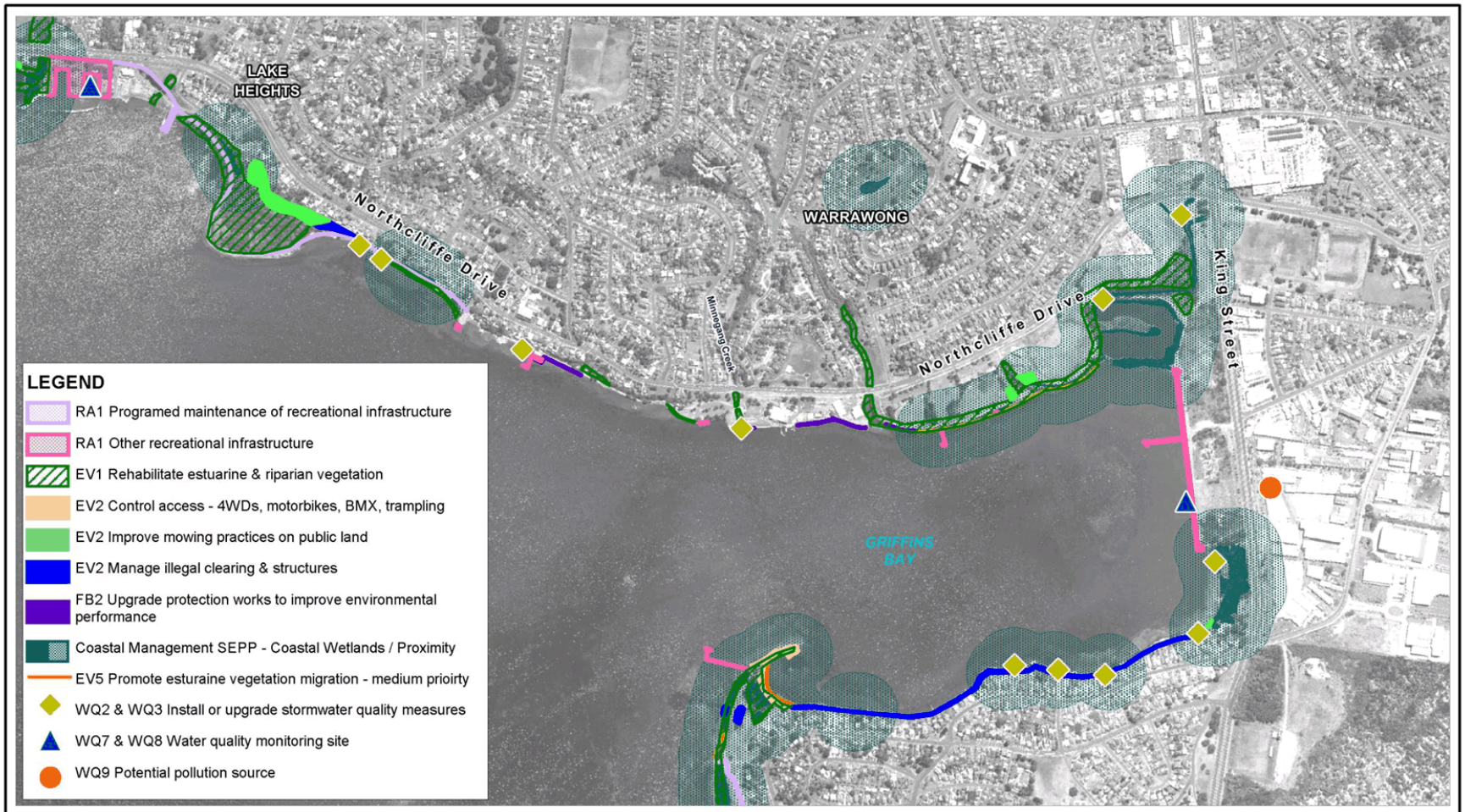

Title:
Lake Illawarra Management Actions - Zone 8

Figure: **5-9**

Rev: **C**

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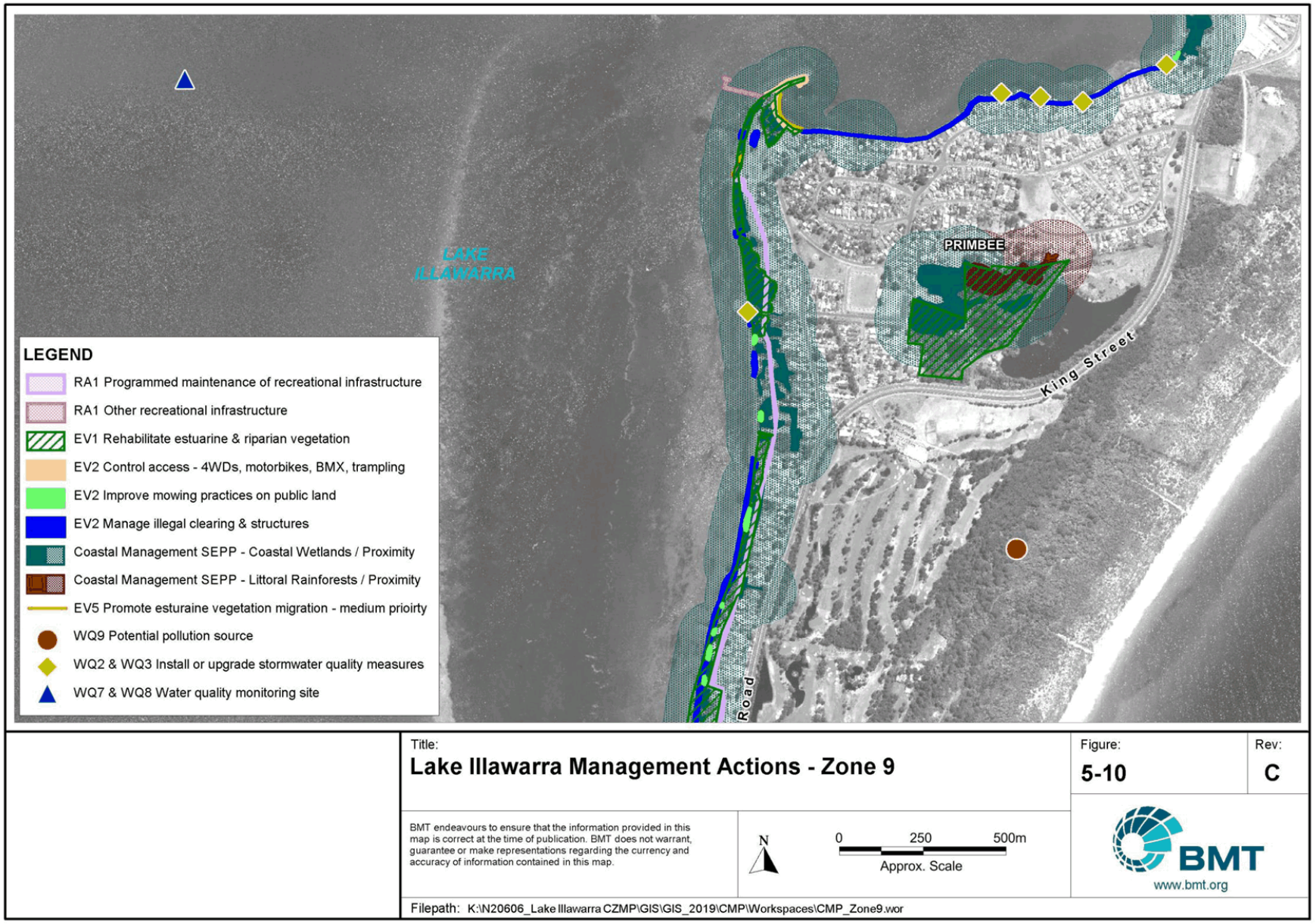
LAKE ILLAWARRA
PRIMBEE
King Street
Road
LEGEND
RA1 Programmed maintenance of recreational infrastructure
RA1 Other recreational infrastructure
EV1 Rehabilitate estuarine & riparian vegetation
EV2 Control access - 4WDs, motorbikes, BMX, trampling
EV2 Improve mowing practices on public land
EV2 Manage illegal clearing & structures
Coastal Management SEPP - Coastal Wetlands / Proximity
Coastal Management SEPP - Littoral Rainforests / Proximity
EV5 Promote esturaine vegetation migration - medium prioirty
WQ9 Potential pollution source
WQ2 & WQ3 Install or upgrade stormwater quality measures
WQ7 & WQ8 Water quality monitoring site
Title:
Lake Illawarra Management Actions - Zone 9
Figure:
5-10
Rev:
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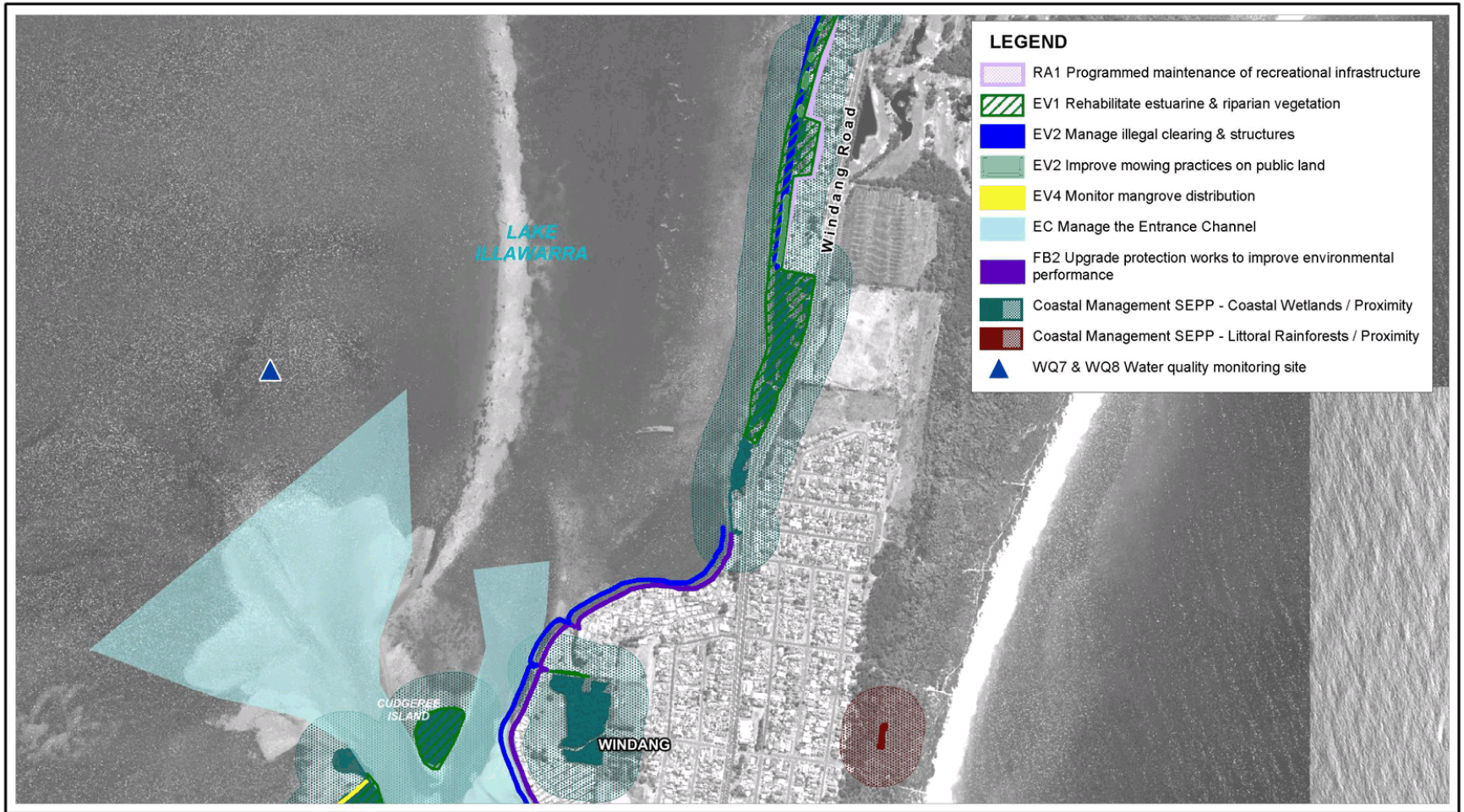

Title:
Lake Illawarra Management Actions - Zone 10

Figure: **5-11**

Rev: **C**

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6 Business Plan

6.1 Intent and Value of Implementing the Lake Illawarra CMP

Preserving and restoring the water quality and environmental habitats of Lake Illawarra is vital to the culture and economy of the local community, with benefits flowing on to the entire state of NSW. The Lake supports numerous endangered ecological communities such as coastal saltmarsh, and these habitats in turn support threatened species such as the Little Tern. In recognition of their high environmental values, NSW legislation requires such habitats to be protected and maintained.

The Lake Illawarra CMP is a program of physical works, monitoring and investigations, and planning and education initiatives that target the threats to the Lake's ecological and cultural values. The CMP also includes actions directly aimed at improving recreational opportunities for the public.

Investment in the Lake Illawarra CMP provides an opportunity to directly improve and preserve the water quality, environmental habitats, cultural spaces and recreational opportunities of Lake Illawarra, and in doing so, bring benefits to the public. The Lake Illawarra CMP contains 37 actions set out within nine strategies, that aim to manage, preserve, improve, promote and rehabilitate our Lake. Many of the actions are targeted towards improving ecological health, as this is the key to supporting the recreational, cultural and economic values of the Lake. And while ecological actions are more numerous, financial resources are well targeted towards supporting recreational amenity, such as for upgrades to facilities and navigation. Funding is yet to be secured for many of the actions, and will be vital for the success of the CMP.

6.2 Resource and Financial Planning

Delivery of the Lake Illawarra CMP is estimated to cost $37,355,000 over 10 years. Existing staff resources in the Councils and OEH are expected to facilitate the delivery of actions as per the Strategy Implementation Plan, with the Councils, state agencies and other stakeholders responsible for funding and/or implementing the actions. It should be acknowledged that as technology and new information changes other management actions may become feasible and will be reviewed for inclusion in the plan. Where additional staff resources have not been identified, this is expected to have an impact on current resourcing levels within both Councils, the financial requirements for this have been included in the Business Plan (e.g. see PM2 in Table 6-1). It is anticipated that both WCC and SCC will work together under a MoU with the guidance of the Lake Illawarra Estuary Management Committee. Each individual council will still be the ultimate decision maker but is expected to provide updates to the Committee.

Based upon the timeframes for actions and estimated costings, $3,236,500 is required in Year 1 to implement specified actions. A forecast $15,166,000 is estimated across Year 2 to 5 (inclusive), with a final $18,932,500 required over Years 6 to 10 for the plan. The cost estimates and their breakdown across the specified years for delivery is provided in Table 6-1.

It should be noted that it is difficult to reliably forecast the costs to funding of the CMP beyond Year 1. Likewise, costings are not indexed. Councils prepare a yearly budget, and through this process, actions from the CMP will be fed into these yearly budgets. For all responsible or supporting organisations that are identified, the actions remain subject to funding, availability of resources, and

organisational and/or government priorities. For example, other Council and State Government priorities and budgetary processes in play that may affect the timing of or ability to implement for implementation of CMP actions. Further to this, there may be situations where CMP actions are delayed, for example funding will be required, and this will change the projections for yearly spend beyond Year 1. As such, costs are provided as a forecast for Year 2 onwards.

Due to many CMP actions involving works on the foreshore of the Lake and its tributaries, Aboriginal Cultural Heritage requirements may be invoked if ground disturbance is needed. Depending on the situation and the works being undertaken, these requirements can be reasonably time consuming and costly. It is therefore possible that particular CMP actions may face implementation delays if this occurs. These requirements are necessary to ensure Aboriginal Cultural Heritage is protected and preserved and as such timeframes may have to be revised as issues arise. This should be considered when updating any forward plans or this Business Plan.

As implementation of the CMP progresses, this Business Plan will be updated on a yearly basis to reflect the budget for the CMP for each upcoming year, to allow relevant actions to be fed into the implementation process, and to account for external grant funding awarded to implement CMP actions (see Financing and Funding below). Councils must integrate these actions into their operational plan, where they can be formally adopted.

Table 6-1 Cost Estimates for CMP Implementation 88

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe (subject to available funding and resources)	Year 1 (estimate)	Year 2 to 5 (forecast estimate)	Year 6 -10 (forecast estimate)	Potential Funding Sources	Alignment with IP&R Frameworks
	Total cost for CMP	**$37,335,000**		**$3,236,500**	**$15,166,000**	**$18,932,500**		
Strategy 1: Improve Water Quality (WQ)								
WQ1	Implement a Risk Based Stormwater Management Framework for the Lake Illawarra catchment	Estimated total of $220,000 = $200,000 for OEH research project (already funded), plus $20,000 for analysis and report preparation, plus staff time throughout	Year 1 to 3	$200,000	$20,000		• Council (Ordinary Rates, Revenue) • Developer Contributions • NSW Coastal and Estuary Management Program	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.1.
WQ2	Install new or replace existing stormwater quality management measures, using water sensitive urban design or other devices that will improve water quality as well as enhance habitat and natural values.	Estimated total of $1.565 million = $25,000 for staff resources ($100,000 for temporary resource to be shared across WQ1 to 4), plus $60,000 for consultancy to complete stormwater audit, plus $1.4 million for new/upgrades to devices (estimated 7 devices @$200,000 each - WCC own 4 of the devices and SCC own 3 of the devices), plus $80,000 for monitoring ($10,000 p.a. for 8 years).	Year 1 to 10	$25,000	$480,000	$1,060,000	• Council (Ordinary Rates, Revenue) • Council Special Rates • NSW Coastal and Estuary Management Program	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.1. • Objective 3.1: Strategy 3.1.2.
WQ3	Review and prioritise maintenance and cleaning regime for existing stormwater quality devices	Estimated total of $2.455 million = $25,000 for staff resources ($100,000 for temporary resource to be shared across WQ1 to 4) plus $30,000 for consultancy to conduct review and develop maintenance program plus $2.4 million in maintenance ($10,000 per device p.a. for approx. 30 devices over 8 years - WCC own 17 of the devices and SCC own 13 of the devices).	Year 1 to 10	$25,000	$930,000	$1,500,000	• Council (Ordinary Rates, Revenue) • Council Special Rates	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.1.
WQ4	Design and implement targeted catchment input monitoring as required for developments resulting in a large-scale change or intensification of land use.	Estimated total of $25,000 for staff resources ($100,000 for temporary resource to be shared across WQ1 to 4). Cost of monitoring program will be variable and developed on a case by case basis, with costs borne by the developer(s).	As required	$25,000			• Council (Ordinary Rates, Revenue) • Developer Contributions • NSW Coastal and Estuary Management Program	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.1.
WQ5	Reduce sediment load to tributaries of the Lake by improving compliance with erosion & sediment controls for development sites.	Estimated total of $320,000 (based on staff resources of $160,000 p.a. for 2 years)	Ongoing	$160,000	$160,000		• Council (Ordinary Rates, Revenue)	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.1.
WQ6	Reduce the impact of sewer overflows	Staff time only	Year 1 and ongoing				• Special Infrastructure Contribution (Sydney Water) • Council (Ordinary Rates, Revenue)	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.1. • Objective 3.1: Strategy 3.1.2.
WQ7	Implement existing water quality monitoring program for estuary health	Estimated total of $540,000 = $50,000 p.a. plus staff time of $4,000 p.a. for 10 years	Year 1 to 5, then review	$54,000	$216,000	$270,000	• NSW Coastal and Estuary Management Program • Council (Ordinary Rates, Revenue)	WCSP 2022 • Goal 1: Objective 1.2. SCSP 2023 • Objective 2.1: Strategy 2.1.1.
WQ8	Undertake water quality monitoring for Recreational Use	Estimated total of $140,000 = $10,000 p.a. plus staff time of $4,000 p.a. for 10 years	Year 1 to 5, then review	$14,000	$56,000	$70,000	• Council (Ordinary Rates, Revenue) • Special Infrastructure Contribution	WCSP 2022 • Goal 1: Objective 1.2. SCSP 2023 • Objective 2.1: Strategy 2.1.1. • Objective 1.1: Strategy 1.2.1.
WQ9	Investigate and manage potential pollution sources including contaminated sites that contribute to poor water quality in the lake	Estimated of $60,000 = estimated 3 episodes @ $20,000 each p.a. plus staff time	Year 2 to 5		$60,000		• NSW Coastal and Estuary Management Program • Council (Ordinary Rates, Revenue)	WCSP 2022 • Goal 1: Objective 1.2. SCSP 2023 • Objective 2.1: Strategy 2.1.1.
WQ10	Undertake water quality monitoring of physico-chemical and bacteriological indicators in the lake catchment.	Estimated total of $600,000 = monitoring cost of $60,000 p.a. for 10 years	Year 1 and ongoing	$60,000	$240,000	$300,000	• NSW Coastal and Estuary Management Program • Council (Ordinary Rates, Revenue)	WCSP 2022 • Goal 1: Objective 1.2. SCSP 2023 • Objective 2.1: Strategy 2.1.1.

Table 6-1 Cost Estimates for CMP Implementation 89

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe (subject to available funding and resources)	Year 1 (estimate)	Year 2 to 5 (forecast estimate)	Year 6 -10 (forecast estimate)	Potential Funding Sources	Alignment with IP&R Frameworks
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	Estimated total of $100,000 = assumed 2 activities @ $50,000 per activity plus staff time.	Year 2 to 10		$100,000		• Council (Ordinary Rates, Revenue) • NSW Coastal and Estuary Management Program	WCSP 2022 • Goal 1: Objective 1.1, Objective 1.6 SCSP 2023 • Objective 2.1: Strategy 2.1.1, Strategy 2.1.2. • Objective 2.3: Strategy 2.3.2.
PM2	Provide ongoing coordinated management of the Lake, which will require ongoing support for existing staff resources.	Estimated total of $2.5 million = staff resource ($250,000 p.a. for 10 years)	Year 1 and ongoing	$250,000	$1,000,000	$1,250,000	• Council (Ordinary Rates, Revenue) • NSW Coastal and Estuary Management Program	WCSP 2022 • Goal 1: Objective 1.1, Objective 1.6 SCSP 2023 • Objective 2.1: Strategy 2.1.3 • Objective 2.3: Strategy 2.3.6.
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.	Estimated total of $980,000 = $80,000 p.a. for a staff member to develop and implement program plus $20,000 p.a. for resourcing program implementation.	Year 1 - staff time, then yearly for program	$80,000	$400,000	$500,000	• NSW Coastal and Estuary Management Program • Council (Ordinary Rates, Revenue) • NSW Environment Trust • National Trust Programs	WCSP 2022 • Goal 1: Objective 1.1, Objective 1.6 • Goal 4: Objective 4.2 SCSP 2023 • Objective 2.1: Strategy 2.1.2, Strategy 2.1.4 • Objective 2.2: Strategy 2.2.1. • Objective 1.1: Strategy 1.1.7.
PM4	Establish a Lake Illawarra Asset Management Working Group that provides coordination services for agencies that manage assets around the Lake Illawarra foreshore.	Estimated total of $70,000 = $5,000 p.a. for 10 years plus $20,000 for Development of a Framework document, plus staff time.	Year 1 and ongoing	$25,000	$20,000	$25,000	• NSW Coastal and Estuary Management Program • Council (Ordinary Rates, Revenue) • NSW Environment Trust • National Trust Programs	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6 • Goal 5: Objective 5.3, Objective 5.5 SCSP 2023 • Objective 2.1: Strategy 2.1.3; • Objective 2.3: Strategy 2.3.6 • Objective 3.1: Strategy 3.1.2 • Objective 1.2: Strategy 1.2.3
Strategy 3: Manage the Entrance Channel (EC)								
EC1	Investigate Entrance Channel Processes and Implement Management Solutions	Estimated total of $6.21 million = $1.21 million for investigations ($460,000 for processes investigations + $750,000 for options feasibility study) plus $5 million (estimated) for implementation of preferred option.	Year 1 to 10	$300,000	$910,000	$5,000,000	• Council (Ordinary Rates, Revenue) • NSW Coastal and Estuary Management Program • Special Infrastructure Contribution • Fisheries Habitat Action Grants	WCSP 2022 • Goal 1: Objective 1.2 SCSP 2023 • Objective 2.1: Strategy 2.1.3.
EC2	Undertake small scale works (e.g. beach scraping, re-shaping etc) to maintain swimming areas.	Estimated total of $300,000 = assumed 3 episodes @ $50,000 - $150,000 per event.	As required		$150,000	$150,000	• NSW Coastal and Estuary Management Program • Council (Ordinary Rates, Revenue) • NSW Environment Trust • Fisheries Habitat Action Grants	WCSP 2022 • Goal 5: Objective 5.3, Objective 5.5. SCSP 2023 • Objective 2.1: Strategy 2.1.3 • Objective 2.3: Strategy 2.3.6
EC3	Undertake dredging in the entrance channel, as required to maintain navigation	Estimated total of $2 million for one dredging campaign	As required		$2,000,000		• Council (Ordinary Rates, Revenue) • NSW Coastal and Estuary Management Program • Special Infrastructure Contribution	WCSP 2022 • Goal 5: Objective 5.3, Objective 5.5. SCSP 2023 • Objective 2.1: Strategy 2.1.3 • Objective 2.3: Strategy 2.3.6
EC4	Monitor changes to the entrance channel.	Estimated total of $20,000 = $10,000 initially then $5,000 bi-annually	Year 1, then every 2-5 years	$10,000	$5,000	$5,000	• NSW Coastal and Estuary Management Program • Council (Ordinary Rates, Revenue) • NSW Environment Trust • National Trust Programs	WCSP 2022 • Goal 1: Objective 1.2 SCSP 2023 • Objective 2.1: Strategy 2.1.3
EC5	Monitor, maintain and if required, upgrade existing entrance channel infrastructure, with any works to be informed by EC1-EC2 and EC4.	Estimated total of $240,000 p.a. (estimated at $15,000 per metre of seawall)	Ongoing	$240,000	$960,000	$1,200,000	• Marine Infrastructure maintenance programs (Crown Lands / RMS) • Council (Ordinary Rates, Revenue) • NSW Coastal and Estuary Management Program	WCSP 2022 • Goal 1: Objective 1.2 • Goal 5: Objective 5.3 SCSP 2023 • Objective 2.1: Strategy 2.1.3. • Objective 2.3: Strategy 2.3.6

Table 6-1 Cost Estimates for CMP Implementation 90

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe (subject to available funding and resources)	Year 1 (estimate)	Year 2 to 5 (forecast estimate)	Year 6 -10 (forecast estimate)	Potential Funding Sources	Alignment with IP&R Frameworks
Strategy 4: Protect and Rehabilitate Estuarine and Riparian Vegetation (EV)								
EV1	Rehabilitate vegetation and manage public access along foreshores and banks of the Lake, its tidal tributaries, islands and broader low-lying areas.	Estimated total of $2.855 Million = $590,000 for SCC sites ($59,000 p.a. for 10 years), plus $570,000 ($190,000 p.a. for 3 years) already committed by WCC to the Natural Areas Restoration Program, plus $995,000 costed for known WCC sites, plus $500,000 costed for EnergyAustralia site at Duck Creek, plus $200,000 for additional new sites (estimated 20 sites @ $10,000 each - WCC = 15 of the sites and SCC = 5 of the sites).	Year 1 and ongoing	$368,500	$1,294,000	$1,192,500	• NSW Coastal and Estuary Management Program • NSW Environment Trust • Public Reserve Management Fund • Building Resilience to Climate Change • NSW Heritage Grant Programs	WCSP 2022 • Goal 1: Objective 1.2 SCSP 2023 • Objective 2.1: Strategy 2.1.1, Strategy 2.1.2.
EV2	Undertake targeted action to control damage to foreshore vegetation, including seagrasses	Estimated total of $1.1 million = $300,000 for works (22 known sites plus 8 new (future) sites @ $10,000 each - WCC = 22 of the sites and SCC = 8 of the sites), plus $800,000 in additional staff resources ($80,000 p.a. for 10 years)	Year 1 and ongoing	$130,000	$470,000	$500,000	• NSW Coastal and Estuary Management Program • NSW Environment Trust • Public Reserve Management Fund • Building Resilience to Climate Change • NSW Heritage Grant Programs	WCSP 2022 • Goal 1: Objective 1.2 SCSP 2023 • Objective 2.1: Strategy 2.1.1, Strategy 2.1.2, Strategy 2.1.3.
EV3	Prepare and deliver an information program for the Lake Catchment	Estimated total of $120,000 = $20,000 to develop program, plus $100,000 for staff time and resources ($10,000 p.a. for 10 years)	Year 1 and ongoing	$30,000	$40,000	$50,000	• NSW Coastal and Estuary Management Program • Council (Ordinary Rates, Revenue) • NSW Environment Trust • National Trust Programs	WCSP 2022 • Goal 1: Objective 1.6. • Goal 4: Objective 4.2. SCSP 2023 • Objective 2.2: Strategy 2.2.1.
EV4	Prepare and implement an estuarine macrophyte mapping and monitoring program.	Estimated total of $85,000 = $75,000 (3 mapping events at $25,000 each) + $10,000 for area specific monitoring.	Year 1 (mapping), 2 to 4 (monitoring), 6 (mapping), 10 (mapping)	$25,000	$35,000	$25,000	• NSW Coastal and Estuary Management Program • NSW Environment Trust • Building Resilience to Climate Change	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.2, Strategy 2.1.4.
EV5	Develop and implement a program to enhance opportunities for estuarine vegetation migration.	Estimated total of $275,000 =$25,000 for consultancy to develop program, plus $250,000 (estimated 5 sites at $50,000 each for migration actions - WCC = 3 of the sites and SCC = 2 of the sitess).	Year 2 to 10		$175,000	$100,000	• NSW Coastal and Estuary Management Program • Building Resilience to Climate Change • Coastal Lands Protection Scheme • NSW Environment Trust	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.1, Strategy 2.1.2. • Objective 2.3: Strategy 2.3.6.
Strategy 5: Maintain and Improve Recreational Amenity (RA)								
RA1	Manage foreshore and waterway recreational infrastructure	Estimated total of $8.76 million = $2.22 million in upgrades already programmed in existing Council Infrastructure Delivery Programs - $720,000 in WCC and $1,500,000 in SCC (for Years 1-3), plus independent audit of $60,000 (Year1-2), plus Lake Illawarra Waterway Facilities Plan of $50,000 + maintenance of $1.25 million (based on $5,000 per item for estimated 25 existing waterway assets p.a. over 10 years), plus estimated costing for new renewal items in future delivery programs ($490,000 p.a. in WCC and $250,000 p.a. in SCC) from Year 4 to 10 of $5.18 million (assumed $740,000 p.a. based on current Infrastructure Delivery Program of $2.22 M over 3 years).	Year 1 to 10	$895,000	$3,540,000	$4,325,000	• Council (Ordinary Rates, Revenue) • Public Reserve Management Fund • State Infrastructure Contribution • Maritime Infrastructure Delivery Programs (RMS / Crown Lands)	WCSP 2022 • Goal 5: Objective 5.3, Objective 5.5. SCSP 2023 • Objective 3.1: Strategy 3.1.2. • Objective 1.2: Strategy 1.2.3.
RA2	Construct new sections of shared pathway to complete the pathway linkage around the Lake.	Estimated total of $1.52 million = $520,000 for programmed works and feasibility study for and Around the Lake Share Path Plan ($120,000), plus $1,000,000 (estimated 5 sites @ $200,000 each - WCC = 3 of the sites and SCC = 2 of the sites) for new/upgraded sections.	Year 1 to 10	$100,000	$820,000	$600,000	• Council (Ordinary Rates, Revenue) • Public Reserve Management Fund (and other DoI - Crown Lands programs) • State Infrastructure Contribution	WCSP 2022 • Goal 5: Objective 5.5. • Goal 6: Objective 6.1 SCSP 2023 • Objective 1.2: Strategy 1.2.4.
RA3	Negotiate a public 'right of way' along the foreshore, as opportunities present themselves	Staff time only	Year 5 to 10				• Council (Ordinary Rates, Revenue) • Building Resilience to Climate Change • Coastal Lands Protection Scheme	WCSP 2022 • Goal 1: Objective 1.6 • Goal 4: Objective 4.2 SCSP 2023 • Objective 2.1: Strategy 2.1.3 • Objective 2.3: Strategy 2.3.2
Strategy 6: Protect and Promote Cultural Heritage (CH)								
CH1	Protect and promote cultural heritage in and around the lake and its catchment.	Estimated total of $1.2 million = $1 million for staff resource ($100,000 p.a. for 10 years) and $200,000 for operating costs ($20,000 p.a. for 10 years).	Year 1 and ongoing	$120,000	$480,000	$600,000	• NSW Coastal and Estuary Management Program • NSW Environment Trust • NSW Heritage Grant Programs • National Trust Programs	WCSP 2022 • Goal 1: Objective 1.4. SCSP 2023 • Objective 2.3: Strategy 2.3.5 • Objective 4.1: Strategy 4.1.3 • Objective 1.1: Strategy 1.1.1

Table 6-1 Cost Estimates for CMP Implementation 91

Action ID	Action	Estimated cost of actions (subject to available funding)	Timeframe (subject to available funding and resources)	Year 1 (estimate)	Year 2 to 5 (forecast estimate)	Year 6 -10 (forecast estimate)	Potential Funding Sources	Alignment with IP&R Frameworks
Strategy 7: Manage Foreshore and Bank Erosion (FB)								
FB1	Undertake a bank condition assessment and determine and implement erosion control measures	Estimated total of $310,000 = $70,000 consultancy for condition assessment and recommended controls (allocation of $15,000 to DoI - Crown Lands and $55,000 to WCC/SCC), plus $40,000 for monitoring ($5,000 p.a. over 8 years), plus $200,000 for erosion controls works (estimated 5 sites at $40,000 each - WCC = 3 of the sites and SCC = 2 of the sites).	Year 1 (assessment), Year 2 to 4 (works), Year 3 to 10 (monitoring)	$70,000	$215,000	$25,000	• NSW Coastal and Estuary Management Program • NSW Environment Trust • Public Reserve Management Fund • Building Resilience to Climate Change • NSW Heritage Grant Programs	WCSP 2022 • Goal 1: Objective 1.2. SCSP 2023 • Objective 2.1: Strategy 2.1.2, Strategy 2.1.3
FB2	Improve the environmental performance and outcomes for foreshore protection works when the renewal of existing or construction of new infrastructure is required, where appropriate and	Estimated total of $150,000 (estimated 3 sites at $50,000 each - WCC = 3 of the sites and SCC = 2 of the sites)	Year 2 to 4		$150,000		• NSW Coastal and Estuary Management Program • NSW Environment Trust • Public Reserve Management Fund • Building Resilience to Climate Change	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.2, Strategy 2.1.3. • Objective 3.1: Strategy 3.1.2.
FB3	Undertake a bathymetric survey of the entire Lake and tributaries up to the tidal limit.	$50,000	Year 5		$50,000		• NSW Coastal and Estuary Management Program • NSW Environment Trust • Building Resilience to Climate Change	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6. SCSP 2023 • Objective 2.1: Strategy 2.1.3, Strategy 2.1.4.
Strategy 8: Prepare for Inundation Risks (IR)								
IR1	Update Asset Management Plans for all publicly owned and managed assets to clearly identify asset at risk from inundation over future timeframes, including tidal inundation	Estimated total of $50,000 (estimated that of the 7 agencies, 5 will utilise minor consultancy assistance at $10,000 each) + staff time	Year 2 to 4		$50,000		• NSW Coastal and Estuary Management Program • Building Resilience to Climate Change • NSW Environment Trust	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6 SCSP 2023 • Objective 2.1: Strategy 2.1.3 • Objective 2.3: Strategy 2.3.6 • Objective 3.1: Strategy 3.1.2
IR2	Whole of Lake Foreshore Adaptation Plan for public (community and environmental) lands	$80,000 plus staff time to incorporate findings into AMPs, POMs and masterplans as and when they are updated	Year 5 to 7		$10,000	$70,000	• NSW Coastal and Estuary Management Program • Building Resilience to Climate Change • NSW Environment Trust	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6 SCSP 2023 • Objective 2.1: Strategy 2.1.3 • Objective 2.3: Strategy 2.3.6 • Objective 3.1: Strategy 3.1.2
IR3	Incorporate tidal inundation mapping into strategic land use planning documents,	$20,000 plus staff time	Year 2 to 4		$20,000		• NSW Coastal and Estuary Management Program • Building Resilience to Climate Change • Coastal Lands Protection Scheme • NSW Environment Trust	WCSP 2022 • Goal 1: Objective 1.2, Objective 1.6 SCSP 2023 • Objective 2.1: Strategy 2.1.3 • Objective 2.3: Strategy 2.3.2
IR4	Water level and condition monitoring for all lake inundation events	Estimated total of $100,000 ($10,000 p.a. for 10 years)	Years 1 to 10	$10,000	$40,000	$50,000	• NSW Coastal and Estuary Management Program • Building Resilience to Climate Change • NSW Environment Trust	WCSP 2022 • Goal 1: Objective 1.2 SCSP 2023 • Objective 2.1: Strategy 2.1.3 • Objective 2.3: Strategy 2.3.2.
IR5	Investigate novel solutions to manage inundation risks to assets such as stormwater, sewer, and water; cycleways, roads and bridges, etc	$30,000 plus research partnership (with a consultancy and/or university)	Years 5 to 10		$10,000	$20,000	• NSW Coastal and Estuary Management Program • Building Resilience to Climate Change • NSW Environment Trust	WCSP 2022 • Goal 1: Objective 1.1; Objective 1.6 SCSP 2023 • Objective 2.3: Strategy 2.3.6. • Objective 3.1: Strategy 3.1.2 • Objective 2.1: Strategy 2.1.3
Strategy 9: Protect and Manage Key Fauna (MF)								
MF1	Develop and implement a fauna management program including shorebirds, fish and other fauna.	Estimated total of $125,000 = $15,000 to develop program, plus $60,000 for ecological surveys (3 at $20,000 each), plus $50,000 to implement program (e.g. for yearly shorebird habitat monitoring, data management etc).	Year 1 and ongoing	$20,000	$60,000	$45,000	• NSW Coastal and Estuary Management Program • NSW Environment Trust • NSW Heritage Grant Programs • National Trust Programs • Building Resilience to Climate Change	WCSP 2022 • Goal 1: Objective 1.1. SCSP 2023 • Objective 2.1: Strategy 2.1.1, Strategy 2.1.2, Strategy 2.1.4.

6.3 Funding and Financing

WCC and SCC have budget allocations to assist with implementing actions to achieve the environmental goals and objectives of their respective Community Strategic Plans. As the Lake Illawarra CMP actions fall largely under these environmental goals and objectives (see details at the end of this Business Plan), the existing budgets of the Council may fund some or part of the actions, particularly in the CMP's first year until grant funding applications can be made. There is a common understanding between the councils that for lake wide actions or actions that span areas in both LGAs that costs are shared at a ratio of 2:1 for WCC to SCC.

There are a range of other funding mechanisms available for financing the implementation of the CMP. Councils have the opportunity to take advantage of the various local, state and federal grant programs, as listed in Table 6-2. The quantity of this funding cannot be accurately quantified until such time as it is awarded.

The staffing resources required to facilitate the implementation of the CMP across the two Councils and their various departments, to forward plan for commencing and progressing the actions over 10 years, and in particular to seek and obtain grant funding to achieve this, are set out for this CMP via Action PM2: Provide ongoing coordinated management of the Lake. This action requires a total investment of ~ $110,000 p.a. (split across both Councils, increasing over time) to fund the staff required to implement the CMP. Via this specific resource, it will be imperative that both Councils and the state agencies maintain good working relationships, as a basis for successful implementation of the CMP.

Through the use of existing Council budgets, seeking grant funding and donations wherever possible, and funding ongoing staff resources to plan, apply for grants, and then progress implementation of actions, it is hoped there will continue to be sufficient funds available to implement this CMP over its intended life of 5 to 10 years.

Beyond this timeframe, there will continue to be risks to the health and sustainability of the Lake, such as from climate change and development pressures, as well as new emerging risks. This CMP is expected to be revised after 10 years, as well as reviewed annually, as detailed in Chapter 7.

Table 6-2 Local, NSW and Federal Government Funding Mechanisms

Funding Source	Details
Council Funding Mechanisms	
Council Ordinary Rates	A key funding mechanism for Council are statutory rates and charges, which can be applied to private landowners and businesses. Under the *Local Government Act 1993* (LG Act), ordinary rates can be applied to all rateable land within a local government area. This money can be used to fund delivery of community assets and services, and may also be used to implement coastal management actions.

Funding Source	Details
Special Rates	Specific works, services, facilities or activities that benefit certain parcels of rateable land can be funded (in whole or part) by Council by applying special rates under the LG Act. Where a coastal management action directly benefits a property owner, special rates provide a mechanism for Council to secure contributions from those landowners over time. Special rates can be implemented in different ways. Council can issue rates over a property or alternatively enter into an arrangement with the owner for payment of a lump-sum amount. Where a property, or properties, benefit from a coastal protection service, a coastal protection service charge can be applied (see below).
Coastal Protection Service Charge	The coastal protection service charge can be applied on rateable land where that land benefits from a coastal protection service, such as a seawall, erosion control measure or beach nourishment for example. The charge can be applied where coastal protection works are constructed by, or on behalf of the owner or occupier (current or previous). The charge can also be applied where coastal works are constructed in a joint arrangement between an owner or occupier and a public authority or council. The charge is applied to cover Council costs for construction, maintenance or repair of the works, as well as managing/remediating the impacts caused by the works. (refer to the NSW Coastal Management Manual (OEH, 2018) for further information).
Development Contributions	Developer contributions, enabled under the *Environmental Planning and Assessment Act 1979* may be used for coastal management in some instances, such as funding capital works to manage the development impacts on the coast or reduce risk to the development from coastal hazards. WCC and SCC differ in the way that they collect and manage Developer Contributions. The criteria and ability to use those contributions will be dependent on the relevant Developer Contribution Plan.
Revenue Generated by Council	Council can also fund coastal management initiatives through revenue they may generate through hire, rental or other commercial partnerships (e.g. Surf Life Savings Clubs, Holiday Parks etc).
NSW Government Funding Mechanisms	
NSW Coastal and Estuary Grants Program	Under this program, the NSW Government provides grants to local government to support coastal management planning (e.g. hazards studies, management plans/programs) and actions to manage the risks of coastal hazards (e.g. erosion protection), restore degraded coastal habitats (e.g. wetlands, dunes) and improve the health of NSW estuaries. Funding of up to 50% of a project cost is available to successful applications and the programme is administered by OEH. Grant funding will be prioritised to Council applications associated with certified Plans.
Building Resilience to Climate Change	The partnership program between Local Government NSW (LGNSW) and OEH aims to address climate change risks and vulnerabilities facing NSW councils. It aims encourage climate change: planning, minimisation, adaptation and implementation adaptation responses.

Funding Source	Details
NSW Environment Trust	Funding is available under the NSW Environment Trust to a broad range of organisations for projects that enhance the environment of NSW. Grants may be awarded for on ground rehabilitation and improvement works, research applications, land acquisition, waste reduction and promotion of environmental education. The NSW Environment Trust is an independent statutory body established by the NSW Government to make and supervise the environment grants. The Trust is administered by OEH. Suitable coastal management grant applications may relate to dune care, for example.
Public Reserve Management Fund	The Crown Reserve Management Improvement Fund (CRIF) is administered by DOI – Crown Lands providing financial support for the development, maintenance and improvement of public reserves. Subject to a competitive application process, the funds may be available to Council for eligible activities / works on coastal Crown reserves managed by Council
NSW Heritage Grant Programs	This program is administered by OEH and aims to fund projects that provide sustainable, long-term heritage benefits and provide public benefit and enjoyment from heritage. Funding may be available for the management of heritage items in the coastal environment.
Special Infrastructure Contributions	Special Infrastructure Contributions (SIC) help fund the delivery of some of the key pieces of State and regional infrastructure required to support a growing population, such as: • state and regional roads; • transport facilities such as bus shelters and interchanges; • regional open space, pedestrian links and cycleways; and • social infrastructure such as schools, healthcare and emergency services. They may also contribute to the cost of planning and offsetting biodiversity impacts. SICs are imposed through a Ministerial Determination. DPE is responsible for the SIC system.
Coastal Lands Protection Scheme	The Coastal Lands Protection Scheme is used to bring significant coastal lands into public ownership and provides for their long term management and care. DPE administers the Scheme, which receives an annual budget allocation of $3 million for strategic acquisitions, such as for. • Public access: to promote public access to the coastal foreshore • Scenic quality: to maintain the scenic quality of the NSW coast • Ecological values: to protect ecological sites of regional, state and/or national significance.
Federal Government Funding Mechanisms	
National Partnership Agreement on Natural Disaster Resilience	The Australian Government partners with State Governments to fund priority disaster resilience initiatives through the National Partnership Agreement on Natural Disaster Resilience. The aim of the program is to enhance Australia's resilience to natural disasters through mitigation works, measures and related activities. Funding is prioritised in terms of states natural disaster risk profile and priorities and focuses on building disaster resilient communities.

Funding Source	Details
National Trusts Program	The Australia Government Department of Environment administers this program. The Trusts program provides funding for works to preserve and enhance Australian cultural heritage. The Australian Council of National Trusts coordinates activities under the program with National Trusts offices in each State and Territory. Funds may be available for items of Australian cultural heritage within the coastal environment.

6.3.1 Cost Benefit & Distribution (Public/Private)

The multi-criteria cost benefit analysis compared CMP actions with the indirect and direct impact upon identified threats, weighted towards the level of threat. Through this process, actions in the CMP primarily aim to benefit estuary health, with flow-on benefits to the public (through improved recreation etc); and some actions primarily aim to benefit the public, with flow-on benefits to estuary health. There are no actions within the CMP that aim to directly benefit private interests. Therefore, no public-private cost sharing arrangements are required.

6.3.2 Implementation Responsibility, Cost Sharing and Funding Contributors

The implementation details provided in the CMP in Chapter 4 highlight the relevant responsible and supporting organisations, including state agencies, who will likely provide financial, technical and /or staff resources towards implementing various actions in the plan. The responsible organisation is expected to lead implementation of an action and commit financial and/or staff resources. Supporting organisations may support the responsible organisation to implement the action through the provision of technical or project management support (that would usually be considered standard business for that organisation), subject to availability, and in rare cases may provide financial support. The CMP requires each state agency that is identified as a responsible or supporting organisation for an action to agree to this responsibility in writing.

Once the plan is certified, WCC and SCC will be responsible for facilitating through budgetary processes the implementation of the plan, using both specific staff resources and using existing elements of the IP&R Framework of both councils to undertake, track and measure the success of actions in the CMP. The integration into the IP&R framework would be considered through the Asset Management Planning process within the Resourcing Strategy. The Community Strategic Plan provides a vehicle for each community to express its long-term aspirations and is the critical link when translating strategic objectives into actions. The Resourcing Strategy makes clear what elements of the Community Strategic Plan each stakeholder is responsible for, with other levels of government, business, non-government organisations, community groups and individuals also having a role in achieving the outcomes of the Community Strategic Plan. SCC and WCC will consider the identified actions within the Coastal Management Plan and how best to implement them and consider the priorities of the Community as identified in the CSP. Through this process, funding and resource contributions from the state agencies will be sought and managed at the appropriate time (see “resource and financial planning” and “funding and financing options” for details regarding when contributions will be required from lead and support organisations). There is a common understanding between the councils that for lake wide actions or actions that span areas in both LGAs that costs are shared at a ratio of 2:1 for WCC to SCC.

The public is anticipated to become involved in implementing CMP actions via education strategies that provide activities for the community to attend, and that aim to change the behaviour of community members to benefit the Lake.

6.3.3 Contingent Liabilities

A contingent liability is a potential liability that may occur, depending on the outcome of an uncertain future event. A contingent liability is recorded in the accounting records if the contingency is probable and the amount of the liability can be reasonably estimated.

The hydraulic adjustment of the entrance channel is an area of potential liability. Ongoing erosion of the northern foreshore may require more substantial investment in protection works than has been estimated for Action EC2 (Implement options to manage erosion using environmentally sensitive methods). Entrance processes and ongoing changes in these processes as a result of entrance training will be investigated through Action EC1 (Investigate Entrance Channel Processes and Management). However, adjustment of the channel will and should be expected to continue to occur over the next 100 years or more. Changes will be exacerbated by ongoing sea level rise. There may continue to be investment required as new challenges arise in the entrance channel area.

Managing the ecological response to the opening of the entrance is covered under Action EV5 (Develop and implement a program to enhance opportunities for estuarine vegetation migration) in the CMP. However, there may be a liability for Council should the ecological responses be greater (or worse) than expected, although the risk of this is considered low.

The impacts arising from storms and sea level rise are also considered a liability. In particular, the opening of the entrance channel has left the channel foreshores far more exposed to swell wave action. Remedial works following storms may consume budget allocations otherwise earmarked for environmental actions in this plan, although Councils do have access to disaster relief funding. The timing of impacts from sea level rise is difficult to predict, and there is potential for impacts to occur earlier or have a greater consequence than anticipated, which would in turn require actions to be implemented or brought into the CMP planning process earlier than anticipated.

An identified threats risk assessment has been completed and is outlined previously in Section 2.4, Table 2-2. There is also the possibility of delays to implementation due to NSW planning changes. Annual review of this business plan in combination with review of CMP implementation (see Section 7.2), will allow regular review of new or existing contingent liabilities, with the annual budget updated as necessary.

6.4 Alignment with the Integrated Planning and Reporting Framework

The Lake Illawarra CMP contains 37 actions set out within 9 strategies, that aim to manage, preserve, improve, promote and rehabilitate our Lake. The actions directly link to the identified threats (see Table 3-1).The Lake Illawarra CMP strategies and actions align with the goals, objectives and strategies of the Shellharbour and Wollongong Community Strategic Plans (CSP), as set out previously in Table 6-1. It should be noted that both CSPs are currently undergoing an update, however the goals, objectives and strategies are not expected to substantially change. To assist with scheduling the implementation of actions, a Gantt chart for the actions (timeline and budget) has been included in Table 6-3.

Table 6-3 Detailed Lake Illawarra CMP Gantt Chart - Including Budget ($) 97

Action ID	Action	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
WQ1	Implement a risk-based decision-making framework for the Lake Illawarra catchment.	$200,000	$20,000									$220,000
WQ2	Install new or replace existing stormwater quality management measures, using water sensitive urban design or other devices that will improve water quality as well as enhance habitat and natural values.	$25,000	$480,000				$1,060,000					$1,565,000
WQ3	Review and prioritise maintenance and cleaning regime for existing stormwater quality devices.	$25,000	$930,000				$1,500,000					$2,455,000
WQ4	Design and implement targeted catchment input monitoring as required for developments resulting in a large-scale change or intensification of land use.	$25,000										$25,000
WQ5	Reduce sediment loads to tributaries of the Lake by improving compliance with erosion and sediment controls for development sites.	$160,000	$160,000	$0	$0	$0	$0	$0	$0	$0	$0	$320,000
WQ6	Reduce the impact of sewer overflows.	Staff time only										$0
WQ7	Implement existing water quality monitoring program for estuary health.	$54,000	$216,000				$270,000					$540,000
WQ8	Undertake water quality monitoring for Recreational Use.	$14,000	$56,000				$70,000					$140,000
WQ9	Investigate and manage potential pollution sources including contaminated sites that contribute to poor water quality in the lake.		$60,000									$60,000
WQ10	Undertake water quality monitoring of physico-chemical and bacteriological indicators in the lake catchment.	$60,000	$240,000				$300,000					$600,000
PM1	Commence integration of key objectives and strategies from the CMP into relevant planning and policy documents of both Councils.		$100,000									$100,000
PM2	Provide ongoing coordinated management of the Lake, which will require ongoing support for existing staff resources.	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$2,500,000
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.	$80,000	$400,000				$500,000					$980,000
PM4	Establish a Lake Illawarra Asset Management Working Group that provides coordination services for agencies that manage assets around the Lake Illawarra foreshore.	$25,000	$20,000				$25,000					$70,000
EC1	Investigate options to manage erosion and accretion changes in the entrance channel and implement management solutions	$300,000	$910,000				$5,000,000					$6,210,000
EC2	Undertake small scale works (eg beach scraping, re-shaping etc) to maintain swimming areas.		$150,000				$150,000					$300,000
EC3	Undertake dredging in the Entrance Channel, as required to maintain navigation.		$2,000,000									$2,000,000
EC4	Monitor changes to the entrance channel.	$10,000				$5,000				$5,000		$20,000
EC5	Monitor, maintain and if required, upgrade existing entrance channel infrastructure, with any works to be informed by EC1-EC2 and EC4.	$240,000	$960,000				$1,200,000					$2,400,000
EV1	Rehabilitate vegetation and manage public access along foreshores and banks of the Lake, its tidal tributaries, islands and broader low-lying areas.	$368,500	$1,294,000				$1,192,500					$2,855,000
EV2	Undertake targeted action to control damage to foreshore and lake vegetation, including seagrasses	$130,000	$470,000				$500,000					$1,100,000
EV3	Prepare and deliver an information program for the Lake catchment.	$30,000	$40,000				$50,000					$120,000
EV4	Prepare and implement an estuarine macrophyte mapping and monitoring program.	$25,000	$35,000				$25,000					$85,000
EV5	Develop and implement a program to enhance opportunities for estuarine vegetation migration.		$175,000				$100,000					$275,000
RA1	Manage foreshore and waterway recreational infrastructure.	$895,000	$3,540,000				$4,325,000					$8,760,000
RA2	Construct new sections of shared pathway to complete the pathway linkage around the entire Lake.	$100,000	$820,000				$600,000					$1,520,000
RA3	Negotiate a public "right of way" along the foreshore, as opportunities present themselves.						Staff time only					$0
CH1	Protect and promote cultural heritage in and around the lake and its catchment.	$120,000	$480,000				$600,000					$1,200,000
FB1	Undertake a bank condition assessment and determine and begin implementing erosion control works.	$70,000	$215,000				$25,000					$310,000
FB2	Improve the environmental performance and outcomes for foreshore protection works when the renewal of existing or construction of new infrastructure is required, where appropriate and feasible to do so.		$150,000									$150,000
FB3	Undertake bathymetric survey of the entire Lake and tributaries up to the tidal limit.					$50,000						$50,000
IR1	Update Asset Management Plans for all publicly owned and managed assets to clearly identify asset at risk from inundation over future timeframes, including tidal inundation.		$50,000									$50,000
IR2	Whole of Lake Foreshore Adaptation Plan for public (community and environmental) lands.					$10,000	$70,000					$80,000
IR3	Incorporate tidal inundation mapping into strategic land use planning documents.		$20,000									$20,000
IR4	Water level and condition monitoring for all lake inundation events	$10,000	$40,000				$50,000					$100,000
IR5	Investigate novel solutions to manage inundation risks to assets such as stormwater, sewer, and water; cycleways, roads and bridges, etc					$10,000	$20,000					$30,000
MF1	Develop and implement a fauna management program including shorebirds, fish, and other fauna.	$20,000	$60,000				$45,000					$125,000

7 Monitoring, Reporting and Review

The Lake Illawarra CMP requires evaluation and reporting regarding the success of its implementation, and the success of actions in reducing the threats and maintaining the values of Lake Illawarra. Where implementation performance is sub-optimal, the evaluation process should identify contingencies to remedy the situation.

This CMP is to be the first of many iterations of a coastal program of works to manage Lake Illawarra, although it is not the first management document for the Lake. Such plans, and the studies that underpin them, should be revised at least every 10 years.

7.1 Internal Communication and Implementation

The importance of internal communications within and between the Councils cannot be over emphasised in the success or otherwise of implementation of this CMP. To support the integration of this CMP with the day to day operations of both councils, it is recommended that 12 months after the CMP is certified, and henceforth at yearly intervals, key staff from both Councils that are responsible for its implementation, in partnership with the regional OEH Coastal representative(s), undertake an internal workshop to gauge the status of implementation of the CMP and general understanding of its objectives through both Councils. The workshop would include a refresher of the CMP contents, to reinvigorate existing staff and for new staff.

7.2 Reporting on CMP Implementation

Both WCC and SCC deliver an Annual Report to document their progress in implementing the respective Councils' Delivery Program and Operational Plan activities over each financial year. Performance measures are included for each action in the Operational Plan.

In the Strategy Implementation Plan of this CMP (Chapter 4), each action has been given a performance measure. This can be used to feed actions into both Councils' Delivery Programs and Operational Plans or longer term Resourcing Plans.

The performance measures shall also be used to gauge whether the actions have been implemented or not, which can then be reported in the Annual Report. This provides for a yearly evaluation of the implementation status of each action in the CMP.

Where actions have not been included in the IP&R Framework, a yearly evaluation of those CMP actions by the officer(s) responsible for facilitating implementation of the CMP is recommended. This may be undertaken through the annual review of the Business Plan (see Section 7.2.1), or as a separate process.

If it is determined that an action has not being implemented in accordance with the nominated timeframe, then one or both of the following contingencies should be adopted:

- Determine the cause for the delay in implementation. If delays are funding based, then seek alternative sources of funding, including applying for new or novel grant funding programs. If delays are resource-based, seek additional assistance from stakeholder agencies and / or consider using an external consultancy to coordinate implementation of the action(s). This can be facilitated through the Business Plan; and if necessary,

- Modify and update the CMP to reflect a timeframe or costing for implementation of the action that is more achievable. It should be noted that revisions to the CMP would need to be endorsed by all relevant stakeholders and agencies responsible for implementation.

7.2.1 Annual Business Planning

The CMP Business Plan (Chapter 6) should be updated on an annual basis. The Business Plan reflects the expected cost of the CMP over the coming financial year, and details the resourcing and financing arrangements to meet these costs. The Business Plan demonstrates the contribution from successful grant funding applications to specific actions, and the additional contribution required from the Councils.

The Business Plan reflects what actions: have been implemented, will be brought online for implementation in the coming financial year, are ongoing and require continued funding, have been carried over to the next financial year, and / or have been modified to improve the potential for implementation. The business plan provides an avenue for bringing delayed actions into play (for example, as identified through the reporting process, Section 7.2). Through the Business Plan, the financial, resourcing or timing requirements for delayed actions can modified, and forecasts adjusted to account for implementation of these actions over the coming or a future financial year.

The business plan will be a key document for tracking success in grant funding applications and part or full contributions from the Councils. It is this financial success that will guarantee the implementation of the CMP.

7.3 CMP Review

A review should be conducted after five years to measure the performance of the CMP in terms of actually managing and reducing the threats to the ecological, social and economic values of the Lake. That is, 'how has the CMP made a difference?' and 'has the level of risk or risk rating for the threats been reduced?'.

The main mechanism for gauging whether the CMP has been successful is to re-evaluate the threats through a repeat of the threat assessment process. As for the first threat assessment, all of the existing controls that assist with managing the threats should be included when assessing the level of risk, particularly those actions that have or are being implemented through the CMP. There are two specific questions to be answered:

- Has the level of risk changed? (including for those threats in this plan that are currently assessed as low); and
- Have the very high or high threats been adequately managed / mitigated? (i.e. has the risk rating been reduced to a tolerable level through management?).

If it is determined that the threats have not been adequately managed / mitigated, or that new intolerable threats have arisen, the following contingencies should be adopted:

- Carry out a formal review of the implemented management strategies, identifying possible avenues for increasing the effectiveness of the strategy in managing the risks along the coastline (including new risks);

- Commence implementation of additional/back-up management strategies that may assist in meeting the objectives of the CMP (possibly 'fast-tracking' some longer term strategies as necessary);
- Reconsider the urgency of management for key threats. Upscaling from passive to active management may be needed, for example, where climate change or entrance channel related threats have increased in severity and now require intervention to ameliorate impacts.

If the need arises, new actions or items can also be added to the CMP as part of the review process.

Any such changes to the CMP would need to be endorsed by the stakeholders and relevant government agencies, as well as the community.

7.4 Water Quality and Estuary Health Monitoring Program

7.4.1 Preamble

A CMP requires a monitoring, evaluation and reporting framework to be established to help determine whether the outcomes intended from the CMP implementation are being realised. One of the outcomes for the Lake Illawarra CMP is protection and improvement in water quality and estuary health of the Lake. The monitoring regime being recommended for this is outlined below.

7.4.2 Background

Water quality monitoring has been ongoing continuously since 2005, but has been added to and refined in more recent years to focus on estuary health. Additionally, recreational monitoring was expanded to cover 4 sites in the lake in late 2018.

It is noted, however, that a focus is on assessing estuary ecosystem health based on water quality indicators alone is somewhat limited. There is opportunity in an ongoing program to include other indicators that are also important for estuary health (such as macrophyte distributions), and to assess water quality for recreational use, given the lake is commonly used for recreational purposes by the community, and the potential for greater use of the lake for this purpose in the future.

Inputs from the catchment have a significant influence on the condition of the lake, and many of the management actions in the CMP relate to reducing these inputs over time. Therefore, targeted monitoring of catchment inputs is also recommended to assess how pollution loads being delivered to the lake are changing over time.

7.4.3 Objectives of the Monitoring Program

The objectives of the water quality and estuary health monitoring program are:

(1) Track the water quality and estuary health condition of the Lake for protection of aquatic ecosystems and for recreational use.

(2) Track the effectiveness of the CMP in reducing catchment inputs to the Lake, by undertaking targeting monitoring of pollution loads.

(3) Identify any emerging water quality and estuary health issues to inform the ongoing management strategy for the Lake.

(4) Keep the community updated on the water quality and estuary health condition of the Lake.

7.4.4 Lake Monitoring at Present

Under the current program being coordinated by WCC, the Lake is monitored at six foreshore and five in-lake locations. An analysis of the results collected over several years has shown that a number of these sites have very similar water quality (WCC, 2015, 2016, 2017, 2018a). Therefore, the number of sites recommended for ongoing monitoring can be rationalised, ensuring that sites with the longest data records are generally retained.

7.4.5 Catchment Monitoring at Present

SCC currently undertakes quarterly water quality sampling at sites throughout the LGA including the Lake Illawarra catchment. Results are reported through the Community Strategic Plan. This monitoring program is currently being reviewed. Physicochemical, nutrient and bacteriological data is gathered and is used inform management actions and identify areas of non-compliance where further investigation is required.

7.4.6 Monitoring Program for this CMP

Table 7-1 describes the overall monitoring design for the Lake, including the requirements for macrophyte monitoring. Action WQ7 outlines the costs, timeframes and responsibilities for undertaking the water quality monitoring program as it is proposed in Table 7-1. Action EV4 provides the details, costs, timeframes and responsibilities for undertaking the macrophyte mapping and monitoring, as proposed in Table 7-1 also.

The sites recommended for ongoing monitoring are shown in Figure 7-1. Table 7-2 presents further information on the location of the water quality sites. No attempt has been made to relabel the sites to ensure they can be related with earlier records. Three new sites have been added for recreational use monitoring. These are areas around the Lake that are already commonly used for a number of recreational activities. This is in addition to the site at Entrance Lagoon Beach that is currently monitored under the Beachwatch program.

Table 7-1 Monitoring Design for Lake Illawarra

Lake use / value	Indicator	Sites	Frequency	Notes
Protection of aquatic ecosystems	Water quality: physico-chemical indicators (temperature, salinity, pH, dissolved oxygen, turbidity; total, dissolved and reactive forms of nitrogen and phosphorus), and chlorophyll *a*	Foreshore sites – 1,2,3, 4, 5, 6 Lake sites – NS1, NS2, NS3, EW1, EW2	Monthly	Protocols being used in the council program follow standard procedures consistent with the MER protocols, and these procedures can be retained.
	Macrophytes – seagrass, saltmarsh, mangroves	Entire lake	Within 2 years, then every 5 years	Follow guidelines in State of NSW and OEH (2016)
Recreational use	Enterococci	BW1, BW2, BW3, ELL	As per the NSW Beachwatch sampling regime	Follow Beachwatch protocol

Table 7-2 Location of Water Quality Monitoring Sites in Lake Illawarra

ID	Site Location	Lake Zone	Purpose
Site 2	Boat ramp at Windang Peninsula	Lake Entrance	For water quality and estuary health
Site 3	At Picnic Island	Lake Entance	
Site 3A	Jetty at Boonerah Point Reserve	Lake Edgee	
Site 4	Jetty at Sailing Club at Burroo Bay	Lake Edge	
Site 5	Boat ramp and jetty at Kanahooka	Lake Edge	
Site 6	Jetty at Griffins Bay Wharf	Lake Edge	
NS1	North along a north-south transect	In-lake	
NS2	Middle along a north-south transect	In-lake	
NS3	South along a north-south transect	In-lake	
EW1	East along an east-west transect	In-lake	
EW2	West along an east-west transect	In-lake	
BW1	At Ski Way Park	Lake Edge	For recreational use
BW2	At Kanahooka Boat Ramp	Lake Edge	
BW3	At Purry Burry Point, Primbee	Lake Edge	
ELL	At Entrance Lagoon Beach	Lake Entrance	

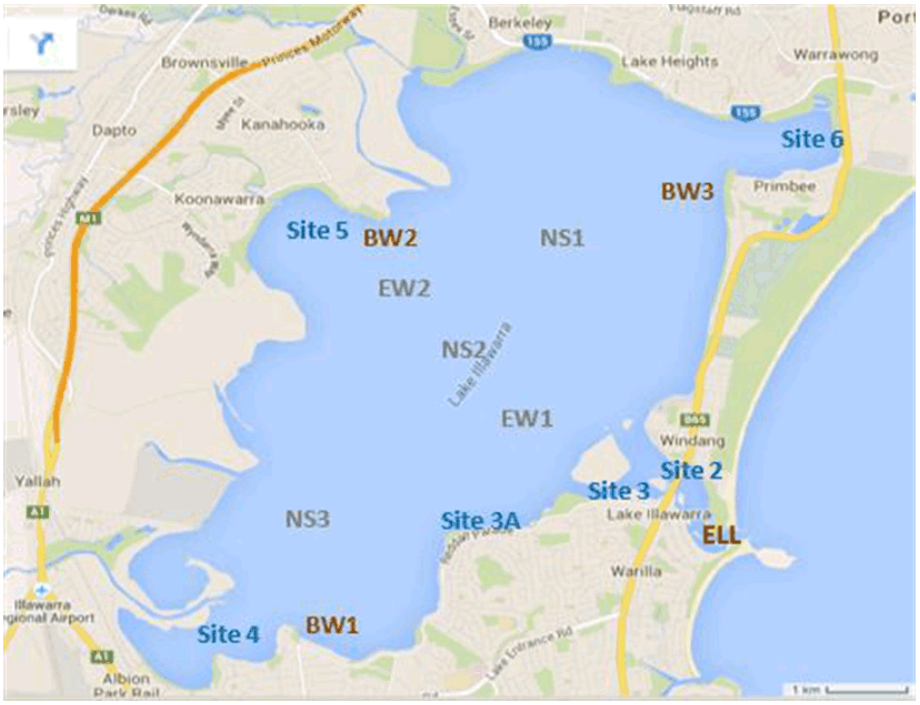

Figure 7-1 Location of Sampling Sites for the Water Quality and Estuary Health Monitoring Program and for Recreational Use

7.4.7 Information Relevant to Estuarine Macrophyte Monitoring

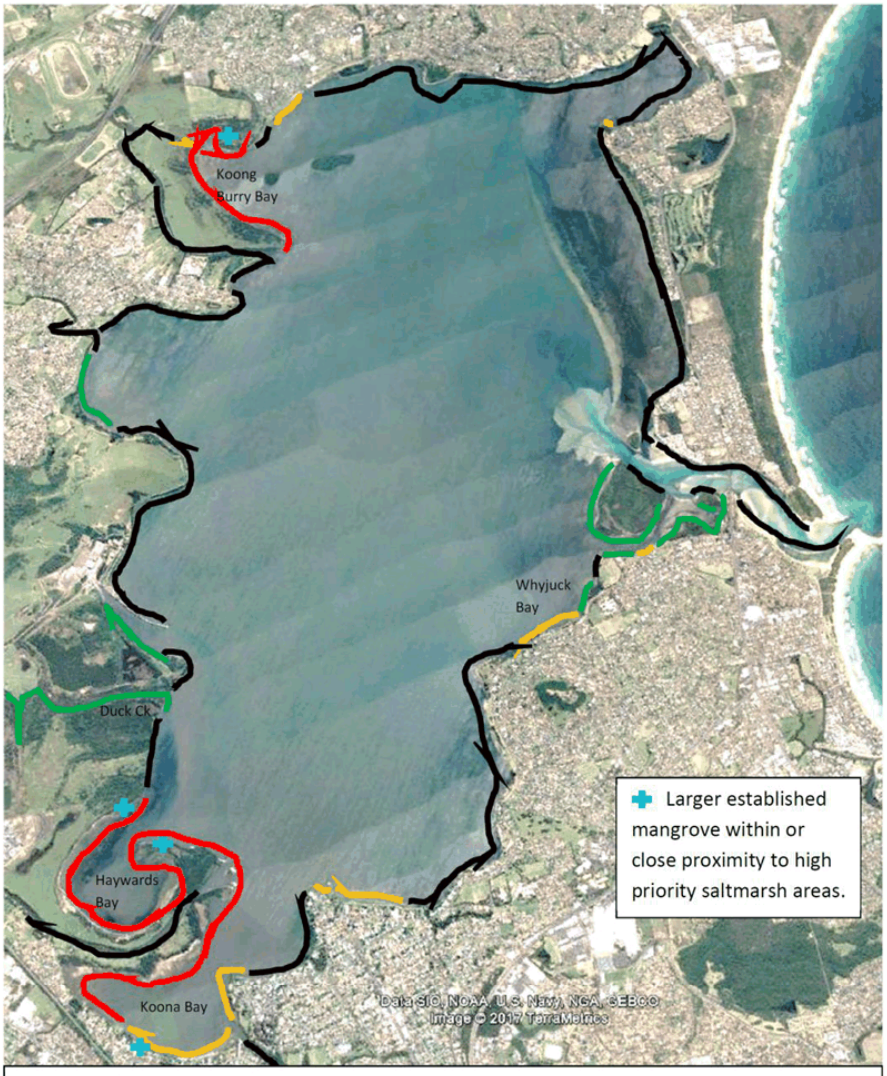

Figure 7-2 Foreshore prioritisation map to guide where effort on mangrove monitoring and conservation of saltmarsh distribution is best placed (reproduced from Williams and Wiecek, 2017)

LEGEND

- Identified potential areas for estuarine vegetation migration (Wiecek, 2018)
- 2016 HHWSS
- 2100 HHWSS

Title:
Lake Illawarra Estuarine Vegetation Migration Investigation Areas

Figure: **4-1**

Rev: **A**

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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8 References

ANZECC (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Vol 2*

Baxter, C. and Daly, T.J. (2010) Ecological changes in Lake Illawarra following completion of entrance training works in 2007. Paper presented to the 19th NSW Coastal Conference, Batemans Bay, 10-12 November 2010.

Beeton RJS., Buxton CD., Cutbush GC., Fairweather PG., Johnston EL., Ryan R. (2012). *Report of the independent scientific audit of marine parks in New South Wales*. NSW Department of Primary Industries and Office of Environment and Heritage: NSW.

BMT WBM (2013). *Lake Illawarra Coastal Risk Assessment.*

BMT WBM (2017). *Wollongong Coastal Zone Management Plan: Management Study.*

BMT (2019a) *Lake Illawarra Information Synthesis Report*.

BMT (2019b) *Lake Illawarra Community Uses, Values, Threats and Opportunities*.

Cardno (2010). Wollongong City Council Coastal Zone Study, prepared for Wollongong City Council by Cardno Lawson Treloar, June 2010.

Cardno (2012). *Lake Illawarra Floodplain Risk Management Plan.* Prepared for LIA, WCC & SCC.

Davis J. (2005), *Lake Illawarra – An Ongoing History*. Published by the LIA, 2005.

Dela-Cruz J, Pik A & Wearne P (2017), *Risk-based framework for considering waterway health outcomes in strategic land-use planning decisions*, Office of Environment and Heritage and Environment Protection Authority, Sydney.

DPE (2015) *Illawarra Shoalhaven Regional Plan*. Published by the NSW Department of Planning and Environment, November 2015.

DPE (2016) Draft Coastal Management State Environment Planning and Policy: Community Fact Sheet. Published by the NSW Department of Planning and Environment, November 2016.

DPE. (2017). NSW Planning Portal. Retrieved February 4, 2019, from https://www.planningportal.nsw.gov.au/opendata/dataset/coastal-management-sepp-coastal-wetlands

Illawarra Local Emergency Management Committee (2017) *Illawarra Local Emergency Management Plan*, from http://www.wollongong.nsw.gov.au/emergency/Documents/Forms/AllItems.aspx

Kumbier, K., Rogers, K., and Woodroffe, C. D. (2019). *Lake Illawarra Hydrodynamic Inundation Modelling – An assessment of sea-level rise scenarios using tidal plane information.*

LIA (2013). *Lake Illawarra Coastal Zone Management Study* (incomplete Draft)

Manly Hydraulics Laboratory [MHL]. (2013). *Lake Illawarra Entrance Inlet Stability Assessment Stage 2*. Prepared for LIA, Wollongong.

References

OEH (2013). *Assessing estuary ecosystem health: Sampling, data analysis and reporting protocols – NSW Natural Resource Monitoring, Evaluation and Reporting Program*. Office of Environment and Heritage, Sydney.

OEH. (2012). *Coastal Eutrophication Risk Assessment Tool – Lake Illawarra*. Available at: <http://www.ozcoasts.gov.au/search_data/detail_result.jsp> [Accessed 23 May 2016].

OEH (2013). *Guidelines for Preparing Coastal Zone Management Plans*, July 2013.

OEH (2018). *NSW Coastal Management Manual*, prepared by the Office of Environment and Heritage, April 2018.

Roper, T., Creese, B., Scanes, P., Stephens, K., Williams, R., Dela-Cruz, J., Coade, G., Coates, B., & Fraser, M. (2011) *State of the Catchment 2010: Assessing the Condition of Estuaries and Coastal Lakes in NSW. MER Technical Report Series: Estuaries and Coastal Lakes.* Prepared for OEH, Sydney.

Shellharbour City Council (2013). *Shellharbour City Community Strategic Plan 2013 – 2023*.

Sloss. C. (2005) *Holocene sea-level change and the aminostratigraphy of wave-dominated barrier estuaries on the southeast coast of Australia*. PhD thesis, School of Earth and Environmental Sciences, University of Wollongong.

State of NSW and OEH (2016). *Assessing estuary ecosystem health: sampling, data analysis and reporting protocols*.

WBM Oceanics. (2006) *Lake Illawarra: Estuary Management Study and Strategic Plan*. Prepared for Lake Illawarra Authority, Wollongong.

West, L. D., Stark, K. E., Murphy, J. J., Lyle, J. M. and F. A. Ochwada-Doyle (2015), *Survey of Recreational Fishing in New South Wales and the ACT, 2013/14*, NSW DPI – Fisheries Final Report Series No. 149, December 2015.

Williams, R.J. and Wiecek, D (2017). *History and Current Status of Mangroves in Lake Illawarra*. Technical report submitted to the Lake Illawarra Estuary Management Committee.

Wollongong City Council (2012). *Wollongong 2022 – Community Strategic Plan*.

Wollongong City Council (2015). *Lake Illawarra Water Quality and Estuary Health Monitoring Program*.

Wollongong City Council (2016). *Lake Illawarra Water Quality and Estuary Health Monitoring Program*.

Wollongong City Council (2017). *Lake Illawarra Estuary Health Monitoring and Reporting*

Wollongong City Council (2018a). *Lake Illawarra Estuary Health Monitoring and Reporting*

Wollongong City Council (2018b). *West Dapto Vision 2018*.

Appendix A NSW Coastal Management Framework and Mandatory Requirements

A.1 Definition and Objectives for the Coastal Management Areas

A.1.1 Coastal Wetlands and Littoral Rainforest Area

Coastal wetlands and littoral rainforest support high value biodiversity that are particularly sensitive to development. This management area is defined in the CM Act as land which displays '*the hydrological and floristic characteristics of coastal wetlands or littoral rainforests and land adjoining those features*' (DPE, 2016). This area focusses on protecting well established and more extensive vegetation communities (as opposed to single trees or isolated stands). Specific controls on development apply to this management area, as set out in the Coastal Management SEPP.

The **objectives of the coastal wetland and littoral rainforest management area** within the *CM Act* are to:

- protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity;
- promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests;
- improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration;
- support the social and cultural values of coastal wetland and littoral rainforest communities, and;
- promote the objectives of State policies and programs for wetlands or littoral rainforest management.

Mapping at Lake Illawarra identifies coastal wetlands to extend across the low lying margins of the Lake, namely around Mullet Creek, Duck Creek and Macquarie Rivulet flood tide deltas, but also within and around the entrance channel and the Windang Peninsula region (see Figure 1-4). Littoral Rainforest areas are present on Windang Peninsula.

A.1.2 Coastal Vulnerability Area

Coastal fringing land threatened by coastal hazards will be encompassed within the coastal vulnerability management area. This area focusses on identifying land subject to current and future coastal hazards, and applying specific controls to inform land use decisions. Development in this management area is permitted, but must comply with the Coastal Management SEPP requirements (DPE, 2016).

The summarised **objectives of the coastal vulnerability management area** within the *CM Act* are to:

- ensure public safety and prevent risks to human life;
- mitigate current and future coastal hazards;
- maintain the presence of beaches, dunes and other natural features;

- maintain public access, amenity and use of the coast;
- encourage land use that reduces exposure to hazards, including through siting, design, construction and operational decisions;
- adopt coastal management strategies that reduce exposure to hazards, in the first instance by restoring or enhancing natural defences such as dunes, and thereafter by taking other action and;
- if taking other action, to;
    - avoid significant degradation or disruption of biological diversity, ecosystem integrity, coastal processes (ecological, biophysical, geological, geomorphological), beach and foreshore amenity, and social and cultural values;
    - avoid adverse offsite impacts, or otherwise restore the land if any impacts are caused by the action to reduce exposure to hazards;
- maintain essential infrastructure, and;
- improve community resilience and reduce reliance on emergency responses.

Hazard types specific to Lake Illawarra include entrance instability, coastal and tidal inundation, and foreshore erosion. The coastal vulnerability management area is not currently mapped in the CM SEPP. The Department of Planning and Environment (DPE) intends to identify areas to be included in the coastal vulnerability area over time (DPE, 2016).

Even though the SEPP mapping does not identify a vulnerability area in the Lake Illawarra coastal zone at present, these hazards do exist. The coastal inundation hazard area derived by Cardno (2010, 2012) may be used to represent the coastal vulnerability area for Lake Illawarra. The coastal inundation hazard area was modelled by Cardno (2010, 2012), using the levels shown in Table A-1, which represents inundation levels inside Lake Illawarra due to present day ocean water level events, and such events at 2050 and 2100 factoring in SLR. The 100 year Average Recurrence Interval (ARI) ocean water level for the present day of 1.44 m AHD was derived from guidance by OEH (formerly DECCW) for Fort Denison in Sydney. For the future time periods of 2050 and 2100, Cardno (2010, 2012) adopted a projected sea level rise of 0.4 m and 0.9 m respectively.

Wave set up was not included in the ocean water level boundary conditions, as swell waves do not penetrate into the estuary further than Windang Bridge, and as such, do not shoal and break to generate wave set up.

Cardno (2010) found that the peak ocean still water levels are modified in the estuary due to tidal attenuation through the Lake entrance. For example, the peak 100-years ARI storm ocean water level of 1.44 m AHD translated into an estuarine water level of 0.7 m AHD upstream of Windang Bridge.

Table A-1 Ocean Water Level Boundary Conditions for Coastal Inundation Modelling

Ocean Water Level Scenario	Indicative Timeframe	Water Level (m AHD)
Immediate: 100 yr. ARI ocean water level	Present Day	1.44
High risk: 100 yr. ARI ocean water level + 0.4 m SLR	2050	1.84
Low risk: 100 yr. ARI ocean water level + 0.9 m SLR	2100	2.34

A.1.3 Coastal Environmental Area

The NSW coastal environment is diverse and encompasses a range of different landforms, processes and environments. The coastal environment management area is land containing features such as the coastal waters of the State, estuaries, coastal lakes and lagoons, and land adjoining those features such as headlands and rock platforms.

The **objectives of the coastal environmental area** within the *CM Act* are to:

- protect and enhance coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes, coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity;
- reduce threats to and improve resilience of these coastal environments, including in response to climate change;
- maintain and improve water quality and estuary health;
- support social and cultural values of the coastal environments;
- maintain the presence of beaches, dunes and natural features of the foreshore; and
- maintain and improve public access, amenity and use of the coast.

The Coastal Management SEPP acknowledges the important environmental values of the coastal environment management area and outlines a range of specific controls that aim to minimise the impact of development on this area (DPE, 2016). Draft mapping of the coastal environment area at Lake Illawarra encompasses the estuary waterbody and its entrance channel, plus a 500m fringe landward of the Lake and entrance foreshore, in addition to 1km upstream beyond the Highest Astronomical Tide within its tidal tributaries (see Figure 1-4).

A.1.4 Coastal Use Area

The coastal zone comprises land that is extremely valuable in terms of the economy and society. Indeed, the coastal zone supports a range of human uses and development types that enable the wider coastal community to live, work and play on the coast. The coastal use management area encompasses land adjacent to coastal waterways (ocean, estuaries, lakes etc.) where impacts of

development on the use and enjoyment of the beaches, dunes, estuaries and lakes need to be considered.

The **objectives of the coastal use management area** within the *CM Act* are to:

- protect and enhance the scenic, social and cultural values of the coast by ensuring that:
  - the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast,
  - adverse impacts of development on cultural and built environmental heritage are avoided or mitigated,
  - urban design, including water sensitive urban design, is supported and incorporated into development activities,
  - adequate public open space is provided, including for recreational activities and associated infrastructure, and
  - the use of the surf zone is considered;
- accommodate both urbanised and natural stretches of coastline.

The Coastal Management SEPP sets out controls specific for the coastal use management area that ensure development proposals address a range of public interest criteria.

A.2 Meeting the Mandatory Requirements and Essential Elements

Table A-2 Mandatory Requirements for a Coastal Management Program Relevant to Preparation of the CMP

Section 14 of the Coastal Management Act 2016 defines the preparation of CMPs as follows	How this CMP addresses these requirements
(1) A local council is to prepare a coastal management program in accordance with the coastal management manual.	The Lake Illawarra CMP has been prepared in accordance with both the current Guidelines for preparing coastal zone management plans (OEH, 2013) and the NSW Coastal Management Manual (OEH, 2018) that was current at the time of this CMP's preparation.
(2) The Minister may, by notice in writing given to a local council, direct the local council in its preparation of a coastal management program. A direction under this subsection prevails to the extent of any inconsistency between it and the coastal management manual.	The Minister has not directed the local councils in preparation of this CMP.
(3) In preparing a coastal management program, a local council must:	
(a) consider and promote the objects of this Act, and	The objects of the CM Act are reflected in the objectives of this CMP, see Section 1.5.

Section 14 of the Coastal Management Act 2016 defines the preparation of CMPs as follows	How this CMP addresses these requirements
(b) give effect to the management objectives for the coastal management areas covered by the program, and	The management objectives for the coastal management areas are re-iterated in the coastal strategy statement and objectives of this CMP, see Section 1.5.
(c) consider the State and regional policies and plans prescribed by the regulations for the purposes of this section.	Legislation relating to the management of the Lake is considered in Section 1.4.
(4) A direction under this section may specify the time within which the direction must be complied with.	This subsection does not apply as the Minister has not directed the local councils in preparation of this CMP.

Section 15 of the Coastal Management Act 2016 defines the matters to be dealt with in a CMP as follows	How this CMP addresses these requirements
(1) A coastal management program must:	
(a) identify the coastal management issues affecting the areas to which the program is to apply, and	A summary of the threats affecting Lake Illawarra is provided in Section 2.4, with detailed analysis of the threats outlined in the Community Uses, Values, Threats and Opportunities Lake Illawarra Report (BMT, 2019b) in Appendix C.
(b) identify the actions required to address those coastal management issues in an integrated and strategic manner, and	A detailed multicriteria cost benefit analysis of the options was conducted, including assessment of the options direct influence on the threats to the Lake, in order to identify suitable actions for the CMP. This assessment is detailed in Section 3.3 and Appendix E.
(c) identify how and when those actions are to be implemented, including those to be implemented by local councils under Chapter 13 of the *Local Government Act 1993*, those to be implemented under environmental planning instruments and development control plans under the *Environmental Planning and Assessment Act 1979* and those to be implemented by public authorities (other than the local council), and	The Strategy Implementation Plan in Chapter 4 provides details of how and when actions are to be implemented, and responsibilities for implementation (lead and support), including the local councils (WCC and SCC) and other public authorities. The implementation tables also indicate those actions to be implemented through changes to the LEP, DCP or other planning documents. The implementation tables also provide details to enable the actions to be implemented through both councils IP&R Frameworks.
(d) identify the costs of those actions and proposed cost-sharing arrangements and other viable funding mechanisms for those actions to ensure the delivery of those actions is consistent with the timing for their implementation under the coastal management program, and	The Strategy Implementation Plan in Chapter 4 provides details of estimated costs for the actions. The Business Plan in Chapter 6 details further the financing and funding mechanisms for implementing the actions in the CMP.

Section 15 of the Coastal Management Act 2016 defines the matters to be dealt with in a CMP as follows	How this CMP addresses these requirements
(e) if the local council's local government area contains land within the coastal vulnerability area and beach erosion, coastal inundation or cliff instability is occurring on that land, include a coastal zone emergency action subplan.	Present day storm inundation risks are currently effectively managed through the Flood Risk Emergency Management process. This CMP sets out the process for defining the coastal vulnerability area for Lake Illawarra, refer to Section 1.5.2.
(2) A coastal management program may also include other matters as may be authorised or permitted by the coastal management manual.	This Lake Illawarra CMP focuses on improving or maintaining the environmental values of the Lake.
(3) A ***coastal zone emergency action subplan*** is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or cliff instability, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event. For the purposes of this subsection, those roles and responsibilities include the carrying out of works for the protection of property affected or likely to be affected by beach erosion, coastal inundation or cliff instability.	A coastal zone emergency action subplan is not required for this Lake Illawarra CMP.
(4) A coastal management program must not include the following:	
(a) matters dealt with in any plan made under the *State Emergency and Rescue Management Act 1989* in relation to the response to emergencies,	This plan does not deal with such matters.
(b) proposed actions or activities to be carried out by any public authority or relating to any land or other assets owned or managed by a public authority, unless the public authority has agreed to the inclusion of those proposed actions or activities in the program.	WCC and SCC have primary responsibility for all actions except WQ6 which is a shared responsibility with Sydney Water, with other agencies listed as support organisations.

Table A-3 Essential Elements for a Coastal Management Program Relevant to Preparation of the CMP

Draft essential elements associated with Section 14 of the CM Act: Preparation of CMPs	How this CMP addresses these elements
4) A CMP is to be prepared using the staged process set out in the manual (see Figure 3 of the Introduction for an outline of the five stages), noting that all stages do not need to be completed if they are not relevant.	The Lake Illawarra CMP has been prepared in accordance with both the current Guidelines for preparing coastal zone management plans (OEH, 2013) and the NSW Coastal Management Manual (OEH, 2018) that was current at the time of this CMP's preparation.
5) All councils commencing the preparation or review of a CMP must complete Stage 1 (scoping study) of the process. At the conclusion of the scoping study, councils should take the opportunity to seek advice from OEH and the Coastal Council on which of the subsequent stages are applicable.	A scoping study has been compiled by WCC and SCC. Advice from OEH was sought, and stated that the Lake Illawarra project could be completed as a CMP. Prior stages of preparing this CMP included an Information Synthesis Report detailing current knowledge of the Lake's processes (Appendix B), and a Community Uses, Values, Threats and Opportunities Lake Illawarra report (Appendix C). Stakeholder and community engagement was undertaken throughout the studies.
6) Councils should take the opportunity to seek advice from OEH and the Coastal Council at the conclusion of key stages of the CMP process.	At each stage of the preparation of this CMP, OEH has been involved in the review of documents and provided guidance on subsequent stages of the CMP.
7) Councils should submit a draft CMP that is consistent with the requirements of the Manual to OEH. After exhibition of the draft CMP, Councils should provide a copy of the final draft of the CMP to OEH for review before it is submitted to the Minister for certification. The Minister may refer the CMP to the Coastal Council for advice before the Minister considers certification.	This is the process to be followed for the Lake Illawarra CMP certification.
8) Councils should identify priority objectives for their coastal management areas. When identifying objectives for a CMP that includes one or more coastal management areas, councils must be consistent with the objectives for coastal management areas as required by the draft CM Bill and proposed CM SEPP. The objectives must align with the objectives identified by the local community in developing the Community Strategic Plan.	The objectives for this CMP have been aligned with the objectives specified in the CM Act, see Section 1.5

Draft essential elements associated with Section 14 of the CM Act: Preparation of CMPs	How this CMP addresses these elements
9) Councils should identify the priority management issues and opportunities affecting the coastal zone where the program is to apply. These may relate to: a) coastal processes and environmental values b) social and cultural values c) Aboriginal values d) coastal economies e) coastal development and land use planning f) current and future risk from coastal hazards and climate change g) the ambulatory nature of the shoreline h) integration and coordination of planning and management i) resilience of coastal assets j) public participation, and k) marine estate. l) What outcomes are required from a CMP process	A comprehensive assessment of coastal management issues and opportunities has been undertaken as part of this Lake Illawarra CMP. Coastal management issues and opportunities affecting the Lake were identified primarily through the Synthesis Report (Appendix B) and the Community Uses, Values, Threats and Opportunities Lake Illawarra Report (Appendix C) completed as a precursor to this CMP.
10) The CMP should be developed after the preparation of:	
a) a Coastal Strategy Statement. The Strategy Statement sets the long-term strategy for the integrated and coordinated management of the coastal zone with a focus on achieving the objectives of the draft CM Bill. This includes identification of: i. coastal management issues and opportunities ii. strategies and actions linked to coastal management areas covered by the CMP, including a map of proposed actions	A coastal strategy statement for this CMP has been prepared in Section 1.5.
b) specific trigger points or indicators of when a strategic approach will no longer be viable. This should be based on thresholds for intolerable and unacceptable risk at that locality.	Strategy “Prepare for Inundation Risks” in Section 4.8 provides the strategies through which trigger points and indicators will be implemented. A tidal inundation risk assessment was conducted for this CMP, and combined with the existing coastal inundation risk registers already completed for the Lake provides detail regarding the specific assets (including natural assets) at risk over specified future timeframes.

Draft essential elements associated with Section 14 of the CM Act: Preparation of CMPs	How this CMP addresses these elements
identification of coastal management actions that are council's responsibility, and are consistent with the Strategy Statement. After certification and adoption of the CMP, the final council actions will be incorporated in council's IP&R framework and land use planning system	The Strategy Implementation Plan in Chapter 4 identifies the responsibilities for implementation (lead and support), including the local councils (WCC and SCC) and other public authorities. The implementation tables also provide details to enable the actions to be implemented through both councils IP&R Frameworks.
c) identification of coastal management actions that are consistent with the Strategy Statement and require coordination with adjoining councils or are the responsibility of public authorities. The draft CMP should include an acknowledged acceptance of these management actions where they include public authority responsibilities and/or coordination with adjoining councils prior to certification by the Minister, and	The Strategy Implementation Plan in Chapter 4 identifies the responsibilities for implementation (lead and support), including the local councils (WCC and SCC) and other public authorities. WCC and SCC have primary responsibility for all actions except WQ6 which is a shared responsibility with Sydney Water, with other agencies listed as support organisations. Acknowledged acceptance of their roles shall be provided prior to certification of the CMP.
d) a business plan to demonstrate viable funding of proposed actions.	A business plan for the CMP is provided in Chapter 6.
A CMP should include: e) a summary statement of the overall CMP Strategy that demonstrates how the CMP provides an integrated and sustainable program of coastal management in line with the Objectives in the CM Bill, any regional objectives and the objectives of the council	Overarching summary statements regarding the purpose, intent, context and objectives of this CMP are delivered in Chapter 1.
f) coastal management actions to be implemented by council through IP&R and land use planning processes which are consistent with the Strategy Statement and are the responsibility of the council, in addition the actions to be implemented by adjoining councils (where relevant) and public authorities	The Strategy Implementation Plan in Chapter 4 identifies the responsibilities for implementation (lead and support), including the local councils (WCC and SCC) and other public authorities. The implementation tables also provide details to enable the actions to be implemented through both councils IP&R Frameworks. The implementation tables also indicate those actions to be implemented through changes to the LEP, DCP or other planning documents.
g) a brief summary of the business plan outlining the key components of the funding strategy for the proposed actions	A business plan for the CMP is provided in Chapter 6.
h) where the CMP is being prepared for a coastal vulnerability area, a coastal erosion emergency action sub-plan, and	As outlined in detail in Section 1.7.3, present day inundation risks are currently effectively managed through the Flood Risk Emergency Management process.

Draft essential elements associated with Section 14 of the CM Act: Preparation of CMPs	How this CMP addresses these elements
i) a map (or maps) showing linked actions for each relevant coastal management area along the coast. These maps should include adjoining local council areas where cross boundary management needs to be consistent or fully aligned to address issues such as regional scale sediment compartment processes, or where an estuary or wetland and its catchment straddles a council boundary.	Management Strategy Maps for the Lake are provided in Chapter 5.
Supporting documentation for a CMP will include: j) a detailed Coastal Strategy Statement which provides context and objectives and establishes council's strategic direction(s) for the coast	A coastal strategy statement for this CMP has been prepared in Section 1.5.
k) a detailed business plan for implementation of the CM, and	A business plan for the CMP is provided in Chapter 6.
l) a listing of all detailed reports relied on in the preparation of the CMP, and a statement as to how to publicly access any of the listed documents.	Previous studies supporting this CMP are discussed in Section 1.9. The Synthesis Report is provided in Appendix B, and a Community Uses, Values, Threats and Opportunities Lake Illawarra report is provided in Appendix C.
11) Councils should identify management actions which reduce risks and contribute to achieving the proposed strategic direction for each coastal management unit. Proposed management responses should reduce consequences or reduce the likelihood of a hazard or threat affecting a vulnerable asset (natural, social or economic). These responses should: a) reflect the vulnerability and opportunities in the coastal management program area b) reduce risks affecting coastal ecosystems and biodiversity and identify opportunities to improve the health of coastal ecosystems c) identify opportunities to improve coastal use, access and amenity, and coast dependent economic activity, and d) be identified in consultation with stakeholders.	The process for identifying management actions is outlined in Chapter 3, with the strategies assessment outcomes documented in Appendix E. The process included a detailed multicriteria cost benefit analysis of the options, including assessment of the options direct influence on the threats to the Lake, in order to identify suitable actions for the CMP.

Draft essential elements associated with Section 14 of the CM Act: Preparation of CMPs	How this CMP addresses these elements
12) Councils must develop a business plan that demonstrates viable funding mechanisms for proposed coastal management actions that are consistent with their IP&R Resourcing Strategy. In the business plan: a) councils should identify and consider the full capital, operational and maintenance costs of potential coastal management actions b) councils should identify the distribution of costs and benefits of potential management actions. The distribution analysis should consider council, agency, directly affected coastal community stakeholders (such as landholders in coastal hazard areas), indirectly affected coastal community stakeholders and the environment, and c) the costs of coastal management actions should be apportioned among beneficiaries, taking into account capacity to pay.	A business plan for the CMP is provided in Chapter 6.
13) If a CMP is prepared to address a coastal vulnerability area, that program should include all parts of the coastal zone that are: a) vulnerable to existing or potential hazards (including extreme events), or b) likely be affected by coastal hazards over a defined planning horizon. c) This could include the waters, beaches, dunes and headlands of the open coast, the waters, shorelines and riparian areas of coastal lakes and the shorelines, and the waters, banks, riparian areas and floodplains of estuaries, as far upstream as the tidal limit.	This CMP sets out the process for defining the coastal vulnerability area for Lake Illawarra, refer to Section 1.5.2.1. Present day inundation risks are currently effectively managed through the Flood Risk Emergency Management process. Coastal inundation for Lake Illawarra was mapped through the course of the Lake Illawarra Floodplain Risk Management Plan (Cardno, 2012), and the Wollongong Coastal Zone Study (Cardno, 2010). A risk assessment was undertaken for coastal inundation in Lake Illawarra, and management strategies developed to address this risk in two key supporting documents to this CMP: • Lake Illawarra Coastal Risk Assessment (BMT WBM, 2013) • Wollongong Coastal Zone Management Plan: Management Study (BMT WBM, 2017). Tidal inundation risks were assessed through a separate hydrodynamic modelling exercise by Kumbier et al (2019) and then a risk assessment was conducted specifically for tidal inundation as documented in the Values Report. Management actions to address future storm and tidal inundation risks are specified in Section 4.8, as well as through other specific actions in the plan.

Draft essential elements associated with Section 14 of the CM Act: Preparation of CMPs	How this CMP addresses these elements
14) The CMP should be developed to consider potential very large, low probability events and ongoing long-term changes, at timeframes up to, and if appropriate, beyond 100 years. Different levels of hazard and risk assessment detail are appropriate for long-term (less certain) and near-term hazards and risks.	The timeframes and events considered through the course of this CMP are outlined in Section 1.6.
15) The area covered by the CMP should allow for uncertainty about the impacts of future coastal hazards and potential threats to coastal biodiversity and socio-economic assets and their condition.	This CMP sets out the process for defining the coastal vulnerability area for Lake Illawarra, refer to Section 1.5.2.1. The threat and risk assessment conducted for this CMP in the Values Report also considered future changes that will affect the future level of risk from identified threats.
16) The planning horizons should consider potential coastal change, including a) climate change, including relative sea level rise b) population growth, and c) projected use of coastal land for infrastructure, housing, commercial, recreational and conservation purposes.	The intended timeframe for implementation of this CMP is 10 years, as consistent with the CM Act. Actions are typically focussed on achieving improvements over this timeframe, with some actions incidentally having a longer term effect. With respect to coastal inundation risks, a longer planning horizon has been considered when developing actions.
17) A CMP may also include opportunities to enhance biodiversity (within coastal wetlands and littoral rainforest areas and coastal environment areas) and social and economic assets and conditions in the coastal zone including enhanced public access and enjoyment of the coastal amenity. The area covered by the CMP should include appropriate buffer areas to allow for uncertainty and change over time.	The Lake Illawarra CMP is focussed on actions to remediate the threats to the Lake and to enhance its environmental and thereby social and economic values. A number of actions in the CMP directly intend to enhance biodiversity, and social and economic assets of the Lake. The area covered by this CMP (as outlined in Section 1.3) provides an appropriate buffer to allow for uncertainty and change over time.

Appendix B Lake Illawarra Information Synthesis Report

Appendix C Community Uses, Values, Threats and Opportunities Lake Illawarra

Appendix D Links to the Marine Estate Management Act

Table D-1 Links between the MEMA Threat and Risk Assessment and the LI CMP Threat Assessment

Ranked Priority Regional Threats identified in State-wide MEMA Environmental Threat and Risk Assessment (TARA): Central Region	Stressors from MEMA TARA	Relevant threat category in Lake Illawarra CMP
Urban stormwater discharge	Water pollution –through nutrients and organic matter, toxic contaminants; sediment resuspension, pathogens Sedimentation Marine debris (including microplastics)	• Water pollution • Catchment development • Litter, plastics and marine debris
Foreshore development	Water pollution – toxic contaminants through antifouling paint and oil spills; sediment resuspension Physical disturbance resulting from beach grooming, shoreline infrastructure, sediment re-suspension and shading resulting in light limitation, sediment deposition Wildlife disturbance through pollution and habitat loss Marine debris	• Foreshore development encroaching public land • Water pollution • Loss of estuarine vegetation • Wetland degradation
Estuary entrance modifications	Changes to tidal flow and tidal prism Water pollution – contamination through acid sulphate soils Sedimentation Physical disturbance resulting from sediment re-suspension, habitat loss Sedimentation Wildlife disturbance	• Entrance channel changes
Agricultural diffuse source runoff	Water pollution - major impacts almost certain from combined stressors of nutrients, suspended sediments, and potentially toxic contaminants.	• Water pollution • Contaminated sediments • Introduced species • Loss of estuarine vegetation • Wetland degradation
Clearing riparian and adjacent habitat including wetland drainage	Water pollution – contamination through nutrients, toxicants; sediment resuspension, acid sulphate soils Sedimentation Physical disturbance, changes to tidal flow velocity and patterns – major impacts possible due to damage to habitat during removal and clearing, altering water tables and connectivity.	• Loss of estuarine vegetation • Wetland degradation • Foreshore development encroaching public land • Loss of riparian habitat • Foreshore and bank erosion

Links to the Marine Estate Management Act

Ranked Priority Regional Threats identified in State-wide MEMA Environmental Threat and Risk Assessment (TARA): Central Region	Stressors from MEMA TARA	Relevant threat category in Lake Illawarra CMP
Climate change 20 years	Physical disturbance, wildlife disturbance, water pollution and reduction in abundances of species and trophic levels due to climate change components of altered ocean currents and nutrient inputs, ocean acidification, climate and sea temperature rise, sea level rise and altered storm and cyclone activity	• Climate change
Recreational Boating - Boating and boating infrastructure	Antifouling paints and fuel spills impacting water quality- considered 'moderate' reflecting the level of impact of the defined stressors and considered 'likely' that this level of impact would occur due to the amount of vessel activity in the identified estuaries. Physical disturbance, of habitats such as seagrass, beaches and mudflats, shallow soft sediments resulting from propellers, anchoring, moorings, sediment re-suspension and shading from boats/jetties resulting in light limitation, fuel spills), and the low resilience of the habitat to these impacts.	• Litter, plastics and marine debris • Contaminated sediments
Sewage effluent and septic runoff	Water pollution - major impacts almost certain from combined stressors of nutrients, suspended sediments and toxic contaminants.	• Water pollution • Contaminated sediments
Navigation & entrance management and modification, harbour maintenance, etc.	Water pollution, physical disturbance – major impacts were considered likely due to sediment re-suspension from operations and dewatering in barges leading to turbidity and potential release of toxic contaminants. Physical disturbances and removal in generally small areas for discrete projects such as jetties, marinas. Likely to occur at a local scale.	• Water pollution • Contaminated sediments
Modified Freshwater flows - Modified freshwater flows	Water pollution – moderate impacts likely to occur from acid sulphate soils leaching and reducing pH. Changes to tidal flow and patterns impacting saltmarsh and mangroves– major impacts likely through changed water table and inundation regimes results in very broad overall impacts	• *Lake Illawarra does not have any large scale dams in the catchment. Changes to freshwater flows are related to catchment flows of water quantity and quality changes. These are addressed through Stormwater Considerations.*
Industrial discharges	Water pollution - moderate impacts likely from combined stressors of nutrients, suspended sediments, and potentially toxic contaminants.	• Water Pollution • Industrial Discharges
Recreation and tourism - Four wheel driving	Physical disturbance - extensive physical destruction and soil compaction possible, but under current management there is limited access to saltmarsh area for four wheel drives, and limited saltmarsh where there is access, although some illegal activity. Major impacts possible in localised areas.	• Wetland degradation • Loss of estuarine vegetation • Litter, plastics and marine debris
Stock grazing of riparian and marine vegetation	Physical disturbance, water pollution– major impacts considered almost certain from the physical disturbance from trampling and grazing and nutrients via defecation.	• Wetland degradation • Loss of estuarine vegetation

Links to the Marine Estate Management Act

Ranked Priority Regional Threats identified in State-wide MEMA Environmental Threat and Risk Assessment (TARA): Central Region	Stressors from MEMA TARA	Relevant threat category in Lake Illawarra CMP
Small commercial vessels (ferries, charter boats, whale watching vessels, fishing vessels etc.)	Water pollution - considered possible that moderate impacts could occur due to potential oil spills, the low resilience of the habitat, and the level of this activity in the estuaries.	• Less of an issue for Lake Illawarra than other large estuaries (Botany Bay, Hawkesbury or Sydney Harbour.): • Water Pollution • Wetland Degradation
Service infrastructure - pipes, cables trenching and boring	Physical disturbance, sedimentation and water pollution – moderate impacts likely, but pulsed impacts at time of construction and mostly highly localised.	• Not directly considered
Recreational fishing - Shore-based line and trap fishing	Harvest - the impact on harvested assemblages as a result of shore-based recreational fishing relates to approx. even levels of recent statewide landings taken from each region, dominated by several species which makes up a majority of the landings, and several that are either overfished, growth overfished or fully fished and/or have either moderate-high to low resilience. Bycatch – risks from bycatch of assemblages associated with the recreational shore-based fishery is considered to be moderate as negative impacts on bycatch assemblages are evident, however, the level of impact has not influenced their overall recovery capacity, and a change in the overall trophic/community structure is not evident in most of the estuaries. Marine debris Ghost fishing	• Not directly considered • Litter, plastics and marine debris
Recreational fishing - Boat-based line and trap fishing	Harvest - the impact on harvested assemblages as a result of shore-based recreational fishing relates to approx. even levels of recent statewide landings taken from each region, dominated by several species which makes up a majority of the landings, and several that are either overfished, growth overfished or fully fished and/or have either moderate-high to low resilience. Bycatch – risks from bycatch of assemblages associated with the recreational shore-based fishery is considered to be moderate as negative impacts on bycatch assemblages are evident, however, the level of impact has not influenced their overall recovery capacity, and a change in the overall trophic/community structure is not evident in most of the estuaries. Marine debris Ghost fishing	• Not directly considered • Litter, plastics and marine debris

Links to the Marine Estate Management Act

Ranked Priority Regional Threats identified in State-wide MEMA Environmental Threat and Risk Assessment (TARA): Central Region	Stressors from MEMA TARA	Relevant threat category in Lake Illawarra CMP
Recreation and tourism - Passive Recreational Use	Physical disturbance, wildlife disturbance, marine debris – moderate consequence considered likely due to a strong evidence base on the threat of recreational activities, particularly domestic dogs, to wildlife. Evidence suggests a moderate risk to threatened shorebirds from domestic dogs including impacts on behaviour, breeding success, as well as direct mortalities. Wildlife are also impacted by marine debris and human disturbance including breaches of the marine mammal approach distance regulations.	• Wetland degradation • Loss of estuarine vegetation • Litter, plastics and marine debris
Thermal discharges	Water pollution – major impacts almost certain from elevated water temperature and changing dissolved oxygen within the affected system Thermal pollution – major impacts considered almost certain with *Zostera* killed by elevated water temperatures. Species richness impacts, associated biota impacts, but limited to local impacts. On-going discharges exist. Water pollution, physical disturbance – known issues of thermal discharges on marine wildlife experiencing thermal shock or getting caught in inlet canals of power stations. Additional impacts from loss of foraging habitat due to loss of seagrass.	• Water pollution
Commercial fishing - Estuary general	Physical disturbance – minor impacts are likely due to activities associated with fishing and trawl gear Wildlife disturbance (shorebirds, turtles, whales)	• Commercial Fishing
Oyster aquaculture		• Not relevant to Lake Illawarra
Recreational fishing - Hand gathering	Wildlife disturbance, physical disturbance, marine debris - minor consequence considered likely due to disturbance to endangered shorebirds from hand-gathering. Disturbance at roosting, foraging, and nesting sites is a key threat to shorebirds in NSW. Displacement from foraging areas is a significant threat to endangered shorebirds such as beach-stone curlews, particularly during summer holiday periods.	• Cockle Harvesting Actions • Not directly considered
Mining and extractive industries	Physical disturbance - major impacts considered possible from subsidence as it affects seagrass viability at depth. Coal mines still mine under seagrass beds, with moderate impacts likely.	• Not directly considered.

Appendix E Strategies Assessment

Table E-1 Complete List of Options Identified for Lake Illawarra CMP

[1] Option identifier from Audit by Baxter et al (2016), Values Report (VR), Synthesis Report (SR) or Project Management Team (PMT)
[2] Based upon Audit by Baxter et al (2016)
[3] As stated in original source document
[4] CMP Strategy and Action that the option has been rolled into
[5] for N/A actions only. Remaining options assessed through analysis of CMP Action

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1	1a	Prepare a plan of management for the public land between Oaklands Village Caravan Park and Windang Bridge. Provide a 'right of public access' around the edge of the Lake Illawarra Village (Jettys by the Lake) and Oaklands Village.	2011 Draft Lake Illawarra Estuary Management Plan	The foreshore between Oaklands village and Jetties by the Lake (onto Windang Bridge) was identified as a missing link in the pathway around the Lake. This site is currently exposed to uncontrolled access resulting in some erosion.	Pathway from Oaklands to Jetties by the Lake not completed. Ministerial papers and Executive Council Minute re boundary adjustment to provide a 3m strip for continuous public access along Oaklands has been approved by the Governor. Gazettal notice placed 16/4/2010. Agreement for Lease has been finalised with Jettys by the Lake re building encroachments. Certificate of Title to foreshore land issued 8/9/2010. Lease to be executed.	$250,000	Windang town centre plan has been completed. Public 'right of way 'is for future consideration.	Maintain and Improve Recreation and Amenity	RA3	
2	1b	Windang Foreshore (Jetties by the Lake and Oaklands) rehabilitation	2011 Draft Lake Illawarra Estuary Management Plan Oaklands Village and Jettys by the Lake, Windang Proposed Foreshore Stabilisation Project (2013).	Shoreline is composed of various types of bank protection structures along with other structures in various states of disrepair. Survey and assessment of the foreshore was undertaken and a draft restoration plan was proposed/ completed? Plan considered habitat friendly seawalls and removal of various uncontrolled fill and structures. Working with adjacent landholders', foreshore rehabilitation will ensure improvements in public safety and environmental value.	Preliminary concept designs completed through funding from OEH (2013).	Unknown	For future consideration.	Manage Foreshore and Bank Erosion	FB2	
3	1d	Judbooley Parade Foreshore Erosion control	Judbooley Parade Landscape Master Plan 2010	Foreshore protection works required to ensure bank stability.	Ongoing Some works are currently being undertaken by WCC to ensure bank stability and protection.	$10,000 pa	Works for future consideration by WCC in accordance with the Judbooley Parade Plan of Management.	Manage Foreshore and Bank Erosion	FB2	
4	1e	Bank erosion control and rehabilitation. Provide bank protection along the northern shore of the entrance channel adjoining Windang Foreshore (Pine Tree) Park to protect foreshore assets against channel migration.	2011 Draft Lake Illawarra Estuary Management Plan	Dynamic shifts in the geomorphology of the entrance channel occurring as a result of the entrance being trained. With this more in depth entrance monitoring and management is now required. Erosion control and bank rehabilitation works will also need to be undertaken over time as shoreline areas become exposed through increases in channel dimensions and channel movement. Groynes have recently been installed in some areas to limit erosion. Monitoring of these structures and nearby areas should continue to identify their effectiveness in limiting erosion and if further action is required.	Two groynes ($125,000) and a rock revetment wall ($75,000) constructed in 2012. Repair works are currently being undertaken by WCC following recent extreme weather events.		Ongoing.	Manage Changes to the Entrance Channel	EC1	

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5	1g	Protection of migratory bird habitat. Develop shorebird habitat management plan for the entrance channel area including monitoring of sand movements around the bird island area	2011 Draft Lake Illawarra Estuary Management Plan	Sand shoals provide valuable habitat for migratory bird species such as Little terns and Pied Oystercatchers. This unique habitat is subject to disturbance from a number of external factors such as dogs, foxes, humans, channel dynamics etc. Ongoing effort has been undertaken to protect this habitat particularly during key reproductive seasons for migratory birds.	Ongoing	$10,000 (management plan)	Option remains relevant for entrance channel, but not necessarily the bird island which has been absent for several years.	Protect and Manage Key Fauna	MF1	
6	1i	Undertake entrance stability assessment	2011 Draft Lake Illawarra Estuary Management Plan	Ongoing maintenance is associated with the entrance structures such as shifts in the breakwaters and mitigation of extreme changed in flow hydrodynamics.	Manly Hydraulics Laboratory engaged to undertook stability assessment in 2012.	$15,000 (Stability assessment)	OEH are continuing monitoring of the entrance channel. WCC is considering an additional entrance stability survey to inform an implementation plan for works along entrance foreshores.	Manage Changes to the Entrance Channel	EC1	
7	1j	Undertake 'as required' dredging of the entrance channel.	2011 Draft Lake Illawarra Estuary Management Plan	Works were continually being undertaken to manage the entrance channel to ensure boating access and improved flows preventing algal build up.	Ongoing. Channel condition including drop off area being regularly monitored – quarterly aerial photos and site inspections with NSW Roads and Maritime Services Boating Officer. NSW Roads and Maritime Services maintain navigation aids as required.	$100,000 per occurrence	For future consideration.	Manage Changes to the Entrance Channel	EC3	
8	1k	Foreshore improvements to Reddall Reserve including lighting, car parking, replacement of toilet block, shade structures, landscaping and wharf.	2011 Draft Lake Illawarra Estuary Management Plan	Floating pontoon installed at boat ramp (2010). Replacement of toilet block to be considered. Kiosk upgraded (2011). EOI called to operate upgraded kiosk. New Operator appointed (2011)	Works in progress. Floating pontoon installed at boat ramp (2010). Replacement of toilet block undertaken in 2015. Kiosk upgraded and new Operator appointed (2011) with arrangement extended in 2015. Reddall Reserve south amenities replaced 2013/14. Shareway from Ocean St to Windang St replaced 2014/15 Design phase underway for replacement of deteriorated promenade with footpath.	$500,000	SCC Aquatic Feasibility study recommended a water play area to be constructed on this site (north of the kiosk). SCC is considering updating the Masterplan for this area. Current Masterplan was developed in the early 2000's.	Maintain and Improve Recreation and Amenity	RA1	
9	1l	Revegetation and weed control of Picnic Island, Berageree Island and the adjacent Pelican View Reserve.	2011 Draft Lake Illawarra Estuary Management Plan Ecological and Bushfire Assessment and Plan of Management, Picnic Island Reserve (ELA, 2015).	These islands are subjected to weed encroachments and degradation of vegetation due to a number of factors including uncontrolled access, erosion and natural processes.	Revegetation and weed control work has been undertaken with grant assistance and as a part of the relevant Plans of Management.	$10,000	Works for future consideration by SCC in accordance with the Picnic Island Reserve Plan of Management, Pelican View Plan of Management	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	

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10	1m	Formalise walkway around Picnic Island	2011 Draft Lake Illawarra Estuary Management Plan Ecological and Bushfire Assessment and Plan of Management, Picnic Island Reserve (ELA, 2015).	An informal track is currently used across Picnic Island. This track is eroded and uncontrolled resulting in a loss of vegetation. The Picnic Island Reserve Plan of Management identifies the use of fencing and signage to discourage access beyond the existing walking track.	A design was prepared for a raised concrete walkway but it was not constructed due to stakeholder concerns.	$70,000	Works for future consideration by SCC in accordance with the Picnic Island Reserve Plan of Management	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
11	1n	Maintain, protect and enhance Bevans Island, Cudgeree Island and Windang Island.	2011 Draft Lake Illawarra Estuary Management Plan	These islands contain approximately four endangered ecological communities and key habitat for a number of species. Due to their isolation these islands are subject to antisocial behaviour and invasion by introduced species.	To be considered LIA was Trustee for these Islands.	$5,000 pa	Windang Island is managed under separate plan of management (ELA, 2015) and will not be considered as a part of the Lake Illawarra CZMP.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
12	2a	Continue maintenance of existing stormwater drains and controls discharging into the Back Channel and Whyjuck Bay.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	Sediment inflows and channel dynamics often result in blockages to the Whyjuck Bay area preventing dispersal of the poor water quality inflows.	As required 2015/16 Maintenance undertaken on wetlands by SCC in south east corner of Howard Fowles. Capital project for flow improvements currently in design phase. 2015/16 Maintenance undertaken by SCC at outlet opposite Trumper St to remove flow restrictions. 2015/16 CCTV inspection undertaken by SCC on several stormwater networks.	$5,000 pa	For future consideration as required.	Improve Water Quality	WQ3	
13	2c	Formalise foreshore pathway along Mt Warrigal foreshore to Boonerah Point	2011 Draft Lake Illawarra Estuary Management Plan	This area is currently used regularly for walking and bike riding resulting in erosion of the formed track.	Complete	$30,000	For future consideration. All works to be undertaken in accordance with the vegetation management plan for Boonarah Point.	Protect and Rehabilitate Estuarine and Riparian Vegetation	N/A	Action has been completed since Baxter et al (2016) audit was compiled.
14	2d	Enhance and protect existing riparian vegetation, Boonerah Point. Plant native vegetation buffer along the shoreline. Provide bank protection to the area of shoreline that is eroding in the small bay (part of Whyjuck Bay) to the east of the Scout Hall on Boonerah Point.	2011 Draft Lake Illawarra Estuary Management Plan Boonerah Point Vegetation Management Plan (SCC, 2016)	The Boonerah Point Park was in disrepair and required upgrades to the parkland. Revegetation works to be undertaken in accordance with the Boonerah Pont Vegetation Management Plan (SCC, 2016). An identified area of bank erosion is adjacent to the site regularly used by the Scout hall.	To be considered. SCC completed landscaping on Boonerah Point (2007/08). Scout Group propose installing a jetty and ramp to launch canoes (2011).	$20,000 (revegetation and park repairs) $200,000 (Bank stability and jetty installation).	Ongoing works to be undertaken by SCC in accordance with the 2016 Management Plans for the site.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
15	2f	Create a beach (adjacent to the Scout Hall) and nourish over time (as the sand washes away) to help reduce bank erosion and aid with removal of seagrass wrack.	2011 Draft Lake Illawarra Estuary Management Plan	Shoreline area used regularly by the scout hall for launching and retrieving boats.	To be considered No work done to date.	$50,000	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
16	2g	Provide bank stabilisation/erosion protection at selected locations along the foreshore.	2011 Draft Lake Illawarra Estuary Management Plan	General areas of steep slopes, which require stability.	To be considered	$25,000	For future consideration.	Manage Foreshore and Bank Erosion	FB1	

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17	2h	Restrict access to Mogurah and Yangar Point foreshore areas to allow native endangered vegetation communities to re-establish	2011 Draft Lake Illawarra Estuary Management Plan	Excessive trampling of the saltmarsh in this sheltered embayment is resulting in a loss of saltmarsh community and faunal habitat. Protection is needed from misuse and vandalism such as illegal vegetation clearing, mowing and excessive access which degrade the quality of these habitats. Bollards are proposed to reduce excessive access to this site.	To be considered. No work done to date.	$10,000	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV2	
18	3a	Upgrade Deakin Reserve carpark area adjacent to jetty and boat ramp.	2011 Draft Lake Illawarra Estuary Management Plan	The carpark currently consists of an informal gravel area, which is subjected to erosion during heavy usage and high rainfall. A sealed surface was considered a better alternative at this location.	To be considered No work done to date.	$30,000	For future consideration.	Maintain and Improve Recreation and Amenity	RA1	
19	3b	Provide public access way along this section of foreshore if reclamation is carried out as part of Burroo Bay dredging.	2011 Draft Lake Illawarra Estuary Management Plan	The sewer alignment is currently within the Lake at this location. In addition to this, there is a need to formal access to prevent uncontrolled access and improve public safety.	To be considered as part of any future dredging works – unlikely due to resident concerns. Private jetties are an obstacle here. No work done to date.	$100,000	For future consideration.\	Maintain and Improve Recreation and Amenity	N/A	Burroo Bay dredging has been completed since Baxter et al (2016) audit was compiled. Had limited effectiveness.
20	3d	Provide a shared pathway and boardwalk (where necessary over sections of saltmarsh) around the shoreline the Koona Bay.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	This shareway will provide a key linkage around the southern aspect of the Lake and will aim to prevent uncontrolled access and promote regrowth of damage saltmarsh.	SCC has approved preferred option 'partial foreshore filling. Approval has been granted under Part 5 of the EP&A Act. Work to be staged. Stage 1 between Wilson Memorial park and Kanahooka St completed (2010). Stage 2 between Karoo St and Wooroo St is currently under construction to be completed late 2013. Biosis engaged to prepare AHIP (2011). Stage 3 plans between Kanahooka St and Shearwater Blvde were exhibited and approved by SCC as a preferred option in 2007. Subject to further design work and environmental approvals. Stage 4 between Shearwater Blvde and Macquarie Rivulet and Stage 5 from Waroo Street to Koona Bay Foreshore Reserve are yet to be considered.	$400,000	Include Stage 3 to 5 as option for future consideration. Design of Stage 3 deferred by SCC to 2018/19 due to competing priorities of footpath capital projects. Renewal of shareway in Mount Warrigal and Warilla programmed for 2016/17 and 2018/19.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
21	3e	Construct wharf / low level platform on Macquarie Rivulet (southern bank) for launching / retrieval of small watercraft e.g. canoes / kayaks.	2011 Draft Lake Illawarra Estuary Management Plan	Watercraft such as canoes and kayaks are currently launched at informal parts of the bank resulting in bank erosion.	To be considered No work done to date.	$50,000	For future consideration.	Maintain and Improve Recreation and Amenity	RA1	

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22	3f	Restrict Access to the Macquarie Rivulet SEPP 14 area.	2011 Draft Lake Illawarra Estuary Management Plan	The saltmarsh habitat of Macquarie Rivulet Delta has become degraded through misuse such as illegal vehicle access and allowing cattle to graze and trample the area. Access to this site needs to be controlled to allow this large area of habitat to become restored and fully utilised as habitat for a number of species of aquatic birds. Fences in neighbouring parcels of land also need to be repaired to prevent stock escaping this area.	Ongoing RCL have to date installed security gates, signage, and concrete blocks on the northern side of the wetland. A maintenance contractor and in more recent time local residents have been providing surveillance of the area. Recently four-wheel drive access was controlled through residents contacting the police. The stage 4 works (above at 3d) are considered part of the solution for this issue on the southern side of the rivulet.	$10,000	Ongoing. For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV2	
23	4a	Investigate options to link the shared pathway from the Macquarie Rivulet Arboretum to Haywards Bay.	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	Connecting link between Haywards Bay and Oakflats.	Options include new bridge across rivulet or connection to highway bridge. Preliminary plans developed and supplied to SCC in 2013 by the LIA..	$10,000	For future consideration.	Maintain and Improve Recreation and Amenity	RA2	
24	4b	Finalise transfer of freehold foreshore land extending to the mouth of Macquarie Rivulet and around Haywards Bay for environmental protection and public open space. Enhance riparian zone and limit illegal access of Macquarie Rivulet Riparian Habitat.	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	This foreshore stretch of land, in ownership of TRUenergy), is not currently maintained and is subjected to weed invasion, degradation through uncontrolled access and dumpling of waste material. This foreshore land contains strong heritage and ecological values. The Haywards Bay Foreshore land currently maintained by Winten (now RCL) was also under negotiation with the LIA for the transfer of this land. Illegal vehicle access to the Macquarie Rivulet Delta has been destroying large areas of saltmarsh. Vehicle access needs to be limited in these areas through the use of bollards or other structures.	Under the current Deed, Winten must transfer the land to the LIA. LIA had agreed to accept the land transfer excluding the area of the water quality control pond (wetland) on the proviso that Winten maintain the wetland to meet performance criteria set down by WCC whilst development works were ongoing. WCC to provide status of hand over process?? Under the Council's conditions of consent monitoring of the wetland is to continue for 15 years after 80% of the subdivision is complete.	$10,000 for transfer costs $500,000 for rehabilitation and access control works.	Land currently under control of RCL (formerly Winten) and TRUenergy. For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV6	
25	4c	Enhance wetland areas and riparian corridor of Duck Ck.	2011 Draft Lake Illawarra Estuary Management Plan	High occurrence of invasive species.	To be considered (part of TRUenergy development?)	$500,000	Under control of TRUenergy. For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
26	5d	Provide bank protection measures to eroded sections of shoreline.	2011 Draft Lake Illawarra Estuary Management Plan	General areas of slope, which require stability.	To be considered	$200,000	For future consideration as required.	Manage Foreshore and Bank Erosion	FB1	
27	5e	Prevent access and install signage on the southern end of the Brooks Creek Delta	2011 Draft Lake Illawarra Estuary Management Plan	Saltmarsh is currently restricted from growing at the Brooks Creek delta due to uncontrolled access including the formation of bike jumps and other activities. Isolation of this area would result in the regeneration of this area with saltmarsh and an improvement in the habitat values of this location.	To be considered. No work done to date.	$10,000	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV2	

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28	6a	Construct shared pathway linking Kanahooka Point to Purrah Bay.	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	There is no shareway linkage around Kanahooka Point requiring pedestrians to walk up Murra Mura Road between foreshore parks.	To be considered. Residents adjacent to this area expressed concerns about this shared pathway. Shared pathway would require elevated boardwalk installed into the rock platform. Concept design developed. No work done to date.	$50,000	For future consideration.	Maintain and Improve Recreation and Amenity	RA2	
29	6b	Enhance riparian zone of Mullet Creek and Purrah Bay Foreshore.	2011 Draft Lake Illawarra Estuary Management Plan	The Mullet Creek foreshore is subject to a large population of invasive weeds with some bank stability issues located upstream. Public access along the foreshore was also discussed as a potential future benefit to prevent uncontrolled access along the foreshore.	To be considered. WCC has completed bank stabilisation works at William Beach Park (2009/10).	$500,000	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
30	6c	Provide public shelters, picnic tables and seats, Purrah Bay.	2011 Draft Lake Illawarra Estuary Management Plan	There are not currently any shelters, seats or tables at the end of the Purrah Bay pathway.	To be considered. No work done to date.	$25,000	For future consideration.	Maintain and Improve Recreation and Amenity	RA1	
31	6d	Establish a vegetative border around existing saltmarsh beds, Kanahooka and Purrah Bay.	2011 Draft Lake Illawarra Estuary Management Plan	The use of a vegetative border such as Juncus or Lomandra has proven an effective deterrent for access to saltmarsh beds. These species or consistent with these communities and dur their spikey nature limit free access through the area. The use of this species can also control mowing boundaries and can allow migration of saltmarsh species.	Has been undertaken at some locations with success. To be considered within suite of options to improve saltmarsh habitats.	$10,000	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
32	7b	Investigate foreshore linkage along Koong Burry Bay foreshore (this could include the construction of a boardwalk).	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	This area is currently accessed by cattle resulting in degradation of saltmarsh. A boardwalk though this area would protect the saltmarsh and provide recreational amenity.	To be considered (part of Currungoba land acquisition). No work done to date.	$20,000	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV6	
33	7c	Investigate the possible acquisition of the land at Currungoba Peninsula (including the Tank Trap) for the purpose of constructing a regional wetland and / or providing bank protection measures to the Tank Trap.	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	Negotiations commenced with the owners of the land known as Currungoba Peninsula to purchase the land (or part thereof) for environmental and recreational purposes. The owner hasn't indicated whether or not he is willing to sell. The Department of Planning has advised that should the owners decide on progressing the acquisition the Authority could make an application for funding assistance under the Coastal Lands Protection Scheme.	Valuation of the land completed (2008).	$1,000,000	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV6	
34	7d	Construct wharf / low level platform on Hooka Creek for launching / retrieval of small watercraft e.g. canoes / kayaks.	2011 Draft Lake Illawarra Estuary Management Plan	Hooka Creek was identified as a key access point, which would allow access for boats including recreational uses such as fishing.	To be considered. No work done to date.	$50,000	For future consideration.	Maintain and Improve Recreation and Amenity	RA1	

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35	7e	Protect and enhance bird habitat area (eastern mud flats) through signage.	2011 Draft Lake Illawarra Estuary Management Plan	This key area of bird habitat is often subject to disturbance from local children and the use of vessels such as hovercrafts and kayaks. This area is utilised for feeding and nesting grounds for a number of water birds.	To be considered No work done to date.	$10,000	For future consideration in consultation with OEH.	Protect and Manage Key Fauna	EV1	
38	8a	Berkeley Boat Harbour Improvements	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	A number of improvements have been proposed for the harbour, which focus on water quality improvements, protection of birds such as pelicans using the area and ensuring the maintenance of harbour environment. Other issues identified include vermin, littering, arson and sedimentation.	Maintenance of western navigation channel undertaken (December 2009). Maintenance of eastern channel undertaken (May 2011). Signage installed on the seawall to deter people (and dogs) from accessing the area - "Waterbird Roosting Area – Do Not Disturb". Designs for the upgrade to the eastern basin of harbour with formalised trailer parking and boat wash down were finalised in 2013 but not progressed due to cost. Construction of an upgraded carpark is currently in the draft WCC forward program.	$5,000 pa	For future consideration.	Maintain and Improve Recreation and Amenity	RA1	
39	8b	Continue maintenance of the existing Budjong Ck Wetland.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	Budjong Creek Wetland provides key bird habitat for a number of species, which utilised the Lake. This wetland also functions in improving water quality prior to discharge to the Lake. As such, sediment and litter accumulate in this wetland from time to time.	As required	$5,000 pa	For future consideration as required.	Improve Water Quality	WQ3	
40	8c	Continue weed removal and bush regeneration activities on Wollamai Point.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	Ongoing bush regeneration activities to improve the ecological value of the park.	As required - works in progress – Budjong Ck Landcare Group. Ongoing works currently being undertaken as part of an OEH grant program.	$20,000 pa	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
41	8d	Enhance the reclaimed 'spur'.	2011 Draft Lake Illawarra Estuary Management Plan	Located adjacent to 81 Northcliffe Drive, this parkland area is currently prone to antisocial behaviour and is underutilised.	To be considered. No work done to date.	$40,000	For future consideration.	Maintain and Improve Recreation and Amenity	RA1	
42	8e	Upgrade former 'Merinda' site wharf and car park area including bank protection of eroded shoreline.	2011 Draft Lake Illawarra Estuary Management Plan	This site is degraded and often experiences antisocial behaviours.	Ongoing, rock rip rap placed.	$100,000	For future consideration.	Manage Foreshore and Bank Erosion	FB2	
43	9a	Upgrade seawalls adjacent to the Yacht Club in accordance with best practice guidelines.	2011 Draft Lake Illawarra Estuary Management Plan	Seawalls should be upgraded to incorporate environmentally friendly principles when it is at the end of its design life and needs to be replaced.	As required No work done to date.	Unknown	For future consideration.	Manage Foreshore and Bank Erosion	FB2	
47	9e	Implement foreshore improvements e.g. weed removal, landscaping provision of seats and tables and possible boardwalk through Kully Bay wetland area.	2011 Draft Lake Illawarra Estuary Management Plan	Areas of the Griffins Bay foreshore including Kully Bay Wetland, require rehabilitation and in some areas formalisation of access to allow vegetation such as saltmarsh to rehabilitate.	To be considered Master Plan (1997) for Joes Bay area to be reconsidered	$200,000	For future consideration by Government Property NSW.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	

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48	9f	Continue maintenance of the existing Joes Bay wetland at the southern end of King Street area and the Primbee shoreline.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	This wetland functions in improving water quality prior to discharge to the Lake. As such, sediment and litter accumulate in this wetland from time to time. This wetland is also used by water birds to feeding and nesting.	Works were undertaken as required.	$10,000 pa	For future consideration as required.	Improve Water Quality	WQ3	
49	10a	Investigate problems of surface and groundwater pollution from the Kemblawarra Industrial area.	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	Water quality in the Griffins Bay area at times experience peaks in nutrient and metals. There are a number of potential sources of pollutant discharge upstream of this area including industrial land uses.	Monitoring of water quality in the Lake indicates Griffins Bay to have very high concentrations of nutrients and chlorophyll a. Any direct links to inputs from Kemblawarra yet to be established.	$120,000	Ongoing monitoring to identify changes in water quality.	Improve Water Quality	WQ9	
50	10b	Provide a SQID on the Nicolle Rd drain at the d/s end of Korrongulla Swamp.	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	Treatment of outflowing stormwater required to capture litter flowing through the stormwater system.	In early 2000, Port Kembla Copper commenced infilling of the dredged pond with copper slag. Approximately 1.5 MT of copper slag has been placed in the pond since decommissioning of the Copper Smelter. PKC currently monitors groundwater, surface water and sediment at the site under Licence 2509. Recent monitoring by WCC has not identified elevated levels of metals in groundwater at the end of Nicole Road. Port Kembla Copper is currently in negotiation with WCC on an exit strategy for the site. SQID designs were finalised by the LIA. Construction appears to have not been undertaken.	Not defined	For future consideration.	Improve Water Quality	WQ2	
51	10c	Investigate problems of groundwater pollution (high ammonia) along the Windang Peninsula.	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	Water quality in the Griffins Bay area at times experience peaks in nutrient and metals. There are a number of potential sources of pollutant discharge upstream of this area including historical emplacements of uncontrolled fill.	Studies have confirmed high concentrations of ammonia in the groundwater in the area. A study currently underway to identify groundwater flow paths, including the connection with the Lake.	Not defined	Ongoing monitoring to identify changes in water quality.	Improve Water Quality	WQ9	
52	10d	Limit public access to saltmarsh community, Purry Burry Point	2011 Draft Lake Illawarra Estuary Management Plan Purry Burry Point to Heritage Park Site Restoration Plan (2013)	This tidal mudflat provides unique habitat for both saltmarsh vegetation communities and wader birds. Uncontrolled access to this area has resulted in degradation of this habitat.	Considered in Purry Burry Point to Heritage Park Site Restoration Plan (2013). No works undertaken.	$10,000	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV2	
53	10e	Remove illegal and 'unsightly' foreshore structures and materials along Primbee Bay.	2011 Draft Lake Illawarra Estuary Management Plan Purry Burry Point to Heritage Park Site Restoration Plan (2013)	A number of residents along the Primbee foreshore have built structures on the edge of the Lake, outside their property boundary. Structures include jetties, BBQ facilities, seating, informal ramps etc.	Review of unauthorised foreshore structures completed (2007/08). Monitoring of foreshore area undertaken on regular basis. Purry Burry Point to Heritage Park Site Restoration Plan completed in 2013.	N/A	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV2	

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54	10f	Provide public access linkage along the Primbee Bay shoreline if reclamation is carried out as part of Griffins Bay dredging.	2011 Draft Lake Illawarra Estuary Management Plan 2006 Lake Illawarra Estuary Management Study and Strategic Plan	The Primbee foreshore is regularly utilised for public access. Formalisation of this walkway was proposed to improve access and prevent erosion and loss of vegetation.	To be considered – unlikely due to resident concerns. No work done to date.	$100,000	For future consideration.	Maintain and Improve Recreation and Amenity	RA3	
55	Xa	Improved opportunities for estuarine vegetation migration	2011 Draft Lake Illawarra Estuary Management Plan	Foreshore landscaping and infrastructure preventing the natural migration of estuarine vegetation as a result of increased sea levels.	No actions undertaken	Unknown	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV5	
56	Xb	Creek rehabilitation	2011 Draft Lake Illawarra Estuary Management Plan	Creeks discharging into the Lake often characterised by a high occurrence of litter, weeds and in some locations sediment build up or structures resulting in blockages.	Ongoing, dredging and clean ups were undertaken each year by the LIA targeting the most effected outflows	Unknown	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
57	Xc	Mangrove migrations Develop ongoing monitoring program to assess encroachment of mangroves and changes in distribution throughout Lake Illawarra	2011 Draft Lake Illawarra Estuary Management Plan	An increasing population of mangroves since ~2007 are resulting in decreases in saltmarsh areas but conversely this protected species is also being removed in areas by neighbouring residents. With mangroves flourishing, monitoring should be undertaken to identify the impacts of this increasing plant species on the existing species in the area.	Draft baseline vegetation mapping was undertaken as part of 2011 EMP process. Research is currently being undertaken by UoW in partnership with OEH.	$20,000	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV4	
58	Xd	Revegetation and weed control	2011 Draft Lake Illawarra Estuary Management Plan	Areas dominated by invasive species or low quality vegetation.	Ongoing	Unknown	Ongoing through various programs of works.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
59	Xe	Revise mowing strategy	2011 Draft Lake Illawarra Estuary Management Plan	Mowing of foreshore areas is resulting in damage to migrating saltmarsh and changes to the species distribution.	Areas within Shellharbour municipality have been the subject of changed mowing strategies for vegetation improvement with some success.	Unknown	For future consideration.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV2	
60	Xf	Stormwater management	2011 Draft Lake Illawarra Estuary Management Plan	Untreated stormwater outflows resulting in decreased water quality and introduction of garbage to the Lake.	Numerous completed in accordance with the developed strategy with many more still to be undertaken.	A stormwater strategy has been completed for the Lake identifying known outflow points.	For future consideration.	Improve Water Quality	WQ1, 2, 3	
61	Xg	Formalise access routes	2011 Draft Lake Illawarra Estuary Management Plan	Informal access tracks result in a loss in vegetation along these areas leading to erosion in some areas.	Ongoing, some completed.	See shareway strategy (2012)	For future consideration.	Maintain and Improve Recreation and Amenity	RA2	
62	Xh	Manage illegal vegetation clearing	2011 Draft Lake Illawarra Estuary Management Plan	Large areas of vegetation are cleared to allow for private recreational amity	Ongoing	Unknown	Ongoing as required.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV2	
63	Xi	Restrict access to sensitive shoreline areas	2011 Draft Lake Illawarra Estuary Management Plan	Shoreline areas open to access can be utilised for activities such as dragging boats, four-wheel-driving and horse riding resulting in degradation of saltmarsh and shoreline erosion.	Ongoing. Bollards have been used to varying degrees of success around the Lake.	Unknown	Ongoing as required.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1, 2	

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64	Xj	Erosion control and bank stabilisation	2011 Draft Lake Illawarra Estuary Management Plan	Degraded slopes requiring bank protection of stabilisation.	Ongoing	Unknown	Ongoing as required.	Manage Foreshore and Bank Erosion	FB1	
65	Xk	Community education	2011 Draft Lake Illawarra Estuary Management Plan	Community engagement mediums such as signage and brochures can educate local and visiting residence on the importance of the estuarine environment and the need for its protection.	Ongoing Saltmarsh brochure was under development in partnership with DPI – Fisheries. Future world educational package developed in partnership between LIA, WCC and Futureworld.	Unknown	Ongoing activity undertaken by councils and government agencies.	Improve Planning and Management Arrangements for the Lake	PM3	
66	Xl	Illegal structures and reclamation	2011 Draft Lake Illawarra Estuary Management Plan	Uncontrolled reclamation or structures have been built in numerous foreshore areas around the Lake removing estuarine habitat and having other environmental impacts.	Ongoing A review of existing unauthorised structures and foreshore reclamations in the Lake is Complete. Existing structures at Jettys By The Lake to be assessed for licensing purposes. Shared Use Jetty proposed.	Unknown	Ongoing as required.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV3	
68	Xn	Investigate dredging (and disposal) in selected areas of the Lake including:	2011 Draft Lake Illawarra Estuary Management Plan	Dredging was an ongoing process of the LIA to ensure flows circulated through the Lake improving water quality and boating safety. These dredging programs were limited due to the need to store PASS classed material resulting from the activity.	Dredging program on hold subject to identifying suitable disposal location(s) for dredged spoil (PASS) – preferred disposal site is within the Lake e.g. the hole created as part of sand extraction at Purry Burry Point. Minor work undertaken in Koonawarra Bay to improve boating access to Lakeside Drive Jetty (2010). Minor dredging of Burroo Bay undertaken (2013)	Griffins Bay, Southern Back Channel, Karoo Bay, Burroo Bay, Koona Bay, Haywards Bay, Koonawarra Bay, Purrah Bay, Koong Burry Bay & Tuggerah Bay $2.3M - 3M, $1.9M - 3M, $0.75M - 1M, $1.1M - 1.5M, $4.5M - 6M, $0.75M - 1M, $0.75M - 1M, $1.1M - 1.5M, $5.6M - 7.5M, $15,000 - 20,000,	For future consideration.	Maintain and Improve Recreation and Amenity	RA5	

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69	Xo	Adopt a policy requiring Water Sensitive Urban Design for all new urban development and provide incentives for implementation of on-site stormwater treatment and re-use for existing developments around the Lake.	2011 Draft Lake Illawarra Estuary Management Plan	The water quality of Lake Illawarra is largely control by the quality of catchment inflows. Correlation shave been drawn between the increase in urban density in the catchment and the resulting decline in the water quality of Lake Illawarra. Improving outflows through stricter development controls is one method to try and reduce this impact.	It is the Councils responsibility to ensure WSUD in developments as per planning instruments. Councils have prepared consolidated DCPs. Wollongong DCP Chapter E15 (2009) outlines WCC's requirements for WSUD for certain types of development.	N/A	N/A	Improve Water Quality	WQ1	
70	Xp	Undertake further research into the driving mechanisms behind algal blooms and the dynamics of macroalgae and microalgae interactions with primary producers in the Lake.	2011 Draft Lake Illawarra Estuary Management Plan	Algal blooms occur within the Lake due to a number of potential factors. These blooms can be toxic to both humans and other fauna.	Potential University partnership project. Research presented at the 2009 summarised a study undertaken titled "Planktonic primary production: a decisive tool for monitoring the health of Lake Illawarra" (S. Kneeshaw et. al).	$20,000 pa	For future consideration.	Maintain and Improve Recreation and Amenity	RA6	
71	Xq	Continue harvesting of macroalgae in the Lake on an as needs basis.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	Since 1988 approximately 30,000T has been removed. This has resulted in the removal of substantial volumes of nutrients such as nitrogen and phosphorus from the Lake as well as improving odour.	Work was undertaken by the LIA as required.	$125,000 pa	For future consideration.	Maintain and Improve Recreation and Amenity	RA6	
72	Xr	Continue clean-up of foreshore areas including removal of decomposing seagrass wrack around the Lake on an as needs basis.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	Since 1988 approximately 50,000T has been removed. This has resulted in the removal of substantial volumes of nutrients such as nitrogen and phosphorus from the Lake as well as improving odour.	Work was undertaken by the LIA as required. In June 2016 collection of seagrass wrack was undertaken following extreme weather in a once off collection event.	$125,000 pa	For future consideration.	Maintain and Improve Recreation and Amenity	RA6	
73	Xs	Continue to provide information to the community on processes and projects within the catchment of the Lake via media announcements, pamphlets, newsletters, publications, relevant websites etc.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	Ongoing mediums of community engagement to educate the community on the values of the Lake and works being undertaken.	As required – Community Updates prepared following each LIA meeting.	$5,000 pa	Ongoing activity undertaken by councils and government agencies.	Improve Planning and Management Arrangements for the Lake	PM3	
74	Xt	Continue to encourage volunteer groups such as Landcare Groups, 'Friends of Lake Illawarra', Green Corps etc. to become involved in worthwhile projects and activities within the Lake catchment. Investigate opportunities to utilise the Education Study Centre off Northcliffe Drive, Warrawong	2006 Lake Illawarra Estuary Management Study and Strategic Plan	Activities undertaken to encourage participation of Lake protection and education of Lake values.	As required Future World was historically on a month by month holding over licence with one months notice required from either party.	N/A	For future consideration by Government Property NSW.	Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	

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75	Xu	Continue monitoring of water quality and water level from the 2 recording stations on the Lake	2006 Lake Illawarra Estuary Management Study and Strategic Plan 2015 Lake Illawarra Water Quality and Estuary Health Monitoring Program.	MHL operate and maintain LIA stations on an annual basis under agreement. Monthly water quality monitoring to continue in accordance with the 2015 Lake Illawarra Water Quality and Estuary Health Monitoring Program. Sydney Water sample entrance swimming lagoon area (every 6 days) as part of the Beachwatch Program.	Ongoing	$80,000 pa	Ongoing.	Improve Water Quality	WQ7	
76	Xv	Monitor changes to the ecology of the Lake and key performance indicators e.g. water sediment, biota and amenity.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	Undertake regular surveys of key ecological parameters.	Seagrass surveys conducted in 2007/08 and 2008/09. Symposium on Lake Illawarra held (2009). Condition / Health Assessment of the Lake prepared (2010). Research Plan prepared (2010)	$60,000	For future consideration.	Improve Water Quality	WQ9, EV5	
77	Xw	Investigate fish stock trends and commercial and recreational fishing practices in Lake Illawarra to determine if any seasonal restrictions or upper limits on number of commercial licences required.	2006 Lake Illawarra Estuary Management Study and Strategic Plan	Carry out surveys on recreational and commercial fishing effort and catch as well as surveys on important species.	DPI – Fisheries collecting ongoing data.	$10,000	For future consideration.	Protect and Manage Key Fauna	MF1, PM1	
78	Xx	Maintenance of existing stormwater drains and controls discharging into the Lake.	2011 Draft Lake Illawarra Estuary Management Plan	Stormwater outflow drains at are subject to discharging poor water of varying quality from the surrounding catchment. In addition to this, the drains are subject to blockage by sand or sediment deposition. Works include alterations to drainage channels and the installation of Gross Pollutant Traps.	Ongoing.	Undefined	For future consideration as required	Improve Water Quality	WQ3	
114	VR1	Funding raised from commercial use of area to fund Lake actions	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	N/A	Option is unclear regarding intent or how this may be implemented. Therefore, this option was not included in the CMP.
115	VR2	More boat washing facilities at Berkeley Harbour	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
116	VR3	Gooseberry Island (and other islands) - better use and access depending on planning controls	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	N/A	A Plan of Management exists for the Berkeley Nature Reserve that considers the appropriateness or otherwise of public access to Islands within the reserve.
117	VR4	Improved flushing and water quality in Griffin Bay (other means besides second entrance)	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ9	
118	VR5	Annual boat show or event to raise community awareness of Lake's value	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	

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119	VR6	Public transport over the water from Wollongong to Shell Harbour	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	N/A	Public transport requirements are a state government issue and beyond the scope of a Coastal management plan. Therefore, this option was not included in the CMP.
120	VR7	Event with Wings over Illawarra; sea plane rides over the Lake	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	
121	VR8	Kite boarding event at Purry Burry/Windang beach depending on wind direction	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	
122	VR9	Activities for school children such as those run by Future World	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3	
123	VR10	Heritage - tremendous values and potential that should not be lost	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	
124	VR11	Enhance bike track all the way around and promote wildly	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2	
125	VR12	Improve configuration and design of entrance training to improve water quality and sedimentation	Values Report (BMT WBM, 2017)					Manage Changes to the Entrance Channel	EC1	
126	VR13	Improve access along foreshore and connect with Heritage Park	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA3	
127	VR14	Tourism opportunities	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA4, CH1	
128	VR15	Gross pollutant traps and other end of pipe solutions	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ1, 2	
129	VR16	In-school education about marine debris	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3	
130	VR17	Development controls on new developments such as WSUD measures etc	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ1	
131	VR18	Increased recreational use of the Lake - increases peoples' values as they are more likely to look after the Lake	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1, RA2, CH1	
132	VR19	Fitness equipment to encourage people to use the Lake and look after it	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
133	VR20	King Street area - turn into parkland with the view to eventually do more, ie; picnic shelters/bbqs, bench seats etc.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
134	VR21	Lake side tourist development	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA4	
135	VR22	Boat shed - boat hire, encourage boat hire businesses	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA4	
136	VR23	Views - line of site strategy that prioritises walkers and public users	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity		Both Councils are preparing strategies to address this issue. Therefore, this option was not included in the CMP.

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137	VR24	State Government management of the entrance	Values Report (BMT WBM, 2017)					Manage Changes to the Entrance Channel	EC1	
138	VR25	Interpretative signage	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3	
139	VR26	Fix up entrance erosion area	Values Report (BMT WBM, 2017)					Manage Changes to the Entrance Channel	EC1	
140	VR27	Gravel at end of boat ramp	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
141	VR28	Flow directors on bridge	Values Report (BMT WBM, 2017)					Manage Changes to the Entrance Channel	EC1	
142	VR29	Kiosk etc. to encourage usage. Council could lease out McKenzie Small reserve	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA4	
143	VR30	Considered community land - surplus to needs	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	N/A	Option is unclear regarding intent. Public access to foreshore land is a tenet of the Coastal Management Act 2016, and is supported by other actions in this CMP. Therefore, this option was not included in the CMP.
144	VR31	Jetty with restaurant	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA4	
145	VR32	Rubbish rack/artificial wetland - was previously suggested by LIA but not completed because of commercial fishing	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ2	
146	VR35	Cycleway connection - at the moment users have to go along the highway (100 km speed limit). Link the cycleway from Macquarie Rivulet to the power station	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2	
147	VR36	Connect cycleway - should be a proper cycleway across Slaters Bridge	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2	
148	VR37	Connect cycleway - Pelican Point	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2	
149	VR38	Bollards to stop bikes on bike tracks	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2, EV2	
150	VR39	Community facilities in and around the Lake on the Wollongong side	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1, RA2	
151	VR40	Park staff need to understand sensitive locations	Values Report (BMT WBM, 2017)					Protect and Rehabilitate Estuarine and Riparian Vegetation	EV2	
152	VR41	No townhouses/high density development here	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM1	
153	VR42	Kayaks etc monitoring water quality	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ7	

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154	VR43	School holiday program with free activities on around Lake Illawarra	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3	
155	VR44	Ban the use of 2 stroke motors to get oil out of the Lake	Values Report (BMT WBM, 2017)					Improve Water Quality	N/A	Recreational boating is a major attraction for the Lake. Banning of 2-stroke boat motors is likely to be highly contentious to other sectors of the community, making this option unworkable. Therefore, this option was not included in the CMP.
156	VR45	GPTs not cleaned out regularly - monitor before rain events	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ3	
157	VR46	Install stormwater/artificial wetlands	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ1	
157	VR47	Install stormwater/artificial wetlands	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ1	
159	VR48	Some of the LIA jetties are never used because it is too shallow	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
160	VR49	More work in Deakin Park re: amenities ie; benches, barbeques. Landcare group were active here but not anymore - need more support	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
161	VR50	Spread money into more than just the entrance area in terms of environmental and recreational improvements	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1, RA2, EV1	
162	VR51	Disabled fishing facilities - need more wharves/platforms with wheelchair access ramps	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
163	VR52	Working with Wingecarribee Council for better land management ie; no till cropping for potato farmers in Robertson	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM1	
164	VR53	Better support for local groups to manage their own patch	Values Report (BMT WBM, 2017)					Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
165	VR54	GPTs and SQIDs in local creeks to treat creek runoff	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ1, 2, 3	
166	VR55	Removal of seagrass wrack build-up	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA6	
167	VR56	Councils need to work together	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM2	
168	VR57	Bubblers/drinking stations along the bike path	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1, RA2	
169	VR58	More bins in parks and along bike paths	Values Report (BMT WBM, 2017)					Improve Water Quality	RA1, RA2	
170	VR59	Cleaning out creeks of sediment build-up - putting in sediment traps	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ2, 3	

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171	VR60	Open the back channel to increase the flows and flushing along the southern foreshore	Values Report (BMT WBM, 2017)					Improve Water Quality	N/A	Cursory consideration of this option indicates it is not technically viable: outflows from the lake are not sufficient to maintain an open back channel (therefore reducing the aim of this option). And the negative environmental impacts of this option also make it unviable. Therefore, this option was not included in the CMP.
172	VR61	Foreshore boat hire and more kiosks and/or other tourism related opportunities	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA4	
	VR62	Happy with the opening - better water quality (dramatic improvements) and no more odour	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ7	
174	VR63	Bike track is great, but needs to be looked after. Grass needs to be cut away from the edges along Reddall Parade.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
175	VR64	Need to keep public access to the Lake - it is important to be able to enjoy it	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2, RA3	
176	VR65	Need to ensure that everything is accessible for people with disabilities such as picnic tables, shelters, linking paths. Opportunity for more people to be involved	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
177	VR66	Freshwater is needed at Tallawarra to clean kayaks and fish. Water wash down area to reduce spread of diseases	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
178	VR67	Marine Rescue do a great job every weekend. Would like to see more support for them.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	N/A	Option is unclear regarding intent. Generally, support for life-savings organisations is not within the scope of a CMP. Therefore, this option was not included in the CMP.
179	VR68	Dredging of southern foreshore	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA5	
180	VR69	Improved entrance management to reduce foreshore erosion	Values Report (BMT WBM, 2017)					Manage Changes to the Entrance Channel	EC1	
181	VR70	Improved catchment management	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM1, PM2	
182	VR71	Dredge back channel	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA5	
183	VR72	A balanced approach to vegetation management around the Lake	Values Report (BMT WBM, 2017)					Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
184	VR73	Improve drainage system and stormwater management	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ1, 2, 3	

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185	VR74	Improve sewer management	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ5	
186	VR75	Potential dredging of Mullet Creek and Koonwarra Bay	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA5	
187	VR76	Completion of shared use pathway and upgrade of associated amenities	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1, RA2	
188	VR77	Business opportunities	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA4	
189	VR78	Future World do great stuff and should be continued - lots of activities for kids and adults	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3	
190	VR79	Should fill in the bay to help the Lake out	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA5	
191	VR80	Cycleway not at Primbee - needs to link to this area	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2	
	VR81	Water used to be a lot worse in the Bay. Less smelly and less seaweed	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ7, 10	
193	VR82	Walkway in this area would be good. LIA did a good draft of it.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2	
194	VR83	Declare lake a recreational fishing zone	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM1	
195	VR84	SCC does a better job of looking after the cycle ways than WCC. Would be nice if it went the whole way around i.e.; Mt Warrigal and Primbee	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2	
196	VR85	Pressure as much as possible - long term preservation needed. Concerned about SCC cutting down trees	Values Report (BMT WBM, 2017)					Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
79	VR86	Programs to support environmental conservation, water quality and the promotion of passive recreation options.	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3	
80	VR87	Where possible, work with Aboriginal people on actions related to bush regeneration and art.	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	
82	VR88	Repair/installation of Lake amenities including jetties, lights along footpaths, signage, public toilets, boat ramps, dog bags, drinking fountains and picnic areas, with increased points of access to the Lake and the foreshore and fenced off-leash areas for dog owners.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1	
83	VR89	Installation of secure-lid bins along the perimeter of the Lake, particularly in picnic areas and popular fishing spots.	Values Report (BMT WBM, 2017)					Improve Water Quality	RA1, RA2	

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84	VR90	Completion of public access to the Lake's foreshore including a shared pathway extending around the entire perimeter. Areas for particular completion include between Fred Finch Park and Kanahooka Point to ensure the safety of people using the Lake for transport.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA2	
85	VR91	Revision of the Lake as a commercial fishing area with respect to increasing fish stocks, tourism assets and research into aquatic species populations to establish sustainable catch limits. Further measures include more active rangers/inspectors to enforce size and catch limits.	Values Report (BMT WBM, 2017)					Protect and Manage Key Fauna	MF1, PM1	
86	VR92	Stricter measures in place to limit catchment development with revised planning policies to ensure sustainability, protection, and enhancement of the Lake's health. Strict penalties for breaching of DA regulations and opportunities to incorporate sustainable designs.	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM1	
87	VR93	Public education/awareness programs and initiatives highlighting the environmental threats to the lake and measures required to mitigate these. This could be undertaken by the formation of a community action group in liaison with Council to develop sustainability measures for the Lake and its foreshore. A number of responses expressed their interest in forming local environmental groups or using current groups, such as Bushcare, for water quality monitoring and other initiatives. Other options include working with local schools to educate the students and promote the environmental value of the Lake.	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3	
88	VR94	Restrictions on the usage or speed of motorised watercraft in the Lake, particularly in the breeding and feeding areas of birds and other aquatic animals, and in other areas requiring rehabilitation.	Values Report (BMT WBM, 2017)					Protect and Manage Key Fauna	PM1	

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89	VR95	Ongoing maintenance for foreshore vegetation (such as mowing of recreational areas) particularly in areas accessed by the public, such as between Fred Finch Park and Kanahooka Point. Replanting appropriate vegetation in these areas and restricted areas in erosion and high-stress hotspots. Weed and intrusive species removal program to enhance public access to the Lake.	Values Report (BMT WBM, 2017)					Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
90	VR96	Ongoing maintenance of the Lake foreshore in general, particularly for overgrown vegetation in residential areas.	Values Report (BMT WBM, 2017)					Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
91	VR97	Reduction of silt, run off and pollution into the Lake. A number of responses identified the need for better drains, constructed wetlands and pollutant traps to reduce the amount of litter entering the Lake.	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ1, 2, 3	
92	VR98	Increased infrastructure to promote tourism such as cruises around the Lake and kayak/watercraft hire.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA1, RA4	
93	VR99	Formation of a group to oversee the funding, works, environmental monitoring, and general activities on the Lake, similar to the LIA.	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM2	
94	VR100	Enhancement of activities on the Lake including boat races, sailing, paddling, and recreational fishing to maintain and promote tourism to the area. Other activities and opportunities include monthly food and market stalls, kiosks, cultural events, sculpture and art exhibitions, food and coffee vans/pop-ups, picnic benches, education signage and fitness stations to encourage use of the area.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA4	
95	VR101	Management of siltation and sand build up with measures in place to reduce erosion around the Lake and places where sediment enters from the broader catchment. Possible dredging in major access points.	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ4, RA5	

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96	VR102	Regular emptying of trash racks and pollutant traps with increased maintenance during major rain/storm events to remove rubbish, vegetation and debris.	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ3	
97	VR103	Development of foreshore areas such as the King Street foreshore and Windang area to include cafes, restaurants, markets, stalls and exhibitions to promote tourism and residential use of the Lake, particularly in off-peak seasons.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	RA4	
98	VR104	Regulation of prohibited activities such as littering, illegal fishing methods and places, use of motorbikes on shared paths and car access to the foreshore causing destruction of the riparian vegetation and causing erosion.	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3, EV2	
99	VR105	Greater transparency and community engagement in the management of the Lake in terms of funding, management committees, committee members, with activities/initiatives or any other plans being made known to the public.	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM1, PM2	
100	VR106	Consider large scale events such as seaplanes in Wings Over the Illawarra. The foreshore at Koonawarra might be a good location for this. It would add an extra element to the air show and make good use of the lake. An Illawarra boat show held on the lake, possibly in the area between Kully Bay and the yacht club. Obviously this would have to be a "small boats" show. Or alternatively a small sail craft show or a kiteboarding competition at Primbee (Purry Burry Reserve).	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	
101	VR107	Selective tree removal to improve views.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity		Both Councils are preparing strategies to address this issue. Therefore, this option was not included in the CMP.
102	VR108	A collaborative approach to environmental monitoring on the lake.	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ6, 7, 8, 10	

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103	VR109	Removal of marine sand deposits from popular swimming areas downstream of the Windang road bridge. Relocation of these sediments to Warilla Beach or Shellharbour Village Foreshore.	Values Report (BMT WBM, 2017)					Manage Changes to the Entrance Channel	EC2	
104	VR110	Educational Signage at regeneration / rehabilitation sites	Values Report (BMT WBM, 2017)					Protect and Rehabilitate Estuarine and Riparian Vegetation	EV1	
105	VR111	Cultural burning as a weed management tool led by Aboriginal knowledge holders	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	
106	VR112	Dredging behind groyne near Redall Reserve	Values Report (BMT WBM, 2017)					Manage Changes to the Entrance Channel	EC3	
107	VR113	Large signs to address tree vandalism	Values Report (BMT WBM, 2017)					Protect and Rehabilitate Estuarine and Riparian Vegetation	EV2	
108	VR114	Passive surveillance (e.g. encourage grey nomads to use carpark near Hooka Point wetlands)	Values Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3	
109	VR115	Improved maintenance of existing stormwater management devices	Values Report (BMT WBM, 2017)					Improve Water Quality	WQ3	
110	VR116	Work with BMX riding kids to find an area that they can create jumps etc.	Values Report (BMT WBM, 2017)					Maintain and Improve Recreation and Amenity	EV2, RA1	
111	VR117	Aboriginal Land and Sea Ranger Program – Funds sourced by Federal Grants for Caring for Country has increased opportunities for Aboriginal employment and cultural tourism initiatives could provide funding to increase employment.	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	
112	VR118	Cultural Tourism- Aboriginal Tourism venture conducting tours around the lake, reclaiming cultural practices such as telling of dreamtime stories, star gazing, fishing tours etc.	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	
113	VR119	Educational programs in relation to Aboriginal Culture and Heritage	Values Report (BMT WBM, 2017)					Protect and Promote Cultural Heritage	CH1	
197	SR1	Assessment of permanent tidal inundation with sea level rise	Synthesis Report (BMT WBM, 2017)					Prepare for Inundation Risks	IR1	
198	SR2	Bank condition assessment (to determine location, extent and cause of erosion)	Synthesis Report (BMT WBM, 2017)					Manage Foreshore and Bank Erosion	FB1	
199	SR3	Education for land managers (public and private) regarding environmental approaches to bank erosion management	Synthesis Report (BMT WBM, 2017)					Manage Foreshore and Bank Erosion	EV3	
200	SR4	Updated estuarine macrophyte mapping	Synthesis Report (BMT WBM, 2017)					Protect and Rehabilitate Estuarine and Riparian Vegetation	EV4	

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201	SR5	Investigate the source of contamination at Entrance Beach	Synthesis Report (BMT WBM, 2017)					Improve Water Quality	WQ6, 8	
202	SR6	Monitoring of changes to the entrance channel (bathymetry-topography) relating to permanent entrance opening	Synthesis Report (BMT WBM, 2017)					Manage Changes to the Entrance Channel	EC4	
203	SR7	Work with EPA and Tallawarra Powerstation to reduce thermal discharges (e.g. when licensing renewal arises).	Synthesis Report (BMT WBM, 2017)					Improve Water Quality	WQ11	
204	SR8	Undertake fauna surveys using methods recommended by OEH (2016) to better understand fish and other fauna assemblages	Synthesis Report (BMT WBM, 2017)					Protect and Manage Key Fauna	MF1	
205	SR9	Develop and apply minimum standards and targets for stormwater quality and quantity to apply to new developments	Synthesis Report (BMT WBM, 2017)					Improve Water Quality	WQ1	
206	SR10	Survey of recreational fishers to provide data on fish species occurring in the Lake	Synthesis Report (BMT WBM, 2017)					Protect and Manage Key Fauna	MF1	
207	SR11	Community recreation survey to better understand recreational activities, areas used and facilities required.	Synthesis Report (BMT WBM, 2017)					Improve Planning and Management Arrangements for the Lake	PM3	
208	PMT1	Ongoing coordinated management of the lake	The PMT					Improve Planning and Management Arrangements for the Lake	PM2	
209	PMT2	Water quality monitoring	The PMT					Improve Water Quality	WQ7, 8, 10	
210	PMT3	Protection of shore birds	The PMT					Protect and Manage Key Fauna	MF1	
211	PMT4	Work with the Aboriginal community to further cultural awareness activities.	The PMT					Protect and Promote Cultural Heritage	CH1	
212	PMT5	Loss of access / connection to the lake	The PMT					Maintain and Improve Recreation and Amenity	RA2, RA3, CH1	

Table E-2 Multi-criteria Cost Benefit Analysis of Actions for the Lake Illawarra CMP

Action ID	Action Descriptor	Details	Entrance channel changes	Water pollution	Catchment development	Loss of estuarine vegetation	Wetland degradation	Litter, plastics and marine debris	Contaminated sediments	Inappropriate / degraded / insufficient infrastructure	Loss of tangible and intangible cultural heritage	Foreshore development encroaching public land	Loss of riparian habitat	Foreshore and bank erosion	Future climate change	Park management practices impacting adjacent natural areas	Commercial fishing	Introduced species	Cumulative Threat Mitigation Score (TMS) Weighted according to risk rating of threat	Capital Costs	Recurrent Costs	Effectiveness	Community Acceptability	Reversible / Adaptable Future	Legal / Approval Risk	Technical Viability	CBA Score	Overall Outcome (considering TMS and CBA)
		Risk Rating	Very High	Very High	Very High	High	High	High	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Low	Very high (x4) High (x3) Medium (x2) Low (x1)	*CBA Scoring: Go = 1, Slow = 0, Stop = -1*									TMS > 30 + CBA ≥ 2 = GO TMS >15 + CBA ≥ 4 = GO TMS <15 + CBA ≤ 2 = STOP TMS <15 + CBA ≥ 4 or TMS > 30 + CBA ≤ 2 = SLOW (for future consideration)
			2=direct positive influence, 1= indirect positive influence, 0 = no influence, -1 = indirect negative influence, -2 indirect negative influence																									
Strategy 1: Improve Water Quality (WQ)																												
WQ1	Implement a Risk Based Stormwater Management Framework for the Lake Illawarra catchment	OEH to undertake a research project that then guides WCC and SCC on DCP updates with 'best practise' pollutant reduction targets for the catchment. Undertake a trial period to compare the new and old pollutant load targets, then determine future application of the targets, including further DCP amendments.	0	2	2	1	1	2	1	0	0	0	1	1	0	0	0	0	35	Go	Go	Go	Go	Go	Go	Go	7	GO
WQ2	Install new or replace existing stormwater quality management measures, using water sensitive urban design or other devices that will improve water quality as well as enhance habitat and natural values	• Audit all stormwater quality management devices in the Lake Illawarra catchment, and determine priorities for replacement. • Identify sites for new devices (including locations recommended here). Prioritisation for new devices may be derived from the Benefit Mapping (Dela-Cruz, et al, 2017, reproduced in Figure 4 1). • Set aside adequate funds for continued maintenance of new/replaced devices. • Monitor the effectiveness of various devices in different areas/settings, by monitoring the nutrient loads exported before and after devices are installed or upgraded. The data may also improve the selection of devices for new or replacement sites.	0	2	2	1	1	2	2	1	0	0	1	1	0	0	0	0	41	Slow	Go	Go	Go	Go	Go	Go	6	GO
WQ3	Review, prioritise and improve maintenance and cleaning regime for existing stormwater quality devices	Gross pollutant traps, artificial wetlands and water sensitive urban design features.	0	2	1	1	1	2	2	1	0	0	0	1	0	0	0	0	35	Go	Slow	Go	Go	Go	Go	Go	6	GO
WQ4	Design and implement targeted catchment input monitoring as required for developments resulting in a large-scale change or intensification of land use	The programs should include monitoring of nutrients in runoff before and after development.	0	2	2	0	2	2	2	0	0	0	0	0	0	0	0	0	34	Go	Go	Slow	Go	Go	Go	Go	6	GO
WQ5	Improve compliance with erosion and sediment controls for development sites	• Increase the number of compliance audits of development sites, which may require additional staff resources. • Audit of sediment and erosion controls to be conducted prior to allowing vegetation clearing and earthworks. • Ongoing audits required throughout the development to ensure sediment and erosion controls are maintained and performing as intended. • Educate Council works staff and contractors regarding best practise erosion and sediment control, and ensure this is being implemented on Council work sites. • Work with private certifiers to improve knowledge of best practise, and auditing and transparency regarding the application of sediment and erosion controls on privately certified development sites.	0	2	2	1	2	2	2	0	0	0	0	2	0	0	0	0	41	Slow	Slow	Go	Go	Go	Go	Go	5	GO
WQ6	Reduce the impact of sewer overflows	• Develop a collaborative relationship between the Councils and Sydney Water to improve gathering and sharing of reports of sewer leaks or overflows (location, severity, frequency). • Improve reporting of leaks and overflows to Sydney Water to assist with prioritising repairs or upgrades.	0	2	1	1	2	1	2	2	0	0	0	0	0	0	0	0	36	Go	Go	Go	Go	Go	Go	Go	7	GO
WQ7	Implement existing water quality monitoring program for estuary health	• Temperature, • salinity, • pH, • dissolved oxygen, • turbidity; • total, dissolved and reactive forms of nitrogen and phosphorus; and • chlorophyll a Set up data exchange arrangements with other land managers, and used in analysis and annual summaries of results. An annual summary of monitoring data and analysis of results shall be compiled, with a review of the program and results every 5 years.	0	2	1	1	1	1	0	0	1	0	1	0	0	0	1	1	29	Go	Go	Slow	Go	Go	Go	Go	6	GO
WQ8	Undertake water quality monitoring for Recreational Use	Done in accordance with the NSW Beachwatch sampling protocols. This typically involves sampling for Enterococci over the summer period, and as needed on an event-basis.	1	2	0	0	0	2	2	0	1	0	0	0	0	0	0	0	27	Go	Go	Slow	Go	Go	Go	Go	6	GO

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		Risk Rating	Very High	Very High	Very High	High	High	High	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Low	Very high (x4) High (x3) Medium (x2) Low (x1)	*CBA Scoring: Go = 1, Slow = 0, Stop = -1*									TMS > 30 + CBA ≥ 2 = GO TMS >15 + CBA ≥ 4 = GO TMS <15 + CBA ≤ 2 = STOP TMS <15 + CBA ≥ 4 or TMS > 30 + CBA ≤ 2 = SLOW (for future consideration)
		2=direct positive influence, 1= indirect positive influence, 0 = no influence, -1 = indirect negative influence, -2 indirect negative influence																										
WQ9	Investigate the contribution of contaminated sites to poor water quality in the lake	• Gather ground and surface water quality monitoring data from active and historical contaminated sites, which may be/have been collected in accordance with EPA licence or other conditions. • Develop and implement a ground and/or surface water quality monitoring program targeting potential point source locations, particularly where no historical data is available. • Liaise with the EPA to target those sites that are found likely to be the source of contaminants to undertake remediation works.	0	2	1	1	1	1	2	0	0	0	1	0	0	0	1	1	32	Go	Go	Slow	Go	Go	Go	Go	6	GO
WQ10	Undertake water quality monitoring of physico-chemical and bacteriological indicators in the lake catchment	Review existing programs.Develop a revised program to address the following issues: • Localised pollution incidents that trigger further investigation. • Pre- and post- development indicators. • Link to management actions. • Link to WQ1.	0	2	1	1	1	1	0	0	1	0	1	0	0	0	1	1	29	Go	Go	Slow	Go	Go	Go	Go	6	GO
WQ11	Work with EPA and Tallawarra Powerstation to reduce thermal discharges (e.g. when licensing renewal arises)		0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	11	Go	Go	Slow	Go	Go	Go	Go	6	SLOW
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	• Update the DCPs to specify vegetation buffers, stormwater treatment measures (such as WSUD), nutrient and sediment load targets for developments within the Lake catchment and foreshore, and the Environmentally Friendly Seawall Guidelines. • Update or produce new POMs for community or crown land to include relevant CMP actions / objectives. • Consider CMP management areas and objectives when revising the LEP. • Review and update Councils' DA checklists to promote preservation of vegetation, erosion and sediment control, management of nutrient and sediment exports, and landscaping for new developments. • Review and update local area plans (e.g. the Windang Town Centre Plan) to include CMP actions and reflect CMP objectives where relevant (e.g. bank protection methods, estuarine vegetation management etc). • Work towards the incorporation of actions into regional and state programs and plans. • Develop Council policies as required to implement CMP objectives and actions. • Provide input to RMS when reviewing the Shoalhaven – Illawarra Regional Boating Plan to have consistency with the proposed Lake Illawarra Boating Plan (see RA1) in terms of recreational facilities; and to provide information relevant to speed / usage of boats in key fauna habitat areas. • Provide input to DPI Fisheries when reviewing the commercial fishing status of the Lake regarding benefits or otherwise of commercial fishing being permitted in the Lake.	1	1	2	2	1	1	1	1	1	2	2	2	1	0	0	0	51	Go	Go	Go	Go	Go	Slow	Go	6	GO
PM2	Provide ongoing coordinated management of the Lake, which will require ongoing support for existing staff resources	Which will require ongoing support for existing staff resources.	1	2	1	2	1	1	1	2	1	2	2	2	1	2	0	1	59	Slow	Slow	Go	Go	Go	Go	Go	5	GO
PM3	Develop and implement a targeted education and marketing strategy that enhances the community's knowledge of, skills in, and commitment to, protecting Lake Illawarra	That enhances the community's knowledge of, skills in, and commitment to, protecting Lake Illawarra.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	41	Go	Go	Slow	Go	Go	Go	Go	6	Go
PM4	Establish a Lake Illawarra Asset Management Working Group that provides coordination services for agencies that manage assets around the Lake Illawarra foreshore	Aims to bring WCC, SCC, Dept of Industry – Crown Lands and PropertyNSW together to manage their lake and foreshore assets in a coordinated manner, considering cost-sharing arrangements, economies of scale, maintenance requirements, renewal and additional asset needs as per RA1.	1	0	0	0	0	0	0	2	1	2	1	2	1	2	0	0	29	Go	Go	Go	Go	Go	Go	Go	7	Go

Table E-2 Multi-criteria Cost Benefit Analysis of Actions for the Lake Illawarra CMP

Action ID	Action Descriptor	Details	Entrance channel changes	Water pollution	Catchment development	Loss of estuarine vegetation	Wetland degradation	Litter, plastics and marine debris	Contaminated sediments	Inappropriate / degraded / insufficient infrastructure	Loss of tangible and intangible cultural heritage	Foreshore development encroaching public land	Loss of riparian habitat	Foreshore and bank erosion	Future climate change	Park management practices impacting adjacent natural areas	Commercial fishing	Introduced species	Cumulative Threat Mitigation Score (TMS) Weighted according to risk rating of threat	Capital Costs	Recurrent Costs	Effectiveness	Community Acceptability	Reversible / Adaptable Future	Legal / Approval Risk	Technical Viability	CBA Score	Overall Outcome (considering TMS and CBA)
		Risk Rating	Very High	Very High	Very High	High	High	High	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Low	Very high (x4) High (x3) Medium (x2) Low (x1)	*CBA Scoring: Go = 1, Slow = 0, Stop = -1*									TMS > 30 + CBA ≥ 2 = GO TMS >15 + CBA ≥ 4 = GO TMS <15 + CBA ≤ 2 = STOP TMS <15 + CBA ≥ 4 or TMS > 30 + CBA ≤ 2 = SLOW (for future consideration)
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Strategy 3: Manage Changes to the Entrance Channel (EC)																												
EC1	Investigate Entrance Channel Processes and Implement Management Solutions	This study shall investigate the hydrodynamics, sediment transport, erosion and sedimentation patterns occurring in the channel, and develop management options to address the issues, using a cost benefit analysis to assess options. The preferred solution(s) shall then be implemented.	2	0	0	1	1	0	0	2	1	1	1	2	1	0	0	0	33	Stop	Slow	Slow	Go	Slow	Go	Go	2	GO
EC2	Undertake beach scraping to maintain swimming areas	This action allows for dredging and / or beach scraping/re-shaping to improve the recreational amenity of swimming areas in the channel.	2	0	0	0	0	0	0	2	0	0	0	1	1	0	0	0	18	Go	Go	Slow	Go	Go	Go	Go	6	GO
EC3	Undertake dredging in the entrance channel, as required to maintain navigation	• Undertake dredging when needed to manage sedimentation and improve navigability, and provided dredging is consistent with the preferred solution derived in Action EC1. • Reuse dredged marine sand on nearby beaches (e.g. Warilla, Perkins Beach) and suitable lake foreshores. • Monitor the success of the dredging in terms of longevity of navigation, effectiveness / longevity of nourished beaches, adverse / positive impacts on surfing breaks / sand bars, and beach amenity.	2	0	0	1	0	0	0	2	0	0	0	2	0	0	0	0	21	Stop	Go	Slow	Go	Go	Go	Go	4	GO
EC4	Monitor changes to the entrance channel	Topographic and bathymetric surveys (using ALS or other efficient method) should be undertaken regularly (every 1-2 years), and the data analysed to determine the trajectory of erosion and accretion patterns. occurring in the entrance channel (e.g. bank erosion / accretion and channel migration, deepening or filling), since construction of the breakwaters, and in relation to any further structural works.	2	0	0	2	0	0	0	1	1	0	0	2	0	0	0	0	24	Go	Go	Slow	Go	Go	Go	Go	6	GO
Strategy 4: Protect and Rehabilitate Estuarine and Riparian Vegetation (EV)																												
EV1	Rehabilitate vegetation and manage public access along foreshores and banks of the Lake, its tidal tributaries, islands and broader low-lying areas	• Conduct a site inspection to confirm known and identify new rehabilitation sites. • Prioritise and prepare a detailed implementation program and action plan for mapped locations. • Continue to fund and implement Council restoration programs within the Lake's catchment. • Support the implementation of the Plans of Management for the Berkeley Nature Reserve.	1	1	1	2	2	1	1	0	1	1	2	2	1	1	0	1	48	Stop	Stop	Go	Go	Go	Go	Go	3	GO
EV2	Undertake targeted action to control damage to foreshore vegetation, including seagrasses	Caused by: 4WDs and other vehicles, bikes (including BMX), boating activities, unfenced stock, mowing practices, tree damage and removal, pedestrians, illegal structures (e.g. land reclamation, seawalls, boat ramps (formal or informal), BBQs, seating, fencing, private signage).	0	1	1	2	2	1	1	0	1	2	2	2	0	2	0	1	46	Slow	Slow	Go	Go	Go	Go	Go	5	GO
EV3	Provide education to foreshore landowners	Education regarding: • mowing and gardening around sensitive foreshore vegetation; • the legalities of building of structures (BBQs, seating, boat ramps, seawalls, land reclamation, fences, etc); • for foreshore structures and works, education on environmentally friendly designs, habitat rehabilitation options, and planning and approval requirements; • Illegal access and dumping; and • vegetation damage and removal.	0	0	1	2	2	1	1	0	1	2	2	2	1	1	0	1	42	Go	Go	Slow	Go	Go	Go	Go	6	GO
EV4	Prepare and implement an estuarine macrophyte mapping and monitoring program	• Undertake estuarine macrophyte mapping for the entire lake, to determine the current coverage and distribution of mangroves, saltmarsh and seagrass. • Determine changes in distribution and coverage of macrophytes, by a comparison with the previous mapping. • Monitor areas identified in Action Maps for conservation of saltmarsh for 2 years, to determine pattern of changes. If areas require action to manage saltmarsh retreat, include these in action EV5. • Repeat lake wide estuarine macrophyte mapping and analysis every 5 years.	0	0	0	2	2	0	0	0	0	2	2	0	1	1	0	1	25	Go	Go	Slow	Go	Go	Go	Go	6	GO
EV5	Develop and implement a program to enhance opportunities for estuarine vegetation migration	• Build on previous work to identify areas that could be modified or managed to permit migration and colonisation by saltmarsh. • From EV4, add areas where action is required to manage saltmarsh retreat. • Develop actions to allow saltmarsh migration or manage retreat, e.g. by: land repurchase, MOUs with landowners, removal of physical barriers (e.g. walls, paths) and levelling land.	0	0	0	2	2	0	0	0	1	2	2	1	2	1	0	1	32	Slow	Slow	Go	Go	Go	Go	Go	5	GO
EV6	Investigate land acquisition or transfer from private to public ownership	• Mouth of Macquarie Rivulet and Haywards Bay. Potential transfer to Council or State Government, and rezoning to environment protection. Land is currently owned by RCL and Tru Energy ($10,000 for transfer costs, $500,000 for rehabilitation and access works). • Currungoba Peninsula, including Tank Trap. Potential acquisition by State Government ($1M for land acquisition, $250,000 for rehabilitation and access works).	0	2	2	2	2	0	1	0	1	1	2	2	2	0	0	0	48	Stop	Stop	Go	Slow	Go	Slow	Go	1	SLOW

Table E-2 Multi-criteria Cost Benefit Analysis of Actions for the Lake Illawarra CMP

Action ID	Action Descriptor	Details	Entrance channel changes	Water pollution	Catchment development	Loss of estuarine vegetation	Wetland degradation	Litter, plastics and marine debris	Contaminated sediments	Inappropriate / degraded / insufficient infrastructure	Loss of tangible and intangible cultural heritage	Foreshore development encroaching public land	Loss of riparian habitat	Foreshore and bank erosion	Future climate change	Park management practices impacting adjacent natural areas	Commercial fishing	Introduced species	Cumulative Threat Mitigation Score (TMS) Weighted according to risk rating of threat	Capital Costs	Recurrent Costs	Effectiveness	Community Acceptability	Reversible / Adaptable Future	Legal / Approval Risk	Technical Viability	CBA Score	Overall Outcome (considering TMS and CBA)
		Risk Rating	Very High	Very High	Very High	High	High	High	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Low	Very high (x4) High (x3) Medium (x2) Low (x1)	*CBA Scoring: Go = 1, Slow = 0, Stop = -1*								TMS > 30 + CBA ≥ 2 = GO TMS >15 + CBA ≥ 4 = GO TMS <15 + CBA ≤ 2 = STOP TMS <15 + CBA ≥ 4 or TMS > 30 + CBA ≤ 2 = SLOW (for future consideration)
			2=direct positive influence, 1= indirect positive influence, 0 = no influence, -1 = indirect negative influence, -2 indirect negative influence																								
Strategy 5: Maintain and Improve Recreational Amenity (RA)																												
RA1	Upgrade and renew foreshore / waterway recreational infrastructure	Upgrade and renew foreshore / waterway recreational infrastructure in accordance with available Transport and Recreation Asset Management Plans, informed by Plans of Management and approved recreation masterplans. Action also aims to improve maintenance programs, with priority given to existing shared pathways and marine assets.	1	0	0	0	0	0	0	2	1	2	0	1	0	2	0	0	23	Stop	Slow	Go	Go	Go	Go	Go	4	GO
RA2	Construct new sections of shareway to complete the pathway linkage around the entire Lake	• Remove and rehabilitate informal / degraded tracks as new sections are completed. • Consider disabled access and facilities, bubblers / drinking stations, and lighting when designing new shared pathway sections. • Ensure siting of the shared pathway does not impact on sensitive environmental and / or cultural areas.	0	0	0	2	0	0	0	2	1	1	2	2	0	0	0	0	25	Stop	Slow	Go	Go	Go	Go	Go	4	GO
RA3	Negotiate a public 'right of way' along the foreshore	Consult with land owners regarding public and private foreshore ownership, to re-open public foreshore sections, and allow public access along private foreshore sections.	0	0	0	1	0	0	0	2	1	2	1	0	0	0	0	0	18	Go	Go	Go	Slow	Go	Slow	Go	5	GO
RA4	Investigate commercial partnerships to enhance tourism and recreational opportunities around the lake (e.g. boat hire, kiosks, etc)	This may involve tenders for use of public areas by private businesses, or more permanent structures, to provide services such as: • Boat hire, for boats and / or small watercraft such as kayaks and canoes, • Cruises, • Kiosks / pop-up facilities / markets / stalls / exhibitions in high use parks and reserves, or at peak times (e.g. holidays), • Cafes / restaurants in suitable locations.	0	0	0	0	0	-1	0	2	1	0	0	0	0	0	0	0	6	Slow	Slow	Go	Go	Go	Go	Go	5	SLOW
RA5	Undertake dredging of bays within the Lake	The aim of this action would be to improve recreational amenity, however this would need to be demonstrated by feasibility studies. Indicative costs and locations: • Griffins Bay ($2.3M - 3M) • Southern Back Channel ($1.9M - 3M) • Karoo Bay ($0.75M - 1M) • Koona Bay ($4.5M - 6M) • Haywards Bay ($0.75M - 1M) • Koonawarra Bay (inc Mullet Creek) ($0.75M - 1M) • Purrah Bay ($1.1M - 1.5M) • Koong Burry Bay ($5.6M - 7.5M) • Tuggerah Bay ($15,000 - 20,000)	0	0	0	-1	0	0	1	1	0	0	-1	0	0	0	0	0	1	Stop	Stop	Slow	Slow	Go	Go	Go	1	STOP
RA6	Continue harvesting of macroalgae in the Lake on an as needs basis. Undertake further research into the driving mechanisms behind algal blooms and the dynamics of macroalgae and microalgae interactions with primary producers in the Lake	Since 1988 approximately 30,000T has been removed. This has resulted in the removal of substantial volumes of nutrients such as nitrogen and phosphorus from the Lake as well as improving odour. Indicative cost: 125,000 p.a. Algal blooms occur within the Lake due to a number of potential factors. The impacts of removing wrack upon fish etc that may rely on wrack and other macroalgae for food resources has not been investigated. Indicative cost: 20,000 p.a. Responsibility: WCC and SCC as a partnership project with Wollongong or other University.	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	7	Slow	Slow	Stop	Go	Go	Slow	Go	2	STOP

Table E-2 Multi-criteria Cost Benefit Analysis of Actions for the Lake Illawarra CMP

Action ID	Action Descriptor	Details	Entrance channel changes	Water pollution	Catchment development	Loss of estuarine vegetation	Wetland degradation	Litter, plastics and marine debris	Contaminated sediments	Inappropriate / degraded / insufficient infrastructure	Loss of tangible and intangible cultural heritage	Foreshore development encroaching public land	Loss of riparian habitat	Foreshore and bank erosion	Future climate change	Park management practices impacting adjacent natural areas	Commercial fishing	Introduced species	Cumulative Threat Mitigation Score (TMS) Weighted according to risk rating of threat	Capital Costs	Recurrent Costs	Effectiveness	Community Acceptability	Reversible / Adaptable Future	Legal / Approval Risk	Technical Viability	CBA Score	Overall Outcome (considering TMS and CBA)
		Risk Rating	Very High	Very High	Very High	High	High	High	High	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Low	Very high (x4) High (x3) Medium (x2) Low (x1)	*CBA Scoring: Go = 1, Slow = 0, Stop = -1*								TMS > 30 + CBA ≥ 2 = GO TMS >15 + CBA ≥ 4 = GO TMS <15 + CBA ≤ 2 = STOP TMS <15 + CBA ≥ 4 or TMS > 30 + CBA ≤ 2 = SLOW (for future consideration)
			2=direct positive influence, 1= indirect positive influence, 0 = no influence, -1 = indirect negative influence, -2 indirect negative influence																									
Strategy 6: Protect and Promote Cultural Heritage (CH)																												
CH1	Protect and promote cultural heritage in and around the lake and its catchment	Employ a Cultural Heritage Officer to work on Lake Illawarra with assistance from Federal or State funding processes. This person will work with the Aboriginal and non-Aboriginal community to further cultural awareness activities.	0	1	0	1	1	0	0	1	2	0	1	2	0	1	0	0	27	Go	Go	Go	Go	Go	Go	Go	7	GO
Strategy 7: Manage Foreshore and Bank Erosion and Sedimentation (FB)																												
FB1	Undertake a bank condition assessment and determine environmentally sensitive erosion control measures	• Undertake a bank condition assessment to map foreshores experiencing erosion. • Identify the likely causes of erosion (e.g. stormwater outflow, wind waves, tidal currents). • Prioritise the sites based on their severity, risks from ongoing erosion (e.g. to public safety, nearby seagrasses etc), and feasibility and cost of controlling erosion. • Determine actions to manage erosion, which may include monitoring for sites of low priority / low risk / poor information. • Concept designs for remedial action should preference the use of revegetation, or otherwise utilise the environmentally friendly seawall guidelines for engineered solutions and aim to improve habitat connectivity. • Monitor success or otherwise of remedial action.	2	2	0	1	0	0	1	1	0	1	2	2	0	0	0	0	35	Slow	Slow	Go	Go	Slow	Go	Go	4	GO
FB2	Upgrade foreshore protection works to improve environmental performance and outcomes	The Environmentally Friendly Seawall Guidelines should be used in upgrade designs, to improve the environmental benefits of existing structures.	2	1	0	1	0	0	0	2	0	1	0	2	0	0	0	0	27	Slow	Slow	Go	Go	Slow	Go	Go	4	GO
FB3	Undertake a bathymetric survey of the entire Lake and tributaries up to the tidal limit	Survey should be conducted along transects used previously in the tributary creeks. Methods such as marine-based LiDAR should be considered. Survey should be compared with previous surveys, to determine if and where sedimentation / erosion is occurring on the lake or creek bed. Survey to be completed every 10 – 20 years	0	0	1	1	1	0	1	0	0	1	1	1	1	1	0	0	23	Go	Go	Go	Go	Go	Go	Go	7	GO
Strategy 8: Prepare for Inundation Risks (IR)																												
IR1	Update Asset Management Plans for all publicly owned and managed assets	This involves notation of the risk of periodic and permanent inundation and timeframe of likely impact on asset management registers for roads, stormwater infrastructure, sewer and water infrastructure, community facilities including parks and reserves, cycleways, jetties, boat ramps, entrance training walls and other waterway infrastructure, environmental assets such as saltmarsh, coastal wetlands, etc.	1	0	0	1	1	0	0	2	2	1	1	1	2	1	0	0	34	Go	Go	Go	Go	Go	Go	Go	7	GO
IR2	Whole of Lake Foreshore Adaptation Plan for public (community and environmental) lands	The action involves assessment and selection of adaptation actions for parks /reserves, including their associated assets such as cycleways, jetties, boat ramps, around the entire Lake Illawarra foreshore considering tidal inundation and current and future usage demand	1	0	1	2	1	0	0	2	2	1	2	1	2	0	0	0	41	Go	Go	Go	Go	Go	Go	Go	7	GO
IR3	Incorporate tidal inundation mapping into strategic land use planning documents	For example as a foreshore building line / buffer / setback in the LEPs, DCPs and council policy. Land use planning controls for flooding will not fully manage tidal inundation risks, and additional controls are needed.	1	0	2	2	1	0	0	1	0	2	2	1	2	0	0	0	38	Go	Go	Go	Slow	Go	Go	Go	6	GO
IR4	Water level and condition monitoring for all lake inundation events	• Record the frequency of inundation events (i.e. tidal, ocean anomaly, rainfall), based on review of existing lake water level gauge data, and • Record assets affected and impacts / condition after each event or yearly, as required.	1	0	0	0	0	0	0	2	1	1	1	2	2	0	0	0	25	Go	Go	Go	Go	Go	Go	Go	7	GO
IR5	Investigate novel solutions to manage inundation risks to assets	This action aims to provide novel and innovative solutions to asset replacement where relocation is not viable. Certain assets by their very nature must be located on low-lying high risk lands, for example sewer and water pump stations and stormwater outlets. Other assets targeted include cycleways, roads and bridges, etc.	1	0	1	2	1	0	0	2	0	2	2	1	2	0	0	0	37	Go	Go	Go	Go	Go	Go	Go	7	GO
Strategy 9: Protect and Manage Key Fauna (MF)																												
MF1	Develop and implement a fauna management program including shorebirds fish and other fauna	• Monitor and protect shorebird habitat, foraging and nesting sites on a yearly basis. • Survey recreational fishers on a regular basis (e.g. every 2 years), to gather data on fish species distribution and numbers in the Lake. • Undertake regular official fauna surveys (e.g. every 2-3 years) to better understand fish and other fauna assemblages, distribution and numbers in the lake. • Analyse the data sources (i.e. recreational fishers, fauna surveys, commercial fishing data) to identify trends (increase or decline) in fauna assemblages, numbers etc. • Where a decline or impact on fauna health is identified, determine causes and develop and implement actions to mitigate the decline / impacts, where possible.	1	0	0	1	1	0	0	0	1	1	1	1	1	1	2	2	29	Go	Go	Go	Go	Go	Go	Go	7	GO

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Indicative Costings Table for CMP Implementation – Wollongong Council

Note that these costs are indicative only and are subject to usual Council planning and budgeting processes.

Improve Water Quality (WQ)

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
WQ1 Implement Risk Based Stormwater Management Framework	$220,000	$0	$13,333	$0
WQ2 Upgrade existing stormwater quality measures	$1,525,000	$16,667	$260,000	$633,333
WQ3 Review and prioritise maintenance for existing stormwater devices	$2,455,000	$16,667	$530,000	$850,000
WQ4 Design and implement targeted monitoring for large scale developments	$25,000	$16,667	$0	$0
WQ5 Improve compliance with erosion and sediment controls for development	$320,000	$80,000	$80,000	$0
WQ6 Reduce the impact of sewer overflows	$0	$0	$0	$0
WQ7 Undertake estuary health water quality monitoring	$540,000	$36,000	$144,000	$180,000
WQ8 Undertake recreational use water quality monitoring	$140,000	$9,333	$37,333	$46,667
WQ9 Manage potential pollution sources including contaminated sites	$60,000	$0	$40,000	$0
WQ10 Undertake in-stream water quality testing in the lake catchment	$600,000	$40,000	$160,000	$200,000

Improve Planning and Management Arrangements for the Lake (PM)

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
PM1 Integrate key objectives of the CMP into planning and policy documents	$100,000	$0	$50,000	$0
PM2 Provide ongoing coordinated management of the lake	$2,500,000	$166,66	$666,667	$833,333
PM3 Develop a community engagement and participation strategy	$980,000	$53,333	$266,667	$333,333
PM4 Establish a Lake Illawarra Asset Management Working Group	$70,000	$16,667	$13,333	$16,666

Manage the Entrance Channel (EC)

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
EC1 Investigate entrance channel processes and implement solutions	$6,210,000	$300,000	$910,000	$5,000,000
EC2 Undertake small scale works (eg beach scraping) to maintain swimming areas.	$300,000	$0	$0	$0
EC3 Undertake dredging in the entrance channel to maintain navigation	$2,000,000	$0	$1,333,333	$0
EC4 Monitor changes to the entrance channel	$20,000	$0	$0	$0
EC5 Monitor, maintain and if required upgrade channel infrastructure	$2,400,000	$0	$0	$0

Protect and Rehabilitate Estuarine and Riparian Vegetation (EV)

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
EV1 Rehabilitate vegetation and manage public access	$2,855,00	$289,500	$778,000	$647,500
EV2 Undertake targeted action to control damage to vegetation, including seagrasses	$1,100,00	$83,333	$333,333	$366,667
EV3 Prepare and deliver community information program	$120,00	$20,000	$26,667	$33,333
EV4 Prepare and implement estuarine vegetation mapping and monitoring program	$85,00	$16,667	$23,333	$16,667
EV5 Develop and implement program to enhance opportunities for vegetation migration.	$275,000.0	$0	$116,667	$50,000

Prepare for Inundation Risks (IR)

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
IR1 Update asset management plans to identify risk of inundation	$50,000	$0	$0	$0
IR2 Develop a whole of lake foreshore adaptation plan for public lands	$80,000	$0	$6,667	$46,667
IR3 Incorporate tidal inundation mapping into strategic land use planning documents	$20,000	$0	$13,333	$0
IR4 Undertake water level and condition monitoring for all lake inundation events	$100,000	$6,667	$26,667	$33,333
IR5 Investigate solutions to manage inundation risks to assets	$30,000	$0	$6,667	$13,333

Maintain and improve Recreational Amenity (RA)

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
RA1 Manage foreshore and waterway infrastructure	$8,760,000	$351,667	$1,800,000	$2,875,000
RA2 Construct new sections of shared pathway	$1,520,000	$50,000	$580,000	$400,000
RA3 Investigate opportunities to increase public access along the foreshore	$0	$0	$0	$0

Manage Foreshore and Bank Erosion Sedimentation (FB)

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
FB1 Undertake bank condition assessment and implement erosion control measures	$310,000	$36,667	$130,000	$16,667
FB2 Improve the environmental performance of foreshore protection works	$150,000	$0	$100,000	$0
FB3 Undertake bathymetric survey of the lake floor and tributaries up to the tidal limit.	$50,000	$0	$33,333	$0

Protect and Promote Cultural Heritage (CH)

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
CH1 Protect and promote cultural heritage in and around the lake and its catchment	$1,200,000	$80,000	$320,000	$400,000

Protect and Manage Key Fauna (MF)

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
MF1 Develop and implement fauna management program	$125,000	$13,333	$40,000	$30,000

TOTAL

Action	Total Indicative Cost for the action over 10 years	Total indicative cost to WCC Year 1 (20/21 – 21/22)	Total indicative cost to WCC Year 2-5 (21/22 – 24/25)	Total indicative cost to WCC Year 6-10 (25/26 – 30/31)
All actions	$37,335,000	$1,699,833	$8,839,333	$12,992,500
		$23,531,667		

File: GCS-920.05.008 Doc: IC19/397

ITEM 3 ELECTRIC VEHICLES AND ASSOCIATED CHARGING INFRASTRUCTURE

Australia has a low uptake of Electric Vehicles (EV's) in comparison with other developed nations. Research has identified existing high EV purchase costs (with no current Government subsidies or benefit) and 'range anxiety' as two of the biggest factors contributing to low uptake rates. This is expected to change as the range of EV models increases and prices continue to trend downwards.

In support of the environmental benefits of EV's, Council is investigating the installation of privately managed electric vehicle charging stations on public land and is currently assessing the policy implications of the use of public land for such ventures.

Council has commenced the introduction of hybrid vehicles in the light vehicle fleet, noting that these vehicles have the lowest total emissions ratings of most other vehicles available today inclusive of EV offerings when the source of the charging electricity is included.

This report provides a summary of actions taken to date in relation to low-emission vehicles and EV charging infrastructure and proposed next steps in this journey.

RECOMMENDATIONS

1 Council endorse the development of an Electric Vehicle (EV) Charging Stations on Public Land Policy.

2 Council note the addition of hybrid and lower-emission vehicles into the Council light vehicle fleet.

REPORT AUTHORISATIONS

Report of: Todd Hopwood, Manager Governance and Customer Service and Chris Stewart, Manager City Strategy

Authorised by: Renee Campbell, Director Corporate Services - Connected + Engaged City

ATTACHMENTS

There are no attachments for this report.

BACKGROUND

At its meeting held on 31 July, 2017 Council considered a Notice of Motion in relation to electric vehicles and resolved as follows:

"1 A report come to Council, accompanied by a briefing, on measures available to Council to accelerate the uptake of electric vehicles in the Wollongong Local Government area.

2 The report to include the feasibility of electric vehicles replacing some of Council's existing fleet."

There are 5 existing charging station options available in the Wollongong LGA, none of which are completely accessible on public land. These sites are at the University of Wollongong (1 station Northfields Avenue Keiraville), the UOW Innovation Campus (1 station Squires Way Fairy Meadow), Figtree Grove (2 stations near the up ramp for first floor parking), the Wollongong Central Market St parking station (3 stations – 2 Tesla) and Warrawong Plaza (2 stations near Jax).

In 2018, approximately 2,700 EV were sold in Australia, which represents an 18% increase from the previous year but is still only minor (0.23%) in terms of total worldwide electric vehicle sales which in 2017 exceeded 1.153 million vehicles.

In 2017 the number of electric vehicle charging stations in Australia increased by 64%, and there is now approximately 1 charging station for every 6 vehicles (783 stations now in total). Previously there was a prevalence of the recharging stations in our capital cities but various initiatives have seen this ratio change to almost 50:50 split between city and regional areas.

Despite these changes, there is still 'range anxiety', that is that a driver will run out of charge before they reach a charging station and be left stranded, due to the size of the regional area to be covered in Australia and the communication of where these sites are.

GLOBAL COVENANT OF MAYORS FOR CLIMATE AND ENERGY

Council became a signatory to the Global Covenant of Mayors for Climate and Energy (GCoM) in August 2017 following a resolution of Council. The GCoM is an international alliance of cities and local governments with a shared long-term vision of promoting and supporting voluntary action to combat climate change and move to a low emission, climate resilient society. The GCoM merges the Compact of Mayors and the EU based Covenant of Mayors with 9,174 cities around the world having committed to date.

The GCoM is comprised of two streams; climate change mitigation and climate change adaptation. Transportation emissions account for 19% of community emissions and the provision of EV charging infrastructure would support emissions reductions in this area thereby contributing to climate change mitigation.

PROPOSAL

This report addresses both parts of the previous resolution. Detailed below is a summary of the actions taken thus far and intended future actions in relation to the measures available to Council to accelerate the uptake of EVs in the Wollongong Local Government Area as well as the actions taken to introduce low-emission vehicles into Council's light vehicle fleet.

EV CHARGING STATIONS ON PUBLIC LAND

Council has the opportunity to install charging infrastructure in existing accessible parking locations to assist with the uptake of EVs in the council area.

An important consideration for the supply of EV charging infrastructure is the source of electricity used to charge the batteries. In NSW the majority of power is generated from coal fired power stations, in spite of this, the emissions from EV are still lower than that of petrol/diesel passenger vehicles; with EVs having an average emissions intensity of 160 g CO_2/km when including the consideration of where the re-charging power is generated. This may decrease further as the electricity grid becomes 'greener'.

It is worth noting that Hybrid vehicles generally have much lower volumes of emissions, for example the Toyota Prius, only emits approximately 84g CO_2/km, which is almost half of the emissions of the average EV if it is charged from standard coal fired powered electricity.

The NRMA has embarked on a project for the installation of charging stations in New South Wales based upon radial distances from Sydney in an endeavour to address "range anxiety". The proposed initial skeleton network of the 40 sites did not include Wollongong due to the consideration that Wollongong is too close to Sydney and therefore not aligning with addressing "range anxiety" considerations. The NRMA worked on a range of charging stations every 200km from Sydney, as such Wollongong was considered too close to Sydney to participate in this program.

Conceptually NRMA proposes "Destination Charging" where tourism/extended visits are encouraged with the placement and subsequent use of this regional re-charging network to encourage business interaction. Council continues to engage with the NRMA as they have called for local councils to demonstrate their interest in having a charging station in their local area. The NRMA is committed to further rollouts of EV Charging Infrastructure and Council has expressed its desire to be involved as a potential partner as Wollongong is a popular day trip and short stay destination for many of their members based in Sydney. Acknowledging the fast pace change in this area, Council has also made contact with Australian based EV Charging Infrastructure manufacturers so staff are aware of technical and site requirements of equipment to ensure that this is incorporated into any criteria for potential site selection.

To support the changing motor vehicle market place, and in consideration of the possibility that Council may not be selected to participate in any future stages of the NRMA Electric Vehicle Fast Charging Network, Council is progressing the introduction of additional charging points on council owned land within Wollongong LGA. A policy on charging stations on public land is in the early draft stages and will provide criteria for the provision, installation, management, maintenance and removal of EV charging infrastructure situated on public land.

There are specific requirements for site selection to minimise infrastructure costs, for example the existence of 11kV high voltage power lines. Council will also need to dedicate 2 existing car parking spaces if installing charging units at the locations chosen. This is due to location of charging points on the vehicles being unregulated and they can differ in location depending on the make of vehicle.

The specific locations for these sites requires further investigation in alignment with operational needs and Policy guidelines once developed. It is anticipated that preferable locations will be locations that are attractive/accessible to tourists rather that in areas such shopping, business districts as people who would generally use those would only be driving short distances and would have the opportunity to charge at home. The policy will identify a number of criteria that will assist in determining suitable locations for charging stations.

The costs associated with installing rapid chargers are anywhere from $70,000 to $150,000 per unit, depending on site costs (the unit cost is approximately $35,000).

It is intended that Council would conduct an Expression of Interest / Tender process to have a third party operator supply, install and manage charging stations located on public land throughout the Wollongong LGA. An EOI / Tender process will commence upon adoption of the EV Charging Stations on Public Land Policy.

EV CHARGING STATIONS ON PRIVATE LAND

Council has limited avenues to encourage the installation of charging stations on private land. Individual consumers can install a slow or trickle charger in a residential property for approximately $1500 - $3000. Council can however look at incentives or concessions that can be provided to developers of high density residential or commercial properties to provide EV charging stations within their developments. This is currently being investigated by the City Strategy team.

MOTOR VEHICLE FLEET SELECTION

At this stage in the development and maturity of Battery EVs in Australia, Council has not proposed to implement these types of vehicles within Council's Motor Vehicle fleet until the availability of more affordable "general" market Battery EVs is increased and better infrastructure is available in the Wollongong LGA for the recharging of these vehicles. This decision has also taken into consideration the source of electricity that would be used to charge the batteries of any Council EVs. As Council's electricity supply is still primarily generated from coal fired power stations, hybrid vehicles currently present the lowest emission footprint for Council. This may change if Council moves to procure green energy at a future point.

With the impending arrival on the Australian market of more Hybrid Technology Vehicles, Battery EVs and Hydrogen Powered Vehicles, Council's Vehicle Acquisition Strategy has been re-drafted and adopted to allow for the inclusion of such varying vehicle types to be considered.

There are several Hybrid EVs that are on the Australian Market now that are available under the NSW Government Pre-Qualification scheme for Motor Vehicles (SCM0653). These Hybrid EVs are fuelled by Unleaded Petrol and run Petrol and Electric Motors in synergy. These vehicles are now priced at a minimal initial capital premium to the traditional internal combustion powered equivalents. Toyota manufacture and supply the Prius range of hybrid vehicles and have now included this hybrid technology in less expensive vehicles in their fleet including Corolla, Camry and now the new RAV4 SUV.

Council's Vehicle Acquisition Matrix has included provision of Hybrid Vehicles within Council's Fleet. The Toyota Camry Hybrid has now been included in place of the standard petrol model Camry, the Toyota Corolla Hybrid has been included in place of the standard petrol model. Council is currently trialling the recently released hybrid Toyota RAV4 with a view to introducing it into Council's fleet if the trial results are favourable. Council is already now operating a hybrid Corolla within Council's fleet, with an additional two to be introduced into the fleet in the near future. Council's only dedicated pool vehicle will be replaced soon with a hybrid Toyota Corolla.

The addition of Hybrid EVs to Council's fleet will help Council to reduce its fuel consumption and tailpipe emissions from the motor vehicle fleet whilst still providing capability to provide a range of services to the community.

Council is investigating other low emission technologies and has commenced discussions with Toyota in relation to the trialling of their Mirai Hydrogen Fuel Cell Vehicle. This vehicle has already been tested in Victoria successfully and Council staff attended the Toyota "Insight to the Future" program in May to review this technology and Toyota's other developing low emission products and technologies. Their projections for future transport options include a wide variety of fuel options and vehicle types, depending on user requirements.

FUEL SECURITY

Australia has a significant reliance on imported petroleum fuels, with 90% of petroleum fuels being imported. This dependence leaves our transport networks and national security vulnerable to geopolitical instability.

With electricity generation being based within our country and zero reliance on imports, there is greater potential for Australia to be less vulnerable to fuel security issues (subject to the installation of charging infrastructure being accessible) with the greater uptake of the EV.

There has also been an upswing in the promotion of hydrogen fuel cell technology for fleet applications and also the potential of an export commodity market for hydrogen generation export from Australian resources. Such self-generation of power via hydrogen further reduces Australia's reliance upon international markets and importation of "fuel", and also assists with fuel security and reducing emissions.

In identifying the opportunities for further low emission technologies Council has been in initial discussions with the University of Wollongong (UOW) - Future Fuels Cooperative Research Centre (CRC). This CRC is where six universities are federally funded to research into the pivotal roles alternate fuels will play in a low-carbon emission economy. This is inclusive of fuels such as hydrogen and biogas and liquid derivatives - ammonia and methanol. Council will continue to work with manufacturers, the UOW and other local, state and federal entities to identify opportunities to continue to reduce the overall emissions of Council's light vehicle fleet.

CONSULTATION AND COMMUNICATION

Council staff have consulted with a number of organisations to inform the development of Council's approach in this important area. These include:

- The NRMA in relation to exploring opportunities to participate in their EV charging open road network.

- Toyota Australia to discuss evolving technologies, including fully electric, plug in hybrids, hybrids and Hydrogen vehicles. This has led to the current trial of a Toyota Hybrid RAV 4 in Council's light vehicle fleet.

- UOW - Future Fuels CRC - to determine potential benefits and opportunities arising from current research into future fuel alternatives.

PLANNING AND POLICY IMPACT

This report contributes to the delivery of Wollongong 2028 "Goal 1 - We value and protect our natural environment, Goal 2 – We have an innovative and sustainable economy, Goal 6 – We have sustainable, affordable and accessible transport". It specifically delivery on the following objectives -

Objective 1.2 – We practice sustainable living and reduce our ecological footprint

Objective 2.2 – The regions industry base is diversified

Objective 6.1 – Wollongong is supported by an integrated transported system.

It specifically delivers on the following Strategies and Actions:

Community Strategic Plan	Delivery Program 2018-2021	Operational Plan 2018-19
Strategy	3 Year Action	Operational Plan Actions
1.2.1 Reduce our ecological footprint, working together to minimise the impacts of climate change and reduce waste going to landfill	1.2.1.1 Develop and implement a range of programs that encourage community participation in reducing Wollongong's ecological footprint	1.2.1.1.1 Coordinate community environmental programs including: Rise and Shine, Clean Up Australia Day, World Environment Day, National Recycling Week, International Composting Week and other waste education activities
	1.2.1.3 Methods to reduce emissions are investigated and utilized.	1.2.1.3.3 Participate in the Global Covenant of Mayors and set emissions reduction targets for the LGA
		1.2.1.3.4 Monitor and report on organizational water, energy and greenhouse gas emissions trends
1.2.2 Government and community work together to mitigate the impacts of climate change on our environment and future generations	1.2.2.1 Our community is proactively engaged in a range of initiatives that improve the sustainability of our environments	1.2.2.1.3 Develop a project and work with partners to further explore the United Nations Sustainable Development Goals and how they align to the community's goals with funding to be considered through the business proposal process
		1.2.2.1.4 Implement resourced priority actions from the Environmental Sustainability Strategy 2014-22
2.2.1 Further diversify the region's economy through a focus on new and disruptive industries and green technology	2.2.1.1 The development of renewable energy products and services is supported	2.2.1.1.1 Seek out opportunities to incorporate green technologies in Council's projects and contracts
6.1.3 Effective and integrated regional transport with a focus on road, bus, rail and freight movement (including the port of Port Kembla)	6.1.3.1 Plan and implement an integrated and sustainable transport network	6.1.3.1.2 Develop a Sustainable Transport Strategy

Reducing greenhouse emissions is also a priority in the Environmental Sustainability Strategy 2014-2022:

- Focus Area 2 - Reducing our ecological footprint – reducing emissions from Council operations.
- Focus Area 5 – demonstrating Sustainable Leadership and Governance – complying with Global Covenant of Mayors requirements, which includes setting emissions reduction targets and developing an action plan to achieve the target.

Ecological Sustainability

The provision of EV charging stations will facilitate the uptake of electric vehicles by providing publicly available charging options within the LGA. This will result in reduced transport emissions (as emissions from EVs with black power are still less than petroleum fuels). The reduction in transport emissions and the provision of hybrid and/or electric vehicles in the fleet will reduce the emissions from Council's own operations and also assist in reaching the community emissions reduction target of the Global Covenant of Mayors for Climate and Energy requirements.

RISK ASSESSMENT

There are a number of potential risks to both installing and not installing EV charging infrastructure.

The risks associated with not installing the charging stations are based upon reputational, cost and environmental concerns. The reputational risk is Council being seen as not supporting environmental infrastructure when surrounding Councils and the NRMA are facilitating the installation of these charging stations on public land.

The risks associated with installing charging stations are predominantly the costs of installing of the infrastructure, costs may have to be solely borne by Council. Future partnerships with external retailers could alleviate such risk/expense. There is additionally a technology risk and financials risks if the EV charging technology becomes redundant and there is a need to remove or replace equipment prior to operational life cycles being fulfilled and full cost recovery has occurred.

FINANCIAL IMPLICATIONS

There are no direct cost implications of the development of an EV Charging Stations on Public Land Policy nor the continued work to reduce the overall emissions of Council's light vehicle fleet which are undertaken using existing resources of the City Strategy and Supply Chain Logistics teams respectively.

If Council progresses to the installation of EV charging stations, this will involve between $10,000 - $50,000 of site costs per site, plus at least $35,000 for the relevant charging infrastructure.

CONCLUSION

There are currently five electric vehicle charging stations that are publicly accessible in the Wollongong LGA, all located on accessible private land. Installing charging infrastructure on public land, with particular focus on areas visited by tourists, would assist to alleviate range anxiety and provide increased public access to charging infrastructure – encouraging engagement of the EV technology.

The continued introduction of low emission technologies within Council's operational fleet via the increased availability of hybrid vehicles and other emerging technologies and variants will reduce Council's emission profile.

It is important for Council to not only introduce technology that provides a community benefit but also provide infrastructure to support the community to transition to low emission alternatives and technologies. This will involve collaboration with industry, government and bodies such as the UOW in investigating all options available and being adaptable and responsive to evolving technologies and markets.

File: RG-914.04.003 Doc: IC19/398

ITEM 4 POLICY REVIEW - DOGS ON BEACHES AND PARKS POLICY

This report provides details of the community consultation and exhibition of the Dogs on Beaches and Parks Policy and recommends the adoption of the revised Policy which includes an additional park based off-leash area at Reed Park Dapto, as well as administrative and operational changes. Enhanced Ranger Services are proposed along with improved signage, educational material and additional dog waste bag dispensers and bins.

RECOMMENDATIONS

1 An off-leash dog area be declared at Reed Park, Dapto and that this area be fenced.

2 The revised Dogs on Beaches and Parks Policy be adopted.

3 The revised Dogs on Beaches and Parks Policy be widely promoted.

REPORT AUTHORISATIONS

Report of: Danny Madigan, Manager Regulation and Enforcement
Authorised by: Mark Riordan, Director Planning and Environment - Future City and Neighbourhoods (Acting)

ATTACHMENTS

1 Existing Dogs on Beaches and Parks Policy
2 Draft revised Dogs on Beaches and Parks Policy
3 Proposed Off-Leash Dog Area - Reed Park, Dapto

BACKGROUND

The Companion Animals Act 1998 requires Council to establish at least one dog off-leash area. Council responded by establishing the original Dogs on Beaches and Parks Policy in 2002. The areas established essentially provided for off-leash free access on beaches and parks where dogs were already being exercised.

There have been a number of reviews of the Policy since that time and all changes were developed based on considerable community consultation (2001, 2006, 2009, 2010, 2014, 2016 and 2018), including specific Aboriginal consultation, a comprehensive Review of Environmental Factors (REF00499) and a peer review of the REF by Lesryk Environmental Consultants. The 2014 Policy review (Attachment 1) also included an assessment of the publication 'Public Open Space and Dogs - A design and management guide for open space professionals and Local Government by Harlock Jackson Pty Ltd, August 1995' an accepted guide for Local Government in planning for dogs in public open space.

Council also considered a report on 25 July 2016 and resolved that, *"…proposed new dog / off-leash areas (Parks) be considered in the review of the Dogs on Beaches & Parks Policy."*

The following parks were assessed as suitable off-leash dog areas but the report noted community consultation about the proposal would be required when the Policy was next reviewed -

- Bellambi Oval, Bott Drive, Bellambi
- Reed Park Dapto
- Northern end JJ Kelly Park – Illawarra Dog Training Club site

Council now provides a high level of access for dogs on beaches and parks across the City. This is important given the high level of dog ownership across the City is large. As at 31 March 2019, there were 60,547 dogs identified in Wollongong on the NSW Companion Animal Register. In addition it is

estimated, based on pound statistics, that there are also another 12,500 un-microchipped dogs in the City. This level of ownership ranks the City as the third highest for dog ownership in New South Wales.

The current review of the Policy commenced in late 2018 with Government Agency and community consultation.

PROPOSAL

Administrative and operational changes to the Policy (Attachment 2) are proposed below -

- changes to the Policy objectives to specifically include improved environmental and heritage protection;
- administrative changes to the Policy in regards language, style and set out;
- the inclusion of specific measures aimed at improving and increasing the protection of Aboriginal heritage;
- enhanced signage placement and promotional and public awareness raising materials;
- the declaration of an off-leash and fenced dog area (Green Zone) at Reed Park Dapto;
- enhanced compliance and enforcement activities.

Changes to the objectives of the Policy reflecting legislative requirements around heritage and environmental protection are strongly supported by NSW government agencies and staff, and have been included in the draft.

The changes in design, language and set out of the Policy clarify requirements so they are more readily defined and understood. Background information relating to the historic development of the Policy has been removed to ensure that the Policy is more concise.

The inclusion of specific additional measures to better ensure the protection and impact minimisation of Aboriginal heritage areas is strongly supported by government agencies and staff. Implementation of these measures will help mitigate the potential impacts of dogs on the very important Aboriginal places of significance in the City.

Improvements in signage to better identify declared dog control areas and to inform dog owners about their responsibilities is proposed and is strongly supported by government agency and community requests. Similarly, increased and improved siting of dog-waste bag dispensers and waste bins is also proposed.

The proposed establishment of an off-leash dog area at Reed Park Dapto (Attachment 3) is derived from Council's resolution on 25 July 2016. Submissions received from users of this reserve and from large numbers of the broader community support the establishment of a dog off-leash area at Reed Park, but request the area be fenced and provided with services such as water, waste bins and seating. The off-leash parks earlier proposed for consideration at Bott Drive Bellambi and JJ Kelly Reserve Wollongong are not supported.

The enhancement of companion animal compliance and enforcement activities was a strong theme during the community consultation and engagement process. Operational changes have been made to better achieve the required standard of enforcement and compliance required, and to enhance animal control services particularly over weekend periods.

CONSULTATION AND COMMUNICATION

Community Comment

The consultation and engagement regarding the review of the Dogs on Beaches and Parks Policy ran from 6 November to 10 December 2018. Proposed new off-leash park locations and facilities were also considered during this review. Feedback was sought on the following areas –

1 Dogs on Beaches and Parks Policy

2 Establishment of three new off-leash parks at Bellambi Oval, Bott Drive, Bellambi, JJ Kelly Park, Wollongong and Reed Park, Dapto

3 Types of equipment to be considered for off-leash parks.

The total number of submissions received during the exhibition was 280, with 220 submissions via the 'Have Your Say' website and 59 submissions via email, letter and feedback form. One petition was received with 1088 signatures.

General Feedback

General feedback regarding the Dogs on Beaches and Parks Policy attracted a diverse range of responses. The main theme was in relation to fencing dog off-leash areas with respondents suggesting fencing would keep dogs safe from traffic, avoid impact with other activities and define the space where off-leash activity was permitted. Concerns about the impacts of dog waste and/or the need to supply dog waste bins and replenish waste bags at all off-leash areas was another common theme. Respondents indicated this was necessary to reduce the impact of waste, promote amenity and health and to ensure that peak usage sites were adequately catered for.

The environmental impact on endangered and threatened species was raised in regard to McCauleys Beach. General feedback recommended increased education and awareness around the timing and off-leash zones, and the definition of orange zone and timed access was important. The placement of signage at beach entry points and in unobstructed off-leash park areas was suggested to support education. There was support for increased enforcement to ensure that dog owners who do not comply with the requirements of dog off-leash areas are fined.

Feedback was generally in support of the three proposed off-leash areas. The highest level of support was for Reed Park, Dapto, provided the area was fenced. The location was viewed as suitable use of green space, particularly to service the growing population in the area. Many dog owners commented they currently travel outside the City to access dog parks. There was a high level of support from respondents to fence the area, supported by the concerns about nearby traffic and the safety that a fenced area would provide.

Although the proposed location at Bott Drive, Bellambi received a high level of support, there were a range of concerns presented including land tenure, the proximity of bushland habitat, and safety issues for users of the adjacent cycleway and adjacent recreation areas. It was also suggested that this location was not suitable for an off-leash area due to its close proximity to the adjacent existing beach off-leash area.

Overall, comments were in favour of the proposal at the Illawarra Dog Training Club at JJ Kelly Park, however this location also had the highest number of comments in opposition to a dog off-leash area. While respondents felt a dog off-leash park was needed in central Wollongong, the main concern referred to the potential impact of an off-leash dog area on the existing formalised dog activities at this site. The greatest concern raised referred to the existing formal dog activities (Illawarra Dog Training Club) at the space and how an off-leash area would impact that existing use.

As a consequence an alternate area of JJ Kelly Reserve on the western side of the creek was explored. Consultation with the user groups of the reserve adjacent was undertaken. Potential impact with users of the sporting fields adjacent was identified including Collegians Junior Rugby League and Coniston Football clubs and as such an off-leash dog park at JJ Kelly Reserve is not at this stage supported.

Various dog exercise equipment was presented for feedback such as bollard runs, dual-use bubblers and tunnels. The most support was for a dual purpose drinking bubbler. Respondents most frequently commented that fencing and the provision of dog waste bags and bins were important at off-leash parks.

Community comments regarding the Policy review were received across the common themes as detailed below.

Issue / Theme	Description	Staff Comment
Equipment and infrastructure	A requirement for a fenced off-leash dog park in the City with infrastructure including water, seating, waste bins and dog waste bags.	A fenced park at Dapto for dogs off-leash is supported
	Upgrading signage in existing off-leash parks	Noted and supported
	Provision of dog waste collection bags and bins at more beach and park locations stocked to cover weekends	Noted and supported
Environmental impacts	Concern re the impact of dog leash free areas on biodiversity (fauna and vegetation)	Noted and supported - Objectives are proposed to include environmental protection
	Support for enclosed areas for dogs without annoying people or endangering wildlife	Noted - a fenced reserve at Dapto is supported
	Concern re the off-leash area at McCauleys Beach re environmental impacts. The Illawarra Aboriginal Land Council requested the removal of the dogs off-leash area on this particular beach due to environmental and cultural concerns.	Changes to the off-leash (green) zone are not proposed at McCauleys Beach but measures aimed at reducing any potential impact have been incorporated in the proposed draft Policy.
Additional sites for off-leash dog areas.	Rezone Fisherman's Beach and East Corrimal Beach to dog prohibited beaches, and consider dog off-leash areas on beaches in un-flagged areas.	The existing beach based zones are considered reasonable
	Extend the off-leash area at Windang Beach	Not supported due to OEH concerns
	Consider off-leash area for Helensburgh	There is an existing off-leash reserve at Helensburgh
Safety and enforcement	Ensuring animals do not harass/intimidate people enjoying outdoor areas and ensure there are adequate dog free beaches and parks where children can play and increase compliance and enforcement.	Noted and comments generally incorporated
	Increase enforcement of dog owners who do not pick up dog waste	Enhancement of enforcement activities is proposed particularly over weekends.
	Provide safer access to dog off-leash areas and alternative entry points to locations frequented by anti-social behaviour	Supported
Social impacts	Ensure the Policy notes the importance of companion animals to health and community wellbeing etc	Supported and already included in the Policy
	Ensure off-leash parks are accessible for dog owners who have mobility constraints and cannot access beaches and walk safely in sand	The draft Policy includes the existing five off-leash parks across the City and proposes an off-leash park at Dapto
Increased	Enhance awareness raising resources to better promote the current off-leash areas and expectations	Noted and supported

Issue / Theme	Description	Staff Comment
education	regarding animal management	
	Review signage location for increased clarity and to support education and enforcement activities	Noted and supported
Consultation and decision making	Work more closely with dog groups and dog owners and improve consultation with industry groups such as Veterinary Practices	Noted and supported
Planning	Develop a planned network of dog parks across the region to accommodate the growth of the City and increasing dog ownership and consider dual purpose spaces with off-leash areas available in sporting clubs off season Implement integrated planning for dog parks into neighbourhood planning. Consider more, smaller and fenced off-leash areas in each neighbourhood	Noted - regular review of the Policy and other recreation planning strategy documents is planned
Specific dog breeds	Provide for all dogs but specifically retired greyhounds. There is a large community of owners of ex-racing greyhounds in the Illawarra. Fighting bred dogs or crosses of these breeds should not be allowed to use these areas unless the dog is properly socialised.	Noted - owner responsibility is key in regard this issue Restricted breeds are regulated in the legislation

A petition was also received during the consultation period which included 1088 online signatures supporting the following statement:

"Build a fully fenced dog park in Wollongong".

The petition was supported by comments that were consistent with the themes of fencing, safety and social impacts. The comments referenced the importance of having a safe space to bring dogs to socialise, that fencing of dog parks was important, and that dog parks were an important place for dogs to interact and bring the community together. Dog off-leash parks also offer an important facility and resource for dog owners who cannot access beach areas.

Government Agency comment

Specific comment regarding the review of the Policy was also sought from government agencies including Department Primary Industries (Fisheries), Crown Lands and the NSW Office of Environment and Heritage. (OEH). Responses were received from OEH. The comments received are collated in the following table -

NSW Office of Environment & Heritage (OEH)		
Issue	**Description / Location**	**Staff Comment**
Policy Objectives	Strengthen Policy objectives with regard biodiversity and heritage protection	An increase in emphasis on wildlife protection is supported and the Policy has been amended to reflect this
Wading Bird Protection	Continue the prohibition of dogs on all rock platforms across the City	No changes to the status of rock platforms as dog prohibited wildlife protection areas is proposed
Policy Enforcement	OEH remarked enforcement and regulation of the Policy appears to be under-resourced. The Windang sandflats were noted as a particular area of concern	Greater collaboration with OEH regarding wildlife protection areas is supported. No change to the

NSW Office of Environment & Heritage (OEH)		
Issue	**Description / Location**	**Staff Comment**
	and OEH are seeking greater collaboration with Council regarding companion animals and wildlife protection areas.	RED zone at Windang is proposed. Strengthening of weekend enforcement activities has been programmed.
Community education & awareness raising activities.	Increase awareness raising and proactive compliance activities regarding the wildlife protection of wading and migratory bird habitat	Increased community awareness raising is a key component of the Policy and was a consistent theme of the broader consultation and is supported
Aboriginal heritage management	OEH requested the Policy be revised to ensure consistency of control measures with Heritage Management Plans particularly in regard McCauleys / Sandon Point and Hill 60 Port Kembla	Noted and supported and included in the draft Policy
	OEH noted that the Sandon Point Declared Aboriginal Place extends to the Low Water Mark and request that dogs on the beach be regulated to satisfy the requirements of the declaration	Noted and supported - refer to comment in theme below
	OEH requested that the values of the Sandon Point and Hill 60 Declared Aboriginal Places be specifically recognised in the Policy and that details of how the values of these places will be protected from the impacts of off-leash areas needs to be included in the Policy	Supported and included in the draft Policy
	OEH supported the criteria in the Policy regarding off-leash areas but suggest cultural and heritage protection should be included in addition to “Environmental Protection Areas”.	Supported and included in the Draft Policy
	OEH supported the provisions of the Policy in regard the areas where dogs are prohibited.	Supported - no changes are proposed to areas where dogs are prohibited
Strategies & controls for impact management	OEH suggested that where Aboriginal heritage values may be impacted by off-leash control areas that the following management strategies be included in the Policy. - Managed beach access for dog owners to limit the impacts to dunal vegetation and potential archaeological sites, - Installation of improved signage and waste disposal bins to limit faeces and litter, - Restriction of access by off leash dogs to the dunal areas, - Enhancing enforcement and ensuring greater compliance with Policy provisions, - Monitoring the Policy provisions to identify impact areas relating to off leash dogs and aboriginal heritage values.	Supported - these requested elements strengthen the management of any impacts that may potentially be caused by dogs and have all been incorporated into the draft revised Policy
General	OEH suggested that specific Aboriginal consultation	Agreed and Noted - Engagement

NSW Office of Environment & Heritage (OEH)		
Issue	**Description / Location**	**Staff Comment**
comments	regarding the Policy review be undertaken particularly in the focus areas of Sandon Point / McCauleys Beach, Bellambi Point and East Corrimal, North Wollongong Beach, Hill 60 and Windang Beach	staff undertook specific consultation during the engagement period
	OEH suggested future Policy reviews consider a broader LGA assessment and approach to establishing companion animal control areas	The next review of the Policy is scheduled prior to 2024. Greater City wide consultation and assessment in regards general recreation needs is supported

Late Submissions

Individual submissions were also received early in 2019 (after the consultation period) from residents of Stanwell Park. These submissions suggested changes to the Stanwell Park off-leash beach area. The approved off-leash area was established in 2010 and is located at the northern end of the beach. The submissions received raised common issues with the existing off-leash area relating to conflict with other beach users. The submissions conclude the issues have resulted from general increased patronage of the beach, from park reserve overflow, from the lifeguard patrolled area now being located more towards the northern end of the beach, and from hang glider and paraglider landings just to the south of the leash free area. The submissions highlight this increased usage as an area of risk to beach users.

Property and Recreation staff have commented that - “Council’s patrolled bathing area moves along the beach dependent on tides, weather, sea and the predominant sand bank position. In the past the mid to southern section of the beach near the Surf Life Saving Club provided better sand banks to establish a safe bathing area, but over the past summer the mid to north section of the beach was the safest area.”

In addition a petition with 63 signatures was received in February 2019 requesting that Woonona Beach be re-classified from ORANGE to GREEN – off-leash zone between the Lighthorse Drive access south to Bellambi. This area is currently limited in accessways, however may be suitable as an additional off-leash area subject to further community consultation.

No detailed assessment or broader community consultation regarding these proposals at Stanwell Park and East Woonona has been undertaken. Should Council wish to proceed with an assessment of these requests to modify the current control areas, specific community engagement and consultation will be required. In this circumstance the following option may be considered.

> *That changes to the current declared dog control areas at Stanwell Park Beach and East Woonona Beach be subject of specific community consultation and engagement and be subject of a subsequent report to Council in regard a possible amendment of the Policy.*

PLANNING AND POLICY IMPACT

This report contributes to the delivery of Our Wollongong 2028 Goal 1 “*We value and protect our environment*”, and Goal 5, “*We have a healthy community in a liveable City*”.

It specifically delivers on core business activities as detailed in the Regulatory Control Service Plan 2018-19.

FINANCIAL IMPLICATIONS

Major changes to the Dogs on Beaches and Parks Policy are not proposed. Administrative changes to language and style will not have financial impact. Publicity around the revised Policy and the renewal of community education resources such as brochures, web information and media will also be funded from existing budget. The review of infrastructure such as dog waste bag dispensers and waste bins

locations, as well as the renewal and relocation of some signage will also be funded from existing budget.

The proposed off-leash dog area at Reed Park, Dapto with fencing, provision of water and seating, will be funded from the existing capital works budget. The proposed park may be designed and scoped and then constructed in 2020.

Enhancement of enforcement activities over weekend periods and in sensitive areas has been achieved through new rostering and structural changes, and this is also being funded from existing budget allocation.

CONCLUSION

Major changes to the Dogs on Beaches and Parks Policy are not proposed. However changes are proposed to the Policy set-out and language with expanded Policy Objectives. Improved signage, promotional materials and dog waste bag dispensers and bins is proposed along with the establishment of a fenced off-leash dog park at Reed Park, Dapto. The enhancement of animal control and enforcement activities across the beach and foreshore areas of the City, especially over weekends, is also proposed. These activities are all able to be funded from existing budget.

Further consultation, engagement and assessment may be undertaken in relation to the additional proposals received to change off-leash areas at Stanwell Park and East Woonona Beach.

DOGS ON BEACHES AND PARKS
COUNCIL POLICY

ADOPTED BY COUNCIL: 24 NOVEMBER 2014

BACKGROUND

Council has a legislative responsibility to provide a minimum of one (1) off-leash area and a responsibility to provide effective and responsible care and management of dogs within our area.

As at 16 October 2014 there are 49,760 dogs identified in Wollongong under the NSW Companion Animal Register. This level of ownership exceeds the State average and is a significant overall number. Council has a responsibility to ensure that access for these dogs on our public places is provided in a way that is consistent with their significance.

This Policy has been developed after considerable community consultation (2009, 2010 and 2014), including specific Aboriginal consultation, an assessment of a comprehensive Review of Environmental Factors (REF00499) and a peer review of the REF by LesryK Environmental Consultants. The Policy also included an assessment of the publication 'Public Open Space and Dogs - A design and management guide for open space professionals and Local Government by Harlock Jackson Pty Ltd, August 1995' an accepted guide for Local Government in planning for dogs in public open space.

This Policy will be reviewed from time to time as dog owner behaviour and community needs change and in accordance with Council's normal review cycle.

OBJECTIVE

The main objectives of this Policy are to have a Dogs on Beaches and Parks Policy that:

- meets accepted planning guidelines;
- is balanced and generally meets the dog-owning and non-dog owning community's needs;
- is valued by the community;
- defines areas for varying levels of dog access; and
- provides for continued education and enforcement.

POLICY STATEMENT

This Policy aims to introduce a comprehensive Policy that considers recommended Office of Local Government planning guidelines and establishes a best practice, balanced, approach to access for dogs in public places within our City.

STATEMENT OF PROCEDURES

1 Context/Background

It has been estimated by the Australian Companion Animal Council in 2010 that 36% of households own at least one (1) dog. They have also estimated that there are sixteen (16) dogs per hundred (100) people in NSW. With a population of approximately 201,000 people in Wollongong this rate equates to 32,160 dogs. As at 16 October 2014 there are 49,760 dogs identified in Wollongong under the NSW Companion Animal Register. As dog ownership exceeds the State average and is a significant number, Council has a responsibility to ensure that access for these dogs on our public places is provided in a way that is consistent with their significance.

The Policy also included an assessment of the publication 'Public Open Space and Dogs - A Design and Management Guide for open space professionals and Local Government by Harlock Jackson Pty Ltd, August 1995' an accepted guide for Local Government in planning for dogs in public open space.

Table 1 provides a history of Council decisions concerning off-leash areas within the Local Government Area with changes to existing off-leash areas identified in green.

Table 1: History of Changes to Dogs on Beaches Policy/Off-Leash Areas

Year	Changes and Additions to Council's Declared Off-Leash Beaches/Parks	Comments/Added Changes
2002	Coniston Beach, Coniston south of Bank Street East Corrimal Beach (east of the Bellambi Sewage Treatment Plant) Figtree Oval, Figtree Riley Park, Unanderra King George V Park, Port Kembla	Ban for dogs on all other beaches
2006 SU23390 6/11/2006	Perkins Beach Windang (extending from Shellharbour Road/ Wattle Street Beach walkway north to easterly projection of unnamed road) MM Beach, Port Kembla East Corrimal Beach from East Corrimal car park to Bellambi Point McCauley's Beach, Thirroul for a distance of 300 metres south of Corbett Ave Little Austinmer Beach, Austinmer Sharkey's Beach, Coledale (from the car park, south toward the rock outcrop) Proud Park, Helensburgh Eleebana Reserve, Koonawarra	No orange zone Ban on beaches other than off-leash areas Ban on rock pools Education and enforcement considered important
2010 Z10/125276 28/9/2010	Perkins Beach, Windang (extending from Shellharbour Road/ Wattle Street Beach walkway north to access way south of Port Kembla SLSC southern car park Puckeys Beach area directly east of Puckeys Estate Fairy Meadow ie walkway north of Fairy Creek lagoon to walkway south of playground at Fairy Meadow Beach Bellambi between Bellambi ramp and ocean pool East Corrimal Beach from East Corrimal car park to Bellambi Point (temporarily on hold) McCauley's Beach, Thirroul, total length of beach (temporarily on hold) Stanwell Park Beach, north of northern lagoon	Orange zone introduced due to public demand after consultation for additional access on beaches Banned rock platforms Red banned areas nominated from Wollongong to North Wollongong Beaches, Austinmer Beach and Coledale Beach. All remaining beaches are orange timed zones. McCauley's and East Corrimal are on hold until Aboriginal and Environmental issues are resolved

2011 **Z11/103827** **27/4/2011**	East Corrimal Beach from East Corrimal car park to Bellambi Point McCauleys Beach, Thirroul, total length of beach	Both McCauley's and East Corrimal continue as off-leash areas after external REF and Aboriginal consultation Woonona Beach considered for off-leash however resolved as orange zone
2012 **Z12/178219** **13/11/2012**	East Corrimal Beach from northern side of Bellambi Lagoon outlet to Bellambi Point	Boundary changed to northern side of Bellambi lagoon to prevent conflicting use problems
2014 **Z14/437392**	Additional parks, including one in Dapto, locations yet to be determined	Existing beaches and parks remained the same due to overwhelming community support

2 Community Consultation

This Policy has been developed after considerable community consultation (2009, 2010 and 2014), an assessment of a comprehensive Review of Environmental Factors (REF00499) and a peer review of the REF by LesryK Environmental Consultants.

In addition to the broad community consultation, a specific Aboriginal consultation process commenced which included meetings with the following Aboriginal groups/Individuals –

- Aunty Muriel Davis, Traditional Owner, Wodi Wodi Elders Group
- Uncle Allen Carriage, Traditional Owner, Wadi Wadi Coomaditchie
- Uncle Reuben Brown, Traditional Owner, KEJ
- Aboriginal Land Council
- Sandon Point Tent Embassy (SPATE)
- Wollongong City Council, Aboriginal Reference Group
- Wider Aboriginal Community – Onsite kiosk Bellambi Neighbourhood Centre

3 Current Legislation

The Companion Animals Act 1998 requires Council to provide at least one (1) off-leash area for the Wollongong LGA. The form of the off-leash area is broad as indicated in Section 13 (6).

Section 13(6) states *"A local authority can by order declare a public place to be an off-leash area. Such a declaration can be limited so as to apply during a particular period or periods of the day or to different periods of different days. However, there must at all times be at least one public place in the area of a local authority that is an off-leash area".*

Council is the authorised authority under the Companion Animals Act to manage companion animals. Dogs are classified as companion animals. A new principal object of the Companion Animals Act, Section 3A, is *"to provide for the effective and responsible care and management of companion animals"*.

Advice provided by the Manager Companion Animals Unit of the Office of Local Government indicate that this new objective was specifically included in the Act to ensure that councils are proactive in the proper management of companion animals under the Act. This increases the level of responsibility to provide education, enforcement and presence in the community.

To understand if Council is effectively and responsibly managing, and therefore complying with legislative obligations, significant consideration has been given to the recent community survey results in the development of this Policy.

With few exceptions, such as in off-leash areas, all dogs must remain on leash whilst in a public space. Section 13 (1) of the CAA states: "*13 (1) A dog that is in a public place must be under the effective control of some competent person by means of an adequate chain, cord or leash that is attached to the dog and that is being held by (or secured to) the person".* Because this is legislated across NSW no signage is required for this to be enforced.

Acting contrary to signage is dealt with under the Local Government Act 1993. Section 632 (1) LG Act states: *"A person who, in a public place within the area of a Council, fails to comply with the terms of a notice erected by the Council is guilty of an offence".* Signage along access paths, in parks and off-leash rules signs are dealt with primarily under the Local Government Act.

4 Strategic Planning for Access by Dogs

4.1 Key Principles

This policy considers current information relating to dogs in public places from 'Public Open Space and Dogs – A Design and Management Guide for open space professionals and Local Government by Harlock Jackson Pty Ltd, August 1995'. This publication is accepted as the guide for Local Government in planning for dogs in public open space.

Jackson 1995 indicates that there are four (4) principles that need to be established and considered when Council is considering access by dogs to public places and provides a sound basis for assessing the options for dogs' access to public open space. They are:

1 Provide formal recognition of the legitimacy of dog owners as being a deserving significant group of customers;
2 Understand more clearly the needs of both dogs and their owners;
3 Aim for integration of dogs with other public space users while recognising that separation is warranted in some instances; and
4 Councils should apply a strategic approach that considers access on a comprehensive Council wide basis rather than on a piecemeal park by park basis.

The basic premise is that since within our community 36% of households have at least one (1) dog, this population should have facilities consistent with their significance. The purpose of establishing off-leash areas, and other forms of access for dogs, is to provide locations where their dogs can be exercised and socialised with other dogs to reduce problems such as barking and other nuisance behaviour.

4.2 Main Access Options

The main dog access options are:

- On-leash areas;
- Off-leash areas;
- Banning;
- Different zones in one (1) park/beach; and
- Time share arrangements. Seasonal variations have also been used although mainly on beaches, eg dogs banned from November to April.

4.3 Selection of Off-Leash Areas

What to look for in selection of off-leash areas:

- Beaches/parks that can withstand free-running by dogs;
- Beaches/parks that have natural boundaries;
- Beaches/parks that meet the needs of dogs and their owners;
- Beaches/parks that are not associated with established recreation interests; and
- Unique local conditions or opportunities.

The areas to avoid in selecting off-leash areas are:

- Areas in the immediate vicinity of children's playgrounds because of the relative unpredictability of children in unfamiliar situations;
- Areas that attract high concentrations of people, eg popular beaches;
- Picnic areas – the presence of food may provoke annoying behaviour; and
- Botanic Gardens or Environmental Protection areas.

4.4 Needs of Dogs and Owners

The most fundamental need for dogs is that they be taken out with their owner as much as possible. This enables them to experience the full range of benefits – exercise, training, socialisation, relief of pent-up energy as well as time and fun with their owner and other dogs. They don't need to run freely off the leash as much as they need interaction with their owner and diversity of experience (sights, sounds, smells, textures, other dogs and humans).

Taking a dog out has been found to stimulate social interaction with other humans. Studies suggest that friendships are developed with others using the same route and that, on average, the conversations lasted longer than those with people without dogs. For some, particularly the elderly who live alone, taking a dog to the park may stimulate the only human contact that person has for an entire day.

Urban consolidation, with more high and medium density housing developments occurring, will place greater demands on public open space both for human needs and as an outlet for dogs.

4.5 Fitness, Health and Mental Health

Harlock Jackson (1995) states that the health benefits of pet ownership is increasingly being recognised. Studies have revealed a beneficial effect of pet ownership on several of the classical factors for coronary heart disease and reported better physical and mental health than of non-dog owners.

Owning a dog encourages people to exercise and provide social opportunities particularly for the elderly and parents isolated at home during the day with small children. In an era when people feel increasingly threatened in public areas, being accompanied by a dog can also improve actual and perceived safety.

Pets can act as emotional substitutes for spouses, romantic partners and children. The studies have found that widows, single people and empty nesters are more likely to emphasise the companionship qualities of pets. Pets are often also obtained to help children learn responsibility and how to share. They show that if affection is given it will be returned.

4.6 Conflicts

The problems generally attributed to dogs and their owners whilst in public places include defecation, aggression to humans and other animals, non-compliance with leash laws and other nuisance behaviour.

Conflict is a matter of degree with its impacts ranging from threats to safety, to detracting from the quality of the recreation experience, to more simple annoyance. Even annoyance is a matter of degree – what is intolerable to one (1) person may only annoy another and may not even be noticed by another.

The most common complaint about unremoved faecal deposits is the effect on aesthetics and the unpleasant experience of dodging droppings on footpaths and in parks.

Dog attacks are the most serious potential problem and there is always a great deal of interest in the issue. Attacks can occur against humans, other dogs and other animals. Most dogs don't bite people or other dogs. Those that do are either frightened, dominant, protective or possessive.

Another argument for restricting dogs' access to public open space is that their presence (behaviour and smell) frightens away native wildlife.

The problems described above are either eliminated or reduced if dogs are confined to a leash. However leash laws of themselves raise another area of potential conflict – that of non-compliance. People don't comply for many reasons whether through protest, lack of awareness, laziness or because they think they can escape prosecution.

5 Three-Tier Approach

The three-tier approach (as in traffic lights) has been chosen as it is a suitable, easily understood way in which to explain the three (3) levels of access provided for the community along the foreshore and beaches. This approach also enables a diagrammatic view of the access provisions along our coast. The green areas are off-leash, the orange areas are time share access areas and the red areas are dog prohibited (banned) areas.

5.1 Green Zone – Off-Leash

The green off-leash zones have been provided to meet the needs of dogs and dog owners given the significant population in our community. Their spread along our coastal area demonstrates that Council is considering good planning practice in accordance with Harlock Jackson (1995). The chosen off-leash areas substantially meet the desired selection criteria for off-leash zones.

The following beaches declared off-leash areas are:

- Perkins Beach, Windang (extending from Shellharbour Road/Wattle Street beach walkway north to access way south of Port Kembla SLSC southern carpark;
- MM Beach, Port Kembla;
- Coniston Beach, Coniston south of Bank Street;
- Beach area directly east of Puckeys Estate Fairy Meadow ie walkway north of Fairy Creek lagoon to walkway south of playground at Fairy Meadow Beach;
- Bellambi between Bellambi ramp and ocean pool;

- East Corrimal Beach from northern side of Bellambi Lagoon outlet to Bellambi Point;
- McCauley's Beach, Thirroul;
- Little Austinmer Beach, Austinmer;
- Sharky's Beach, Coledale(from the carpark, south toward the rock outcrop); and
- Stanwell Park Beach, north of northern lagoon.

The following parks are also declared as off-leash areas:

- Figtree Oval, Figtree;
- Proud Park, Helensburgh;
- Riley Park, Unanderra;
- Eleebana Reserve, Koonawarra; and
- King George V Park, Port Kembla.

5.2 Orange Zone – Timed Access

The orange zone is a time sharing zone. This zone allows dogs on beaches on-leash only and only within certain times. This time sharing zone is an important zone that allows additional access for dogs and their owners in a controlled manner.

This zone is on-leash only as Council determined the need for this to minimise fauna and flora impact from unrestrained dogs as necessary. It also enables Council to have a higher degree of success in improving dog owner behaviour in relation to faeces management. Keeping dogs on-leash also has the added benefit of reducing unwanted aggressive behaviour due to the increased control.

In these zones access on-leash is allowed in summer before 9am and after 6pm and in winter before 9am and after 4pm. To assist the community with a simple education analogy for summer this area is also known as flags up – no dogs/flags down – dogs on-leash. The orange zone includes all beaches not designated as off-leash or banned areas.

Summer is defined as being from September school holidays to ANZAC day, (in line with lifeguard and SLSC patrols), and winter is the remainder of the year.

5.3 Red Zone – Banned

The red zone is an area where dogs are prohibited. The banned areas have been considered as a last resort to all other access provisions. These areas have been banned due to sites with sensitive environmental fauna and flora factors, high human population areas or for heritage reasons.

The banned areas for dogs are:

- All rock pools and ocean pools including Wombarra, Coledale, Austinmer, Bulli, Woonona, Bellambi, Towradgi, the old men's baths (rock pools north of the continental pool) and the nun's pools (northern headland of Wollongong City Beach) rock pool areas;
- All rock platforms;
- Windang Beach from Lake entrance to southern point of off-leash area;
- Port Kembla Beach extending to south end of southern carpark;
- The entire Wollongong to North Wollongong Beach area described as extending from Coniston off-leash area (east of Bank Street) beach to 500 metres north of Fairy Creek entrance North Wollongong (east of lower level of Puckeys estate). This area includes Belmore Basin;
- Austinmer Beach; and
- Coledale Beach.

5.4 Other Public Places including Parks and Sports Fields

The Companion Animals Act 1998 requires all dogs to be under effective control by cord or leash while in a public place. Signage is not required to enforce this effective control provision as it is NSW State Legislation applying throughout the State. Therefore, unless otherwise stated, all public road reserves and park areas allow access for dogs but they must be maintained on-leash.

Signage is used to determine alternatives to on-leash including prohibition. With the exception of the current parks identified as off-leash areas, other specific parks and sports fields have been determined to prohibit dogs. These areas will have No Dogs Allowed signage. The signage has been determined as appropriate in the past and will be enforced by Council under the Local Government Act 1993.

6 Faeces Management

The impact of dog faeces has been assessed by a report titled 'Review of Environmental Factors REF 00499' undertaken by Wollongong City Council. The REF identifies a report prepared on behalf of the Australian Veterinary Association that concluded that although dog faeces may contain a variety of organisms that are pathogenic to humans the risk to human health does not justify the banning of dogs from those areas. Several factors detailed in the report indicated that the risk was low and that these risks are acceptable and can be almost eliminated with an effective education and enforcement strategy. An education and enforcement strategy are both part of this Policy.

The need for bins and dispensers has been highlighted as an essential requirement to reducing current faecal problems on the beach and along the bike track and pedestrian walking areas. Each off-leash area will have sufficient bins and dispensers and the bike track adjoining the orange zones will also be provided with bins and dispensers.

7 Enforcement

Enforcement will be undertaken in accordance with Council's current Enforcement Policy and Ranger Services procedures. The REF also confirms the need for enforcement to manage compliance for zone requirements and faeces management. Council's current Penalty Notice Review Policy will be used by Compliance Officers in relation to the issuing and handling of Penalty Infringement Notices and the representation process.

The Regulation and Enforcement Division commits to providing regular enforcement for dogs on public land, particularly enforcement on beaches. This will form part of a regular roster to patrol these areas.

To improve conditions for users of off-leash areas conditions of use, or rules, have been included on rules signage at each off-leash area. The following wordage exists on the rules signs:

All dogs within the designated off-leash area must be supervised by a person. The person in charge of any dog within this area, (which has been provided as a facility for enjoyment by the community), ***MUST****:*

1 *Be a competent person 16 years of age or over. Be able to control the dog (by voice command or other means);*
2 *Carry a bag suitable for dog faeces;*
3 *Remove and place dog faeces in a suitable bag and dispose in an appropriate rubbish bin;*
4 *Not allow restricted breeds, or dogs declared as dangerous, to use this off-leash area;*
5 *Not allow dogs suffering from contagious disease, skin irritation or parasitic infection to use this area.*

NOTE: THE OWNER OF A DOG IS LEGALLY RESPONSIBLE IF THE DOG ATTACKS A PERSON OR ANIMAL.

As well as educating users in regard to expectations of use, the rules sign can be enforced under the Local Government Act where users act contrary to the signage.

8 Signage/Education

Council will provide education to the community in the following manner:

- Website information;
- Media Releases at appropriate intervals or incident;
- Telephone caller waiting information;
- Development and use of an off-leash brochure;
- Ranger in-field education;
- School education;
- Distribution of brochures and other education material to RSPCA and veterinary clinics; and
- Promoting the Policy at microchipping days.

Additional education will be provided by signage in various forms. Signage has been recognised as particularly important to providing an effective Policy and appropriate signage will be increased. Signage includes:

- Zone explanatory signage;
- Off-leash rules signage;
- Access path signage;
- Dogs prohibited signage; and
- Directional signs.

Enforcement staff will also recommend additional signage after the Policy becomes operational where ongoing non-compliance occurs and where signage should be increased for compliance and education purposes.

9 Risk of Aggressive Behaviour by Dogs

The various levels of access within the three (3) zones have a varying degree of risk associated with it in relation to unwanted attention or aggressive behaviour. The issue of responsibility has arisen in the review and advice received by Council is that the Tort of Duty of Care arises under the common law of negligence and that Council has no responsibility as off-leash areas are allowed and specified under the Act.

Irrespective of this advice Council provides enforcement support to increase compliant behaviour in the dedicated zones. By providing clear access options and signage, the community is able to decide which area they wish to frequent and assume the risk associated with that area. Education advice will also be provided to the community in relation to risk.

Council also has included conditions of use on each off-leash area that will reduce risk of aggressive behaviour to users. Council Rangers will enforce under the Local Government Act when dog owners fail to comply with these conditions.

Should an attack occur in a public place, including an off-leash area, Council will ensure that all matters are investigated and the appropriate enforcement action taken. Action can include issuing Penalty Infringement Notices and/or having a dog declared a dangerous dog. Any injury or damage as a result of an attack is the responsibility of the attacked person to take legal action against the owner of the offending dog through the Court process.

10 Fauna Flora

The fauna and flora impacts of access by dogs on our beaches will be minimised by adopting the recommendations of REF00499 and adopting Plans of Management that includes recommendations of the LesryK Environmental Consultant's report in relation to McCauley's Beach and East Corrimal Beach. The red zone protect fauna and flora and the orange zone has been made on-leash only also to protect fauna and flora.

11 Aboriginal Heritage

The Sandon Point Aboriginal Place is a highly valued area for the Aboriginal Community and this site is known to contain at least one (1) burial. This area is also the only declared 'Aboriginal Place' under the National Parks and Wildlife Act 1974 in the Local Government Area. East Corrimal to Bellambi Point has potential to carry similar levels of significance and cultural concern as Sandon Point. Although this is not as well documented the traditional elders indicate that the significant areas relate to the western side of the dunal system.

These two (2) sites are two (2) of the key coastal areas of Aboriginal cultural significance in the LGA. Council will be undertaking its duty of care to ensure the protection of the cultural significance of the Aboriginal Place.

It is clear that members within the Aboriginal Community consulted in the development of this Policy, (including several highly respected elders) do not feel that the banning of dogs is a necessary option and feel comfortable with the off-leash area continuing despite the Aboriginal Cultural Heritage significance. Their advice is that Aboriginals and dogs have co-existed for generations and therefore is not an issue particularly on the sandy part of the beach.

The Aboriginal community's concern is directed at the areas behind the beach, the dunal areas, and how people gain access to the beach through areas of Aboriginal significance. Plans of Management (PoM) will be completed which will implement protection measures to limit Aboriginal heritage disturbance by both people and dogs. The Aboriginal community request respect of these areas and the Plans of Management will assist in educating the broader community of their cultural significance.

12 Complaint Handling

The current customer service action request system will be used to register and monitor complaints in relation to dogs in public places. In addition, to improve the monitoring of the current system, a separate category has been installed within the system specific to off-leash areas. This information will be used in future reviews of this Policy.

13 Review

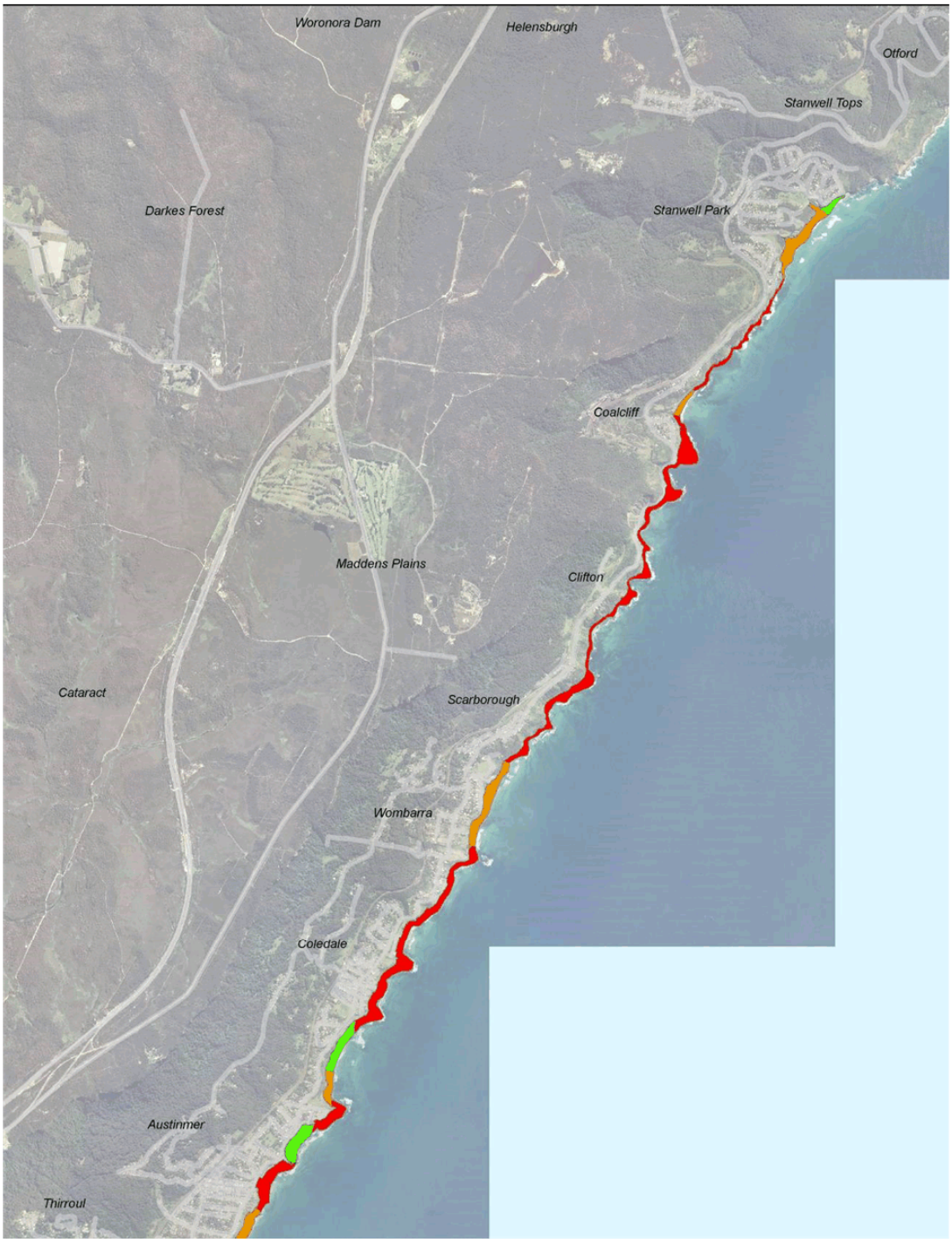
Council will review this Policy on a regular basis. The review will include public consultation and feedback, an assessment of complaints received, Penalty Infringement Notices levels and areas, the level of enforcement resources, changes to dog owner behaviour and other significant impacts or Legislative changes since the development of this Policy.

14 Attachments: Maps of Zone Areas

Legend:

- Off-Leash
- Timed On-Leash Access
- Dogs Banned

Map 1: Stanwell Park to Austinmer



Map 2: Coledale to Bellambi

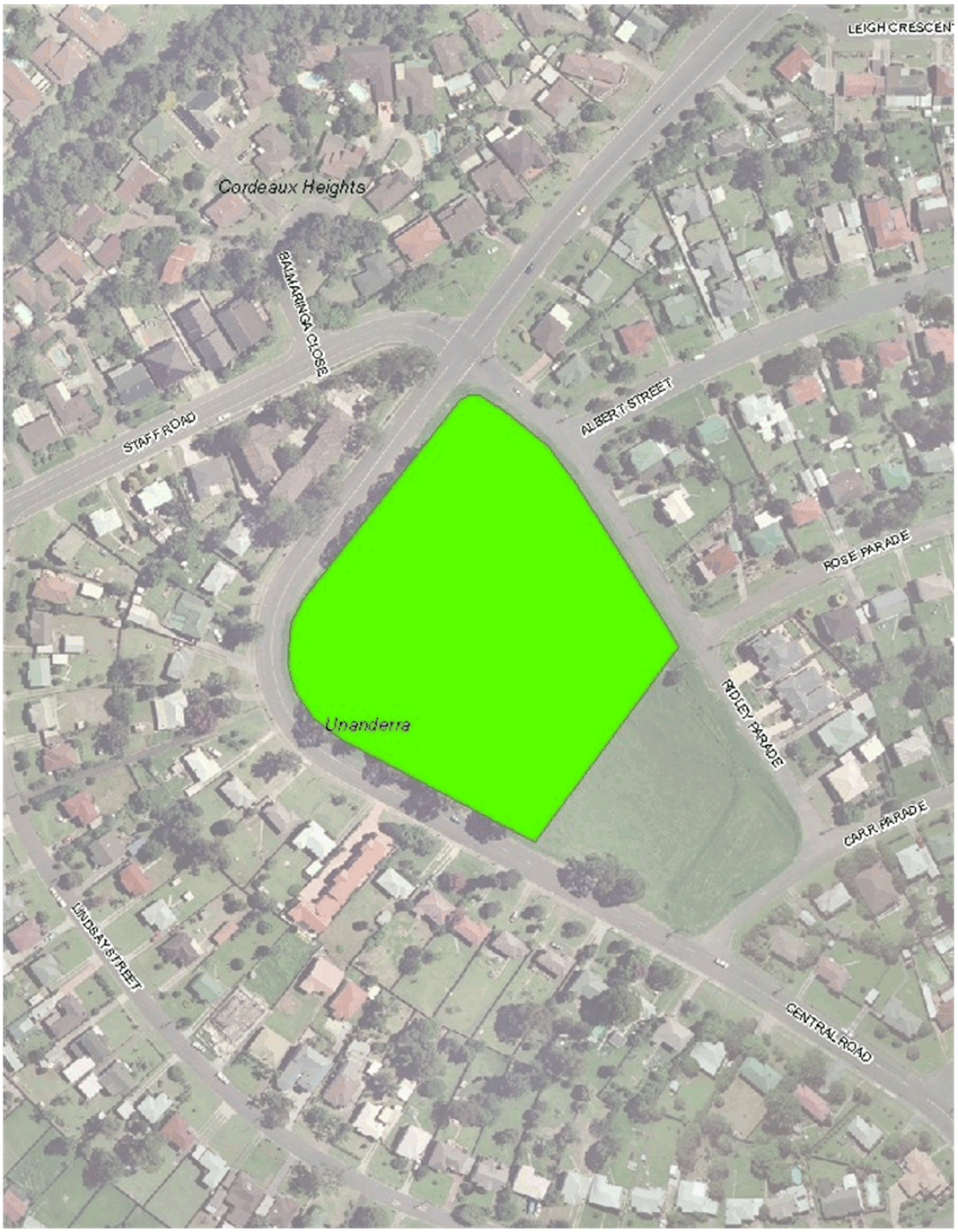
Map 3: Woonona to North Wollongong

Map 4: North Wollongong to Coniston

Map 5: Port Kembla to Windang

Map 6: Primbee to Lake Illawarra

Map 7: Riley Park, Unanderra



Map 8: Eleebana Reserve, Koonawarra

Map 9: Figtree Oval, Figtree

Map 10: King George V Park, Port Kembla

Map 11: Proud Park, Helensburgh

DOGS ON BEACHES AND PARKS

COUNCIL POLICY

SUMMARY SHEET	
Responsible Division	Regulation and Enforcement
Date adopted by Council	24 November 2014
Date of previous adoptions	26 November 2012, 27 April 2011, 28 September 2010
Date of next review	April 2019
Prepared by	Ranger Services Manager
Authorised by	Director Planning and Environment

DOGS ON BEACHES AND PARKS
COUNCIL POLICY

ADOPTED BY COUNCIL: [TO BE COMPLETED BY CORP SUPPORT]

BACKGROUND

Council has a legislative responsibility to provide a minimum of one (1) off-leash area and a responsibility to provide effective and responsible care and management of dogs within the City.

As at 1 July 2018 there were 60,547 dogs identified in Wollongong on the NSW Companion Animal Register. It is estimated from pound statistics that there are another 12,500 un-microchipped dogs in the City. This level of ownership ranks Council as being the third highest Local Government Authority for dog ownership in NSW. This Policy has been developed after considerable community consultation (2002, 2006, 2009, 2010, 2014, 2016 and 2018), including specific Aboriginal community consultation, a comprehensive Review of Environmental Factors (REF00499) and a peer review of the REF by Lesryk Environmental Consultants. The 2014 Policy review also included an assessment of the publication 'Public Open Space and Dogs - A design and management guide for open space professionals and Local Government by Harlock Jackson Pty Ltd, August 1995, an accepted guide for Local Government in planning for dogs in public open space.

This Policy will be reviewed in accordance with Council's normal review cycle.

OBJECTIVES

The objectives of this Policy are:

- To specify conditions under which dogs are permitted on beaches and parks / reserves across the City;
- To establish dog control areas including off-leash areas and locations where dogs are prohibited;
- To restate dog owner's responsibilities in respect to dogs in public places;
- To support environment, heritage, wildlife and threatened species protection; and
- To provide dog owners with adequate access to open space for exercising their dogs.

POLICY STATEMENT

Wollongong City Council will provide for dog management on beaches, parks and public places within the City by:

- Declaring, promoting and regulating off-leash areas, wildlife protection areas and other control areas;
- Controlling and regulating dogs in accordance with the legislation; and
- Developing and implementing educational materials and programs aimed at promoting responsible dog ownership through microchipping and registration, de-sexing and the protection of Aboriginal heritage and native wildlife.

STATEMENT OF PROCEDURES

Introduction

This procedure describes Council's process and systems for the management of dogs on beaches, parks and public place within the City. Leash free areas are identified, as well as other areas, where specific dog controls are in place as required by law. The procedure also includes general information on dog ownership and details general dog owner responsibilities. It also outlines Council's compliance and enforcement role. The Procedure will be supported by various community awareness and promotion materials.

Background

The Act commenced in 1998 and Council commenced implementation in 1999 with an emphasis on managing dogs. Leash free areas were generally established on beaches and parks where people tended to already exercise their dogs off-leash.

Significant consultation has occurred since that time with reviews of the Policy and Procedure occurring in 2002, 2006, 2010, 2011, 2012, 2014, 2016 and 2018.

General responsibilities

Dog owners have an obligation to ensure that their dog does not adversely affect any other person:

- Dogs should be kept away, wherever possible, from adjacent private properties to prevent dogs in backyards from creating a nuisance;
- People with dogs in public places should be aware of other dogs and their owners, the general public and children in particular and should move to avoid conflict where it is anticipated;
- In natural areas such as reserves or beaches, dog owners should be mindful of native flora and fauna and keep dogs on established tracks and away from foredunes and other sensitive areas.

Legal Responsibilities

Dog on leash:

Throughout NSW, dogs are required to be on leash at all times in public places. The exceptions to this rule are:

- Dogs accompanied by a person within a declared Council leash free area;

  NOTE: In leash-free areas the person with the dog is still required to ensure that the dog does not attack, harass or chase any person or animal. This means that the dog must be controlled so that other users of the area are not affected;
- A dog participating in an obedience class or trial;
- A dog being exhibited in a show;
- A dog working stock;
- A Police dog;
- A dog secured in a cage or vehicle or tethered to a fixed object or structure.

Collar and Name Tag:

A dog that is away from the premises of the owner must wear a collar and tag. The tag must show the name of the dog and the address or telephone number of the owner.

Microchip and registration:

Dogs over the age of twelve (12) weeks must have a microchip implanted and be recorded on the NSW Companion Animal Register. Dogs over six (6) months of age must be lifetime registered.

Cleaning up after your dog:

If a dog defecates in a public place the dog owner must immediately remove the faeces and dispose of it in a proper manner. The need for bins and dispensers has been highlighted as an essential requirement in reducing dog faeces problems on beaches and along bike track and pedestrian walking areas in particular. Each off-leash area will have sufficient bins and dispensers and the bike track adjoining the orange zones will also be provided with bins and dispensers.

No more than four (4) dogs:

Any one person can only have a maximum of four (4) dogs under their control. This applies to dogs on leash and dogs off-leash in a leash free area.

Dog Control Areas

The three(3) tier approach (as in traffic lights) has been chosen as it is a suitable, easily understood way in which to explain the three (3) levels of access provided for the community along the foreshore, beaches and reserves. This approach also enables a diagrammatic view of the access provisions along our coast. The red areas are dog prohibited (banned) areas, the orange areas are time share access areas and the green areas are off-leash. All dog control areas declared by Council, require near the boundaries of those areas and at reasonable intervals, notices or signage detailing the relevant control areas. (Refer to the attached Maps).

RED ZONES - Dogs are declared prohibited in the following places (whether or not they are leashed or otherwise controlled):

- **Children's play areas (RED ZONES)** - meaning any public place across the City that is within ten (10) metres of any playing apparatus provided in that public place for the use of children;
- **Food preparation areas** – within ten (10) metres of any food preparation areas or food consumption areas such as barbeques, public tables and picnic shelters, except where these areas are in a public thoroughfare;
- **School Grounds and Child Care Centres** – unless with permission of the person in charge.

Public bathing areas where dogs are prohibited (RED ZONES) - meaning any public place or any part of a public place that is used for or in conjunction with public bathing or public recreation (including a beach):

- All lifeguard patrolled beaches including the area between the dunes and the edge of the surf zone and within any patrolled zone indicated by the flags and areas within 100 metres of the patrolled zone;
- All rock pools and ocean pools including Wombarra, Coledale, Austinmer, Bulli, Woonona, Bellambi, Towradgi, the old Men's Baths (rock pools north of the continental pool) and the Nun's pools (northern headland of Wollongong City Beach) rock pool areas;
- Windang Beach from the Lake entrance to the Perkins Beach access off Murrie Street, Windang;
- Port Kembla Beach from the beach access at the south end of the southern Port Kembla SLSC carpark, through to the Fisherman's Beach boundary;

- The entire Wollongong to North Wollongong Beach area (Wollongong City Beach and North Beach) from the Bank Street, Wollongong Beach entry point to a point on Puckey's Beach which is approximately 250 metres north of the lagoon in Stuart Park, Wollongong. This area includes Belmore Basin;
- Sandon Point from the Sandon Point SLSC through to the McCauley's Beach boundary;
- Austinmer Beach from the Thirroul Beach boundary which is located approximately 130 metres south of the Austinmer rock pool through to Toxteth Avenue, Austinmer;
- Headlands Beach from the Little Austinmer Beach carpark through to the most northern point of Austinmer Boat Ramp carpark; and
- Coledale Beach from the most northern point of the Sharkey's Beach carpark through to the northern side of the Wombarra rock pool.

Wildlife protection areas (**RED ZONES)** - meaning any public place or any part of a public place set apart by Council for the protection of wildlife and in which the local authority has ordered that dogs are prohibited for the purposes of the protection of wildlife e.g. on all rock platforms.

Recreation areas where dogs are prohibited (RED ZONES) – These areas include any public place, or part of a public place, provided for public recreation or the playing of organised games and in which Council has ordered that dogs are prohibited and in which, or near the boundaries of which, there are conspicuously exhibited at reasonable intervals, notices to the effect that dogs are prohibited in or on that public place or part.

ORANGE ZONES – The orange zone is a time sharing zone. Dogs are declared prohibited in the following places except at the detailed times and only when on leash. In these zones dogs are only permitted when on leash in summer prior to 9:00 am and after 6:00 pm and in winter prior to 9:00 am and after 4:00 pm.

Summer months are defined as being from the September school holidays to Anzac day, (in line with lifeguard and SLSC patrols), and winter months are taken to mean the balance of the year.

This zone is on-leash only and within the times designated to minimise fauna and flora impact from unrestrained dogs. It also enables Council to have a higher degree of success in improving dog owner behaviour in relation to faeces management. Keeping dogs on-leash also has the added benefit of reducing unwanted aggressive behaviour due to the increased control. (Refer to Maps)

- Stanwell Park Beach from the southern side of the lagoon in Stanwell Park reserve through to the boundary of the Coalcliff rock platform;
- Coalcliff Beach from the boundary of the Coalcliff rock platform through to the Scarborough to Coalcliff rock platform boundary which is located approximately 85 metres south of the Coalcliff SLSC;
- Scarborough and Wombarra Beaches from the Scarborough to Coalcliff rock platform boundary through to the northern side of the Wombarra rock pool;
- Brickyard Point from the southern boundary of Sharkey's Beach through to the most northern point of Austinmer Boat Ramp carpark;
- Thirroul Beach from the Austinmer Beach boundary, which is located approximately 130 metres south of the Austinmer rock pool, through to Corbett Avenue, Thirroul;
- Sandon Point Beach from the southern side of the Sandon Point SLSC through to the most northern point of the Bulli SLSC carpark;

- Bulli Beach from the southern side of the Bulli rock pool through to the northern side of the Woonona rock pool;
- Woonona and Bellambi Beaches from the Woonona rock pool through to the northern side of the Bellambi rock pool;
- Corrimal Beach from the southern side of the Bellambi lagoon through to Towradgi Pool;
- Towradgi and Fairy Meadow Beaches south from the Towradgi rock pool boundary through to the Puckey's Beach boundary which is located approximately 150 metres from the most southern point of the Fairy Meadow SLSC carpark;
- Puckeys Estate from the entrance on Squires Way through the estate to the entrance on Elliotts Road; and
- Fisherman's Beach from the Fisherman's Beach rock platform, south to the Port Kembla Beach and rock pool boundary.

GREEN ZONES

The green off-leash zones have been provided to meet the needs of dogs and dog owners given the significant population in our community. Their spread along our coastal area demonstrates that Council is considering good planning practice in accordance with Harlock Jackson (1995). The declared off-leash areas substantially meet the desired selection criteria for off-leash zones.

The following beaches are declared as off-leash areas:

- Stanwell Park Beach from the northern side of the lagoon in Stanwell Park reserve through to the northern end of the beach which aligns with The Drive, Stanwell Park;
- Sharkey's Beach from the most northern point of the Sharkey's Beach carpark through to the Brickyard Point boundary;
- Little Austinmer Beach from the Headlands rock platform boundary south through to the rock platform at the end of Toxteth Avenue, Austinmer;
- McCauley's Beach from Corbett Avenue, Thirroul through to the Sandon Point rock platform boundary;
- Bellambi Harbour from the Bellambi rock pool boundary through to the carpark at the Bellambi boat ramp;
- East Corrimal Beach from the Bellambi boat ramp through to the northern side of the Bellambi lagoon;
- Puckey's Beach south from the Fairy Meadow Beach SLSC Carpark boundary through to a point on Puckey's Beach which is approximately 250 metres north of the lagoon in Stuart Park, Wollongong;
- Coniston Beach from the Bank Street, Wollongong Beach entry point to Port Kembla Harbour;
- MM Beach from the Port Kembla rock platform boundary south through to Fisherman's Beach rock platform boundary; and
- Perkins Beach from the south end of the southern Port Kembla SLSC carpark through to the Perkins Beach access off Murrie Street, Windang.

Parks and Reserves (Green Zones)

The following parks are also declared as off-leash areas:

- Figtree Oval, Figtree
- Proud Park, Helensburgh
- Riley Park, Unanderra
- Eleebana Reserve, Koonawarra
- King George V Park, Port Kembla
- Reed Park Dapto.

Provision of Facilities

Council will provide waste disposal bins in all dog leash free areas where possible and may also supply faeces disposal bags for the community's convenience. When no bins or bags are available, dog owners are required to provide and use their own disposal bags and remove the used bags from the area.

Other Public Places including Parks and Sports Fields

The Companion Animals Act 1998 requires all dogs to be under effective control by cord or leash while in a public place. Signage is not required to enforce this effective control provision as it is NSW State Legislation applying throughout the State. Therefore, unless otherwise stated, all public road reserves and park areas allow access for dogs but they must be maintained on-leash.

Signage is used to determine alternatives to on-leash including prohibition. With the exception of the current parks identified as off-leash areas, other specific parks and sports fields have been determined to prohibit dogs. These areas will have No Dogs Allowed signage, incorporated into the Public Place signage that is displayed. The signage has been determined as appropriate in the past and will be enforced by Council under the Local *Government Act 1993.*

Aboriginal Heritage

There are two (2) gazetted Aboriginal Places within land covered by the Policy and Procedure namely Sandon Point Aboriginal Place and Bellambi Aboriginal Place.

East Corrimal to Bellambi Point has potential to carry similar levels of significance and cultural concern as Sandon Point. Although this is not as well documented the traditional elders indicate that the significant areas relate to the western side of the dunal system.

In addition to the general requirements of the Companion Animals Act 1998 and general conditions of the Policy that are aimed at minimising impacts of dogs, specific protection of the heritage values is also indicated. To achieve this the following measures are also included to manage off–leash areas (Green Zones) and time limited prohibited areas (Orange Zones) at and adjacent to the above sites.

- Managed beach access via signage and barriers etc at dunal boundaries;
- Restrictions of access to dunal areas by rationalising accessways and via vegetative barriers; and
- Programming specific increased enforcement and education efforts.

It is clear that members within the Aboriginal Community consulted in the development of this Policy, (including several highly respected elders) do not feel that the banning of dogs is a necessary option and feel comfortable with the off-leash area continuing despite the Aboriginal Cultural Heritage significance. Their advice is that Aboriginals and dogs have co-existed for generations and therefore is not an issue, particularly on the sandy part of the beach.

The Aboriginal community's concern is directed at the areas behind the beach, the dunal areas, and how people gain access to the beach through areas of Aboriginal significance. Plans of Management (PoM)

will be completed which will implement protection measures to limit Aboriginal heritage disturbance by both people and dogs. The Aboriginal community requests respect of these areas and the Plans of Management will assist in educating the broader community of their cultural significance.

Enforcement

Enforcement will be undertaken in accordance with Council's current Compliance and Enforcement Policy and Ranger Services procedures. The Regulation and Enforcement Division commits to providing regular enforcement for dogs on public land, particularly enforcement on beaches. This will form part of a roster to regularly patrol these areas.

The various levels of access within the three (3) zones have a varying degree of risk associated with them in relation to unwanted attention or aggressive behaviour. The issue of responsibility has arisen in the review and advice received by Council is that the Tort of Duty of Care arises under the common law of negligence and that Council has no responsibility, as off-leash areas are allowed and specified under the Act.

Irrespective of this advice, Council provides enforcement support to increase compliant behaviour in the dedicated zones. By providing clear access options and signage, the community is able to decide which area they wish to frequent and assume the risk associated with that area. Education advice will also be provided to the community in relation to risk.

Council also has included conditions of use for each off-leash area that will reduce risk of aggressive behaviour to users. Council Rangers will enforce under the *Local Government Act 1993* and/or the *Companion Animals Act 1998* when dog owners fail to comply with these conditions.

Should an attack occur in a public place, including an off-leash area, Council will ensure that all matters are investigated, and the appropriate enforcement action taken. Action can include issuing Penalty Notices and/or having a dog declared a dangerous, menacing or nuisance dog. Any injury or damage as a result of an attack, is the responsibility of the attacked person to take civil legal action against the owner of the offending dog, through the Court process.

An on-call after hours emergency service is also provided for dog attacks, aggressive and dangerous dogs at large, and in response to NSW Police requests.

Signage

The Policy will be implemented more effectively through consistent appropriate regulatory and educational / information signage. Signage is acknowledged and recognised as particularly important in providing clarity and consistency about the Policy requirements and appropriate signage will be erected and maintained. Signage includes:

- Zone explanatory signage;
- Off-leash rules signage;
- Access path signage;
- Dogs prohibited signage; and
- Directional / demarcation signage.

To improve conditions for users of off-leash areas, conditions of use have been included on signage at each off-leash area.

All dogs within the designated off-leash area must be supervised by a person. The person in charge of any dog within this area, (which has been provided as a facility for enjoyment by the community), MUST:

- Be a competent person 16 years of age or over;

- Be able to control the dog (by voice command or other means);
- Carry a bag suitable for dog faeces;
- Remove and place dog faeces in a suitable bag and dispose in an appropriate waste receptacle;
- Not allow restricted breeds, or dogs declared as dangerous, to use this off-leash area; and
- Not allow dogs suffering from contagious disease, skin irritation or parasitic infection to use this area.

NOTE: THE OWNER OF A DOG IS LEGALLY RESPONSIBLE IF THE DOG ATTACKS A PERSON OR ANIMAL.

Enforcement staff will also regularly review signage across all control Zones particularly where ongoing non-compliance occurs and where signage should be increased for compliance and education purposes.

Education and Awareness Raising

Council will provide education to the community in the following manner:

- Website information;
- Community Newsletters;
- Media Releases, including Social Media, at appropriate intervals following an incident;
- Telephone caller waiting information;
- Development and use of an off-leash brochure;
- Ranger in-field education;
- School education;
- Distribution of brochures and other educational material to RSPCA, caravan parks, camping areas and veterinary clinics; and
- Promoting the Policy at microchipping days.

Complaint Handling

The Customer Service action request system will be used to register and monitor complaints in relation to dogs in public places. In addition, to improve the monitoring of the current system, a separate category has been installed within the system specific to off-leash areas. This information will be used in future reviews of this Policy.

Attachments: Maps of Zone Areas

The following maps depict all declared control areas across Wollongong City Council. All dog control areas are identified using the following legend.

Legend:

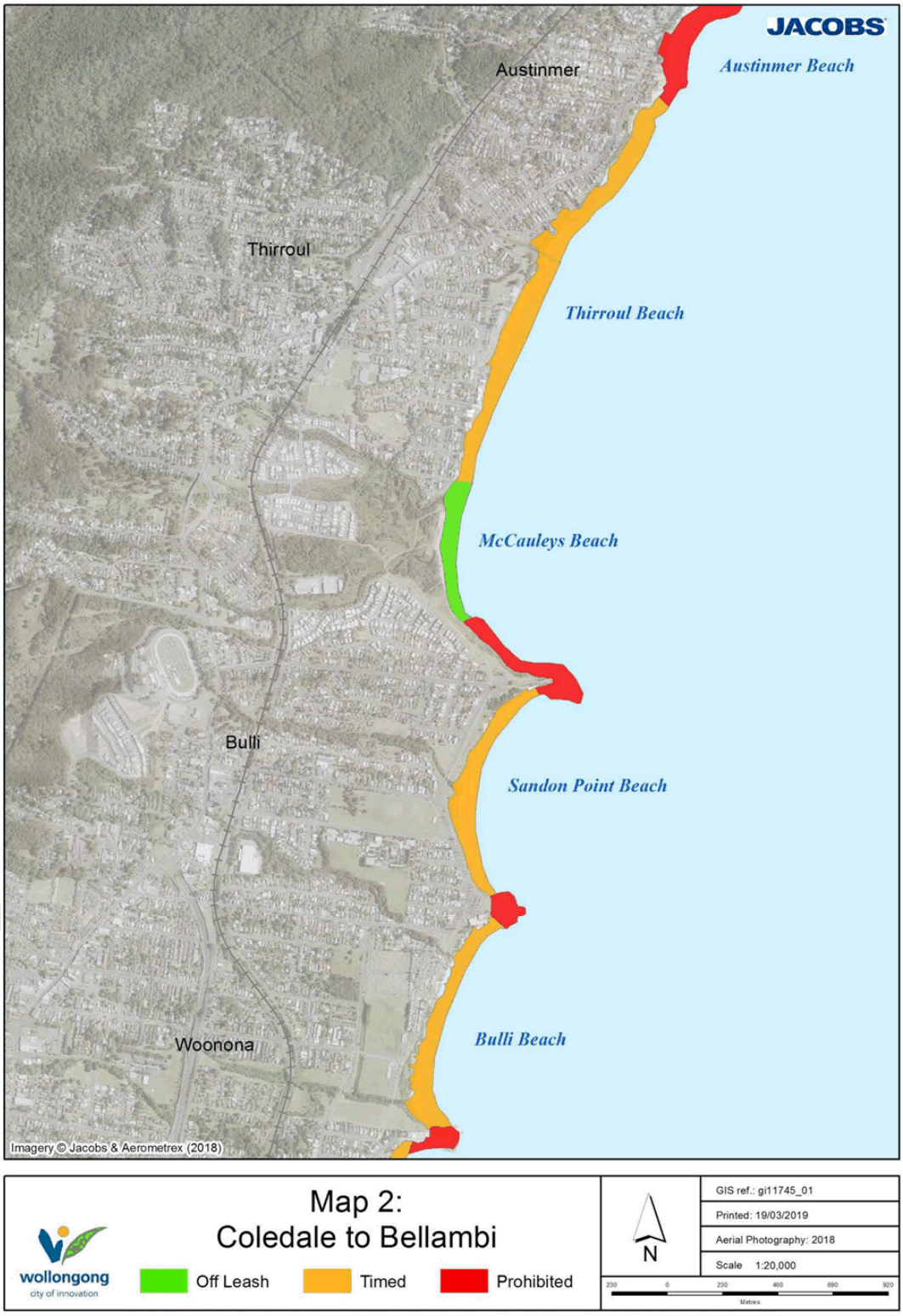
Off-Leash

Timed On-Leash Access

Dogs Prohibited

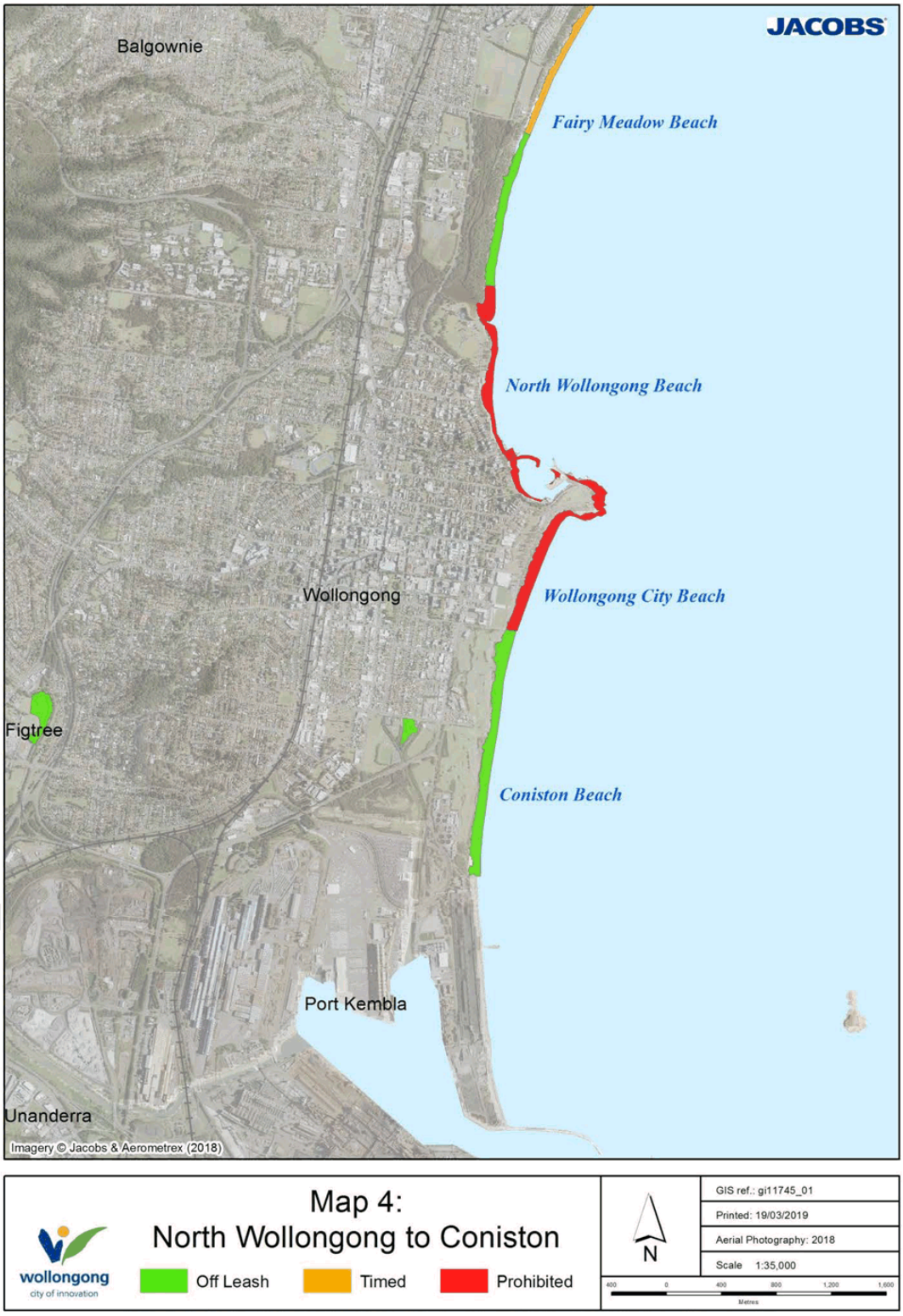
Map 1: Stanwell Park to Austinmer

Map 2: Coledale to Bellambi



Map 3: Woonona to North Wollongong

Map 4: North Wollongong to Coniston



File: FI-230.01.481 Doc: IC19/245

ITEM 5 TENDER T18/47 NORTH DEPOT VEHICLE ENCLOSURE

The purpose of this tender is to replace the existing deteriorated plant and machinery enclosure and increase the covered storage area for additional plant and machinery. The current enclosure has reached the end of its useful life and is located at Council's Northern Depot in Bulli.

This report recommends to decline to accept any of the tenders received for the North Depot Vehicle Enclosure in accordance with the requirements of the Local Government Act 1993 and the Local Government (General) Regulation 2005.

RECOMMENDATION

In accordance with clause 178(1)(b) of the Local Government (General) Regulation 2005, Council decline all tenders received for North Depot Vehicle Enclosure and carry out the requirements of the proposed contract itself.

REPORT AUTHORISATIONS

Report of: Mark Roebuck, Manager City Works
Authorised by: Andrew Carfield, Director Infrastructure + Works

ATTACHMENTS

1 Locality Plan

BACKGROUND

The existing vehicle enclosure has been identified as at the end of its design life and is too small to supply adequate protection to the plant and machinery currently housed at the facility. The proposed works include a replacement concrete enclosure structure of an increased area to meet the ongoing requirements of the facility. An upgrade of the wash bay will include side and rear walls to contain overspray and meet environmental requirements. Additionally, the areas in the vicinity of the new enclosure will be asphalted to ensure an adequate hardstand.

This project replaces existing assets no longer suitable for purpose and will meet the ongoing requirements of the facility for plant and machinery movement, cleaning and storage.

Tenders were invited for this project by the open tender method with a close of tenders of 10.00am on 14 February 2019.

Twelve (12) tenders were received by the close of tenders and all tenders have been scrutinised and assessed by a Tender Assessment Panel constituted in accordance with Council's Procurement Policies and Procedures and comprising representatives of the City Works, Infrastructure Strategy + Planning, Finance and Governance + Customer Service Divisions.

The Tender Assessment Panel assessed all tenders in accordance with the following assessment criteria and weightings as set out in the formal tender documents:

Mandatory Criteria

Satisfactory references from referees for previous projects of similar size and scope.

Assessable Criteria

1 Cost to Council 55%;

2 Appreciation of scope of works and construction methodology 10%;

3 Experience and satisfactory performance in undertaking works of similar size, scope and risk profile10%;

4 Project schedule 5%;

5 Demonstrated strengthening of local economic capacity 5%;

6 Workplace health and safety management system 10%;

7 Environmental management policies and procedures 5%.

The mandatory assessment criteria have been met by the recommended tenderer.

The Tender Assessment Panel utilised a weighted scoring method for the assessment of tenders which allocates a numerical score out of 5 in relation to the level of compliance offered by the tenders to each of the assessment criteria as specified in the tender documentation. The method then takes into account pre-determined weightings for each of the assessment criteria which provides for a total score out of 5 to be calculated for each tender. The tender with the highest total score is considered to be the tender that best meets the requirements of the tender documentation in providing best value to Council.

Table 1 below summarises the tenders received.

TABLE 1 – SUMMARY OF TENDERS RECEIVED (in alphabetical order)

Name of Tenderer
Adaptive Pty Ltd trading as Dezign
Advanced Constructions
Affective Services Australia Pty Ltd
Asset Group
Batmac Constructions Pty Ltd
CBC Project Management Group Pty Ltd
Civil Engineered Construction trading as ELH
Davone Constructions Pty Ltd
Donnelley Civil Pty Ltd
Dynamic Civil Pty Ltd
Edwards Constructions Pty Ltd
Peleton Pty Ltd

PROPOSAL

Council's assessment criteria assessed the 12 tenders received. The Cost to Council criteria does compare the received amounts and it has been found that all tenders exceed the budget allocated for this project.

After very careful consideration of the received tenders and noting the efforts of the organisations in submitting a tender for the proposed work, it is proposed Council decline to accept all tenders and carry out the requirements of the proposed contract itself.

CONSULTATION AND COMMUNICATION

1 Members of the Tender Assessment Panel consisting of representatives from City Works, Governance and Customer Service, Finance and Infrastructure Strategy + Planning Divisions;

2 Nominated Referees;

3 External Consultants – John Libro, Technical Advisory, Troutman Asset Integrity.

PLANNING AND POLICY IMPACT

This report contributes to the delivery of Our Wollongong 2028 goal, "We are a connected and engaged community". It specifically delivers on the following:

Community Strategic Plan	Delivery Program 2018-2021	Annual Plan 2018-19
Strategy	3 Year Action	Annual Deliverables
4.3.2 Resources (finance, technology, assets and people) are managed effectively to ensure long term financial sustainability.	5.5.1.2 Manage and maintain community infrastructure portfolio with a focus on asset renewal.	Progressively implement the Asset Management Improvement Program. Deliver 85% of Council's capital investment into our asset renewal program.

RISK ASSESSMENT

The risk in accepting the recommendation of this report is considered low on the basis that the tender process has fully complied with Council's Procurement Policies and Procedures and the Local Government Act 1993.

The risk of the project works being carried out by internal resources is considered low based upon Council's risk assessment matrix and appropriate risk management mitigation strategies will be implemented.

FINANCIAL IMPLICATIONS

It is proposed that the total project will be funded from the following source/s as identified in the Annual Plan –

Capital Budget project number - W254388

CONCLUSION

All tenders received exceeded Council's allocated budget and Council should decline all tenders and carry out the requirements of the contract with internal resources.

File: FI-230.01.519 Doc: IC19/388

ITEM 6 TENDER T19/12 CHARLES HARPER PARK HELENSBURGH, PLAYGROUND REPLACEMENT

This report recommends acceptance of a tender for T19/12 – Replacement Playground – Charles Harper Park, Helensburgh in accordance with the requirements of the Local Government Act 1993 and the Local Government (General) Regulation 2005.

The current playground in Charles Harper Park is aged and in need of replacement. Scope includes -

- Removal and demolition of the existing playground equipment, kerb and soft fall
- Site preparation and landscape works and foundations for the new playground equipment
- Co-ordination of the installation of playground equipment by equipment suppliers.

RECOMMENDATION

1 In accordance with clause 178(1)(a) of the Local Government (General) Regulation 2005, Council accept the tender of Lamond Contracting Pty Ltd for Replacement Playground – Charles Harper Park, Helensburgh, in the sum of $237,246.00, excluding GST.

2 Council delegate to the General Manager the authority to finalise and execute the contract and any other documentation required to give effect to this resolution.

3 Council grant authority for the use of the Common Seal of Council on the contract and any other documentation, should it be required, to give effect to this resolution.

REPORT AUTHORISATIONS

Report of: Joanne Page, Manager Open Space & Environmental Services
Authorised by: Andrew Carfield, Director Infrastructure + Works

ATTACHMENTS

1 Location Plan

BACKGROUND

Charles Harper Park playground was originally programmed for renewal in 2018/19, given its age, condition and limited play opportunities for a district level playground.

The playground planning for this district level playground was undertaken in 2018/19 by specialist play space landscape architects, Iscape following consultation with local children.

The construction of the project has been rescheduled to 2019/20 to enable the play space to incorporate community requests for the inclusion of shade structures and amended detailed design documentation to be completed to a standard suitable for tendering.

The design of the playground is consistent with principles outlined in Council's adopted Play Wollongong Strategy 2014-24, in particular Principle 3, "Meaningful engagement is undertaken with the community including children, in relation to the space planning, provision and management" in addition to Principle 4, "Play spaces are well designed, inclusive of all ages and abilities and encourage participation in play."

Tenders were invited for this project by the open tender method with a close of tenders of 10.00 am on 27 June 2019.

10 tenders were received by the close of tenders. One tender was received after the closing time, therefore this tender was deemed a late tender and was given no further consideration. Another tender was non-conforming as it didn't cover the complete scope. The remaining tenders have been scrutinised and assessed by a Tender Assessment Panel constituted in accordance with Council's Procurement Policies and Procedures and comprising representatives of the Property & Recreation, Open Space & Environmental Services, Community Cultural & Development, Finance and Governance & Customer Service Divisions.

The Tender Assessment Panel assessed all tenders in accordance with the following assessment criteria and weightings as set out in the formal tender documents:

Mandatory Criteria

1 Satisfactory references from referees for previous projects of similar size and scope.

2 Willingness to have a financial assessment acceptable to Council which demonstrates the tenderer's financial capacity to undertake the works.

Assessable Criteria

1 Cost to Council - 55%;

2 Experience and satisfactory performance in undertaking projects of similar size, scope and risk profile - 10 %;

3 Project Methodology - 10 %;

4 Project Schedule - 10 %;

5 Demonstrated strengthening of local economic capacity - 5 %;

6 Workplace health and safety management system - 5 %;

7 Environmental management policies and procedures - 5 %.

The mandatory assessment criteria have been met by the recommended tenderer.

The Tender Assessment Panel utilised a weighted scoring method for the assessment of tenders which allocates a numerical score out of 5 in relation to the level of compliance offered by the tenders to each of the assessment criteria as specified in the tender documentation. The method then takes into account pre-determined weightings for each of the assessment criteria which provides for a total score out of 5 to be calculated for each tender. The tender with the highest total score is considered to be the tender that best meets the requirements of the tender documentation in providing best value to Council. Table 1 below summarises the results of the tender assessment and the ranking of tenders.

TABLE 1 – SUMMARY OF TENDER ASSESSMENT

Name of Tenderer	Ranking
Lamond Contracting Pty Ltd	1
Simpson Landscapes & Consultants Pty Ltd	2
RK Evans Landscaping Pty Ltd	3
Landform Gardens Pty Ltd	4
BNS Landscapes Pty Ltd	5
GJ's Landscapes Pty Ltd	6
Co-Ordinated Landscapes Pty Ltd	7
Undercover Landscapes Pty Ltd	8
Scape Constructions Pty Ltd	9
Synthetic Grass & Rubber Surfaces Australia Pty Ltd	NON CONFORMING
Growth Civil Landscapes	LATE SUBMISSION

PROPOSAL

Council should authorise the engagement of Lamond Contracting Pty Ltd to carry out the Replacement Playground – Charles Harper Park, Helensburgh in accordance with the scope of works and technical specifications developed for the project.

The recommended tenderer has satisfied the Tender Assessment Panel that it is capable of undertaking the works to Council's standards and in accordance with the technical specification.

Referees nominated by the recommended tenderer have been contacted by the Tender Assessment Panel and expressed satisfaction with the standard of work and methods of operation undertaken on their behalf.

CONSULTATION AND COMMUNICATION

1 Members of the Tender Assessment Panel

2 Nominated Referees

PLANNING AND POLICY IMPACT

This report contributes to the delivery of Our Wollongong 2028 goal "We have a healthy community in a liveable city". It specifically delivers on the following:

Community Strategic Plan	Delivery Program 2018-2021	Operational Plan 2019-20
Strategy	3 Year Action	Operational Plan Actions
5.5.1 Public facilities in key locations and transport routes are maintained and clean, accessible and inviting to our community and visitors.	5.5.1.2 Manage and maintain community infrastructure portfolio with a focus on asset renewal	Achieve our expenditure targets for capital renewal by programming these works with sufficient flexibility to allow re-phasing, deferral and/or the introduction of other deferred renewal works as required.

RISK ASSESSMENT

The risk in accepting the recommendation of this report is considered low on the basis that the tender process has fully complied with Council's Procurement Policies and Procedures and the Local Government Act 1993.

The risk of the project works or services is considered low based upon Council's risk assessment matrix and appropriate risk management strategies will be implemented.

FINANCIAL IMPLICATIONS

It is proposed that the total project be funded from the following source as identified in the Annual Plan –

Operational Plan 2019-2020

CONCLUSION

The recommended tenderer (Lamond Contracting Pty Ltd) has submitted an acceptable tender for this project and Council should endorse the recommendations of this report.

File: FI-914.05.001 Doc: IC19/396

ITEM 7 STATEMENT OF INVESTMENT - JUNE 2019

This report provides an overview of Council's investment portfolio performance for the month of June 2019.

Council's average weighted return for June 2019 was 1.73% which was slightly above the benchmark return of 1.65%. Council's portfolio continues to provide a high level of consistency in income and a high degree of credit quality and liquidity.

RECOMMENDATION

Council receive the Statement of Investment for June 2019.

REPORT AUTHORISATIONS

Report of: Brian Jenkins, Chief Financial Officer
Authorised by: Renee Campbell, Director Corporate Services - Connected + Engaged City

ATTACHMENTS

1 Statement of Investment - June 2019
2 Investment Income Compared to Budget 2018-2019

BACKGROUND

Council is required to invest its surplus funds in accordance with the Ministerial Investment Order and Division of Local Government guidelines. The Order reflects a conservative approach and restricts the investment types available to Council. In compliance with the Order and Division of Local Government guidelines, Council adopted an Investment Policy on 10 December 2018. The Investment Policy provides a framework for the credit quality, institutional diversification and maturity constraints that Council's portfolio can be exposed to. Council's investment portfolio was controlled by Council's Finance Division during the period to ensure compliance with the Investment Policy. Council's Audit, Risk and Improvement Committee's (ARIC) role of overseer provides for the review of Council's Investment Policy and the Management Investment Strategy.

Council's Responsible Accounting Officer is required to sign the complying Statement of Investment contained within the report, certifying that all investments were made in accordance with the Local Government Act 1993 and the Local Government Regulation 2005.

Council's investment holdings as at 30 June 2019 were $154,161,422 (Statement of Investment attached) [30 June 2018 $157,531,585].

Council's average weighted return for June 2019 was 1.73% which was above the benchmark return of 1.65%. The result was primarily due to the positive returns from the Emerald Mortgage backed securities and the term deposits in Council's portfolio. The remainder of Council's portfolio continues to provide a high level of consistency in income and a high degree of credit quality and liquidity.

At 30 June 2019, year to date interest and investment revenue of $4,463,789 was recognised compared to the year to date budget of $4,300,473.

Council's 24 floating rate notes had a net decrease in value of $59,506 for June 2019.

Council holds two Mortgaged Backed Securities (MBS) that recorded a net increase in value of $4,750 for June 2019. The coupon margins on these investments reflect pre Global Financial Crisis (GFC) pricing. For example, the Emerald A is paying 45 basis points over the BBSW where a comparative investment is now paying 100 basis points over the BBSW. This is reflected in the coupon rates on both these investments. While the maturity dates are outside Council's control, the investment advisors had previously indicated that capital is not at risk at that stage and recommended a hold strategy due to the illiquid nature of the investment.

Council has two investment holdings under the NSW TCorp Hour Glass Facility: the Long-Term Growth Facility and the NSW TCorpIM Cash Fund. The Long-Term Growth recorded a net increase in value of $72,574 and the Cash Fund recorded a net increase in value of $1,272 in June 2019. The fluctuation in the Long-Term Growth Facility is a reflection of the current share market volatility both domestically and internationally, whereas the Cash Fund provides relatively stable returns with low potential for capital loss while maintaining high levels of liquidity, similar to an at call account. The fund only invests in Australian cash and fixed interests.

At the June 2019 RBA meeting, the official cash rate was cut by 25 points, down from 1.50% to 1.25%. This was followed by an additional rate cut of 25 points during the July meeting, down from 1.25% to a new record low of 1.00%. The RBA has advised that it would continue to assess the outlook and adjust policy as needed to foster sustainable growth in demand and inflation outcomes consistent with the inflation target over time. The current inflation rate is quite low and below target.

This report complies with Council's Investment Policy which was endorsed by Council on 10 December 2018. Council's Responsible Accounting Officer has signed the complying Statement of Investment contained within the report, certifying that all investments were made in accordance with the Local Government Act 1993 and the Local Government Regulation 2005.

PLANNING AND POLICY IMPACT

This report contributes to the delivery of Wollongong 2028 goal '*We are a connected and engaged community*'. It specifically delivers on the following:

Community Strategic Plan	Delivery Program 2018-2021	Operational Plan 2019-20
Strategy	3 Year Action	Operational Plan Actions
4.3.2 Resources (finance, technology, assets and people) are effectively managed to ensure long term financial sustainability	4.3.2.1 Effective and transparent financial management systems are in place	Monitor and review achievement of Financial Strategy
		Continuous budget management is in place, controlled and reported
		Provide accurate and timely financial reports monthly, quarterly and via the annual statement
		Manage and further develop a compliance program to promote awareness and compliance with Council's procurement policies and procedures and other related policies

CONCLUSION

The investments for June 2019 have performed favourably compared to the year to date budget and the portfolio recorded an average weighted return above the annualised Bloomberg Bank Bill Index Benchmark.

File: IW-911.01.188 Doc: IC19/387

ITEM 8 CITY OF WOLLONGONG TRAFFIC COMMITTEE MINUTES OF MEETING HELD ON 26 JUNE 2019

The City of Wollongong Traffic Committee meeting was held on 26 June 2019. Items listed in Sections 2, 4 to 5 are to be adopted by Council through delegated authority. The items listed in Section 3 must be determined by Council and is recommended to Council for approval for temporary Regulation of Traffic on public roads for works or events by independent parties.

RECOMMENDATION

In accordance with the powers delegated to Council, the Minutes and Recommendations of the City of Wollongong Traffic Committee held on 26 June 2019 in relation to Regulation of Traffic be adopted.

REPORT AUTHORISATIONS

Report of: Mike Dowd, Manager Infrastructure Strategy + Planning
Authorised by: Andrew Carfield, Director Infrastructure + Works

ATTACHMENTS

1 Standard Conditions for Road Closures
2 Standard Conditions for Road Parties
3 Coastal Classic 30km Trail Run
4 New Years Eve
5 Australia Day
6 Southern Stars
7 Australian Motorcycle Festival

BACKGROUND

1 OTFORD – Ward 1 (Item 3.1 of Wollongong Traffic Committee Minutes of Meeting)

Coastal Classic 30km Trail Run – Saturday 7 September 2019
Station, Beaumont and Fanshawe Roads - Road Closures

Background

The event organisers for the annual Coastal Classic Trail run have applied to close Station, Beaumont and Fanshawe Roads, Otford on Saturday 7 September 2019 between 7.30am and 10.00am. The event will start at Otford Public School and arrangements have been made for participants to register at the school as in previous years. Based on previous years experience the organisers have a good relationship with the Otford community and this event will have minimal effect on the wider community in terms of the road network.

The organisers are also arranging for permission to cross Lady Wakehurst Drive under traffic control, from the Roads and Maritime Services (RMS). Runners will be released every 5 seconds and the crossing of Lady Wakehurst Drive can be managed on a hold and release pattern.

Updated plans showing vehicle mitigation on Station Road were tabled at the meeting.

Consultation
Consultation with effected property owners is a condition of approval for this event.

PROPOSAL SUPPORTED UNANIMOUSLY

The road closures of Station, Beaumont and Fanshawe Roads be approved subject to Council's Standard Conditions for Road Closures and approval from the RMS to cross Lady Wakehurst Drive and the submitted Traffic Management Plans for the Coastal Classic 30km Trail Run.

2 BULLI – Ward 1 (Item 3.3 of Wollongong Traffic Committee Minutes of Meeting)

Christmas Party - Saturday 7 December 2019
Owen Street – Road Closure

Background

Council has received a request from residents in Owen Street for a street party to be held on Saturday 7 December 2019 from 2pm to 7pm. The request is for a full road closure of Owen Street between Franklin Avenue and Waterloo Street, Bulli. Diversion of traffic around the closure is expected to have minimal inconvenience upon drivers.

Consultation
Residents in the affected area have indicated their support of the road closure via signed consent which was submitted with the Application for Road Closure.

PROPOSAL SUPPORTED UNANIMOUSLY

The proposed road closure be approved subject to Council's Standard Conditions for Street Parties.

3 WOLLONGONG – Ward 2 (Item 3.4 of Wollongong Traffic Committee Minutes of Meeting)

New Year's Eve - 31 December 2019 from 4.00pm to 10.30pm
Cliff Road and Eastern end of Harbour Street – Road Closures

Background

Council has prepared traffic management plans for the annual celebration for New Year's Eve 2019. The road closure involves Cliff Road between Endeavour Drive and Georges Place. The closures take effect from 4.00pm until 10.30pm on Tuesday 31 December 2019. The program of events is centred at Wollongong Harbour and is completed with fireworks at around 9.30pm; consistent with the family orientation of the celebrations. The Gong Shuttle will be diverted via Georges Place and Corrimal Street during the closure.

The Traffic Management Plans were tabled at the meeting and it was noted that additional vehicle mitigation will be required at the intersection of Hector Street and Harbour Street and at Old Court Lane and Hector Street.

Consultation
Consultation regarding this Agenda item is a condition of approval.

PROPOSAL SUPPORTED UNANIMOUSLY

The road closures be approved subject to Council's Standard Conditions for Road Closures and amended Traffic Management Plans, detailing additional vehicle mitigation in Hector Street and Old Court Lane.

4 WOLLONGONG - Ward 2 (Item 3.5 of Wollongong Traffic Committee Minutes of Meeting)

Australia Day - Sunday 26 January 2020
Bourke Street, Cliff Road, Harbour Street, Endeavour Drive, Marine Drive – Road Closures

Background

Council has prepared Traffic Management Plans for the annual celebration for Australia Day 2020. It is proposed that a temporary bus zone be installed on Springhill Road adjacent to the JJ Kelly car park to permit the operation of a park and ride service throughout the day. The road closures of Bourke Street, Cliff Road, Harbour Street, Endeavour Drive and Marine Drive will take effect from 5.00am until 11.00pm on the day. The Gong Shuttle will be diverted by Corrimal Street throughout the day but regular route service buses will be permitted to use the Marine Drive Terminus.

In previous years there were some difficulties with traffic congestion at the intersection of Wilson and Campbell Streets with drivers looking for parking close to Osborne Park. In the 2020 event Wilson Street will only be available for residents and patrons of the motel.

Traffic Management Plans were tabled at the Meeting.

Consultation
Consultation regarding this Agenda item is a condition of approval.

PROPOSAL SUPPORTED UNANIMOUSLY

The road closures be approved subject to Council's Standard Conditions for Road Closures and the submitted Traffic Management Plans.

5 WOLLONGONG – Ward 2 (Item 3.6 of Wollongong Traffic Committee Minutes of Meeting)

Southern Stars from 21 August to 24 August 2019
Harbour Lane and Crown Street – Road Closures

Background

The WIN Entertainment Centre is hosting the annual Southern Stars music festival during the week 21 to 24 August 2019 as in previous years. Road closure plans A and B have been submitted to cover the range of requirements for safe conduct of the event during dress rehearsals, school matinee performances and the final public performances. The road closures can be summarised as follows:

1 Rehearsals Thursday 22 August: Plan B will be used during the hours 5.30pm – 7pm at the completion of the rehearsals. It involves the closure of Crown Street between Harbour Street and Marine Drive. During this closure buses and residents will be permitted to pass through.

2 Matinee performances Friday 23 August: Plan A will be in place and involves the closure of Crown Street and Marine Drive between Harbour Street and Cliff Road. The closure will be in place between 8.30am – 5.00pm. Buses and residents will also be permitted to pass through the road closure. The buses used for audiences and participants will then be parked on the closed section of Marine Drive during each performance.

3 Evening Public Performance Friday 23 August: Plan B will be used at the end of this public performance between 9.30pm – 11.00pm.

4 Evening Public performance Saturday 24 August 2019: Plan B will be used prior to the beginning from 4.00pm until 5.30pm and at the conclusion of the performance from 9.30pm to 11.00pm The WIN Entertainment Centre have arranged to access Council car parks in the vicinity; Quilkey Place and Stewart Street Carpark. As in previous years the buses used to transport students to and from the facility will be managed by an experienced volunteer. Parents will be advised of the arrangements to drop off and pick up students away from the WIN Entertainment Centre in order to reduce traffic congestion.

Vehicle mitigation has been considered but no arrangements for barriers or additional parked vehicles were made because the students and audiences are within the building for the event.

The collection of student performers and the student matinee audiences is to be by bus. There are waiting areas inside the Wollongong Entertainment Centre where students are called once their bus arrives. As a result the students entering the footpath area around the WEC are protected by the waiting buses.

The audience arrivals and departures other than the student matinee are similar to other events at this complex and vehicle mitigation is not regarded as necessary. Traffic Management Plans were

tabled at the Meeting.

Consultation
Consultation is a condition of approval for this Agenda item.

PROPOSAL SUPPORTED UNANIMOUSLY

The road closures be approved subject to the submitted Traffic Management Plans and Council's Standard Conditions for Road Closures.

6 WOLLONGONG - Ward 2 (Item 3.7 of Wollongong Traffic Committee Minutes of Meeting)

Australian Motorcycle Festival from 8 to 10 November 2019
Marine Drive – Road Closure

Background

The Australian Motorcycle Festival is proposed for Friday 8 to Sunday 10 November 2019 at Lang Park Wollongong. In order to set up the event the organisers have proposed that parking be removed in Hector and Hinton Streets to permit the heavy vehicles involved have access to Lang Park. The parking restrictions are required Thursday and Friday 8 November from 6 am to 5 pm and from 3 pm to 10 pm on Sunday 10 November 2019.

The event also involves the closure of Marine Drive from 7 am to 4pm on 9 and 10 November 2019 from the roundabout at the eastern end of Cliff Road to Crown Street. It is proposed that residents, buses and drivers accessing parking in Quilkey Place will be permitted in Crown Street, east of Harbour Street. The organisers have traffic controllers planned to be in place to allow buses in and out of the Marine Drive Bus Terminus during the event.

The Traffic Management Plans were tabled at the Meeting and it was noted that the vehicle mitigation on the roundabout at the eastern end of Crown Street should be relocated to Marine Drive immediately north of the bus terminus.

Although not part of the direct impacts on the road network the organisers propose a number of stunt motorcycle events at Flagstaff Hill and Wollongong Harbour. One additional traffic controller will be necessary at the eastern end of Cliff Road to facilitate the movement of pedestrians between Lang Park and the Wollongong Harbour precinct.

Consultation
Consultation is a condition of approval for this Agenda item.

PROPOSAL SUPPORTED UNANIMOUSLY

The road closures be approved subject to Council's Standard Conditions for Road Closures and amended Traffic Management Plans which detail the additional traffic controller at the eastern end of Cliff Road and the relocation of the vehicle mitigation to a point north of the bus terminus on Marine Drive.

PLANNING AND POLICY IMPACT

This report contributes to the delivery of Our Wollongong 2028 goal "We have affordable and accessible transport".

It specifically delivers on core business activities as detailed in the Draft Service Plan 2018-19.

Attachment 1 - Standard Conditions for Road Closures

Standard Conditions for Road Closures

For Special Events and Work Related activities Within Council Road Reserves.

Following approval by Wollongong City Council, road closures are subject to the additional Council conditions:

1. **The Applicant must complete the Council form** *'Application to Open and Occupy or Underbore a Roadway or Footpath' (Refer to Checklist below – relates to Section 138 of the Roads Act.)*
2. **NSW Police Approval:** The Applicant must obtain written approval from NSW Police, where required under the Roads Act.
3. **If the Road Closure is within 100m of any traffic control signals or on a *'State Classified Road'*** the Applicant must obtain a Road Occupancy Licence (ROL) from NSW Roads & Maritime Services (RMS).
4. **The Applicant must advise all affected residents and business owners** within the closure area of the date/s and times for the closure, at least 7 days prior to the intended date of works.
5. **The Applicant must advise Emergency Services:** Ambulance, Fire Brigade and Police, Taxi and Bus Companies of the closure dates and times in writing, 7 days prior to the intended date of works. The Applicant must endeavour to minimise the impact on bus services during the closure.
6. **Traffic Management Plan:** The closure must be set up in accordance with the approved **Traffic Management Plan (TMP)** prepared by an appropriately qualified traffic controller; a copy of whose qualifications must be included with the submitted TMP.
7. **Traffic Management Plan Setup:** The Traffic Management Plan must be set up by appropriately qualified traffic control persons or the NSW Police.
8. **Access to properties affected by the road closure must be maintained where possible.** Where direct access cannot be achieved, an alternative arrangement must be agreed to by both the applicant and the affected person/s.
9. **Public Notice Advertisement:** The Applicant must advertise the road closure in the Public Notices section of the local paper, detailing closure date/s and times at least 7 days prior to the closure.
10. **Public Liability Policy:** The Applicant must provide Council with a copy of their current insurance policy to a value of no less than $20 million dollars to cover Wollongong City Council from any claims arising from the closure.

Checklist:

☑ **Completed Council Form:**
'Application to Open and Occupy or Underbore a Roadway or Footpath'.

Required information as shown below MUST be attached:

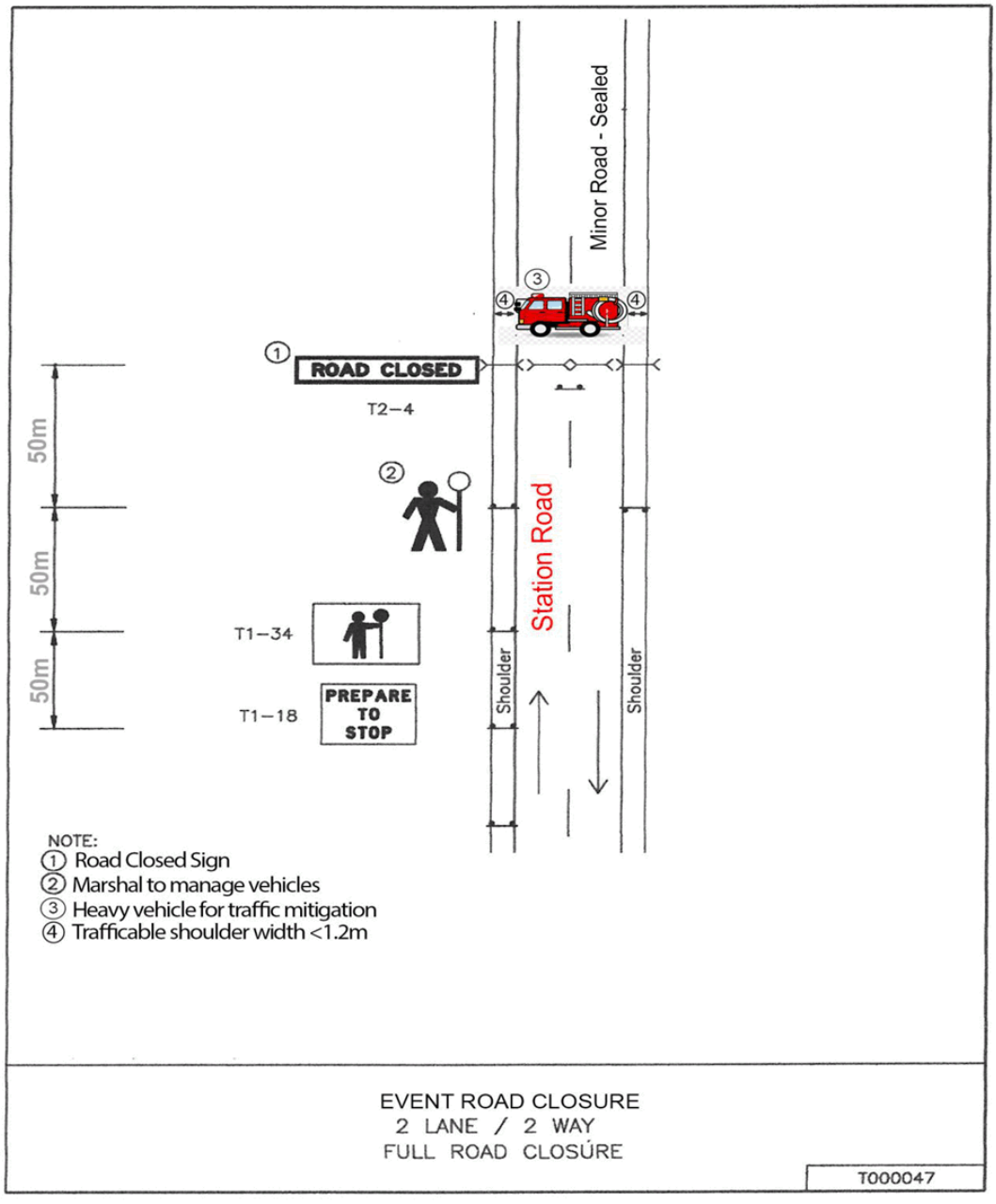
☑ A copy of the letter from the Traffic Committee authorising the closure
☑ The Traffic Management Plan (TMP)
☑ The Road Occupancy Licence (ROL) *if required*
☑ Written approval from NSW Police
☑ Public Liability Insurance

Applications may be lodged in the Customer Service Centre located on the Ground Floor of Council's Administration Building, 41 Burelli Street Wollongong between 8.30am and 5pm Monday to Friday.

Attachment 3
Coastal Classic 30km Trail Run

TCP - A

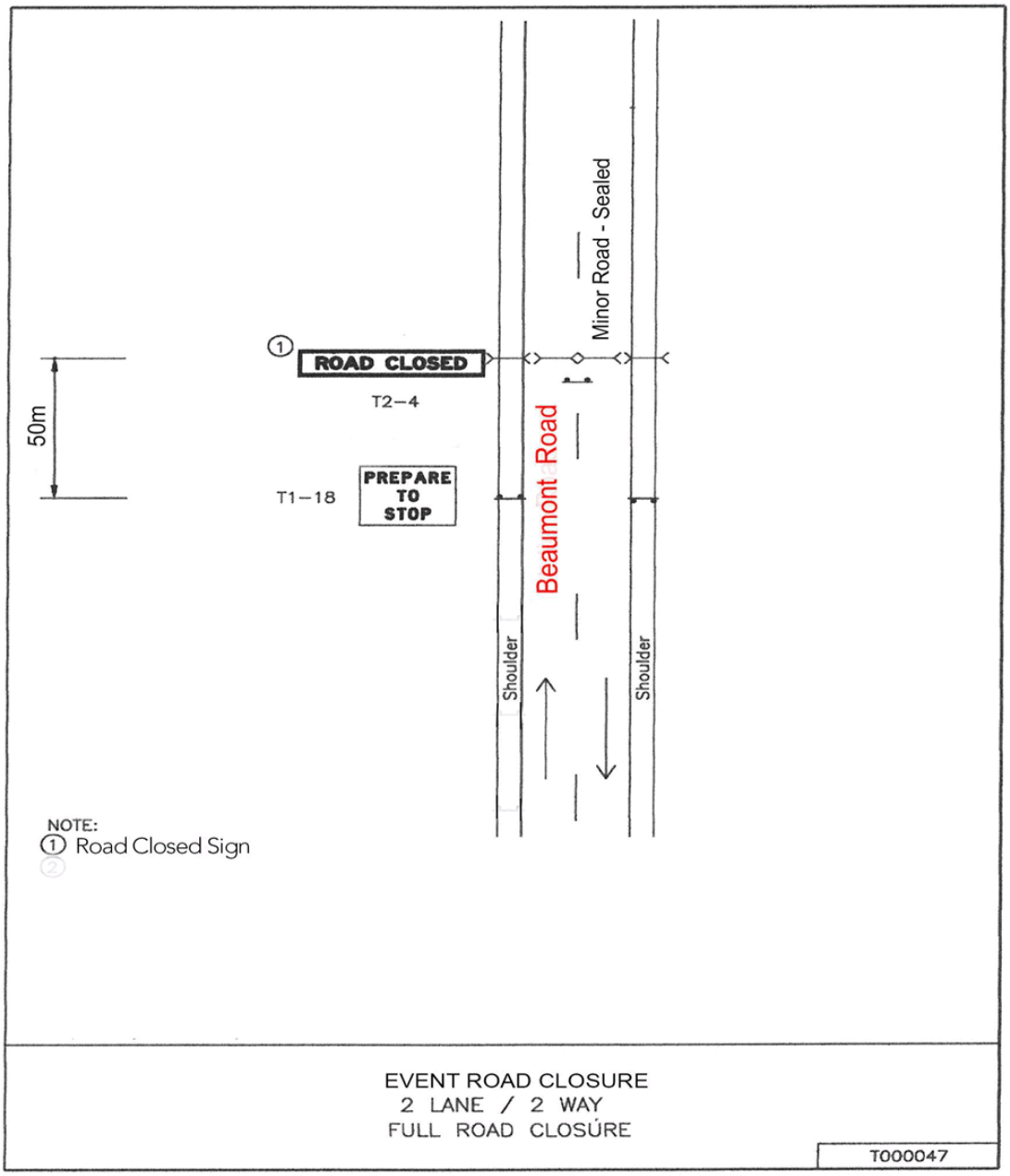
Traffic Control Plan for Running Event



Design and Inspect Traffoc Control Plans
Gary Farebrother
Card No: 0032576581 Exp: 18/July/2019

TCP - B

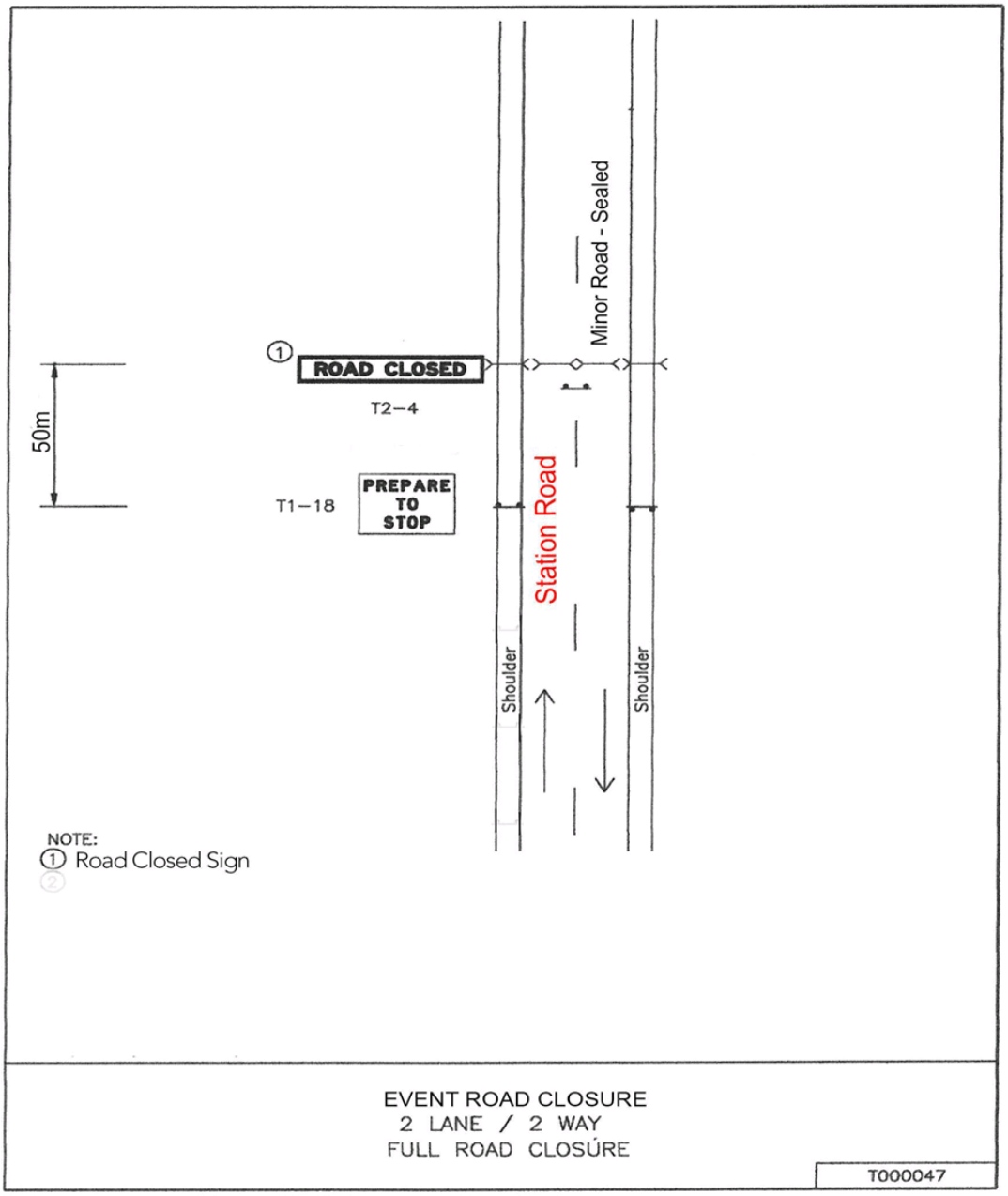
Traffic Control Plan for Running Event



Design and Inspect Traffic Control Plans
Gary Farebrother
Card No: 0032576581 Exp: 18/July/2019

TCP - C

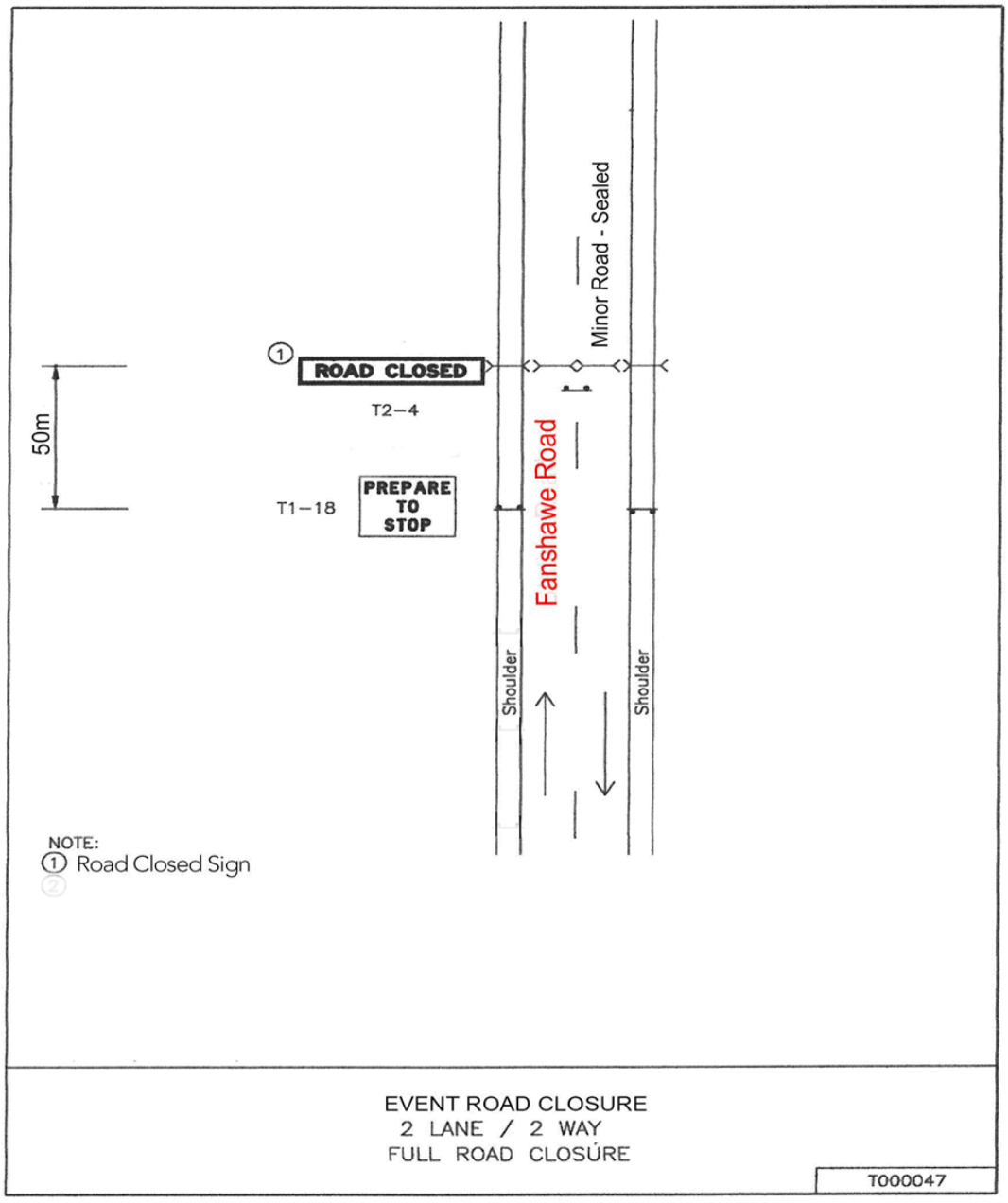
Traffic Control Plan for Running Event



Design and Inspect Traffic Control Plans
Gary Farebrother
Card No: 0032576581 Exp: 18/July/2019

TCP - D

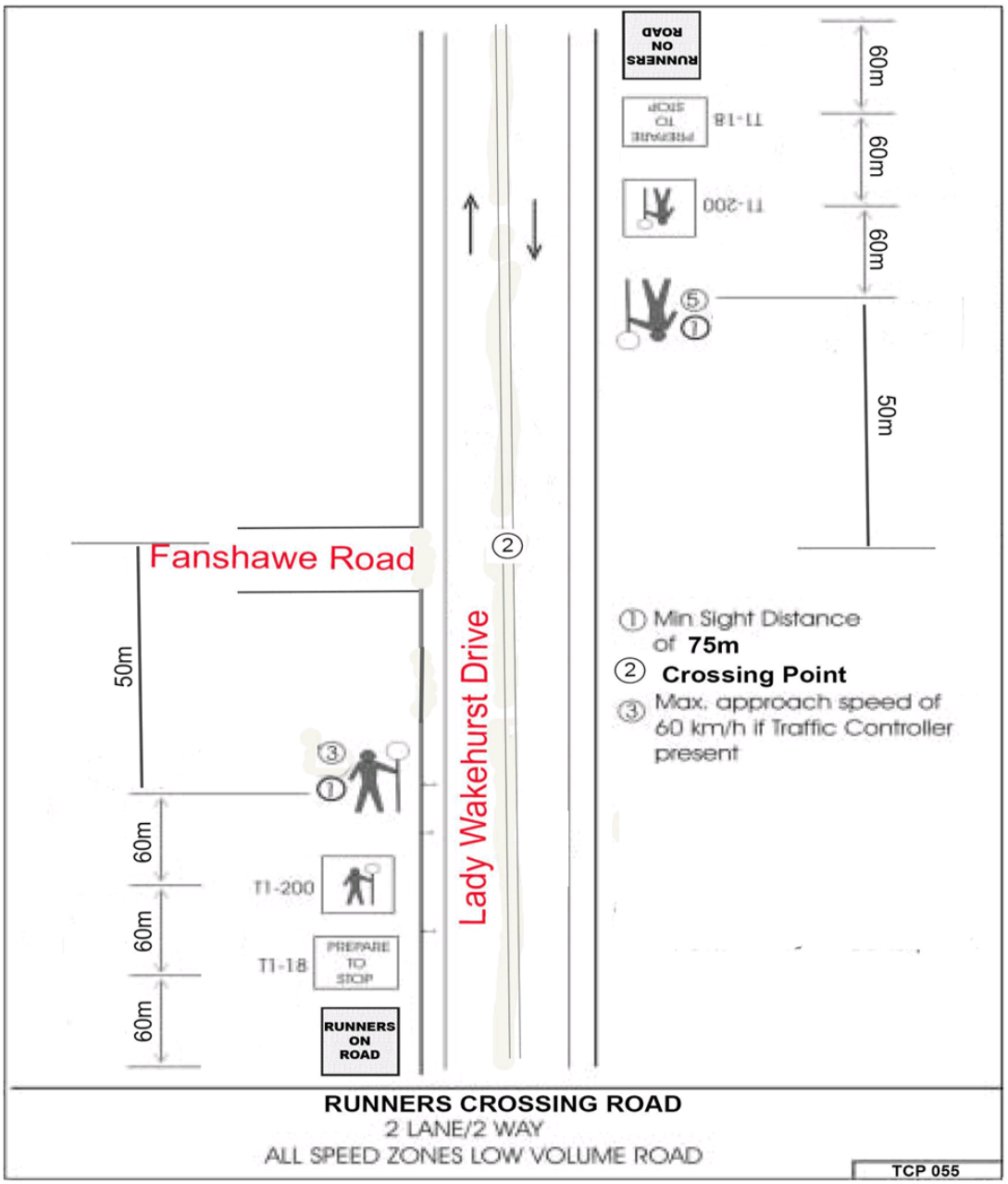
Traffic Control Plan for Running Event



Design and Inspect Traffic Control Plans
Gary Farebrother
Card No: 0032576581 Exp: 18/July/2019

TCP - E

Traffic Control Plan for Running Event



Design and Inspect Traffic Control Pans
Gary Farebrother
Card No: 0032576581 Exp: 18/July/2019

File: CO-910.01.004 Doc: IC19/391

ITEM 9	NOTICE OF MOTION - COUNCILLOR T BROWN - INSTALLATION OF A PERMANENT RAINBOW CROSSING IN WOLLONGONG FORESHORE OR CENTRAL BUSINESS DISTRICT LOCATION TO DEMONSTRATE ONGOING SUPPORT FOR THE LGBTQIA

Councillor T Brown has submitted the following Notice of Motion –

"I formally move that Wollongong City Council install a permanent Rainbow Crossing, in a prominent Wollongong foreshore or CBD location, to show our ongoing support for the LGBTQIA+ community and reflect Wollongong's status as an inclusive and welcoming city. Staff to report back on suitable locations via an information note within one month."

Background provided by Councillor T Brown:

Since 2013 rainbow crosswalks or roundabouts have begun appearing in Australia, installed by local councils such as George's River and Ashfield. The most notable being the City of Sydney's permanent rainbow crossing in Taylor Square, on the corner of Bourke and Campbell streets, unveiled in 2019.

Since that time local councils have embraced this visible sign of support for a section of the community, who following the same sex marriage debate, often feel vilified and can be the subject of homophobic anti-social behaviour.

In Braddon, following the 2017 same-sex marriage victory, the ACT Government installed a rainbow roundabout.

https://www.georgesriver.nsw.gov.au/Council/About-Your-Council/Media/Pride-Month-rainow-crossing-to-let-all-people-know-they-are-Welcome-Here-en

https://www.abc.net.au/news/2017-11-22/canberra-now-home-to-rainbow-roundabout-to-mark-ssm-yes-vote/9181248

https://www.sbs.com.au/topics/sexuality/agenda/article/2019/02/08/permanent-rainbow-crossing-unveiled-ahead-sydney-mardi-gras

https://en.wikipedia.org/wiki/DIY_rainbow_crossing