SYDNEY WATER
UPPER SOUTH CREEK ADVANCED WATER RECYCLING CENTRE

URBAN DESIGN AND LANDSCAPE PLAN – STAGE 1

Prepared for Sydney Water | Document number AWRC-TRA-PLN-DES-0001

Sydney WATER

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Quality Assurance

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URBAN DESIGN AND LANDSCAPE PLAN – STAGE 1
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Glossary

PROJECT DEFINITIONS	
Stage 1 (2026)	(Operational Site/Zone) The Project and basis of UDLP
Stage 2 (2035)	Potential Expansion within Operational Site
Masterplan	Potential Future Green Space

Abbreviation	Definition
AEP	Annual Exceedance Probability
AWRC	Advanced Water Recycling Centre
CPTED	Crime Prevention Through Environmental Design
CPW	Cumberland Plain Woodland
CSSI	Critical State Significant Infrastructure
DCP	Development Control Plan
D&C	Design and Construction
DPE	Department of Planning and Environment
ECI	Early Contractor Involvement
EIS	Environmental impact Statement
ESD	Ecological Sustainable Development
FPL	Flood Plain Level
ISC	Infrastructure Sustainability Council
IQL	Independent Qualified Individual
IS	IS Rating Scheme
ISC	Infrastructure Sustainability Council
LMP	Landscape Management Plan
MCoA	Ministers Conditions of Approval
MoU	Memorandum of Understanding
PMF	Probable Maximum Flood
RAP	Registered Aboriginal Participant
Reference Design	Upper South Creek Advanced Water Recycling Centre Urban Design Report (Sydney Water July 2021)
RFT	Request For Tender
SSI	State Significant Infrastructure
UMM	Updated Management Measures
USC	Upper South Creek
VMP	Vegetation Management Plan
WSUD	Water Sensitive Urban design
WSA	Western Sydney Aerotropolis
WSAP	Western Sydney Aerotropolis Plan
WHMP	Wildlife Hazard Management Plan

Acknowledgement of Country

We acknowledge and pay our respect to the Traditional Custodians of the AWRC site, the Darug people, and acknowledge their continuing connection to Country for thousands of years. We extend that respect to the Dharawal people who also have custodial obligations for this area and Wianamatta South Creek, which flows from Dharawal into Darug Country. We also extend that respect to the many other Aboriginal and Torres Strait Islander peoples who have lived in Western Sydney for many generations.

We understand that Wianamatta South Creek is significant to Darug and Dharawal people. Her name means 'the Mother Place', and like all water bodies, she is critical to the cultural and spiritual health of Country.

The AWRC project provides Sydney Water with an opportunity not only to learn about the cultural value of Wianamatta, but also to help restore and rehabilitate her, while also educating the broader community about her role in Country. We hope to be part of that process.

Executive Summary

The response to Country and culture in the design of places builds on engaging and being guided by the Aboriginal community and recognised knowledge holders. Connecting to Country principles have been utilised to guide the planning of the Advanced Water Recycling Centre (AWRC) and will be developed during the Design and Construction phase to assist in the delivery and management of the site.

Urban design sets a strong foundation for the aspirations and desired outcomes for the USC AWRC by embedding place making and landscape-led design principles as core pillars. Importantly, the site will contribute to place-based outcomes through designing and caring for Country and supporting biodiversity through providing a restored landscape and a sustainable wastewater service for now and into the future. A balanced perspective promotes the environment as an opportunity for water cycle education.

The AWRC site is within a developing Western Parkland City and is an important infrastructure asset that has local and regional significance. It will build upon the retention and enhancement of blue and green networks linking open space and recreational systems to cool an emerging polycentric city.

This UDLP sets the strategy for the urban, landscape and architectural design at the AWRC. It outlines the context, opportunities and constraints that have informed the development for Stage 1 (Operational Site) and Stage 2 (potential expansion within Operational site - 2035) and the Green Space Masterplan. Sydney Water has developed design objectives to guide a landscape led masterplan. Urban Design for the AWRC is a policy-driven initiative to implement planning objectives to lead transformational outcomes.

Design Approach

Establishing a benchmark in integrating essential infrastructure with the provision of broader community and ecological benefits, the development of the AWRC site will build upon existing character and heritage through:

- Building on existing features
- Creating a landscape led biodiverse environment.
- Showcasing water on the site
- Human scale and nature-based solutions
- Providing opportunities for the future
- Ensuring a feasible and sustainable outcome
- Integrating a cultural heritage response

The guiding principles of Wastewater Treatment, Resource Recovery, Sustainability, Community and Built Environment Approach identified in the reference design *Upper South Creek Advanced Water Recycling Centre Urban Design Report* (Sydney Water July 2021) have been adopted to develop a joint vision with Sydney Water.

The Upper South Creek AWRC is a place where the connection of people to the land, water and sky is appreciated and deepened, bringing community together to restore, discover, meet and enjoy.

Connecting with Country, heritage interpretation and public art objectives have been identified in the *Upper South Creek Advanced Water Recycling Centre Heritage Interpretation Strategy* (Extent Heritage October 2021) and incorporated into the planning for the Project.

Sydney Water has made a commitment to improved sustainability outcomes at the Upper South Creek AWRC and is targeting an Infrastructure Sustainability Council (ISC) IS rating of "Gold", aspiring to "Platinum" for the Design and As-Built categories. More broadly, Sydney Water's approach to Climate Change and sustainability includes a commitment to achieving a net zero carbon in its operations by 2030.

The urban design approach for the AWRC to manage potential visual and landscape impacts has been considered by creating a parkland setting, architectural treatments and developing a landscape within an ecological and heritage context. The AWRC is located in an area that is expected to change to industrial and employment land uses and will likely reduce the significance of the impact of the AWRC over time. In addition, a landscape-led approach to urban design provides opportunities to positively enhance the visual impact of the AWRC.

Environmental Impact Statement

The Project is critical State Significant Infrastructure and Sydney Water has prepared the Upper South Creek Advanced Water Recycling Centre Environmental Impact Statement (EIS) which assesses environmental and community impacts. The EIS was placed on public exhibition on 21 October to 17 November 2021. Comments and submissions are captured in the Submissions Report March 2022 including recommendations for future stages. The Project was approved on 28 November 2022.

Sydney Water expects to begin construction in mid-2023.

Detailed Engagement

Sydney Water has confirmed a more detailed engagement process with the community, external stakeholders and Traditional Custodians of the land will continue to inform the future green space development, cultural heritage interpretation and ongoing caring for Country. During the design and construction phase, elements of this engagement that Sydney Water feel are beneficial to support the delivery and outcomes of the Stage 1 works will be considered.

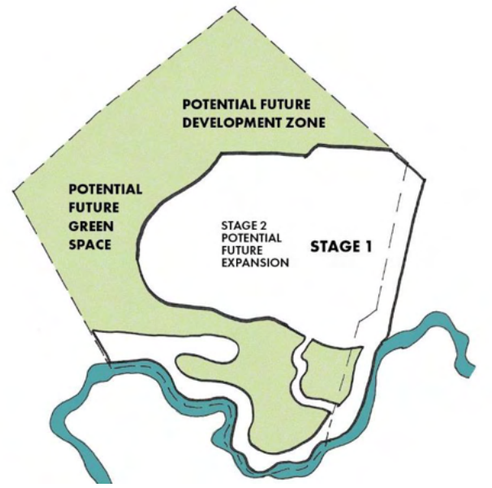

Figure 1 Staged Development of AWRC site

Figure 2 Wianamatta South Creek

Figure 3 Context Map: Upper South Creek Advanced Water Recycling Centre

1 Project Overview

1.1 Introduction

Preamble

The Upper South Creek Advanced Water Recycling Centre (AWRC) was approved on 28 November 2022. The AWRC will be delivered in stages, with the Stage 1 AWRC Operational Site (this Project and UDLP) being delivered by 2026, Stage 2 is for the expansion of assets within the same operational site with ultimate capacity in approximately 2035. The Green Space Masterplan is part of the Stage 1 CSSI approval however, the urban design and landscaping is subject to ongoing consultation which extends beyond the plans included in this UDLP. The Green Space Masterplan will either form another stage in Stage 1 or be delivered as part of Stage 2.

This Urban Design and Landscape Plan (UDLP) has been established to demonstrate Sydney Water's approach to urban design for the Project and addresses the relevant Ministers Conditions of Approval, and applicable guidelines and standards. The UDLP establishes the framework for the staged development of the AWRC, ensuring consistency of integration.

The *Upper South Creek Advanced Water Recycling Centre Urban Design Report,* (Sydney Water July 2021) Reference Design formed the basis for the development of the urban design to the preliminary Concept Stage. The site is strategically located within a developing city and the UDLP presents a vision and principles that will see the delivery of critical infrastructure within a restored environment.

The Green Space Masterplan will be advanced during the Design and Construction (D&C) phase to establish future implementation strategies.

Water, land, and the sky are the greatest assets of the Western Parkland City. The waterways and green networks will define the character of the city. Sydney Water is providing a strategy to embed a seamless landscape that will enhance and cool the City and be an extraordinary place that links into its neighbourhood, recycles water, recovers resources, promotes biodiversity, heritage, education, play and recreation.

Greening is essential for the broader connections within the Western Parkland City. The landscaping for the site emphasises the importance of connected ecological systems along with physical networks, setting the thoughtful bench marking that can guide the development of future segments of Wianamatta South Creek and Kemps Creek.

The precinct is undergoing significant transformation that is being driven by infrastructure and land use initiatives associated with the Western Sydney Airport and Aerotropolis. The majority of rural lands will transition towards urban development (residential and employment) and existing urban hubs will increase in density to house a growing population.
Urban Design addresses the staged nature of the Project, current and future needs in restoring and enhancing greening along Wianamatta South Creek, providing a level of certainty and flexibility to match the planned capacity growth of the AWRC. Connections across the site and linkages to planned open space networks have been identified.

The UDLP recognises the objectives and strategic directions for the implementation of the local Green Grid. Wianamatta South Creek is a priority project and will be developed from the principles as set in the Sydney Green Grid. The Green Space Masterplan forms the basis of enhancement that will keep the AWRC green and cool, encourage healthy lifestyles, support walking and cycling, provide better access to open spaces, enhance bushland and support ecological resilience.

Making use of the attributes of the site, along with a range of other goals, the Masterplan will ensure the Western Parkland City becomes a more equitable and liveable city which evolves with a genuine sense of place woven throughout.

Background and Scope

Stage 1 Operational Site for the wastewater treatment infrastructure includes catalyst and high priority elements due to their important place making characteristics. Preserving and enhancing the natural attributes of the site is a tangible way in which our community respects and cares for Country and our natural environment.

The desired future outcomes for the site have been used as a basis for short (Stage 1- 2026), medium and longer-term (Stage 2 -2035) planning. Implementation requires Sydney Water to lead collaborative planning and responsible management of the environment through sustainable natural resource management practices that respect ecosystem functions. Sydney Water will be a custodian acknowledging the importance of creating and maintaining the AWRC as an asset for all. Further collaboration with Sydney Water and the broader community will occur during the D&C Phase.

The Environmental Impact Statement submitted to DPIE includes a Project Description on which impacts have been based. This UDLP is materially consistent with the Project as outlined in the EIS and will not cause impacts exceeding those assessed.

1.2 Ministers Conditions of Approval

An environmental Impact statement (EIS) for the Project was on exhibition from 21 October to 17 November 2021 submitted by Sydney Water for public exhibition and comment. In October 2022 a submissions report was prepared in response to submissions received during the EIS exhibition period. The Project was approved on 28 November 2022.

The UDLP has been prepared to satisfy clauses E23, E59, E61, E62, E63, E64, E65, and E66 of the Ministers Conditions of Approval (CoA). In addition, the UDLP captures Updated Management Measures (UMM) items UD01, UD02, SW02, G14, WW11 and Infrastructure Sustainability Council (ISC) IS Rating Scheme for Level 1 and Level 2.

CoA, UMM and ISC are contained in Chapter 3 of this Plan. Compliance with the Conditions, measures and design criteria are noted and referenced in this Plan where each condition is addressed.

The UDLP focuses on the Stage 1 AWRC Operational Site (this Project) and aligns the project vision and principles with the ultimate capacity (2035) and green space development.

1.3 Suitably Qualified Experts

Tract Consultants has been engaged to prepare this UDLP. Tract is a national consultancy practice with expertise in urban design, landscape architecture and planning, established in 1973. Julie Lee is a fellow of the Australian Institute of Landscape Architects and is a member of the NSW State Design Review Panel. Matthew Easton is a Senior Principal at Tract and Environmental Manager, and also serves as the Revegetation consultant on the Project. Julie and Matthew each have over 30 years professional experience.

Other experts include:

- Bushfire consultant – GHD and Jacobs
- Revegetation consultant – Matthew Easton
- Ecology consultant – Biosis
- Flooding consultant – GHD and Jacobs
- Soil consultant – SESL Australia
- Heritage consultant – Extent Heritage

Table 1 Consultant Advice

Consultant	Document	Date	UDLP Chapter Ref.
GHD and Jacobs	Bushfire Assessment – Review of Bush Fire Constraints and Opportunities	28 July 2023	9.2
Tract	Vegetation Management Plan	To be confirmed and is subject to further development of Greenspace Master Plan.	8.3, 8.4, 10.3, 10.6, 11.1, 17.1
Biosis	Review of the UDLP and VMP for the Upper South Creek – Advanced Water Recycling Centre	13 September 2023	8.3, 10.5, 10.6, 11.1, 17
GHD and Jacobs	Upper South Creek existing flood modelling results	14 June 2023	9.3, 12.1
SESL Australia	Soil Re-Use Assessment and Advice – Advanced Water Recycling Centre (AWRC)	20 September 2023	8.5, 17.1
Extent Heritage	Incorporation of outcomes and opportunities included in the Heritage Interpretation Strategy (HIS) (Extent Heritage October 2021). HIS is a comprehensive review of potential interpretation opportunities to ensure that traditional, historical, and contemporary values and meanings are integrated.	October 2021	7.1, 14

Figure 4 AWRC view looking southwest

2 Connection to Country

2.1 Country

The Project continues to be Country led to inform the design, advising the design principles, project values, landscape, architecture and local needs. Using water to tell a new story about Place, we have and will continue to engage with local Aboriginal people and Traditional Custodians

Water is life, linking our ecosystems. Building on the *Connecting to Country Framework* and *Designing with Country* discussion paper established by the Government Architect of NSW, the *Recognise Country- Guidelines for the development in the Aerotropolis* and the *Consultation Outcomes Report Aerotropolis Stormwater Catchment Scheme Plans- Aboriginal Engagement* (Sydney Water Corporation GHD Zion, Waters 29 November 2022).

The *Upper South Creek Advanced Water Recycling Centre Heritage Interpretation Strategy* (Extent Heritage for Sydney Water October 2021) outlines the need to engage with Aboriginal and broader community before an Interpretation Plan can be prepared.

A comprehensive and integrated approach will include a range of initiatives that develop an increased understanding and response to Darug Country and the cultural context of Wianamatta South and Kemps Creek to guide landscape outcomes more meaningfully. The engagement strategy is expanded upon in Chapter 14 Community and Stakeholder engagement.

Through this methodology, social, cultural and built form considerations are elevated beyond 'business as usual' to focus on Country, stewardship and cultural heritage.

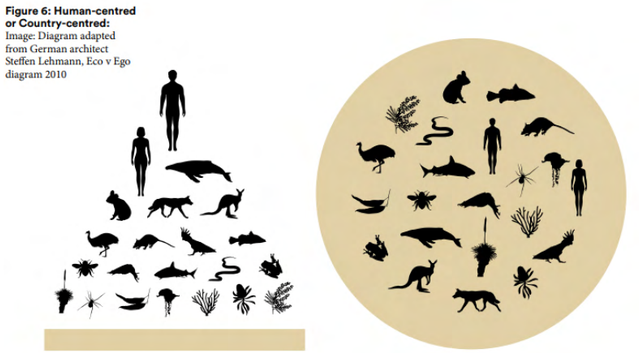

Figure 5 Human Centred vs. Country Centred approach (Image: GANSW 2023)

Figure 6 Designing with Country Paper

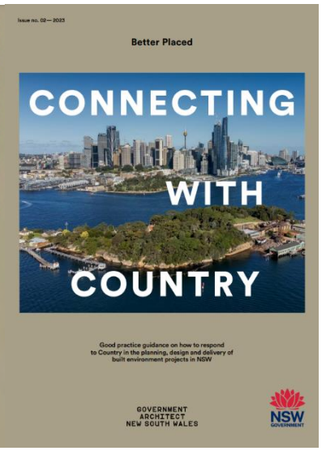

Figure 7 Connecting with Country Framework

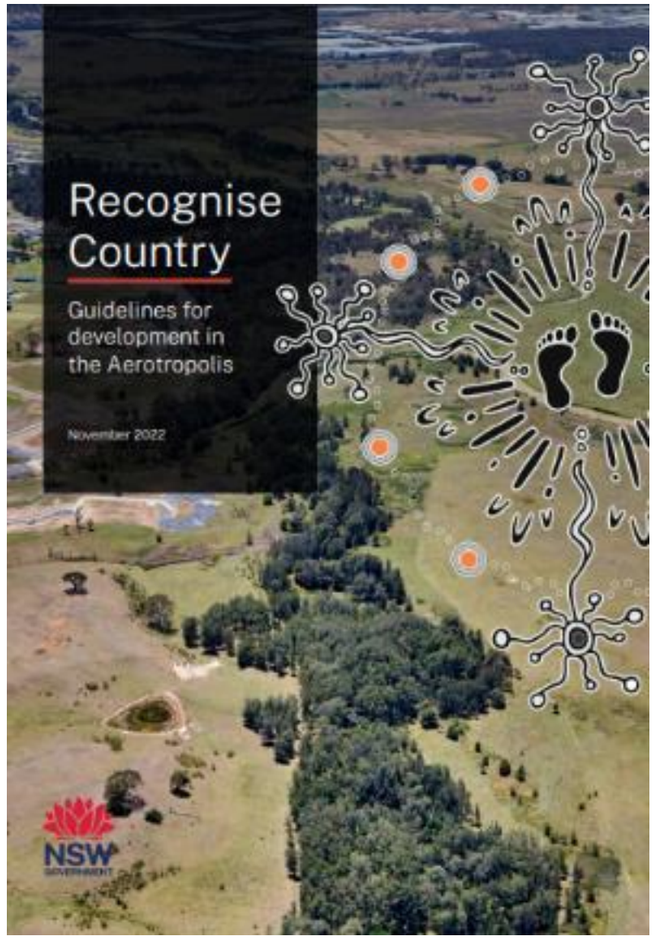

Figure 8 Recognise Country Guidelines

3 Urban Design Vision, Objectives and Principles

3.1 Vision

The AWRC is a legacy project that is grounded in a shared vision developed during the RFT stage:

Upper South Creek AWRC is a place where the connection of people to the land, water and sky are appreciated and deepened, bringing community together to restore, discover, meet and enjoy.

Project Urban Design Objectives and Principles

Background

Urban design is a significant element of the Project as Sydney Water has identified place making and landscape-led design principles to underpin the desired outcomes in the near and long-term. As part of the emerging Western Parkland City, restoring natural systems will assist in the mitigation of environmental loss associated with Climate Change and Stage 1 of the AWRC will establish the framework for the stewardship of a significant site for both Sydney Water and the community.

Objectives and Principles

The primary urban design objectives and principles are aligned with those identified in the Reference Design report *Upper South Creek Advanced Water Recycling Centre Urban Design* (Aurecon Arup July 2021). These objectives and Principles are implemented throughout the detailed design process to contribute to place-based outcomes by designing and caring for Country through supporting biodiversity through the provision of a restored landscape. The design of the AWRC site will further consider Country during the development of the Green Space Masterplan when detailed engagement with the local Indigenous community and key stakeholders will continue to occur to inform the design of the green space and cultural heritage interpretation.

Objectives and principles are described in Table 1.

Connection to Country is the overarching principle for engaging with Country – and therefore community and culture.

ISC Criteria and alignment with Vision and Principles

The following table identifies the Urban Design objectives and aspects that have been addressed in line with urban design principles (Commonwealth of Australia 2011). Additional information can be found in the section of the UDLP as identified.

Table 2 Alignment of Vision and Principles

Urban Design Objective	Aspect	Approach	UDLP Chapter ref.
Integrating with existing and likely future infrastructure and development	Design of the Stage 1 of the facility considers the potential expansion to ultimate capacity by 2035.	The urban design places nature as a key component by only taking up space that is essential to the AWRC's function. Design of the site plan to minimise the footprint of the built form to maximise green space	6.2, 6.3
Public and active transport	Active transport links and potential future walking trails along waterways	M12 active transport route to link to site and opportunities for cycle paths in future green space.	Figure 35
Green infrastructure integration, including water urban sensitive design	Green infrastructure that responses to site's constraints and restores the landscape	The AWRC and its landscape works towards an environmentally sustainable future, considering the interconnectivity of humans, nature and culture where humans are not the dominate species.	12
	Water Sensitive Urban Design	Retention and slowing of water to maximise opportunities to integrate green infrastructure outcomes through passive irrigation and maximising of permeable surfaces.	12
Biodiversity and habitat connectivity	Planting of diverse species and restoring network connections.	The proposed Cumberland Plain Woodland species will support a biodiverse environment that will enhance existing fauna numbers and create opportunities for a networked environment that reinforces a greater number of species interactions.	10
	Restoration of Wianamatta South Creek and billabongs.	Restoration of Wianamatta South Creek and billabong will improve waterway quality, reduce erosion and support aquatic species.	10
	Heat island mitigation	The establishment of tree cover and improved water quality supports the broader Aerotropolis and Western Parkland City objectives including the need to mitigate heat island effects.	10
Response to the natural landscape	Use of Cumberland Plain Woodland species to create linking landscape to broader communities	Appropriate local species suitable to the ground and climatic conditions.	10

Table 3 Urban Design Objectives and Principles

CONNECTING TO COUNTRY, CULTURE AND PEOPLE	
OBJECTIVE	**PRINCIPLES**
1. Placemaking To create and support a sense of place drawing on the character of the local area	**Placemaking.** Create a strong sense of place that derives a narrative from "Connection to Country'
	Existing natural context. Rediscover the natural context of the site to provide a strong set of visual and physical markers through contextual planting that reference the sites' natural identity.
	Integration with strategic urban design principles of district, precinct plans and policy.
	Built form and facility that is integrated with landscape urban character
	Consideration of aerial view experienced from flights as part of the experience.
	Creation of a vibrant place for workers and visitors as a regional asset.
	Landscape led design approach aligned with WSAP and Western Parkland Vision and connecting networks
	Integration of water to support a landscape that mitigates urban heat island effect in Western Sydney
2. Leading edge environmental responsiveness Ensure environmental practices respond to the natural systems of the area and promotes sustainability	**Existing vegetation.** Provide a robust revegetation strategy that features Indigenous plant species that are suitable for the local climate and references the Cumberland Plain plant communities.
	Protect and enhance waterways. Capitalise on the opportunity to restore the Wianamatta South Creek and it billabongs.
	Landscape restoration. Provide a landscape restoration strategy that allows for landscape to be restored.
	Green infrastructure and biodiversity. Integrate natural patterns and ecology into the design, protect Wianamatta South Creek and manage drainage to support new landscape.
	Incorporate leading edge WSUD strategies into the design. Provide measures to reduce the urban heat island effect.
3. Urban renewal and liveability Fit the AWRC sensitively into the unique natural, built, and cultural environment of the bridging landscape between Kemps Creek and Wianamatta South Creek	**Improved environment.** Develop a unified landscape strategy that enhances and improves the site.
	Improved Cultural Awareness through interpretation strategies that reflect Country.
	Improved Connectivity. Provide improved access and connections.
	Safety and Security. Integrate CPTED strategies into all aspects of the design to ensure that they are safe and comfortable to use at all times.

4 Planning Approval Framework and compliance

4.1 Ministers Conditions of Approval, Updated Management Measures and Infrastructure Sustainability Council (ISC) IS Rating Scheme

The relevant Conditions of Approval, Updated Management Measures and Infrastructure Sustainability Council IS Rating Scheme Level 1 and 2 requirements specific to the urban design, landscape and place making for the Project are listed in Table 2 with reference to where each condition or measure is addressed within the relevant Chapter of this UDLP.

Table 4 Conditions of Approval and reference in UDLP

CONDITIONS OF APPROVAL		
ID	Condition	UDLP Chapter ref.
	BIODIVERSITY	
	Re-use of native vegetation and other habitat features	
E23	Stage 1 of the CSSI must maximize the reuse of native vegetation and other habitat features that have been approved for removal. Where reuse by the CSSI is not possible, relevant council(s), NSW National Parks & Wildlife Service, Western Sydney Parklands Trust, Greater Sydney Local Land Services, local Landcare groups, DPI Fisheries and any additional relevant government agencies must be consulted prior to the removal of vegetation and other habitat to determine if: (a) hollows, tree trunks (greater than 25-30 centimeters in diameter and 2-3 metres in length), mulch, bush rock and root balls salvaged from native vegetation impacted by the CSSI; and (b) collected plant material, seeds and/or propagated plants from native vegetation impacted by the CSSI, could be used by others in habitat enhancement and rehabilitation activities, before pursuing other disposal options. If the native vegetation and other habitat features can be reused by others, the Proponent must advise them and facilitate access for salvage.	Chapters 8.3, 8.4 Chapter 10.5

CONDITIONS OF APPROVAL		
ID	Condition	UDLP Chapter reference/ comment
	FLOODING	
E27	Prior to the commencement of construction within the green space area as mapped in Figure 4-7 and Figure 4-8 of the Environmental Impact Statement listed in Condition A1, the Proponent must prepare a Flood Impact and Risk Assessment (FIRA) for the proposed concept design of the green space area. The FIRA must incorporate all proposed elements (including but not limited to vegetation, walking paths, fences, irrigation area and outdoor learning spaces). The FIRA must be prepared by a suitably qualified and experienced flood consultant in consultation with EHG and provided to the Planning Secretary for approval. *Note: Condition E27 excludes construction of elements required for effective operation and management of operational components of the AWRC plant. This includes release infrastructure to South Creek, fences around the AWRC operational area and fire trail around the AWRC operational area.*	Chapters 9.3, 12.1
	PLACE, DESIGN AND VISUAL AMENITY	
	Lighting and Security	
E59	Stage 1 of the CSSI must be constructed and operated with the objective of minimising light spillage to surrounding properties. All lighting associated with the construction and operation of Stage 1 of the CSSI must be consistent with the requirements of AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting, relevant Australian Standards in the series AS/NZ 1158 – Lighting for Roads and Public Spaces, and National Airports Safeguarding Framework (NASF) Guideline E: Managing the Risk of Distractions to Pilots from Lighting in th Vicinity of Airports. Additionally, mitigation measures must be provided to manage any residual night lighting impacts to protect properties adjoining or adjacent to the CSSI, in consultation with affected landowners. Note: The outcomes of this condition must be demonstrated in the Urban Design and Landscape Plan.	Chapter 13.2
	DESIGN OUTCOMES	
E61	The place making, design and landscape outcomes for the AWRC site of Stage 1 of the CSSI must be: (a) informed by and be consistent with the Upper South Creek Advanced Water Recycling Centre Urban Design Report, dated July 2021 (provided as Attachment A to RFI 1, dated 1 June 2022) and identified in the documents listed in Condition A1, including but not limited to the objectives and design principles, requirements, and opportunities; and (b) prepared in consultation with the community (including the affected landowners and businesses or a representative of the businesses), LALCs, RAPs and relevant council(s).	Chapter 3.1 Chapter 14
E62	Where work results in the temporary removal of a recreational or community use, and no similar use with sufficient capacity for regular users is located within two (2) kilometres of the site, then a temporary facility of comparable scale must be provided for the duration of the use of that site.	At this stage of construction planning, the project has not identified any location (recreational or community) where CoA E62 will be triggered. The project will continue to monitor potential locations as construction planning progresses and will engage with relevant stakeholders, including Sydney Water, should the need arise.

CONDITIONS OF APPROVAL		
ID	**Condition**	**UDLP Chapter reference / Comment**
	URBAN DESIGN AND LANDSCAPE PLAN	
E63	An **Urban Design and Landscape Plan (UDLP)** must be prepared for the AWRC site to document and illustrate the permanent built works and landscape design of Stage 1 of the CSSI and how these works are to be maintained. The UDLP must be:	
	(a) prepared by a suitably qualified and experienced person(s) in place, urban and landscape design and bush regeneration.	Chapter 1.3
	(b) prepared in consultation with relevant council(s) and the community, including affected landowners and businesses.	Chapters 1.1, 6.4, 14
	(c) submitted to the Planning Secretary for approval no later than one month before the construction of permanent built surface works and/or landscaping in the area to which the UDLP applies; and	
	(d) implemented during construction and operation of Stage 1 of the CSSI.	
	Note: The UDLP may be developed and considered in stages to facilitate design progression and construction. Any such staging and associated approval would need to facilitate a cohesive final design and not limit final design outcomes.	
E64	The **UDLP** must document how the following matters have been considered in the design and landscaping of the project:	
	(a) the requirements of **Conditions** E61 to E62;	Chapters 3.1, 14
	(b) the requirements of the **Wildlife Management Plan under Condition** E130;	Chapter 9.1
	(c) demonstrated integration of Crime Prevention Through Environmental Design (CPTED) principles;	Chapter 11.5
	(d) Designing with Country and the principles and objectives of the draft Connecting with Country Framework;	Chapters 2, 7.1, 7.2, 14
	(e) the finalised version of the draft guideline 'Recognise Country – Draft Guidelines for development in the Aerotropolis';	Chapters 2, 6.1, 14.1
	(f) constraints associated with bushfire, flooding, and airport safeguarding;	Chapter 9.2
	(g) vegetation management that considers the principles of Guidelines for Vegetation Management Plans on Waterfront Land (NSW Office of Water, DPI 2012), draft Western Sydney Aerotropolis Riparian Revegetation Strategy, and the tree planting provisions in the draft Western Sydney Aerotropolis Development Control Plan – Phase 2 (October 2021);	Chapter 17
	(h) architectural design to soften the industrial aesthetic;	Chapter 11.3, 11.4
	(i) integrating heritage character of the site with treatment and finishes of the new design; and	Chapter 7, 11.1
	(j) inputs from relevant experts in architecture, landscape architecture, bushfire management, heritage, revegetation, ecology, wildlife hazard management and flooding.	Chapter 1.3

CONDITIONS OF APPROVAL		
ID	Condition	UDLP Chapter reference/ Comment
E65	The UDLP must include descriptions and visualisations (as appropriate) of: NSW Government 47 Department of Planning and Environment Conditions of Approval for Upper South Creek Advanced Water Recycling Centre – Concept and Stage 1 (SSI 8609189) (a) the design of the permanent built elements for the AWRC site including their form, materials and detail;	Chapter 11
	(b) place, design, and landscape outcomes for the proposed green space area, consistent with the Upper South Creek Advanced Water Recycling Centre Urban Design Report, dated July 2021 (provided as Attachment A to RFI 1, dated 1 June 2022) and identified in the documents listed in Condition A1;	Chapters 6.4, 7.2, 8, 10.4, 11.1, 12.2, 17.1
	(c) the design of the project landform and landscaping elements;	Chapters 6.1, 8, 9.1, 10
	(d) the type and design of public and open space;	Chapters 6, 7, 8, 9.1, 10.1, 10.2, 10.3, 10.4, 11.1, 11.2
	(e) details of strategies to rehabilitate, regenerate or revegetate disturbed areas with local native species; and	Chapters 8, 9.1, 10, 11.1, 17
	(f) management and routine maintenance standards and regimes for design elements and landscaping Work (including adequate watering of plants following planting depending on forecast weather conditions and weed management) to ensure the success of the design and landscape outcomes.	Chapter 17
	OPERATIONAL MAINTENANCE	
E66	The ongoing maintenance and operation costs of urban design, open space, landscaping and recreational items and work implemented for the AWRC site as part of this approval remain the Proponent's responsibility until satisfactory arrangements have been put in place for the transfer of the asset to the relevant authority. Before the transfer of assets, the Proponent must maintain items and work to at least the design standards established in the UDLP, required by Condition E65.	Chapter 17

Table 5 Updated Management Measures and reference in UDLP

UPDATED MANAGEMENT MEASURES		
REF	Management Measure	UDLP Chapter/ Comment
G14	Incorporate the requirements of the Planning for Bush Fire Protection 2019 into the detailed design of the AWRC.	Chapter 9.2
UD01	Visual impact of AWRC site structures and parkland area	Chapter 13.1
	The UDLP must include descriptions and visualisations (as appropriate) of: Prepare an Urban Design and Landscaping Plan for the AWRC site aligning with the themes and principles outlined in Table 4-4 and consider the opportunities identified in Table 4-4 as the urban design progresses. This plan will also:	This UDLP
	• Address constraints associated with bushfire, flooding, and airport safeguarding;	Chapter 9
	• Incorporate vegetation management that considers the principles of Guidelines for Vegetation Management Plans on Waterfront Land (NSW Office of Water, DPI 2012) and the Western Sydney Aerotropolis Riparian Revegetation Strategy (once finalised) and the tree planting provisions of the Phase 2 Aerotropolis Development Control Plan (once finalised);	Chapters 8.3, 8.4, 17
	• Include architectural design to soften the industrial aesthetic;	Chapters 11.3, 11.4
	• Consider integrating the heritage character of the site with the treatment and finishes of the new design;	Chapters 7, 11.1
	• Consider the finalised version of the draft guideline 'Recognise Country – Draft Guidelines for development in the Aerotropolis';	Chapters 2, 6.1, 14.1
	• Incorporate inputs from relevant experts in architecture, landscape architecture, bushfire management, heritage, revegetation, ecology, wildlife hazard management and flooding.	Chapter 1.3
UD02	Alignment of AWRC site urban design with NSW Government aspiration for Wianamatta South Creek green spine. Consult with the DPIE teams responsible for place management and green spaces in preparing the Urban Design and Landscaping Plan to ensure the project aligns with the NSW Government's vision for the green spine along Wianamatta South Creek.	Chapters 6.2, 6.4, 8.1, 10.2, 14
WW11	Consider riparian planting and natural bank stabilisation measures in the detailed design phase.	Chapter 11.1
SW02	Increased runoff, reduced infiltration and pollutant loading to Wianamatta- South Creek, including exacerbated downstream flooding conditions. • Design, install and maintain stormwater management measures on the AWRC site. • Including a range of Water Sensitive Urban Design measures to ensure: • Operational releases to South Creek achieve DPE EES water quality and flow objectives by considering stormwater quality and flow targets in the draft Western Sydney Aerotropolis DCP – Phase 2 (October 2021); • Operational efficiency of installed measures. • Post-development peak flows do not exceed pre-development peak flows for the 50%, and 1% AEP storm events.	Chapter 12

Table 6 ISC Design Criteria

INFRASTRUCTURE SUSTAINABILITY COUNCIL IS Rating Scheme (IS)		
REF	DESIGN CRITERIA FOR PLA-2 CREDIT	UDLP Chapter/ Comment
Level 1	**DL1.1 An Urban and Landscape Design Plan has been developed and design options implemented**	
	Evidence for DL1.1 • The urban and landscape design plan, as specified above. • Evidence of urban and landscape design option implementation e.g., Design drawings; urban and landscape design report. • Documentation for the suitably qualified professional	This UDLP
	DL1.2 The maintenance arrangements for the project's urban and landscape design components have been reviewed.	
	Evidence for DL1.2 • Documentation and review of on-going maintenance arrangements, as specified above. • Documentation for suitably qualified professional.	Chapter 17
Level 2	**DL2.1 An urban and landscape design statement has been prepared.**	
	Evidence for DL2.1 • Documented urban and landscape design statement, as specified above.	This UDLP
	DL2.2 The urban and landscape design plan and statement have been independently reviewed at key stages throughout the design.	
	Evidence for DL2.2 • Independent report (or documented meeting outputs) for each design review, as specified above including justification of review frequency.	Chapter 15

- As applicable, specifics of the independent members of the Design Review Plan or of the independent qualified reviewer.
- Actions taken as a result of the Design Review feedback and recommendations.

5 Referenced Documents

All relevant standards, guidelines, assessments, and reports that have been referenced and complied with during the development of the UDLP are listed in Table 7 below.

Table 7 Complete List of Referenced Documents

COMPLETE LIST OF REFERENCED DOCUMENTS		
Reference	**Governing Body**	**Date**
14 Patterns of Biophilic Design report	Terrapin Bright Green	2014
A Liveability Framework for Sydney	NSW Government Department of Planning and Environment, ARUP	2017
AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting	Standards Australia	2019
ASTM E1980-11 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces	ASTM International	2001
Australian Standard AS1428.1 Design for access and mobility	Standards Australia	2009
Aviation Safeguarding Guidelines – Western Sydney Aerotropolis and surrounding areas	NSW Government	November 2022
Australian Urban Design Protocol	Commonwealth of Australia	2011
Better Placed	Government Architect NSW	2017
Circular Economy and Resource Recover Strategic Blueprint	Sydney Water	2022
Commonwealth Environment Protection and Biodiversity Conservation Act 1999	NSW Government	1999
Connecting with Country framework	Government Architect NSW	2023
Consultation Outcomes Report Aerotropolis Stormwater Catchment Scheme Plans – Aboriginal Engagement	Sydney Water, GHD, Zion	November 2022
Cumberland Plain Conservation Plan	NSW Government Department of Planning and Environment	2022

Cumberland Plain Conservation Plan	NSW Government	August 2022
Cumberland Plain Recovery Plan	NSW Department of Planning and Environment	August 2022
Cumberland Plain Western Sydney Interpretation Guidelines	National Parks and Wildlife Service	2002
Dark Sky Planning Guideline	NSW Department of Planning and Environment	June 2023
Designing with Country discussion paper	Government Architect NSW	March 2020
Development and Assessment BASIX	NSW Government	2023
Greener Places Design Guide	Government Architect NSW	June 2020
Ecological Sustainable Development tool	Infrastructure Sustainability Council	2023
EIS amended flood impact assessment	Sydney Water	2022
Environmental Impact Statement	Sydney Water	September 2021
Everyone Can Play grant program	NSW Government Department of Planning and Environment	2021-2022
Floodplain Development Manual	NSW Office of Environment and Heritage	2005
Floodplain Risk Management Guidelines	NSW Office of Environment and Heritage	2015
Greater Sydney Regional Plan – A Metropolis of Three Cities	NSW Greater Sydney Commission	2018
Guidelines for Vegetation Management Plans on Waterfront Land	NSW Office of Water	2012
Heritage Interpretation Strategy	Extent Heritage	October 2021
Infrastructure Sustainability Council IS Rating Scheme for Level 1 and Level 2	Infrastructure Sustainability Council	2023
IS v2.1 Design & As Built	Infrastructure Sustainability Council	2023
Local Strategic Planning Statement 2020	Penrith City Council	2020
Ministers Conditions of Approval	NSW Government	2023

National Airports Safeguarding Framework Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports	Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts	October 2014
National Airports Safeguarding Framework Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports	Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts	October 2014
National Construction Code	Australian Building Codes Board	2023
Net Zero Directional Statement	Sydney Water	November 2022
Net Zero Plan 2030	NSW Government Department of Planning, Industry and Environment	2020
Net-Zero Carbon Plan	Sydney Water	November 2022
NSW Biodiversity Conservation Act 2016	NSW Government	2016
NSW Climate Change Policy Framework	Office of Environment and Heritage	2016
Penrith Green Grid Strategy	Penrith City Council, Tract	2021
Penrith Local Environmental Plan 2010	Penrith City Council, NSW Government	2010
Planning for Bush Fire Protection 2019	NSW Rural Fire Service	2019
Recognise Country – Guidelines for the development in the Aerotropolis	NSW Government	November 2022
Recovering bushland on the Cumberland Plain – Best Practice Guidelines for the Management and Restoration of Bushland	NSW Department of Environment and Conservation	2005
Regulation 94 of CAR 1988	Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts	1988
Re-Imagining water in Western Sydney – Western Sydney Regional Master Plan	Sydney Water	March 2020
Review of Bushfire Constraints and Opportunities report	Sydney Water	2022
Safer by Design	NSW Police Force, NSW Government	2001
Scoping Report Upper South Creek Advanced Water Recycling Centre	Sydney Water	July 2020

Section 78A (8) of the Environmental Planning and Assessment Act 1979	NSW Government	1979
Soil Re-Use Assessment and Advice – Advanced Water Recycling Centre (AWRC)	SESL Australia	September 2023
Standard Secretary's Environmental Assessment Requirements	NSW Government	1979
State Environmental Planning Policy	Western Sydney Aerotropolis	2020
State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	NSW Government	2020
Submissions Report March 2022	Sydney Water	March 2022
Sub-Plan A: Conservation Program and Implementation	NSW Government	2020
Sydney Green Grid	Government Architect NSW, Tyrrell Studio	2017
Sydney Green Grid Plan 3 – South West District	Government Architect NSW, Tyrrell Studio	2017
Sydney Water Environmental Policy	Sydney Water	October 2021
Sydney Water Strategy 2020-2030	Sydney Water	2020
Sydney Water Upper South Creek – Advanced Water Recycling Centre Vegetation Management Plan	Sydney Water, Tract	July 2023
Technical guidelines for Urban Green Cover in NSW	NSW Office of Environment and Heritage	2015
The Penrith Community Plan 2017	Penrith City Council	2017
Updated Management Measures	Sydney Water	June 2021
Updated South Creek Flood Study	Penrith City Council, WorleyParsons	2015
Upper South Creek Advanced Water Recycling Centre Final Submission ECI Deliverables	John Holland, Trility, Jacobs, GHD, Tract	May 2022
Upper South Creek Advanced Water Recycling Centre Heritage Interpretation Strategy	Sydney Water	October 2021
Upper South Creek Advanced Water Recycling Centre Urban Design	Aurecon, ARUP	July 2021
Upper South Creek Advanced Water Recycling Centre Urban Design Report	Sydney Water	July 2021
Western City District Plan	NSW Greater Sydney Commission	2018
Western Sydney Aerotropolis Development Control Plan	NSW Government	November 2022

Western Sydney Aerotropolis Draft Wildlife Management Assessment Report	Western Sydney Planning Partnership, Avisure	May 2020
Western Sydney Aerotropolis (Initial Precincts) Riparian Corridors Assessment	Sydney Water	December 2021
Western Sydney Aerotropolis Precinct Plan	NSW Government Planning and Environment	March 2022

6 Urban Design Context

6.1 Strategic Context

Greater Sydney Regional Plan-A Metropolis of Three Cities

In 2018 the NSW Greater Sydney Commission released 'A Metropolis of Three Cities – The Greater Sydney Region Plan' to plan for the needs of a changing and growing city. The plan sets out a vision for a Sydney with three productive, liveable, and sustainable cities:

- The Eastern Harbour City
- The Central River City
- The Western Parkland City

The plan advocates for 30-minute cities whereby all residents live within 30 minutes of their jobs, education and health facilities, services, and amenities. Each city has its unique character and landscapes with a focus on different industries and economies.

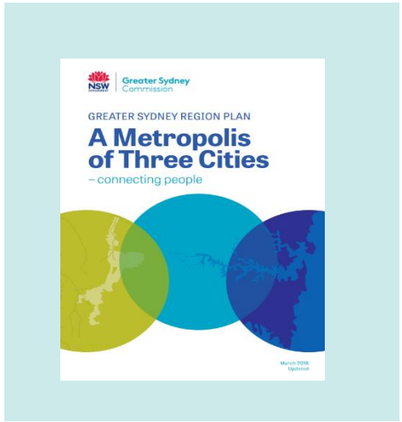

Figure 9 Greater Sydney Region Plan 2018

Western City District Plan

The AWRC is located within the Western Parkland City - a city in the landscape. The Western District Plan is a 20-year integrated plan to guide and manage the growth of the Western Parkland City.

The following metropolitan-wide actions will deliver sustainability objectives:

Objective 25
The coast and waterways are protected and healthier.

Objective 26
A cool and green parkland city in the Wianamatta South Creek corridor.

Objective 27
Biodiversity is protected, urban bushland and remnant vegetation is enhanced.

The catalyst for growth and the development of the Western Economic Corridor is the future Western Sydney Airport. This will see the construction of major transport infrastructure, such as the North South Rail Line and the M12 Motorway (which adjoins our site), to support the transformation of predominantly peri-urban lands into a region that will be the home for over 1.5 million by 2056.

The Western Economic Corridor will attract globally significant commerce and trade, generating highly skilled, knowledge intensive jobs.

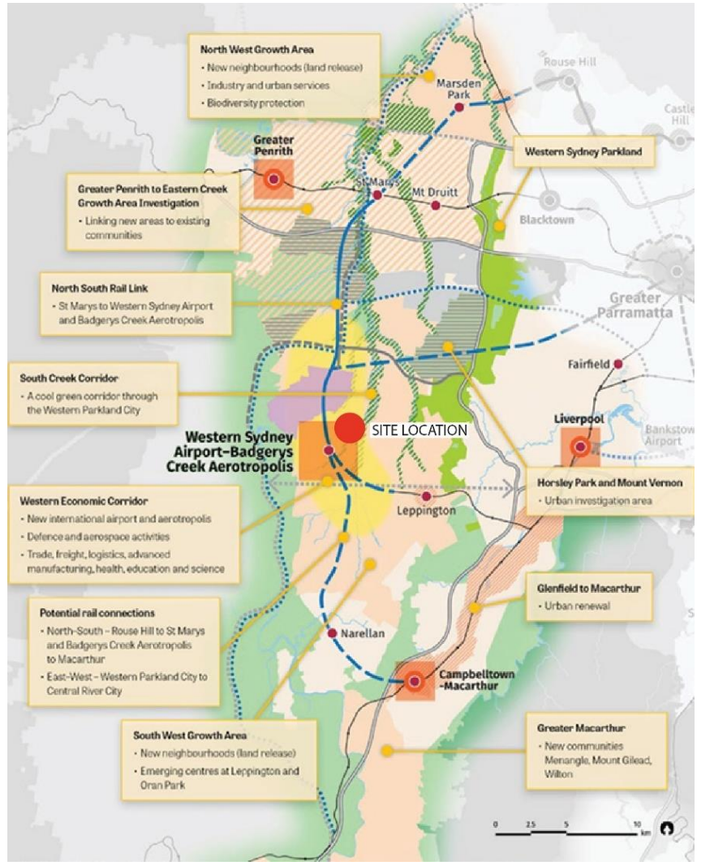

Figure 10 A Metropolis of Three Cities: Western Parkland City (Greater Sydney Commission)

Wianamatta South Creek Corridor

Wianamatta South Creek is the central urban element of the Western Parkland City. Bordering the western boundary of the site, it forms approximately 80% of the Western Parkland City's catchment, running through one of the flattest, driest, and hottest parts of Greater Sydney.

Wianamatta South Creek forms one of the thirty-eight objectives outlined in 'A Metropolis of Three Cities' and the 'Western City District Plan':

Objective 26/Planning Priority W13: A cool and green parkland city in the Wianamatta South Creek Corridor. The objective reflects the vision of the Corridor as forming the identity and acting as a defining spatial element at the heart of the parkland city.

Wianamatta South Creek will create linking corridors of active and passive recreation and open spaces, parks, walking and cycling trails and community facilities to promote a connected, healthy, liveable, and sustainable city.

An important tributary of Sydney's water catchment, the role of the Corridor in providing essential ecological services such as nutrient capture, urban cooling and habitat will be strengthened through innovative approaches to future development in the area.

Aspects around stormwater and wastewater management, flood mitigation, the introduction of wetlands to retain more water and increasing tree canopy to mitigate the urban heat island effect are a few of the strategies outlined under the objective.

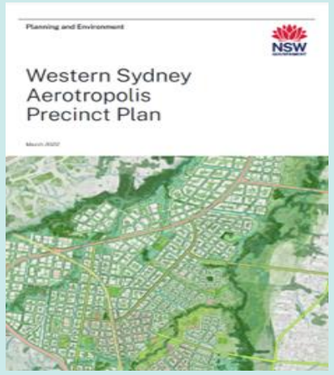

Figure 11 Western Sydney Aerotropolis Precinct Plan

Western Sydney Aerotropolis Precinct Plan

The Western Sydney Aerotropolis Precinct Plan provides the place-based objectives and requirements to guide development in the Aerotropolis in a consistent and sustainable manner over time.

Western Sydney Aerotropolis, Phase 2 Development Control Plan, includes two accompanying documents:

- Draft Recognise Country Guideline: Guidelines for development in the Aerotropolis (Guidelines)
- Draft Aviation Safeguarding Guidelines: Western Sydney Aerotropolis and surrounding areas

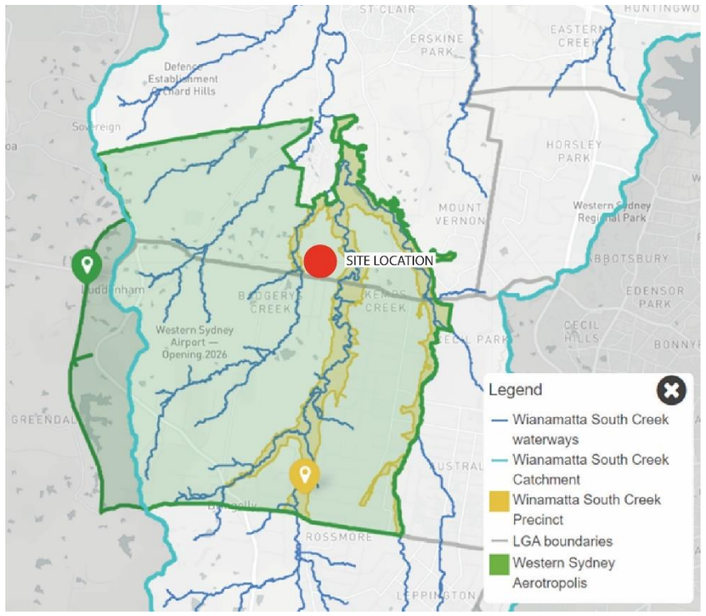

Figure 12 Wianamatta South Creek Precinct (Image: Department of Planning and Environment)

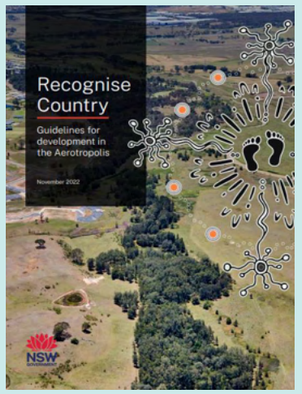

Figure 13 Recognise Country Guidelines

Figure 14 Aviation Safeguarding Guidelines

Cumberland Plain Conservation Plan 2020-2056

The Cumberland Plain Conservation Plan (The Plan) is one of the largest strategic conservation plans to be undertaken in Australia, aiming to protect the region's important conservation values. Covering 200,000 hectares The Plan details:

Twenty-Eight commitments under four categories, building knowledge and capacity to improve ecological resilience and support biodiversity and growth in the Western Parkland City. The four categories are:

- Avoiding and minimising impacts
- Mitigating indirect and prescribed impacts
- Conserving flora, fauna, and associated habitats
- Managing landscape threats

The Plan has been prepared to meet requirements for strategic biodiversity certification under the NSW Biodiversity Conservation Act 2016 and strategic assessment under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Adopting a landscape-led approach to delivering the AWRC presents a major opportunity to minimise the environmental impacts of the centre and contribute to the ecological restoration of the waters and surrounding region.

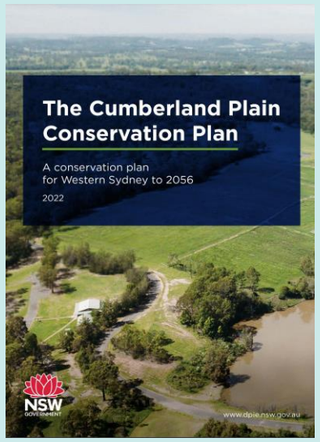

Figure 15 The Cumberland Plain Conservation Plan

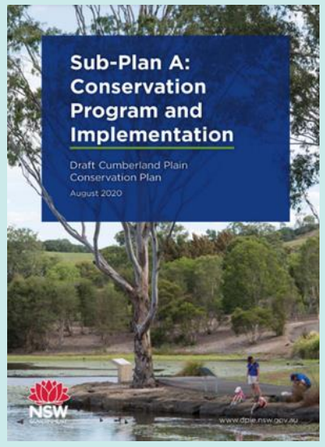

Figure 16 Sub-Plan A

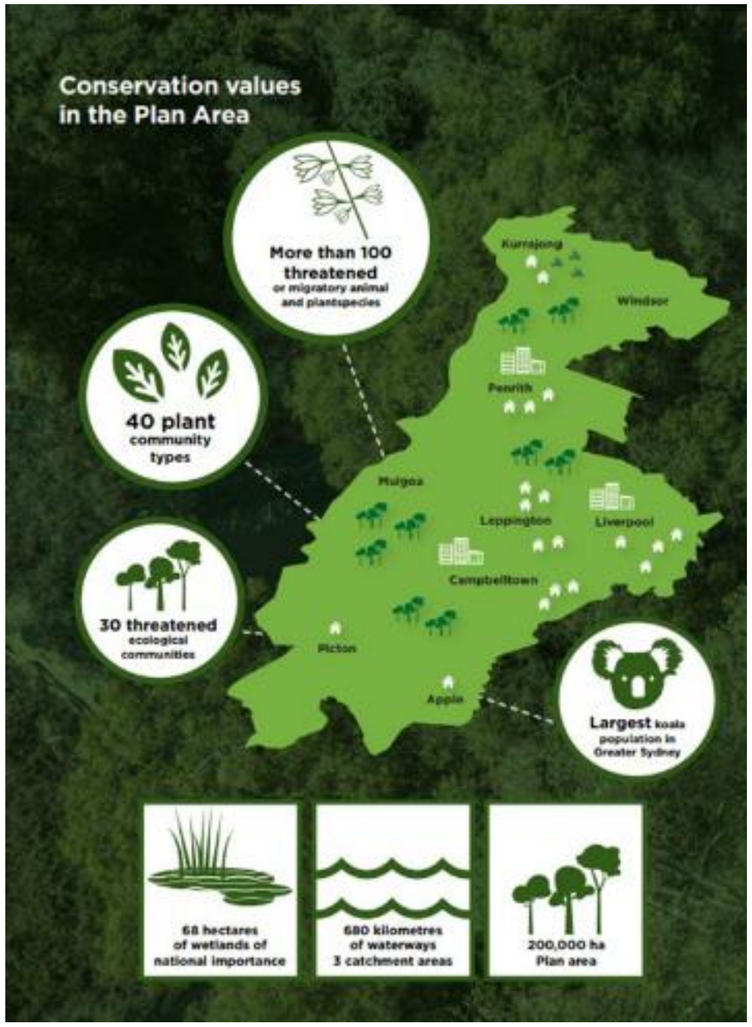

Figure 17 Conservation Values of CPCP

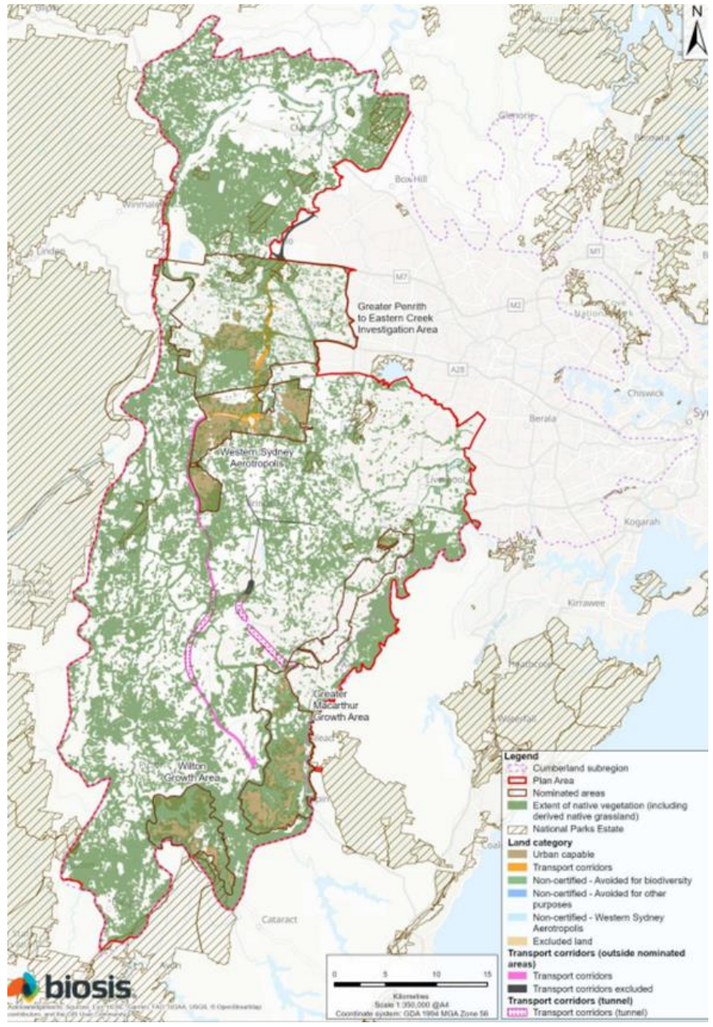

Figure 18 Existing native vegetation in the Plan area Biosis

Sydney Green Grid + South West District Grid

Underpinning Objective 32 of 'A Metropolis of Three Cities,' Sydney's Green Grid analysed spatial qualities, open space, waterways, context, and key natural features to develop preliminary prioritisation of Green Grid opportunities. Their strategic potential serves as catalysts for the establishment of an interconnected high performance green infrastructure network which will support healthy urban growth.

The Sydney Green Grid is delivering an interconnecting network of open space that will keep the city cool, encourage healthy living, enhance biodiversity, and ensure ecological resilience.

Linkages between open spaces are fostered within the wider public realm through enhancing creek corridors, transport routes, suburban streets, footpaths, and cycle ways.

Sydney Green Grid Government Architect of NSW

South and Kemps Creek Corridors

"South Creek is a major tributary of the Hawkesbury-Nepean River, starting from Narellan in the South West District, it flows north all the way to Windsor where it connects to the Hawkesbury River. It runs over 50 km and passes through more than 20 suburbs. The water quality of South Creek has a major impact on the Hawkesbury River, and it also has important ecological communities along its banks. The Project aims to create a continuous open space corridor along the entirety of South Creek that provides ecological protection and enhancement, improved stormwater treatment and a regionally significant recreation and active transport corridor for Western Sydney. The Project passes through the South West Growth Area and will act as a major open space corridor for the future development of the region. There is an opportunity to set riparian zones along the creeks that provide open space, habitat and to improve water quality" (Sydney Green Grid Plan 3 South west district 2017).

Figure 19 Sydney Green Grid 2017

Figure 20 South West District 2017

SW1.7 SOUTH AND KEMPS CREEK

"Western Sydney is defined by its network of creeks and river systems. Currently many of the creeks suffer from poor water quality due to surrounding land uses and reduced or fragmented vegetation cover. Ropes and South Creek corridors have the potential to be enhanced to provide a greater contribution to the development of healthy urban environments. With a balanced approach to access, biodiversity, development, and recreation these networks can form valuable green infrastructure opportunities supporting future growth in the district. There is also opportunity to complete the regional trail connecting South Creek with the Great River Walk on the Hawkesbury Nepean River."

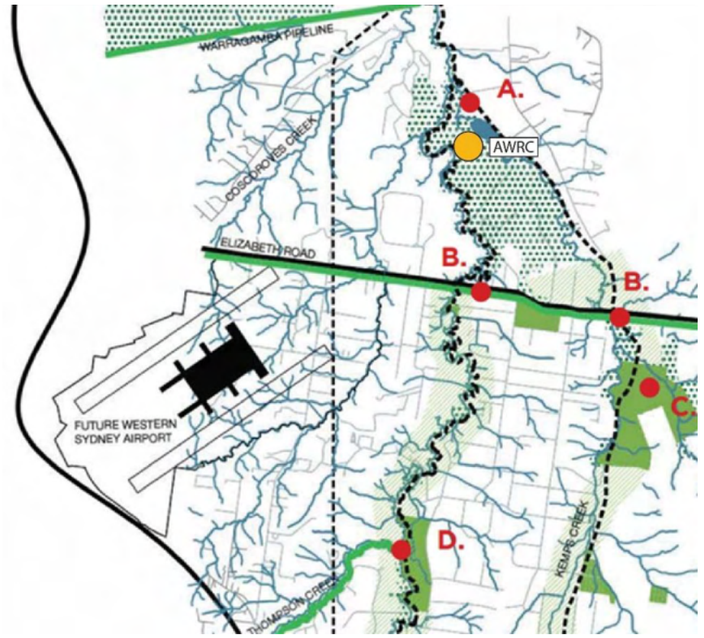

Figure 21 Sydney Green Grid Plan 3 South West district 2017 Item A
South Creek and Kemps Creek is identified as a potential focus area in the Sydney Green Grid

Greener Places

Aligned with the Premier's Priorities: 'Greening Our City' and 'Greener Public Spaces,' Greener Places builds on the Sydney Green Grid, which forms part of the 'Plan for Growing Sydney and the District Plans.' Greener Places is a state green infrastructure policy which aims to create healthier, more liveable, and sustainable communities by improving the quality and access to natural and semi-natural systems such as parks and recreation, and waterways and bushland.

Greener Places highlights the social, environmental, and economic benefits of green infrastructure and the need for well designed, planned, and green infrastructure to support the ecological health of our environments, supporting biodiversity and habitat, and strengthening climate resilience.

The four principles for designing green infrastructure are:

- Integration
  Combine Green Infrastructure with urban development and grey infrastructure.
- Connectivity
  Create an interconnected network of open space.
- Multi-functionality
  Deliver multiple ecosystem services simultaneously.
- Participation
  Involve stakeholders in development and implementation.

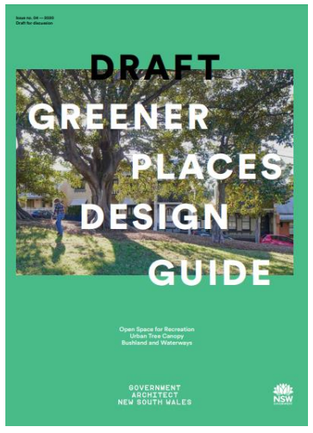

Figure 22 Draft Greener Places Design Guide

Better Placed

The state's first design-led policy, Better Placed recognises the role our built environment has on shaping our lives and how the quality of design affects how places and spaces function and integrates with the broader context.

The policy defines well designed architecture, public spaces, and environments as being: Healthy; Responsive; Integrated; Equitable; and Resilient.

The seven key objectives are:

- Better fit
  Contextual, local and of its place
- Better performance
  Sustainable, adaptable and durable
- Better community
  Inclusive, connected and diverse
- Better for people
  Safe, comfortable and liveable
- Better working
  Functional, efficient, and fit for purpose
- Better value
  Creative and adding value.
- Better look and feel
  Engaging, inviting and attractive

Figure 23 Better Placed Design Guide

Connecting with Country

This framework established by the NSW Government Architect aims to unite all involved in delivering built environment projects to adopt the following commitment:

All NSW built environment projects will be developed with a Country-centred approach guided by Aboriginal people, who know that if we care for Country, Country will care for us.

The health and wellbeing of Country will help to:

- Reduce the impacts of natural events such as fire, drought, and flooding through sustainable ways of using land and water
- Value and respect Aboriginal cultural knowledge with Aboriginal people co-leading design and development of all NSW infrastructure projects
- Ensure Country is cared for appropriately and sensitive sites are protected by Aboriginal people having access to their homelands to continue their cultural practices

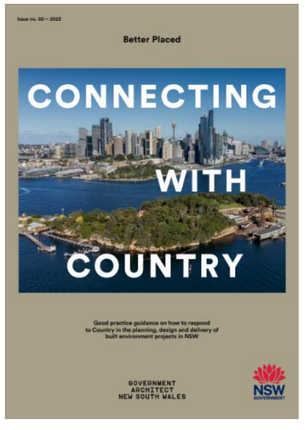

Figure 24 Connecting with Country Framework

Sydney Water Strategy 2020-2030

Responding to key challenges of today and the future, this strategy outlines the activities and ambitions of Sydney Water in achieving their vision to create a better life with world-class water services over the next decade.
The strategy identifies four outcomes, detailing what success looks like, and what is required to accomplish this.

The four strategic outcomes include:

- First choice of customers and partners
- Successful and innovative business
- High performance culture
- Thriving, liveable and sustainable cities

The development of the AWRC aligns and contributes towards Sydney Water's 'thriving, liveable and sustainable cities' outcome. In doing so, it will need to deliver on the following objectives:

- Our cities' waterways are clean, healthy, and safe for swimming and recreation.
- Our system is resilient to shocks and disruptions (e.g., we have achieved advanced system reliability and performance).
- Our water and waterways are world class and support thriving liveable and sustainable cities.
- Our environmental performance is world class.
- We are a resource recovery business with an increasing portfolio of circular economy products and services.
- We have made substantial progress towards zero impact on the environment (focusing on water, waste, and carbon).

Figure 25 Sydney Water Strategy Blueprint

Re-imagining water in Western Sydney

Western Sydney Regional Masterplan Policies and Guidelines

In support of these government policies and aspirations, Sydney Water developed the 'Western Sydney Regional Masterplan.' To deliver on the vision of a green and blue Western Parkland City, the Plan identifies the opportunity to manage water and wastewater in a more integrated way. In addition, increasing water recycling would deliver more economic value and enable opportunities for water reuse and for the circular economy. The Project forms a part of delivering the site's flexible, adaptive, and high-value pathways for whole-of-community benefits.

Sydney Water's Environmental Policy outlines the commitment to protect, restore and enhance the natural environment, with commitments to:

- Having no net impact from discharges to the air, water, or land.
- Maximising resource value and supporting a circular economy by responsibly managing energy, water and materials, and minimising waste creation.
- Managing the entire integrated water cycle in the catchment, including capturing, treating, distributing drinking water and collecting, treating and releasing wastewater.
- Protecting, restoring and enhancing natural and cultural heritage assets.
- Social responsibility by having at the forefront the wellbeing of the community to improve overall environmental performance.

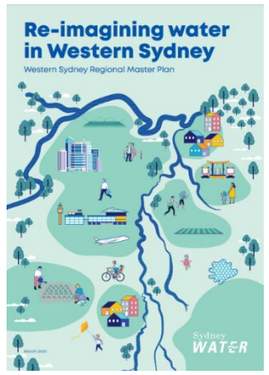

Figure 26 Re-imagining water in Western Sydney

Sydney Water Circular Economy and Resource Recovery Strategic Blueprint

Water has a central role to play in transitioning the world out of the linear cycle of production and consumption of resources, and towards their circular use. The successful transition to a circular economy requires a true nexus approach to water, energy and materials; to go beyond traditional silos and develop innovative partnerships with customers, business, communities and all levels of government.

Sydney Water's *Circular Economy & Resource Recovery (CE&RR) Strategic Blueprint* is a framework to guide embedding circular economy principles within the organisation. Sydney Water is committed to the three circular economy principles: 1) to design out waste and pollution, 2) to keep resources in use at their highest value, and 3) to restore and regenerate natural systems.

The Strategic Blueprint seeks to realise the three principles across five outcome areas – Water, Nature, Materials, Energy & Carbon, and Partnerships. Each outcome area has its own set of measures through which progress can be benchmarked and measured. The measures have been developed with guidance from leading-edge circular economy assessment tools and aligned with directions from other Sydney Water Strategic Blueprints.

Sydney Water's *Net-Zero Carbon Plan* sits within the Circular Economy Blueprint and is a response to the importance of climate change abatement, to enable *our Thriving, liveable and sustainable cities* strategic outcome and achieve our vision of creating a better life with world-class water services. The *Net-Zero Carbon Plan* presents an outcome to reduce carbon emissions aligned with customer ambitions and its *Net Zero Directional Statement* provides direction on how to make decisions to enable the Plan.

Sydney Water has an aspirational net zero carbon target of 2030 across our operations and 2040 in our supply chain. By quantifying the impact of carbon emissions, it will enable the identification of reduction pathways to achieve this target through energy efficiency, renewable energy, low emission technologies, innovation, and the supply chain.

Net Zero Plan 2030 and NSW Climate Change Policy Framework

Outlines the State Government's long-term objectives and plan to achieve net-zero emissions by 2050, increasing the State's resilience to a changing climate.

Department of Planning and Environment: A Liveability Framework for Sydney + Department of Planning and Environment: Everyone Can Play

The guides identify the most important considerations for achieving liveability improvements and suggest example ways to achieve these outcomes.

Complementing the Western Parkland City and WSA visions, while not binding, they are good references for best practice principles to achieving improved liveability within Greater Sydney.

The AWRC has the potential to assist the government in achieving the State Government's climate and energy goals outlined in the above guides and frameworks.

Legislation and policy relevant to the Urban Design and Landscape Plan

The strategic guidelines detailed on previous pages together with local policy and legislation (Table 8) has informed the development of the Urban Design and landscape Plan.

Table 8 Legislation and Policy

LEGISLATION AND POLICY RELEVANT TO THE URBAN DESIGN AND LANDSCAPE PLAN		
Legislation/Policy reference in full	**Brief description of legislation, salient parts and intent**	**How legislation/policy is relevant to the urban design**
Australian Standard AS1428.1 Design for access and mobility (Australian Standard, 2009)	Specifies the design requirements for new building work as required by the Building Code of Australia (BCA) and the Disability Standards to provide access for people with disabilities.	All areas including the administration office, facilities and publicly accessible outdoor areas will need to comply to AS1428.1.
State Environmental Planning Policy (Western Sydney Aerotropolis 2020)	The SEPP facilitates development in the WSA in accordance with the objectives and principles of the WSAP.	The AWRC must comply with this SEPP. It replaces conflicting policies identified under the Penrith Local Environmental Plan 2010.
Technical guideline for Urban Green Cover in NSW (OEH, 2015)	Provides practical advice on best practices to increase community resilience to Climate Change.	Complements the Western Parkland City vision. While not binding, it is a good reference for best practice principles.

6.2 Regional Context

The Greater Sydney Regional Plan identifies the Western Parkland City as one of the strategic Three Cities for Sydney. The plan is structured around infrastructure, productivity, sustainability, and implementation.

The population of the Western Parkland City is projected to grow from 740,000 in 2016 to 1.1 million by 2036, and well over 1.5 million by 2056.

The city will emerge with the development of new neighbourhoods and centres, and with urban renewal close to existing centres. Place-making will help to design neighbourhoods with fine grain fabric and human scale. This will support healthy lifestyles and connected communities.

Development along the spine of Wianamatta South Creek and its tributaries will re-imagine liveability and sustainability, providing new cool and green neighbourhoods and centres with generous open space in a parkland city.

Greater Sydney Regional Plan

The AWRC is located at the confluence of the Wianamatta South Creek and Kemps Creek and is within an open space and environmental corridor. It is directly below Western Sydney Airport's flight path and will be bordered to the south by the proposed M12 Motorway. The M12 Motorway will provide an active transport link connecting broader communities from the Penrith, Blacktown, and Fairfield Local Government Areas.

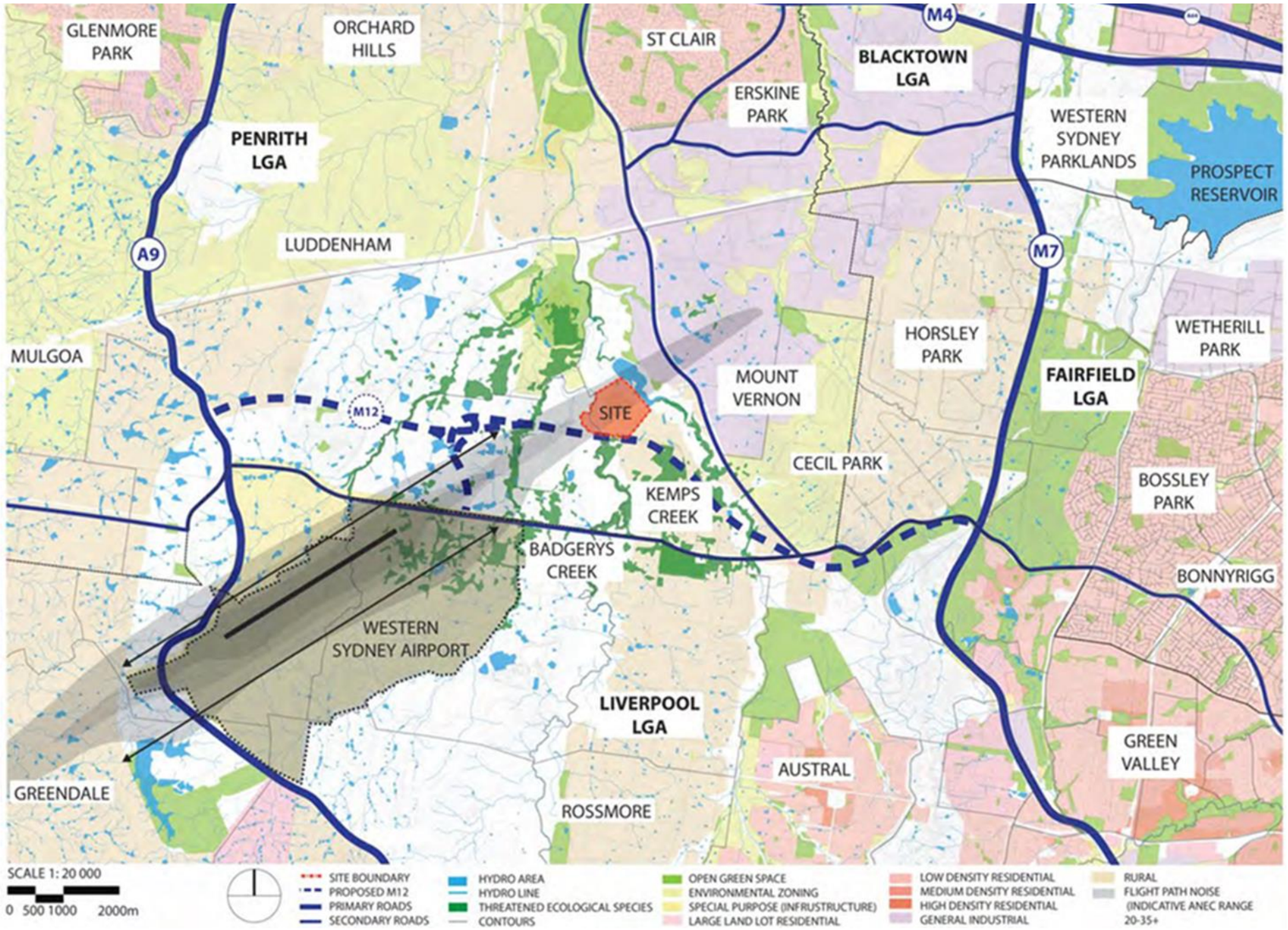

Figure 27 Regional Context (Tract)

6.3 Local Context

Penrith City

The AWRC site is located in Greater Sydney's peri-urban region between the Blue Mountains and the Sydney CBD, approximately 30 km south-west of Parramatta CBD, within the future Western Parkland City. Strategically positioned six kilometres north-east of the future Western Sydney International Airport, under the flight path, the proposed site forms part of the Western Sydney Aerotropolis – the future international gateway to Sydney in the west.

Sitting on the confluence of Wianamatta South Creek and Kemps Creek, the proposed site forms a part of the Hawkesbury-Nepean catchment within the Cumberland Plain Bioregion. Wianamatta South Creek accounts for around 80% of the Western Parkland City's catchment, running through some of the flattest, driest, and hottest parts of Greater Sydney.

The AWRC site is located within the Penrith Local Government Area and key strategic documents include:

- The Penrith Community Plan 2017

  The Plan outlines broad strategies to guide Penrith's future and build its resilience over the next 10-20-year period.

- Local Strategic Planning Statement 2020

  The Strategy relates to and must be considered in conjunction with a range of other Council policy and strategic documents including Cooling the City, Sport and Recreation Strategy, Penrith.

- Penrith Green Grid Strategy Penrith City Council /Tract

  The strategy sets the strategic framework for the implementation of the local Green Grid linking, recreational open space, waterways, environmental corridors, and future development.

Figure 28 Penrith City Council Community Plan 2017

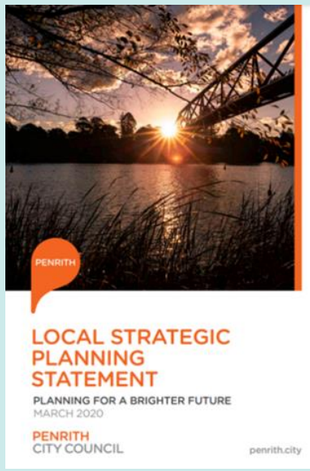

Figure 29 Penrith Local Strategic Planning Statement 2020

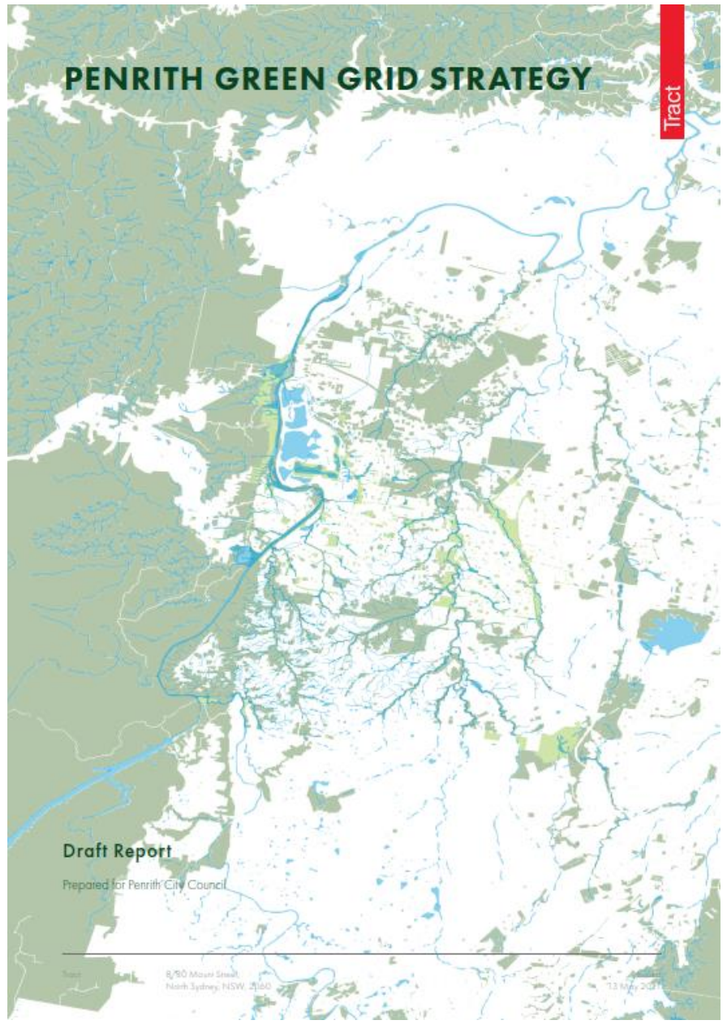

Figure 30 Penrith Green Grid Strategy (Tract)

Opportunities and Constraints

Relevant opportunities and constraints were identified for the Project.

Opportunities considered include:

- Aboriginal cultural landscape and European heritage interpretation.
- Restoring the critically endangered Cumberland Plain native woodlands to riparian corridor conservation areas to provide critical habitats for endangered species.
- Linking to active transport on proposed M12 Motorway.

Engagement with and understanding water:

- Integrating water sensitive urban design across the site.
- Creating pathways and trails that will connect to broader networks.
- Maintain existing views and visual connections and create new ones, maximising viewing opportunities out from the site, along the creeks, and into the site from the M12 Motorway.
- Linking to the Sydney University site through creek restoration and future access.
- Co-locating habitat areas with community uses to encourage stewardship.
- Embedding long term resilience.

Constraints that have been considered in the design include:

- Land ownership boundaries including boundaries shared with Sydney University.
- A portion of the site is subject to 1 in 100-year flood events.
- Design for bushfire within the Asset Protection Zone.
- Wildlife strike mitigation design and management of the landscape.
- Urban Heat Island Effect in Western Sydney.

Figure 31 Local Context Plan

Figure 32 Biodiversity Analysis

Figure 33 Threatened Ecological Communities Analysis

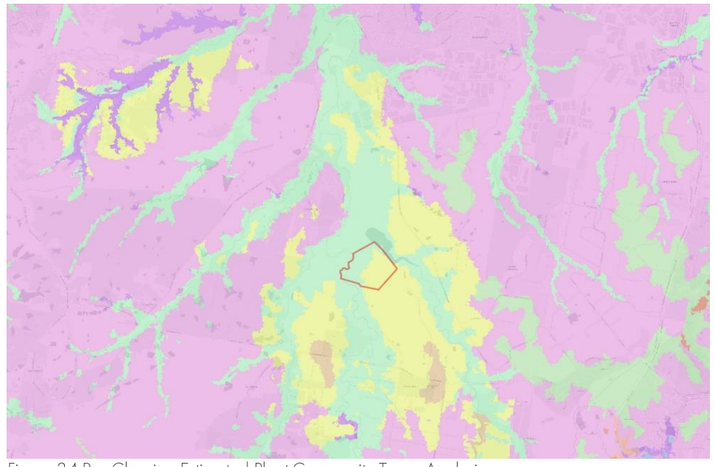

Figure 34 Pre-Clearing Estimated Plant Community Types Analysis

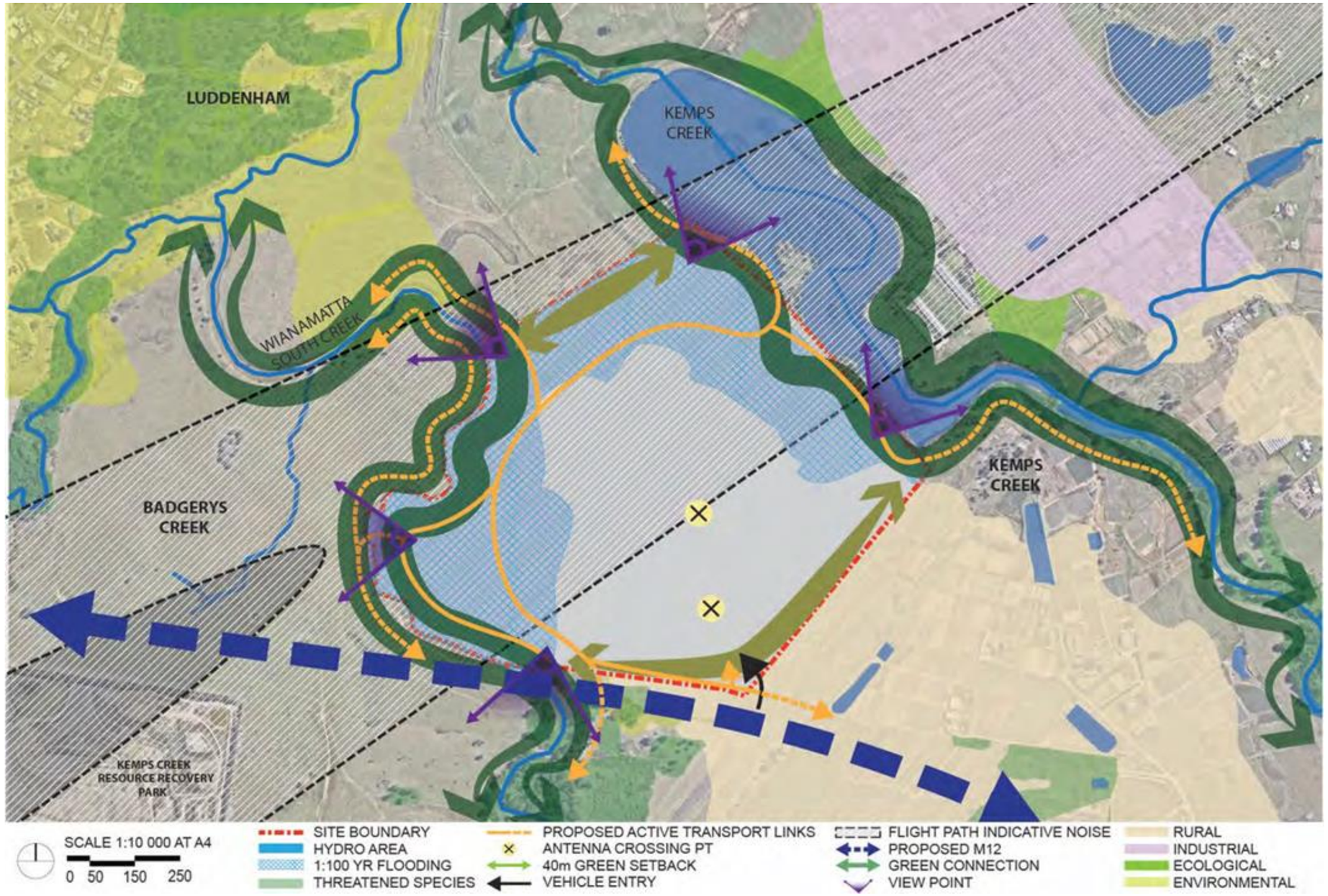

Figure 35 Opportunities and Constraints (Tract)

Existing Environment

The AWRC is located between Wianamatta South Creek and Kemps Creek. The land is relatively flat, and part is located within a flood plain. The site has been largely cleared of native vegetation with some remnant planting along its boundaries and a covering of pasture grass. Formerly used for research and grazing, the site is heavily compacted. The site is zoned as Rural Land and Environmental/ Recreational Land. The land immediately surrounding the site to the east, north and west is currently zoned as Environmental Conservation and Future/Environmental recreation. To the south and beyond the Environmental conservation area, the land is zoned as Rural Land/Flexible Employment Land.

6.4 Urban Design for AWRC

A preliminary plan was developed that reflects the staged development of the AWRC site. It will be implemented in stages comprising of:

Stage 1 - Operational Site, this Project (2026)

Stage 2 – Potential expansion within Operation Site (2035).

The development of a Green Space Masterplan outside of the operations zone will be undertaken to allow Sydney Water to assess implementation opportunities as the site and surrounds evolve.

Urban Design brings together several key elements by balancing opportunities and constraints to achieve an optimum constructed outcome. Maximising environmental outcomes with functional attributes of the AWRC will ensure the development supports the creation of a biodiverse environment where the broader precinct goals of open space and biodiverse networks are achieved.

Stage 1 Operational Site Plan

The Stage 1 Operational Site Plan has been refined through working with Sydney Water, and includes the treatment plant, relevant landscaping, and the riparian planting along Wianamatta South Creek. During the D&C phase, refining and developing of the Stage 1 Plan and Green Space Masterplan design will ensure the future proofing of the AWRC site through the incorporation of outcomes from key stakeholders and community engagement.

Opportunities include:

- Implementation of native plant species.
- Integrated cultural heritage interpretation.
- Retaining water on the site to recharge groundwater systems to support landscape establishment.
- Showcasing water on site by reinstating existing billabongs.

Green Space Masterplan / Future Opportunities

The Green Space Masterplan will support the ongoing evolution of the AWRC, as the restoration of natural systems and implementation of a new landscape takes time. The plan will provide a level of certainty and flexibility to match the planned capacity growth of the AWRC. The strategy to enhance and cool the Western Parkland City and deliver ecologically connected systems with a physical network across the site and linkages to planned open space networks will be considered in developing the green space opportunities.

Restoration activities will provide connection to community, Caring for Country and knowledge sharing through creating a benchmark for revegetation projects that restore the Cumberland Plain landscape on pasture and denuded creek environs.

Opportunities include:

- Retaining water on the site to recharge groundwater systems to support landscape establishment.
- Walking and cycling networks connected to the creeks and the broader regional networks.
- Integrated cultural heritage interpretation across the site.
- Locations for recreation, education, and play.
- Biodiverse communities across the site.
- Maximising viewing opportunities out from the site, along the creeks and into the site from the M12 Motorway.
- Green Grid links along Wianamatta South Creek and Kemps Creek.
- Potential linkage to the University of Sydney lands to the south.
- Active transport connections to the M12 Motorway and future creek networks.
- Greening of the western edge of Wianamatta South Creek (currently outside of Sydney Water ownership).
- Greening of the western edge of Kemps Creek (currently outside of Sydney Water ownership).

Whilst the Green Space is part of the Stage 1 CSSI approval, the urban design and landscaping is subject to ongoing conversations which extends beyond the plans included in this UDLP. Stakeholders will have the opportunity to be involved with the Green Space Masterplan later this year, and will either form another stage in Stage 1 or be delivered as part of Stage 2.

Potential Future Development Zone

A potential waste to energy facility has been located on the Future Commercial and Circular Economy Zone (refer Figure 75).

Figure 36 USC AWRC site

Design Approach

Establishing a benchmark in integrating essential infrastructure with the provision of broader community and ecological benefits, the development of the AWRC site and development of the future Green Space Masterplan will build upon the existing character and heritage of the site through the following:

- Building on existing features
- Creating a landscape-led biodiverse environment
- Showcasing water on the site
- Human scale and nature-based solutions
- Providing opportunities for the future
- Ensuring a feasible and sustainable outcome
- Integrating a cultural heritage response

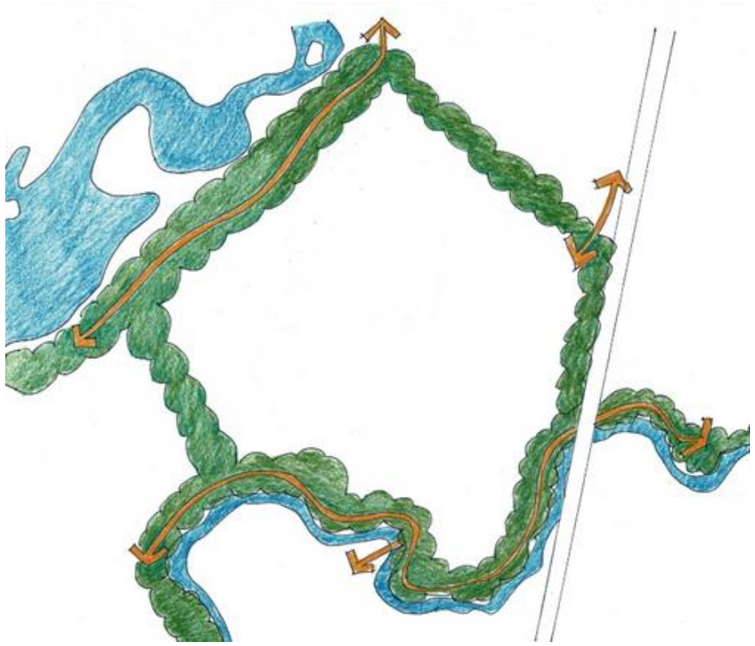

Figure 38 Key moves - Reconnect AWRC site and expand the Green Grid - Green Space Masterplan

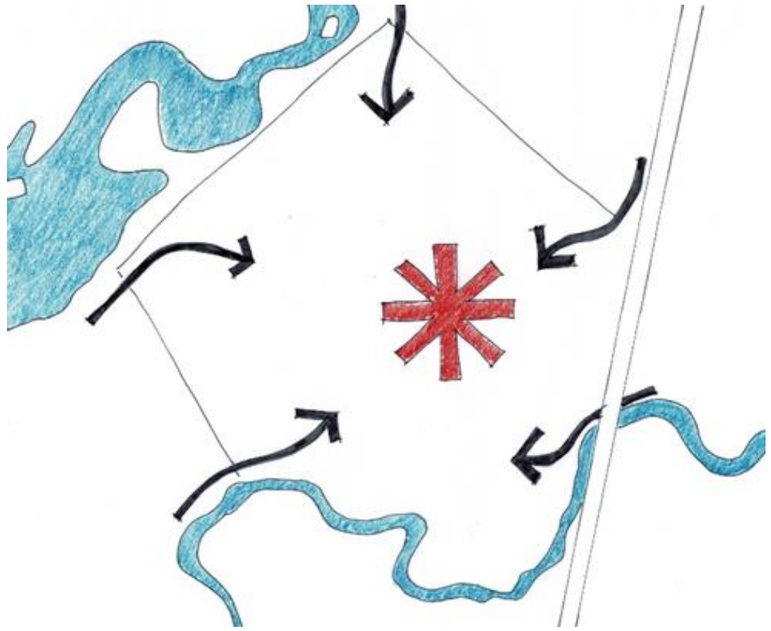

Figure 39 Create a destination that connects nature and people locally and regionally - Green Space Masterplan

Figure 37 USC AWRC Site looking south

7 Connecting to Country

7.1 Historical and Cultural Significance

Context

The site of the AWRC has strong historical and cultural significance. Interpretation will be woven into the design of project elements to reinforce a sense of place. A co-design approach across all disciplines will be realised in the design, including the integration of an Indigenous voice to the design and implementation.

The design of all elements will be undertaken so that they are perceived as a family of elements to provide a cohesive and unified design outcome. The *Heritage Interpretation Strategy* (Extent Heritage October 2021) is a comprehensive review of potential interpretation opportunities to ensure that traditional, historical, and contemporary values and meanings are integrated. Three preliminary interpretative themes from Country were identified:

The Ebb and Flow (water),
The Infinite Land (land), and
To The Stars (sky).

These themes will be refined after engagement with key knowledge holders to understand Wianamatta South Creek as a source of life, how the local topography was used as way-finding markers and how the spaces between stars guided journeys at night.

The three themes form the basis of three significant and circular stories:

- Night sky used for navigation by Aboriginal people and how the site's former use as Fleurs Field Station for radio astronomy researched the sun's outer atmosphere.
- The story of the creeks as a water source and the proposed AWRC to produce water suitable for reuse.
- The Lands were rich in food for Aboriginal communities and subsequently used for farming and grazing.

This Project has come full circle with the re-establishment of lost networks and the restoration of a denuded landscape. Through knowledge sharing to broaden our understanding, interpretation will be informed by feedback and guidance from the Aboriginal community during the Design and Construction phase. Refer to Chapter 14 Community and Stakeholder Engagement.

Figure 41 Night Sky

Figure 40 AWRC site: The Infinite Land, Water, Land and Sky

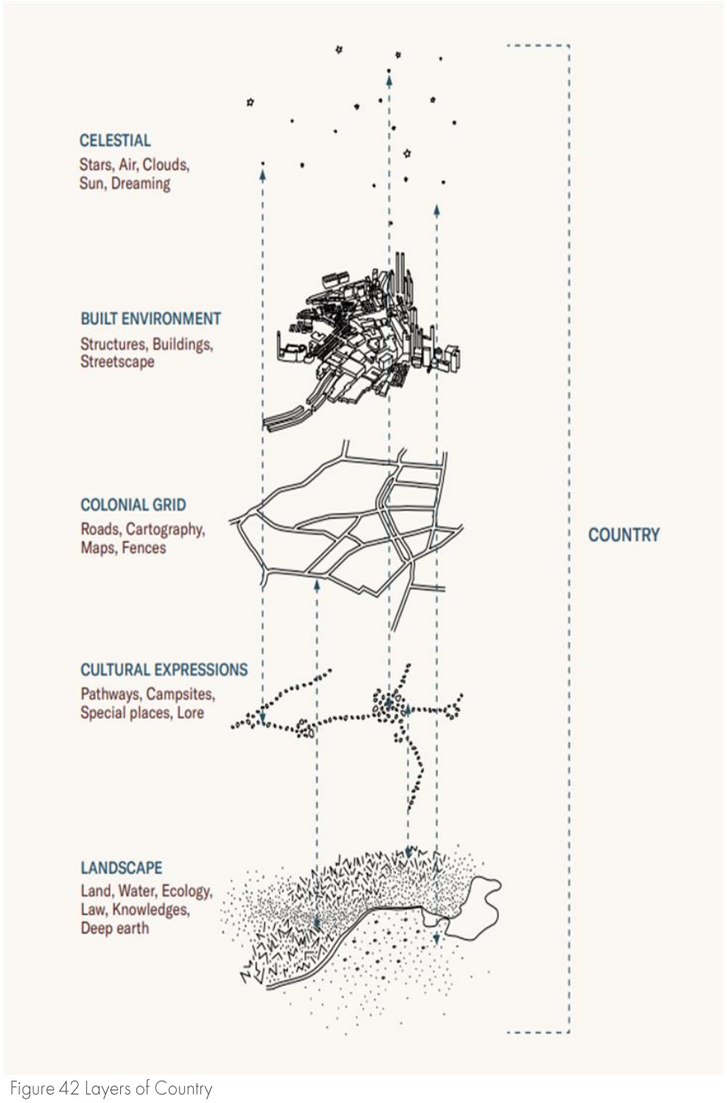

Figure 42 Layers of Country

7.2 Recognising Country

Multiple chapters of the Recognise Country: Guidelines for Development in the Aerotropolis (NSW Government 2022) have been considered in this UDLP. These considerations are an introduction to the design and design thinking, with further details to follow in subsequent chapters.

Starting with Country (2.1)

The design and in particular the master planning for the future green space considers how values can be revitalised through a cultural lens. The initial planning for the AWRC preceded the establishment of the Designing with Country and Recognise Country Guidelines. This design team were not involved in the masterplan framework and did not have the opportunity to engage with Traditional Custodians during the early planning stages. The nature of the procurement process (competitive tender) also limited access to Traditional Custodians due to consultation fatigue and project timing. However, the need to start with Country and making appropriate design decision responding to Country's needs have been considered and continue to be considered in the development and post construction management of the site.

Traditional Custodians have been consulted and will continue to be part of this process, including social impact opportunities associated with building enterprise. Walks on Country with Traditional Custodians and Registered Aboriginal Participants has occurred, and engagement outcomes and recommended actions are being incorporated into the project outcomes.

The AWRC site is primarily cleared, heavy compacted from grazing with soils of high salinity and within a flood plain (SESL 2023). The design responds to Country through the emphasis on healing Country. A focus on minimal impact and maximum benefit to ecological systems and community.

The proposed restoration of fragmented ecological systems associated with the Cumberland Plain Woodland landscape across the site will support a biodiverse environment that will enhance existing fauna numbers and create opportunities for a networked environment that reinforces a greater number of species interactions.

The restoration of Wianamatta South Creek will improve waterway quality, reduce erosion, and support aquatic species. The establishment of tree cover and improved water quality supports the broader Aerotropolis and Western Parkland City objectives including the need to mitigate heat island effects. Water, land and sky are key principles for the project interpretation strategy.

Cultural Safety (2.1.1)

A balance in engagement is being established to reduce the cultural load on Traditional Custodians. Engagement will focus on the opportunity to revitalise place through a cultural lens to establish AWRC as Country that is living and offers different experiences at different times of the day and year. There is potential to incorporate areas for cultural practice and activation within the future Green Space and consideration of post construction opportunities for co-management will be explored.

Economic development opportunities (2.1.3)

Sydney Water's Aboriginal Procurement Participation Plan 2021-2023 informs the procurement process for the development of the AWRC. Specific employment opportunities include archaeological investigations, seed collection for the establishment of local plant material suitable for the site, supply of goods and services, including the establishment and on-going maintenance of the landscape. There are also opportunities in the development of the interpretation strategy and implementation for the site.

Cultural Landscape (2.2)

The AWRC is within the expansive waterway system of Western Sydney and the 'site' does not exist in the broader context when viewed as land, sky, and water. It is clear when approached in this way the site is within land that is communal, reflecting traditional, scientific, ecological and knowledge values. There is a specific identity associated with the Darug as a unique people and language. We are focusing on the restoration of a living culture at the AWRC.

Landscape (2.2.2)

The Green Space Masterplan will include sightlines and views to nearby landforms and key geographic markers such as the Blue Mountains, Kemps Creek, and Wianamatta South Creek, and offers opportunities to connect to the broader cultural landscape.

The existing vegetation will be supplemented with the local Cumberland Plain Woodland species to retore a networked system to create a nature-based solution maximising biodiversity outcomes. In particular, the creek networks within and beyond the site.

Developing the landscape design to include select indigenous species focusing on the use of plant material grown from seeds of provenance honours the original landscape. Alongside this is understanding the challenges of the salinity in the on-site soils in reestablishing plant communities.

Water (2.2.3)

The UDLP has used the water systems (including riparian corridors) and flood mapping as a base layer to inform spatial decisions. The Operational Zone is located above the 1% AEP flood extent to protect assets, while the remaining Green Space topography will be retained. The restoration of billabongs and landscape along the Wianamatta South Creek promotes the opportunity to engage with water and the story of water.

Parks and open space (2.2.4)

Aboriginal interpretation is to be embedded into the Interpretation Strategy elements for the site's development, in particular the Green Space. Opportunities include stories of place, cultural activation, and sensing County. The site has been identified as part of a broader area of cultural practice. There is the opportunity to establish areas of cultural practice within the proposed Green Space. Further engagement with Traditional Custodian will inform this opportunity.

Built Form (2.3)

The refined layout has minimised visual impact by consolidating built forms and designing the facility to be economical in layout and footprint to minimise built form extents. The road layout has been designed to minimise pavements and maximise permeable surfaces. Building façades reflect local earth and landscape colours. The orientation and shaping of the Administration Centre maximise views towards Wianamatta South Creek and away from the M12.

Culturally responsive public art (2.3.3)

Public art will be incorporated as part of the site's interpretation strategy that will be considered during the development of the Green Space Masterplan. Aligning art with cultural heritage values and Country will reinforce the significance of the site.

Language and naming, wayfinding and signage (2.4)

Sydney Water is considering the naming of the entry road and AWRC in the Darug language in consultation with the Traditional Custodians. The Darug language will also be considered in the development of wayfinding and signage.

7.3 Connecting with Country

This section outlines how we will achieve the principles and objectives identified in the Connecting to Country Framework (GANSW 2023) chapters 4.1, 4.2, and 4.3.

Where is our project located

The project team recognises the Darug People as the Traditional Custodians of the AWRC land and acknowledges their continuing connection to Country for thousands of years.

Language use and first placenames

Revitalise and raise awareness of the Darug language through integration as a placename, interpretative signage, history, geography, family and human relationships, stories and art. Continuing engagement with Traditional Custodians to establish the correct language.

Connect to the broader landscape

This UDLP recognises that healing Country is not restricted to the boundary of the site. The AWRC is a piece of a larger puzzle that is the greater Western Sydney landscape and its inhabitants. By restoring the Cumberland Plain Woodland and the health of Wianamatta South Creek within the AWRC site, it is a starting point of a systems connectivity into Country.

Promote and protect Aboriginal cultural heritage

Aboriginal Cultural Heritage investigations (excavations) have been undertaken to further understand the history of the site and its significance. Future Aboriginal cultural heritage opportunities on site will be respected and planned for, overseen by the Traditional Custodians. Cultural awareness heritage training will be incorporated into project activities and actions under the guidance of Traditional Custodians.

Acknowledge our shared history

Cultural Awareness Heritage Training for the project includes Traditional Custodian input and the need for ongoing conversations. A timeline is included in the training package with an emphasis on Wianamatta South Creek.

Country-centred approach

Recognising the importance of restoring the Cumberland Plain Woodland and Wianamatta South Creek as the start of a broader strategy to healing and caring for Country to reestablishing biodiversity and acknowledging that all living things exist as part of an interconnected system where humans should not be the dominate species.

Supporting Living systems: Earth, Water, Sky

The purpose of the AWRC and its landscape is to work towards an environmentally sustainable future, considering the interconnectivity of humans, nature and culture where humans are not the dominate species. Aside from earthworks for the built form where essential, the Green Space retains the existing topography of Country, and the objectives and principles outlined in this UDLP ensure that the living systems that have emerged and evolved from this topography will continue to be naturally expressed.

Restoring Wianamatta South Creek ensures that not only Water Country, but Earth and Sky systems can continue to function healthily, benefitting all living beings. Restoring the billabongs to their natural state by removing the dam wall in between them further supports the natural topography and water systems of the site to be expressed. Existing fauna will be relocated from trees that are to be removed and non-weed species tree trunks will be retained on site for fauna habitat and resources.

Reawakening memory

Archaeological investigations have shown that the AWRC site was a place of cultural practice. There is potential to carry this memory into the future through landscape design subject to the guidance of Traditional Custodians. Additionally, memory of place is being expressed in the urban design through the use of building materials and colours inspired by Country.

In-between spaces

In-between spaces will be explored and developed in the Green Space Masterplan.

Indirect Connections

How the site is sensed through the creation of visual, physical and ephemeral connections will strengthen a living culture. The Green Space Masterplan will include sightlines and views to nearby landforms and key geographic markers such as the Blue Mountains and waterways.

Precinct scale

The development of the Aerotropolis and the identification of the Western Sydney Parkland City as place informs the precinct wide connections, landscape and placemaking attributes. The landscape within the AWRC is only a piece of the Greater Western Sydney landscape puzzle. Wianamatta South Creek and Kemps Creek are key connections to many peoples, stories, cultures and ecosystems.

Building scale

The urban design places nature as a key component by only taking up space that is essential to the AWRC's function. Building and road axes have been aligned with the former Fleurs parabolic antennae cross arrays and align to key water bodies surrounding the site: north-east to Kemps Creek and west to Wianamatta South Creek. Building colours have also been considered to reflect those naturally occurring on Country.

7.4 Designing with Country

In line with the Designing with Country Framework (GANSW 2020), this UDLP recognises the importance of having a Country-led design to ensure the sustainable future of the site and all that is connected with it – Water Country, Sky Country, biodiverse plants and animals, and resources. It considers the greater connections the AWRC has with the wider landscape, and that human needs are not weighted above all other living entities.

Continuing engagement with Traditional Custodians will occur to embed a Country-centred approach.

Further details on the design will be elaborated in the following chapters of this UDLP.

7.5 Country, Heritage and Aboriginal Interpretation, and Public Art

The development of an Interpretation Plan will be shaped by the Interpretative Strategy objectives. A seamless integration of heritage to the physical environment of place will need to occur in conjunction with the determination and confirmation of the audience for interpretation. Interpretative devices can be incorporated progressively, and some initial interpretation opportunities include:

- Aboriginal cultural interpretation
    - Connecting to Country through the establishment of Cumberland Plain Woodland species and care for Country actions such as seasonal cold burning of understorey plant species.
    - Potential establishment of Aboriginal cultural spaces within future Green Space for the connecting of Traditional Custodians to their culture. Spaces to be designed in collaboration with Traditional Custodians.
    - Incorporation of Aboriginal language in naming and wayfinding and signage.
    - Interpretation Strategy opportunities include planting, growing and cultivating to create cultural spaces, storytelling on site, art installations (e.g. murals) and temporal works that respond to longer narratives of place.
    - Interpretative work can focus on the passing of time.
- Restoration of Cumberland Plain Woodland, creek health and biodiversity corridors to promote a diverse range of flora and fauna, food sources and medicinal plants
    - The establishment of a range of local native species will reconnect the site with its pre-colonial identity, increase biodiversity through the provision of habitat and food for native fauna.
    - The restoration of the Wianamatta South Creek will improve water quality and reestablish a key cultural element for Traditional Custodians.
- Connecting trails and networks to the broader precinct
    - Proposed trails will connect to places of significance, i.e., Wianamatta South Creek, Kemps Creek and link with future networks within the Western Sydney Parkland City.
- Colour of built form and landscape materials including stone material used as tools reflected in paving and architecture and gravel surfaces
- Understanding of the night sky and views to local landforms
    - Interpretative signage and potential educational tours can showcase the site's Aboriginal and colonial connection to the night sky. Tours can convey information through story telling.
    - Vantage points to local landforms can be reinforced in the Green Space Masterplan.
- Language, Story, Place naming
    - Interpretative signage with the Darug language, street and place names, and stories throughout the site where appropriate.
- A gathering place, education programs including tours, demonstrations, and interactive elements
    - Opportunities for learning and interpretation will be identified in the Green Space Masterplan. The site offers a variety of potential interpretation opportunities associated with storytelling, water, food, local fauna and flora.
- Artwork, murals, sculpture, and digital media
    - Aboriginal art and media can be developed and curated with local Aboriginal artists and incorporated on site where appropriate and incorporated into the educational programs. This will be incorporated into the Green Space masterplan development.

Fleurs Field Crosses

The site was used for Radio Astronomy when it was leased to CSIRO. The Fleurs Field Station accommodated the Mills Cross, Shain Cross, and Chris Cross arrays that were major technological innovations in cross type telescopes.

- Community engagement during the D&C phase will include Astronomy groups with an interest in Fleurs Field Station.

The proposed road network of the facility has been orientated to the crosses of the former field station. At the crossing points of the former arrays, the landscape will be marked with feature pavements and interpretative signage.

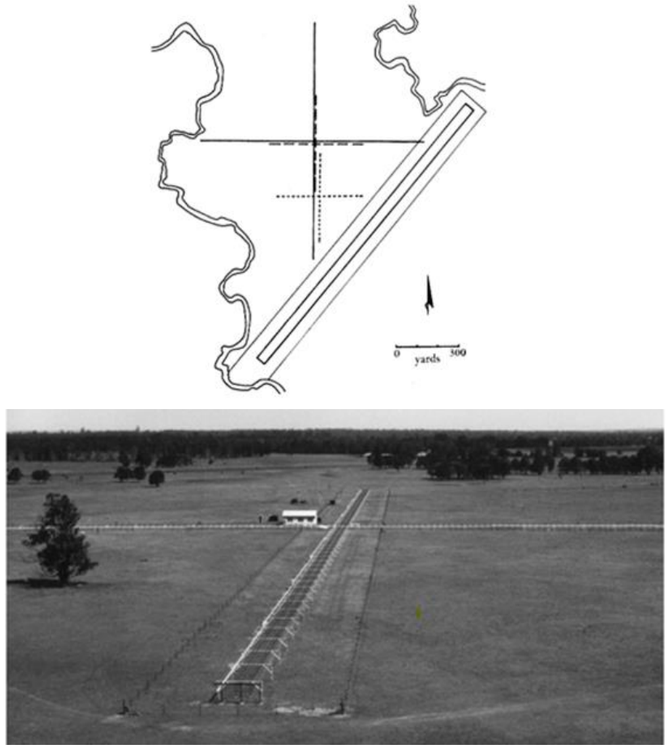

Figure 43 Location of Fleurs Field Crosses

Parabolic Antennae

The two remaining parabolic antennae can be interpreted within the future green space. How these are incorporated to ensure that they are viewed but not accessed and used as climbing frames will require consideration. The site's European history can be reflected in interpretation and art strategies to be developed as part of the Green Space Masterplan.

Figure 44 Mills Cross Array (Image: ATNF Archive 3476-3)

Figure 45 Antenna at Fleurs (Image: ATNF Archive)

Figure 46 Antennae remnants zoomed in

Figure 47 Antennae remnants on ground

Figure 48 Antennae remnants full view on site

Sydney University Water Harvesting Project

The local area was used as a research facility by Sydney University in the early 1950s to apply science to farm management. Associate Professor H.J Geddes developed water harvesting to improve the optimisation of rainfall for pastures which informed P. A. Yeoman's Keyline Design techniques where amplified contour ripping captured and conserved water to restore soil depth and fertility.

The Green Space Masterplan incorporates a layout along contour lines as an element that can be seen from the air and as a landscape organisational element.

Water in the landscape can be interpreted as play and educational elements throughout the site from facility tours to understanding the flora and fauna within the creek environs and proposed wetlands.

Figure 49 Keyline Design (Image: Volterra)

Figure 50 Keyline Design (Image: Volterra)

Benchmarking the scale of the AWRC

To understand the opportunities that the AWRC site offers, a benchmarking exercise to compare the scale and use of the site against established green spaces has been undertaken. Sydney Park, Centennial Park and Bicentennial Park were reviewed and mapped. Centennial Park is twice the size of the AWRC with significant water bodies, cultural heritage elements and regional recreational facilities. Bicentennial Park has two distinct zones, the conservation wetland area and the recreational parklands which are comparable in scale to the green space area at the AWRC.

Figure 51 Sydney Park

Figure 52 Centennial Park

Figure 53 Bicentennial Park

Figure 54 Sydney Park bioretention (Image: City of Sydney)

Figure 55 Sydney Park wetlands play (Image: City of Sydney)

Figure 56 Sydney Park art interpretation (Image: City of Sydney)

Figure 57 AWRC grassland

Sydney Park's site area is similar to the AWRC when the Treatment Plant and future commercial zone is not included. Sydney Park has significant bio detention water bodies with a variety of recreational and open space elements and is centrally located within a growing population. Established on a former municipal waste facility, the Park is of regional recreational importance and has been successfully remediated and transformed in stages. Based on our assessment, the potential carrying capacity, local and regional importance of the AWRC site is significant and will be used as the basis of the master planning of the future green space.

Figure 58 Area comparison benchmarking

8 Landscape Design

8.1 Landscape and Biodiversity

Landscape and biodiversity are significant elements of the Project as Sydney Water has identified place making and landscape-led design principles underpin the desired outcomes in the near and long-term. As part of the Western Parkland City, ecological resilience and restoring natural systems will assist in the mitigation of environmental loss associated with Climate Change. Stage 1 of the AWRC will establish the framework for the stewardship of a significant site for both Sydney Water and the community. A landscape approach will improve biodiversity on site.

The site will contribute to place-based outcomes by designing and caring for Country, support biodiversity and provide a restored landscape. The design of the AWRC site will further consider Country during the D&C stage when detailed engagement with the local Indigenous community and key stakeholders will occur to inform the design of the green space and riparian corridors.

The restoration of fragmented ecological systems will repair our ability to support species. Through the facilitation of the movement of different species across the landscape, the AWRC will become an ecological linkage and the first stage of a connectivity along Wianamatta South and Kemps Creek to support biodiversity. Aboriginal custodians are deep and rich sources of traditional knowledge of how to care for the landscape and will be consulted to refine the proposed landscape and biodiversity outcomes.

Noted benefits that come from the retention or creation of ecological linkages across a landscape (Molloy et al. 2009) include:

- Increased ecological effectiveness
- Increased migration rates
- Increased foraging and home range areas for species
- Provision of cover for escape from predators between large patches
- Provision of alternative refuge from major disturbances
- Provision of green belts to limit the effects of urbanisation on species and ecological communities

Aims of the Landscape and Biodiversity

Landscape and Biodiversity is aligned with the Project's urban design principles whilst addressing key constraints and opportunities. To achieve this, a balance between habitat improvement and public amenity is needed and a balanced framework is therefore proposed:

- Protect, rehabilitate and recreate creek line habitat to create broader regional links.
- Provide adequate spatial coverage of habitat for native flora and fauna, including longitudinal connectivity, riparian width and habitat complexity.
- Stabilise creek banks by retaining or planting deep rooted trees.
- Enhance the visual experience by creating a more natural environment.
- Adopt best practice management strategies and techniques.
- Stage works to maintain ecosystem functions.

Figure 59 Quote from ECI Deliverable Item 25

8.2 Cumberland Plain Recovery Plan

We will create an enduring landscape for the AWRC that aligns the site's potential biodiversity to regional networks by realising a landscape and ecological strategy that meets the objectives of the *Cumberland Plain Recovery Plan, Department of Environment, Climate Change and Water (NSW) 2011* and the *Cumberland Plain Conservation Plan 2022* The Recovery Plan has been designed to provide for the long-term survival and protection of the threatened biodiversity of the Cumberland Plain as the area develops.

Restoration works will align with *Recovering Bushland on the Cumberland Plain – Best Practice Guidelines for the Management and Restoration of Bushland* and the *Cumberland Plain Recovery Plan, NSW Office of Environment and Heritage (OEH)*.

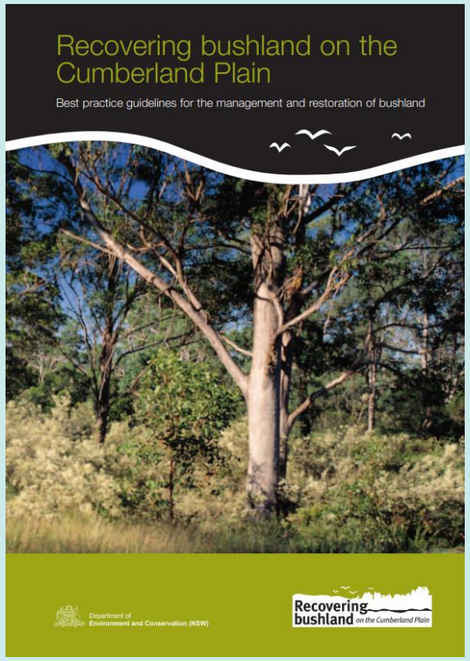

Figure 60 Recovering Bushland on the Cumberland Plain

8.3 Vegetation Management Plan

The Sydney Water Upper South Creek – Advanced Water Recycling Centre Vegetation Management Plan is being developed and considers the principles of Guidelines for Vegetation Management Plans on Waterfront Land (NSW Office of Water, 2012), the tree planting provisions in the *Western Sydney Aerotropolis Development Control Plan – Phase 2* (November 2022), and the *Draft Western Sydney Aerotropolis Riparian Revegetation Strategy* in Section 4 of the *Western Sydney Aerotropolis (Initial Precincts) Riparian Corridors Assessment* (December 2021).

The Vegetation Management Plan details how the restoration and rehabilitation will be carried out. The main objective of this Plan is to provide a stable watercourse and riparian corridor which will emulate local native vegetation communities. Of relevance to this Project's Vegetation Management Plan is the action to support and promote the adoption of best practice standards for bushland management and restoration.

Preparation of the Vegetation Management Plan has commenced for Stage 1 of the AWRC. It is contingent on completion of the landscape design and once finalised, the Vegetation Management Plan will be issued for approval in accordance with the relevant MCoA E64(g).

Future master planning activities by Sydney Water may require that the Vegetation Management Plan be amended to ensure any relevant information is applied consistently across all stages of the AWRC.

Figure 61 Existing Casuarina sp. along Wianamatta South Creek

8.4 Re-use of native vegetation and other habitat features

The Cumberland Plain Woodland is reflected in three Plant Community Types (PCTs) in the Project site: Cumberland River-flat Forest, Cumberland Shale Plains Woodland, and Cumberland Swamp Oak Riparian Forest. All plant species used in revegetation and regeneration will be local provenance species from the Cumberland Plain Woodland.

All non-weed species have been salvaged to be relocated on site as habitat opportunities for local fauna, where possible. Locations include under the existing trees to the north east of the Project site near Kemps Creek. The existing dead tree in the billabong will be retained for birdlife.

Habitat features such as tree hollows and logs will be salvaged where feasible during clearing and stockpiled on site for future use. Stored habitat features will be placed within reconstructed areas where they will not harm new plantings in coordination with an ecologist.

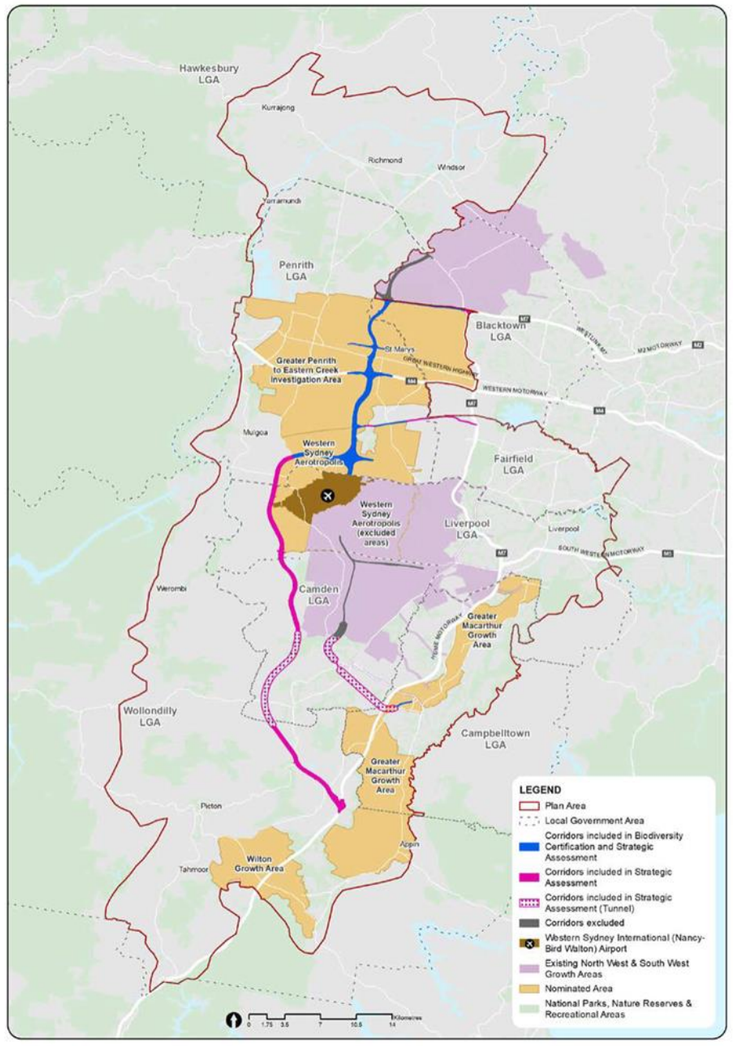

Figure 62 Draft Cumberland Plain Conservation Plan area and scope (2020-2056)

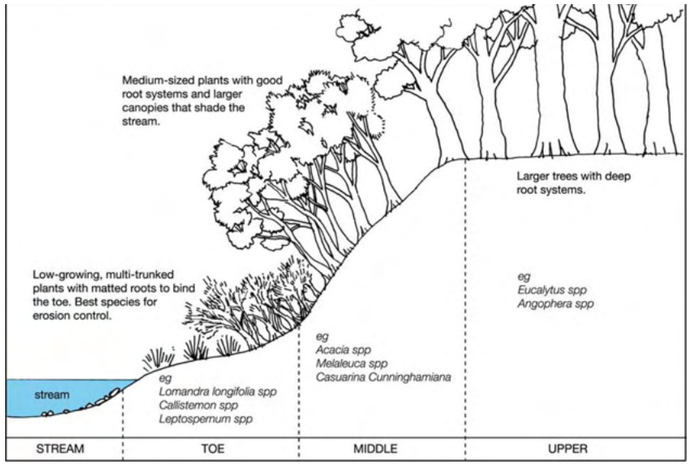

Figure 63 Typical riparian cross section - Adapted from Rivercare: Guidelines for Ecological Sustainable Management of Rivers and Riparian Vegetation: Raine, A.W & Gardiner, J.N, (1995), Land and Water Resources Research and Development Corporation, Canberra.

The Vegetation Management Plan for AWRC provides guidance on the future management of the site's riparian vegetation and:

- Describes the physical and biological characteristics of the site, including endangered ecological communities and threatened species habitat.
- Describes management issues, including prioritised actions, riparian guidelines, and recommended plant species for different zones within the site.
- Provides baseline conditions including species lists.
- Defined monitoring and reporting methods to be used as a reference for future performance monitoring.

The Vegetation Management Plan will be implemented as part of the development of the AWRC.

8.5 The Site

The AWRC site is located six kilometres north-east of the Western Sydney Airport and under its flight path. Wianamatta South Creek and Kemps Creek form the southern and north-west boundaries. These waterways are part of the Hawkesbury-Nepean catchment and are the key catchments for the developing Western Parkland City. The proposed elevated M12 Motorway will run along the south-eastern edge of the AWRC.

The existing flat and cleared landscape comprises of former pastoral land with very few remnant trees. A portion of the site (below RL 39.00+) is subject to flooding during 1:100-year events. The riparian corridor along Wianamatta South Creek is eroded and generally accessible. Access to the site will be via an access road off the realigned Clifton Avenue.

Figure 64 Existing and proposed contours (Tract)

Figure 65 Site photo of creek edge

Figure 66 Existing creek conditions

Figure 67 Existing grassland

Figure 68 View of field

Figure 69 Field wider view

Soils and geology

AWRC is located on Quaternary Alluvium soil type and geology, with a small section of the southern area on Tertiary Alluvium soil type. This geology is characterised by floodplains, valley flats, drainage depressions and fertile soils.

The soil landscapes within the AWRC site include Blacktown (bt) and South Creek (sc) which have an acidic pH, low fertility and high erodibility (SESL 2023).

Cumberland Plain Woodland

The site is part of the Coastal Valley Grassy Woodlands subregion of the Sydney Basin Bioregion. Native vegetation in the subregion is characterised by Cumberland Plain Woodland (CPW) in flat or hilly terrain with an open tree canopy and groundcover of grasses and herbs. Our site is part of a 'Shale Plain Woodland' and is the most widely distributed form of Cumberland Plain Woodland.

The Cumberland Plain Woodland has been listed by the Australian and NSW Governments as a critically endangered ecological community. The community is characterised by:

- Canopy species are dominated by Grey Box (*Eucalyptus moluccana*), Forest Red Gum (*E. tereticornis*), Narrow-leaved Ironbark (*Eucalyptus crebra*), Spotted Gum (*Corymbia maculata*) and Thin-leaved Stringybark (*Eucalyptus eugenioides*) occurring sporadically.
- Small tree species include *Acacia decurrens, Acacia parramattensis, Acacia implexa and Exocarpos cupressiformis*
- Shrubs including *Bursaria spinosa, indigofera australis, Hardenbergia violacea, Daviesia ulicifolia, Lespedeza juncea, Dillwynia, Dodonaea viscosa* and grasses such as Kangaroo Grass (*Themeda triandra*) and Weeping Meadow Grass (*Microlaena stipoides*).

The development of the AWRC will create a place that achieves improved biodiversity relative to the existing conditions through the implementation of Cumberland Plain Woodland species. The Stage 1 landscape will establish biodiversity framework outcomes through the incorporation of soil amelioration and structure planting that allows for the reestablishment of ecological communities. Nominated existing site vegetation which contributes to the proposed community will be retained and protected during all construction activities.

The strategy for AWRC is to create an enduring landscape aligning the biodiversity of the site to regional networks by realising a landscape and ecological strategy that meets the objectives of the Cumberland Plain Recovery Plan and Conservation Plan whilst also mitigating the risk of bird strike.

The site has many challenges due to its location under the Western Sydney Airport flight path, being within a flood plain and subject to fire risks. These constraints have shaped the new landscape; however, they do not limit our ability to return the site to a broader natural system but encourages an approach that maximises environmental opportunities. Plant selection and habitat creation has responded to site risks. At a broader level, our proposals allow for opportunities to work with the community and stakeholders to contribute to the open space and greening networks as the Western Parkland City develops.

For the creek and billabong environs, methods to increase soil stability to establish permanent vegetation cover have been considered. Soil networks and quality will have a major impact in the successful formation of vegetation cover and remediation of site soils is proposed for the landscape implementation.
The ongoing care for the landscape to ensure that it reaches its full potential will be guided by the Landscape Management Plan (refer Chapter 16 Management and Maintenance) outlines how the AWRC will be maintained during the operations period of the Contract. The Landscape Management Plan will encompass management and monitoring strategies including bushfire risks and the Wildlife Management Plan (WMP) which will guide the maintenance of the landscape to minimise all risks whilst supporting the environment to reach maturity.

Figure 70 Restore Wianamatta Creek and site with Cumberland Plain Woodland

Figure 71 Cumberland Plain Woodland in native grassland

9 Designing With Site Constraints

9.1 Wildlife Strike Mitigation

Two objectives of the Aerotropolis are to safeguard the 24 operations of the Western Sydney International (Nancy -Bird Walton) Airport (WSI) and to achieve the Western Parkland Vision which includes a landscape-led approach to planning and an increase in tree canopy cover to minimise urban heat island effects.

Aviation Safeguarding Guidelines Western Sydney Aerotropolis

Safeguarding the 24/7 operations of the airport and the vision of the Western Sydney Aerotropolis are essentially at odds. By its nature, safeguarding attempts to minimise the numbers, flock size and diversity of wildlife operating in and around the WSA airspace, by contrast the Western Sydney Aerotropolis aims to increase tree canopy cover across the area to 40%, enhance riparian zones and wetlands and generally maximise biodiversity across the area. Accordingly, we have had to take a balanced approach that affords the area amenity but minimises the main wildlife threats to aviation.

Western Sydney Aerotropolis Draft Wildlife Management Assessment Report Western Sydney Planning Partnership (2020)

The Aviation Safeguarding Guidelines Western Sydney Aerotropolis and surrounding areas (NSW Department of Planning, Industry and Environment 2021) sets out planning guidelines to inform land use planning decisions on land impacted by safeguarding controls. The objectives allow for the assessment on land surrounding Western Sydney International (Nancy -Bird Walton) Airport (WSI) where wildlife may present a risk operation and ensure wildlife management provisions when undertaking land use planning.

The activity of birds and animals in the vicinity of the WSI Airport is a recognised potential source of hazard to the safe operation of aircraft. This hazard results from the possibility of a collision between an aircraft and one or more birds or animals i.e., a bird strike. The site falls within the 8 km wildlife buffer zone, refer Figure 72: Wildlife Buffer Zone Map. *National Airports Safeguarding Framework Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports* has been incorporated into the Aerotropolis SEPP and Aerotropolis DCP provides a framework for how to manage

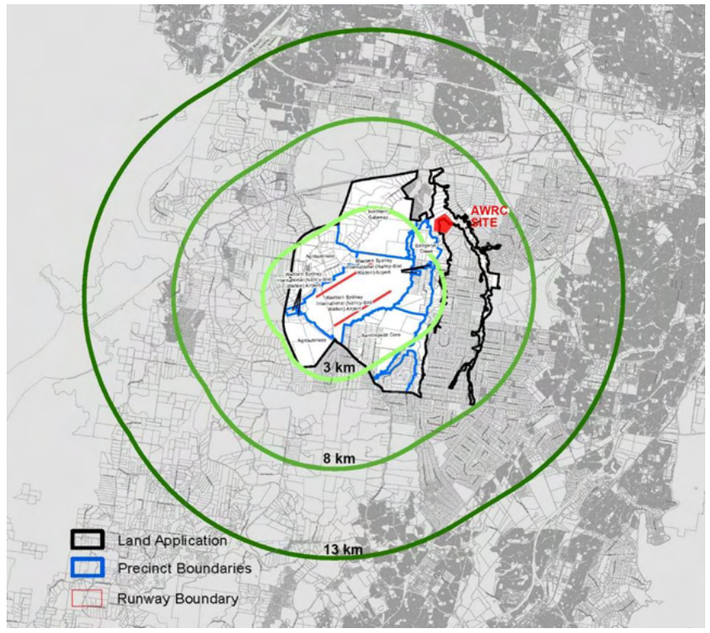

Figure 72 Wildlife Buffer zone Map, adapted from State Environment Planning policy (Western Sydney Aerotropolis) (NSW Department of Planning Industry & Environment 2020)

the risk of wildlife strike on aircrafts. New land uses within 13km of airport property should be regularly monitored and action plans created to mitigate any unacceptable risk of bird strike.

Wildlife management will be an important aspect of operations at the AWRC. Aviation risks to be mitigated in the landscape design are around the creation of habitats that are attractive to birds and bats. Key considerations include ensuring that the design does not create wildlife attractive features (natural and built), bird and bat populations are monitored to assess strike risk. The Wildlife Management Plan (WMP) identifies mitigation actions where hazard is identified. Further the WMP integrates routine monitoring, wildlife awareness, wildlife management and performance standards, wildlife deterrent and surveillance patrols.

The wildlife strike mitigation strategy should not preclude the development of the site to improve biodiversity in the region by attracting and supporting microfauna. The design of the landscape has considered plant species selection, density of vegetation cover, depth of wetlands and the operation of the site to minimise habitats that attract wildlife hazards.

Species selection

The *Western Sydney Aerotropolis Draft Wildlife Management Assessment Report* (Western Sydney Planning Partnership & Avisure 2020) provides guidelines for planting species to minimise the attraction of birds and flying foxes within the Aerotropolis. It is recommended that "trees and shrubs planted in the area should not bear edible berries, fruits, seeds, nuts, nectar, or bear flowers profusely. Such vegetations attract flying foxes and birds such as lorikeets. Plants that attract insects may also pose a risk in attracting small numbers of birds.

Landscape implementation proposes a variety of different species sparsely inter-mixed to allow local biodiversity to evolve. For example, the planting of Acacia sp. will improve soil fertility through nitrogen fixation and allow cross pollination.

The proposed Landscape Management Plan will allow for the continual monitoring and maintenance of the landscape across the entire site to minimise wildlife hazards.

Density of vegetation cover

Planting density has been predominately determined using bushfire risk criteria, (refer next Section: Bushfire Risks) except for the planting proposed along the Wianamatta South Creek which is part of the regional green networks and falls within the category of enhanced riparian and wetland corridor landscape to improve biodiversity. Proposals include:

- *Embankment restoration zone*: Hydromulch mix of groundcovers with Casuarina glauca planting at 5m centres whilst allowing Casuarina seedlings to establish under existing trees by restricting slashing extents.
- Riparian and revegetation zone: trees at 1 per 50m^2, shrubs and groundcovers at 6 per m^2.

Additionally, to meet condition E64(b), hazardous wildlife deterrents have been considered in the design and ongoing management of the landscape. A Wildlife Management Plan will be prepared to inform the operation of the AWRC prior to operations commencing. Particular consideration includes the design and management of the landscape to deter bird populations. The facilities' grass areas will be kept to 100mm in height in accordance with guidelines for asset protection within fire zones. Large, still permanent water bodies will be netted. Monitoring will inform the need for the introduction of sonic devices or ultrasonic repellers deter wildlife.

The Landscape Management Plan will describe the management activities to be undertaken for the long-term care of the environment. There will be focus on particular management activities which support the goals and objectives of wildlife and bush fire management.

Depth of Wetlands

The restoration of Wianamatta South Creek has a strong emphasis on waterway and catchment health to satisfy commitments to tree planting, align with biodiversity principles in the Cumberland Plain Conservation Plan, enhance ecological value and mitigate impacts against threatened species. Slow moving water and where water accumulates for extended periods of time can be attractive to wildlife. Artificial wetlands can attract significant numbers of wildlife. Specific measures that will be incorporated into the Design Development of the landscape include:

- *Bioretention and detention basins*: Temporarily hold water and fully drain within 24-48 hours.
- *Retention basin and wetland embankments*: 4 Vertical to 1 Horizontal to basin bank slopes
- *Drainage grass swale depth*: 200-400mm maximum in height
- *Billabong & wetland water depth*: between 0.5m and 1.18m is less likely to attract hazardous flocking bird such as pelicans, swans, and cormorants; or upending ducks such as Pacific Black Ducks; or wading birds such as ibis and egrets.
- *Sedge/wetland planting*: designed with steeper slopes.
- *Biorention basins*: vegetation 300-600mm in height.

Figure 73 Existing billabong near Kemps Creek

9.2 Bushfire Risks

The Green Space Masterplan incorporates control measures to manage the risk of bushfire as outlined in the *Review of Bushfire Constraints and Opportunities* report and the *Planning for Bush Fire Protection 2019* guide.

Stage 1 will incorporate the following measures:

- A 10 metres Asset Protection Zone (APZ) around the facility including the perimeter fence and fire trail.
- A further 20 metres of pasture grass zone to the outside of the fire trail will be slashed to keep vegetation low.
- The future green space zone will be maintained to minimise fire risks.
- Within the Inner Protection Area:
- Low fuel condition (<100 mm in length) grass will be incorporated within the solar farm (native grass) and the Treatment plant (turf grass). Both species will be regularly mown or slashed.
- Tree canopy cover <15% at maturity, will not touch or overhang buildings and canopies separated by 2-5 m.
- Species selection will focus on smooth barked and low flammability trees and shrubs.

Shrubs will not be directly placed under trees and form <10% ground cover.

The landscape will be maintained and monitored to minimise risks as part of the site's Landscape Management Plan.

Figure 74 Asset Protection Zone

9.3 Flooding

For the permanent USC AWRC site works, detailed hydrological and hydraulic modelling was undertaken for the EIS. Both the hydrology and hydraulic baseline models were validated against the Penrith City Council's reference flood study (WorleyParsons 2015) showing agreement.

The hydraulic model was updated with the topographical changes resulting from the proposed development to assess the impacts on baseline flooding conditions. Alignment of this study in response to a series of NSW guidelines including *Floodplain Development Manual, Floodplain Risk Management Guidelines,* and *Standard Secretary's Environmental Assessment Requirements* (SEARs)

The site area is located on a topographically high point between Wianamatta South Creek and Kemps Creek above the Flood Planning Level (FPL). This means that the built surface of the USC AWRC will remain free from inundation. While the AWRC operational area is above the 1% AEP, the Green Space area is below the 1% AEP and susceptible to flooding. A full flooding assessment will be undertaken once the Green Space Masterplan is developed to meet the requirements of MCoA E27 and an associated UDLP will be submitted to DPE.

The Project would not cause any redirection of flow, significant changes in flow velocities, flood levels, hazards, and hydraulic categories. The creek edge restoration includes the reshaping of sloping embankments to minimise erosion. This change will increase the capacity of the creek during flooding events.. The vegetation proposed for installation within the Green Space at the AWRC is minor in nature from the existing environment. Due to this there is no net impact to localised flooding within the area. In summary, no significant adverse effect is expected.

The AWRC development will not impact on the local flooding behaviour, or impede access to existing road networks, it is not expected to have any impacts on the existing community emergency management arrangements for flooding.

10 Landscape Communities

10.1 Cumberland Plain

Native Vegetation maps of the *Cumberland Plain Western Sydney Interpretation Guidelines* (National Parks and Wildlife Service 2002) indicate the site has the potential to contribute to two Cumberland Plain Communities, Alluvial Woodlands along the creek and Riparian Forest within the parkland precinct. Alluvial Woodlands occur exclusively along, or near minor watercourses draining soils derived from Wianamatta Shale. It is the most common community found on soils of recent alluvial deposition and found on the floodplains the Hawkesbury-Nepean River, and grades into Riparian Forest on the terraces immediately adjacent to the river.

Alluvial Woodland

- The two most common species are *Eucalyptus amplifolia* and *E. tereticornis,* with *Angophora floribunda* occurring less frequently.
- Small trees stratum including *Acacia parramattensis subsp. parramattensis,* and less frequently *Casuarina glauca,* and *Angophora floribunda* and *Melaleuca linariifolia.*
- Shrub stratum is often sparse and dominated by *Bursaria spinosa.*
- Dense ground cover with grasses such as *Oplismenus aemulus, Microlaena stipoides var. stipoides, Entolasia marginata* and *Echinopogon ovatus.*
- Herb species including *Solanum prinophyllum, Pratia purpurascens* and *Commelina cyanea.*

Riparian Forest

- Tree species include *Eucalyptus botryoides, E. elata, Angophora subvelutina* and *A. floribunda.*
- Small tree stratum contains species of *Acacia,* such as *A. binervia, A. floribunda* and A. mearnsii, Ground stratum include *Oplismenus aemulus, Pteridium esculentum, Microlaena stipoides var. stipoides, Stipa ramosissima* and *Echinopogon ovatu.*

10.2 Landscape Character Zones

The landscape design aligns key principles to create a Place that is integrated and nuanced within restored Cumberland Plain Woodland environs. It will be a Place with amenity and a diverse landscape for wildlife habitats and for people to improve health and wellbeing. The AWRC will feature five landscape character zones and will be restored and planted to contribute to the overall Cumberland Plain community.

Riparian corridor: the restoration of the Wianamatta South Creek corridor and Kemps Creek (Stage 2) to minimise erosion and establish an ecological corridor to create habitats for fish and marine species. *Alluvial Woodland community.*

Billabongs: restoration and creation of new environments to support the retention of water on site with wetland ecosystem planting. *Alluvial Woodland community.*

Linking landscape: connecting corridor vegetation between Wianamatta-South Creek. *Riparian Forest community.*

Operational Zone Landscape: Cumberland Plain tree, bio detention and grass species. *Riparian Forest community.*

Refer Figure 75: Landscape Character Zones - Stage 1.

Figure 75 Landscape Character Zones - Stage 1

10.3 Establishment of the Cumberland Plain Woodland Community

The Cumberland Plain Woodland community will require staged and ongoing actions to ensure establishment with the following supporting actions:

- Relocating individual plants of threatened species
- Soil testing to inform Remediation Action Plan
- Identifying sources for collecting seeds of provenance to germinate for use at the AWRC
- Translocating topsoil containing seeds of threatened species if encountered.
- Controlling noxious weeds before planting and as they arise
- Replanting as required to establish community.
- Controlling pest animal species
- Training staff in harm minimisation practices around vegetation
- Regular monitoring through ecological assessment and procedures.

The Vegetation Management Plan includes additional information on specific Cumberland Plain plant communities that will be installed as part of Stage 1.

Figure 76 Wianamatta South Creek to be restored with Cumberland Swamp Oak Riparian Forest community

Figure 77 Existing landscape at AWRC Site

Figure 78 Wianamatta South Creek at AWRC Site

Figure 79 Aerial view of billabongs at AWRC Site

10.4 Habitat Creation for Biodiversity

Urban biodiversity for Stage 1 works and how it supports future development of the wider site will be achieved through the following methods as identified in **Table 9 Habitat Creation:**

HABITAT CREATION FOR AWRC		
	Description	**Outcome**
Habitat Area	Introduction of new habitat within existing pasture landscape.	*Proposed areas of new habitat:* Operational Zone • Native grass: 1,750 m^2 • Tree planting/planted beds: 3,100 m^2 Riparian zone: 7,100 m^2
Habitat Variety	Creation of a diversity of landscape character treatments, species selection, shape and form.	Landscape Character zones across site: • Operational Zone, • Grassland (existing pasture and future green space), • Riparian corridor including billabong, • Natural succession and preservation of natural vegetation
Habitat Quality	Protection of creek corridors through revegetation and creek line restoration utilising seeds of provenance for plant stock and linking to the ecosystems associated with the Cumberland Plain riparian ecosystems.	• Improving habitat quality to support micro fauna, and plant species variety in multiple stratums.

HABITAT CREATION FOR AWRC		
Habitat Quality	Minimise light and noise pollution from Treatment Plant	• Structured variety encompassing trees, shrubs, fallen branches, leaf litter, groundcover to ensure a greater diversity of wildlife species.
Habitat patch/corridor size and shape	Linking ecological habitat and landscape communities to enable migration, colonisation and interbreeding of plants, animals and fungi.	New enhanced continuous corridors: • Stage 1 will create restored riparian corridor of 7,100 m^2
Habitat Connectivity	Linking Kemps Creek and Wianamatta South Creek/billabong habitat corridors to broader green networks outside of the site. Future green space.	Linear linking corridors restored:1000 lin.metres @30 metres wide Wianamatta South Creek: 1,300 lin. metres @ 40m. wide Kemps Creek (Stage 2):790 lin. metres @ 40m wide

10.5 Native species and seeds of Provenance

The AWRC site is hot, dry, and subject to intermittent flooding. Plants in Western Sydney have grown and adapted to the conditions and through preserving local provenance, we will protect biodiversity by maintaining the genetic integrity of species. Seed collection from existing trees to be demolished will occur and utilised to grow plant stock to be used in establishing the new landscape.

The AWRC will utilise planting of provenance for trees, shrubs, and groundcover to ensure seed stock is grown from healthy plants of the local genetic variation and in similar environmental conditions. These local species have adapted to the local climate and soil conditions and are therefore more likely to lead to a successful self-perpetuating plant community.

Growing from seed will require additional lead times and this will be factored into the procurement of plant material for the site.

Native grasses suitable for cultural burning will be used outside of the fire Inner Protection Zone. All grass areas will require mowing to be retained at a maximum height of 100mm.

Figure 80 Seeds of Provenance

Figure 81 Seeds of Provenance

Figure 82 Seeds of Provenance

10.6 Cumberland Plain Woodland species

The following photos show some of the flora species that characterise the Cumberland Plain Woodland ecological community. The species will be used as a guide in conjunction with seed availability and the recommended species from the Vegetation Management Plan for the creek and billabong restoration and revegetation. The Plant Community Types (PCTs) of the Cumberland Plain Woodland existing on the project site include:

- PCT 835 Forest Red Gum
- PCT 849 Grey Box
- PCT 1800 Swamp Oak Riparian Forest

Cumberland Plain Shale Woodlands Key Species

Figure 83 Cumberland Plain Woodland Key Species

Cumberland Plain Shale Woodlands Key Species

Biodetention and Riparian Species

Figure 84 Cumberland Plain Woodland Key Species

11.1 South Creek and Kemps Creek

The restoration and stabilisation of Wianamatta South Creek will be guided by the Vegetation Management Plan (VMP). The aim is to slow water speed and stabilise the bed and banks of the creek line, control and reduce weed species and to establish ecological communities through a combination of bush regeneration and native species planting.

To minimise disturbance to Country, earthworks and grading will be targeted to only deeply eroded embankments to allow the establishment of new vegetation.

The overall objective of the VMP is to emulate the native vegetation communities of the area and ensure a naturalised stable creek. Project staging will allow the creek line implementation to occur over several years to reduce risks associated with flood, drought, and pestilence. The maintenance period normally associated with creek restoration is up to 5 years.

Staging will assist in achieving the following:

- Allow regeneration of *Casuarina sp.* Adjoining exiting mature trees currently along the creek bank.
- A vegetated buffer to protect the environmental integrity of the core riparian zone from weed invasion, micro-climate changes, litter, trampling and pollution.
- Implementation of viable native riparian vegetation in conjunction with the natural functions of its aquatic and terrestrial qualities to provide a continuous, vegetated riparian corridor for the movement of flora and fauna species.
- To recognise that the creek is located within an urban context and will provide environmental benefits, valuable amenity, character, landscape, and open space benefits to the people who live, work and play in the local area.
- Restoration of adjoining billabongs that are part of the localised natural system.

Figure 85 Existing downstream creek condition

Figure 86 Casuarina sp. on eroded creek

Figure 87 Location of billabong to be restored

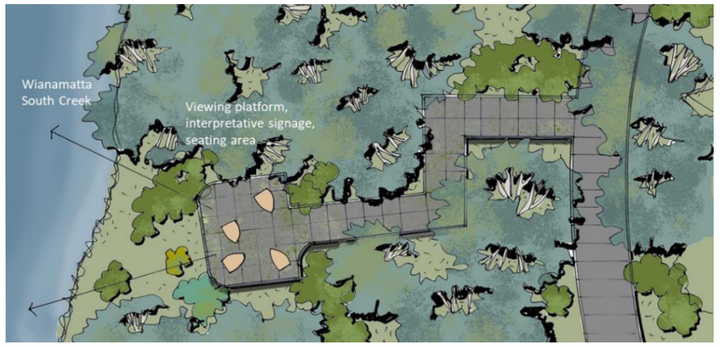

Figure 88 Wianamatta South Creek edge

Figure 89 Wianamatta South Creek edge

11.2 Access and Circulation

The development of a road hierarchy to service the treatment facility, access and circulation for vehicles and pedestrians have been aligned and co-ordinated to allow movement through the various areas of the site.

Earthworks and site material

The AWRC promotes an environmentally sustainable development with a focus on waste avoidance and resource recovery. There are environmental and economic benefits by minimising the need for imported fill material and reusing remediated site soil in the new landscape and minimising the need for transport to dispose waste soils.

Site soil testing will guide amelioration measures for insitu and harvested soil from the Operational zone earthworks. Remediation of site won soil for reuse in the establishment of the proposed landscape will also support the local endemic species that are proposed for the site.

For future stages, suitable material from the biodigesters could be utilised within the green space in the establishment of the proposed landscape.

Where possible, the site has been designed to the existing topography to avoid the necessity of cut and fill. An existing flood level bench is being used for the Operational and Administration Centre zone and other site areas not required to be above the 1:100-year flood level such as the solar park and fire trail have been sited on existing contour levels.

Operational Site layout

The Operational Site layout has been refined to co locate facilities to meet operational requirements and to allow for the incorporation of the ultimate capacity. Stage 1 road layout is complimentary to the development of the Stage 2 with very little redundancy in road pavements. Digestors and potential Waste to Energy facilities are located to the east to allow interface with future circular economy initiatives. The layout has focused on minimising the interaction between heavy vehicles with visitors and maintaining secure and safe environs. Internal access paths for pedestrians are localised to key building entry points.

Vehicle Access

Access and circulation elements include:

- Secured site entry.
- Road hierarchy separating heavy vehicles from cars comprising of a loop for truck movements with narrower access roads for general circulation.
- Catering for operations associated with regular deliveries with separated service road link to the chemical dosing plant and digesters.
- Staff and visitors to the Administration Centre can access via the internal road or the proposed green space road through secure entry points. The access road is a direct link along the southern boundary from the entry point.
- The Administration Centre is located to service the facility and to take advantage of the outlook to the proposed green space.
- Staff and visitors parking area with twenty-three (23) spaces and two (2) accessible bays
- Solar Park gravel service roads.
- Perimeter gravel fire trail within Asset Protection Zone.
- Clear wayfinding signage will be incorporated within the facility layout.
- Future entry to Circular Economy Site has been considered for Stage 2 to allow the development of a suitable road network to suit the scale and type of operations that may occur, including a perimeter fire trail.

Pedestrian Access and Circulation

Access and circulation elements include:

- Pedestrian pathways linking the Administration Centre to Treatment Plant
- Footpaths and hardstand areas within Treatment Plant to allow small groups to safety walk within facility.
- The fire trail offers a pedestrian path around the perimeter of the site
- Access links to restored Billabongs and Wianamatta South Creek.

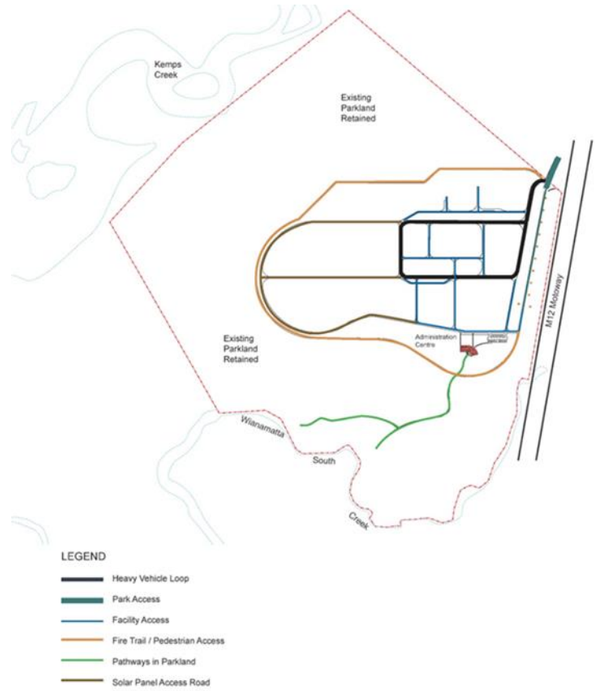

Figure 90 Access and circulation Stage 1 Operational site

Figure 91 Stage 1 Plan

Figure 92 Render of USC AWRC Stage 1 looking south

Figure 93 Render of USC AWRC Stage 1 looking north

11.3 Site Plan and Built Form Functional Layout

The operating facility is designed to meet compliance and Sydney Water criteria for the development of a wastewater treatment plant. The built form, materials, interrelations of functions is prescribed within the Sydney Water design criteria.

The site layout has been developed to meet urban design principles including:

- Heritage interpretation through developing the road geometry to reflect the Fleurs radar field cross arrays.
- Efficiency of movement to reduce road pavements by creating a one-way loop system.
- Minimising pavement areas between buildings and under pipework to achieve permeable surfaces.
- Creation of swales for the retention of runoff within the site.

External treatments

The following table captures the built form within the Stage1 works and the proposed external treatments. A cladding review proposes non-standard Sydney Water colours to create a site-specific facility that reflects Country and assists in the mitigation of heat absorption and therefore the island effect.

BASIX identifies *"A roof with a lower solar absorptance will reflect more heat than a roof with a higher solar absorptance and will keep the roof space and dwelling cooler on a hot day. While a lighter colour roof will have higher heat reflection (or lower solar absorptance) than a darker roof, it will not necessarily produce more glare or light reflection. It is possible to get a roof with low solar absorptance AND low light reflection"*.

Table 10 AWRC Building Schedule

	Building	Approx. Footprint (L x W)	Approx. Height (H) (m)	Approx. No. Personnel Doors	Approx. No. Roller Doors	External Roof Finish	External Wall Finish	Comments	Treatment process flow
1	**Administration**	42 x 13	4	4 No Single external	0	Colourbond	Brick		N/A
2	**Workshop**	25 x 17	7	2	2	Colourbond	Colourbond		N/A
3	**Main HV Switchroom (Including Inlet Works)**	35 x 14	5	7	0	Colourbond	Painted blockwork		1 (Water Stream)
4	**Digester Switchroom**	25 x 10	5	4	0	Colourbond	Precast Concrete		2 (Solids Stream)
5	**Bioreactor Switchroom**	26 x 12	5	4	0	Colourbond	Precast Concrete		2 (Water Stream)
6	**AWTP Switchroom**	23 x 12	5	4	0	Colourbond	Precast Concrete		5 (Water Stream)
7	**TW/Brine Switchroom**	30 x 14	7	6	0	Colourbond	Precast Concrete		7 (Water Stream)
8	**Dewatering & Outloading Building**	17 x 16	18	4	3	Colourbond	Colourbond		3 (Solids Stream)
9	**Thickening Poly System Carport**	9 x 12	6	0	0	Colourbond	Colourbond	Wall sheet to finish 3m above ground level	1 (Solids Stream)
10	**Blower Building**	17 x 29	9	1	1	Colourbond	Precast Concrete	~10 No 1.8x1.8 louvre openings – ~5 per side	3 (Water Stream)
11	**Chemical Dosing Carport**	64 x 16	9	0	0	Colourbond	Colourbond	Wall sheet to finish 3m above ground level	6 (Water Stream)
12	**AWTP/RO Building**	51 x 15	8	2	5	Colourbond	Colourbond	10 No 1.5x1.5 louvre openings – 5 per side	4 (Water Stream)
13	**Treated Water/Brine Pump Station**	44 x 14	9	12	1	Colourbond	Colourbond	~5 No 3.0x2.6 louvre openings – ~2 per side	8 (Water Stream)

Thermal Values

Figure 46 Colourbond steel core colours with SA and SRI indexes identifies the following measurements.

SA = Solar Absorptance

Solar Absorptance (SA) is a measure of how much of the sun's heat that a material absorbs. Choosing a colour with a lower SA is a cooler option and may help to meet building regulations such as NCC or BASIX.

SRI = Solar Reflectance Index

Solar Reflectance Index (SRI) provides a guide of a surface's ability to reject solar heat on the basis of the relative temperature of surfaces, with respect to a reference black (SRI=0) and white surface (SRI=100). The SRI value of a surface is calculated from its solar reflectance and thermal emittance. These are nominal values based on new product and determined in accordance with ASTM E1980-11.

Preliminary concepts

Preliminary colour concepts to improve solar absorption and to reduce heat loading are indicated in Figure 47 Preliminary design studies for cladding to reduce solar absorptive criteria.

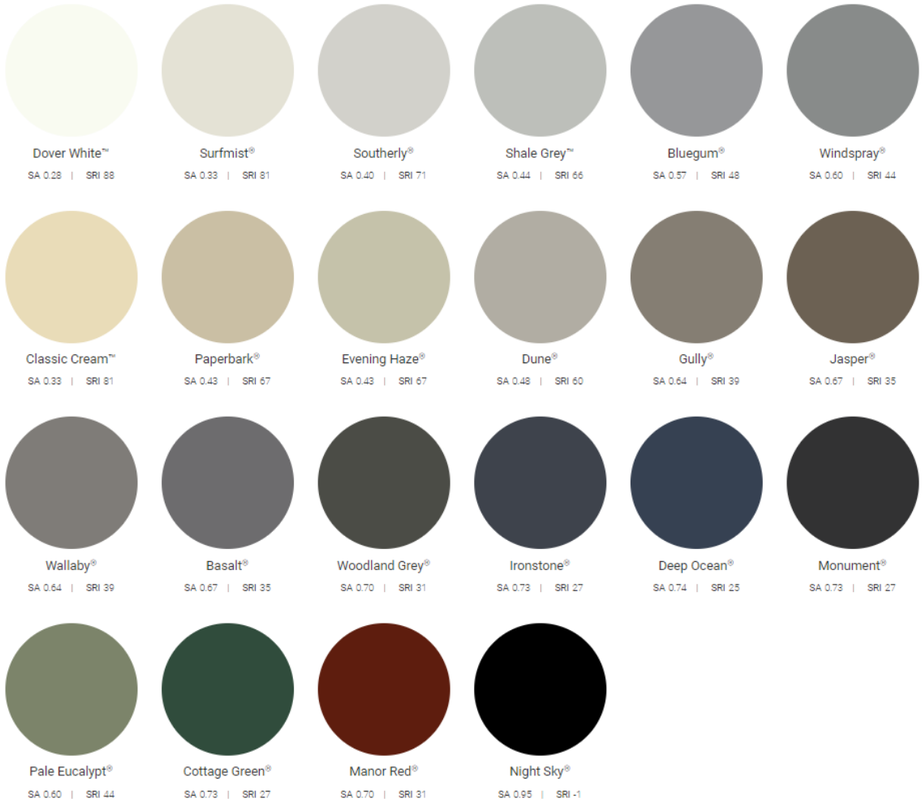

Figure 94 Colourbond steel Core Colours

Figure 95 Biosolids Outloading Building Colour Markup

Figure 96 AWTP RO Building Colour Markup

Figure 97 Preliminary design studies for cladding on Chemical Storage building to reduce solar absorptive criteria.

Figure 98 Preliminary design studies for cladding on Sludge Thickening building to reduce solar absorptive criteria.

Figure 99 Preliminary design studies for cladding on the Workshop building to reduce solar absorptive criteria.

Figure 100 Preliminary design studies for cladding on the Transfer Pump Station to reduce solar absorptive criteria.

Figure 101 Colourbond colours tested

11.4 Administration building architectural design approach

A master planning approach has been adopted for the administration building and immediate surrounds. Works delivered as part of the Stage 1 AWRC will include the administration building. The primary purpose of this building is to support the functional requirements of the operational wastewater treatment plant site. There is provision for future works in the precinct including a potential visitor centre and space for additional facilities.

The key concept underpinning the architectural design is the idea of the connection between water, land, and sky, with the main building elements – roof, walls and ground plane – responding to these ideas in a way that encourages building users to consider their relationship to the environment, and the ways in which we interact with, and are part of, the complex ecosystem in which we all exist.

Water

Water is vital to the site, the role of Wianamatta, and to the processes that will take place on the site in the future given its function as a water recycling centre. The facilities buildings (Stage 1 and future) are in a way the architectural manifestation of these processes, and there are key aspects of these that should be celebrated, rather than hidden or screened, to educate visitors on the innovative ways our water resources can be conserved.

The Stage 1 Administration/Operations Building and future Visitors Centre will provide an opportunity to further explore our relationship with water and the role of Wianamatta, and the importance of water by placing it front and centre in the design. The future Visitors Centre pavilion is defined by its circular roof form which provides shelter and acts as a rain capture device. At the centre of the roof is an oculus which allows rainfall to flow into the centre of the pavilion and fall through the centre, creating a feature where rainfall can also be captured and used for irrigation purposes. This is an architectural gesture that is both functional and symbolic of the notion of water being central to life.

Land

The materiality of the walls and ground plane elements should resonate and connect buildings with the landscape. Brick / masonry wall finishes are of the earth and highly sustainable, provide a solid perimeter to the Administration/Operations Building and function as an acoustic buffer to the nearby M12 Motorway. These walls take on more of a free form in the future Visitors Centre Pavilion, framing key views of the landscape and defining a series of informal spaces inside and outside the pavilion for sitting, standing, display and protection from the elements. The solidity of the brick / masonry walls to the perimeter of the Administration/Operations Building is countered by the highly glazed north and west facing curved façade, which wraps the central courtyard and permits views of the land and landscape beyond. Roof overhangs and operable screening devices are used to control sunlight penetration to these areas.

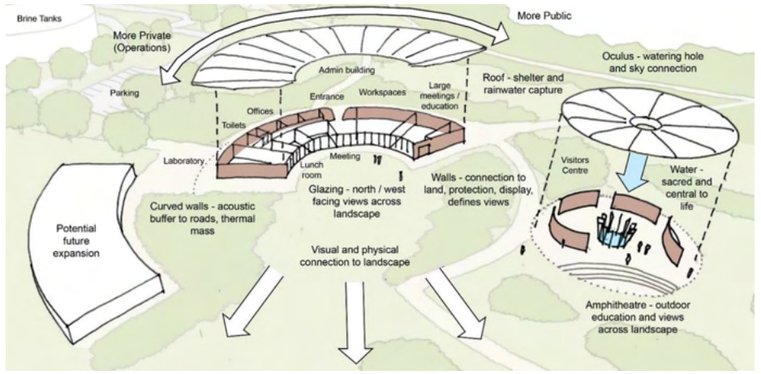

Figure 102 Early sketch showing architectural design concept for the Administration/Operations Building and Visitors Centre Pavilion

Sky

The potential future Visitors Centre oculus could connect visitors directly to the sky, by allowing light to penetrate the centre of the pavilion, and even sit directly beneath the sky. The lack of perimeter columns gives the roof a floating quality and provides unobstructed multi-directional views towards the landscape and horizon.

The roof form also has obvious connotations with the heritage parabolic antennae elsewhere on the site.

Figure 103 Administration building west elevation

The predominantly glazed façade provides views towards the landscape and is protected from unwanted solar penetration in summer by overhangs and external sun shading devices.

Figure 104 Administration building east elevation

Site layout

The Administration Building is 'J' shaped in plan, with the public facing areas and workspaces being within the crescent shaped portion of the plan, and the laboratory, toilets and 'back of house' areas within the rectilinear part. The crescent plan form of the Administration/Operations Building allows it to curve towards the landscape, gently embracing it, and offering views towards it with its primarily north and west facing curved glazed façade.

Biophilic design

Biophilic design improves health and wellbeing in the Built Environment.

Biophilic design can reduce stress, enhance creativity and clarity of thought, improve our well-being and expedite healing.

A Visual Connection with Nature is a view to elements of nature, living systems and natural processes.

14 Patterns of Biophilic Design Terrapin Bright Green

At the AWRC, operational staff will be based within the administration centre. The floor plans where staff are located have been designed to orient to view the windows on the western side of the building to take advantage of the green space.

Proposals to restore the landscape and natural systems will increase nature sounds to site. Birds, frogs and other fauna will continue and increase within the sites landscape. Additional tree canopy will add nature based aural sounds reflecting climate.

Connection to natural systems will include Wianamatta South Creek and the seasonal variation in the grassland and changes in the proposed plants from flowering to spring growth.

Prospect is an unimpeded view over a distance for surveillance and planning.

14 Patterns of Biophilic Design Terrapin Bright Green

Adaptability

The layout and siting of the building is adaptable for future expansion to the north and southwest for visitor and educational facilities. A layout of the administration centre precinct is provided in Figure 105 with future opportunities for expansion including a Visitors Centre Pavilion, canopies, and shade structures to facilitate outdoor learning activities, and amenities. The site plan allows for the extension of the carpark and future expansion of the Administration/Operations Building to the north if required.

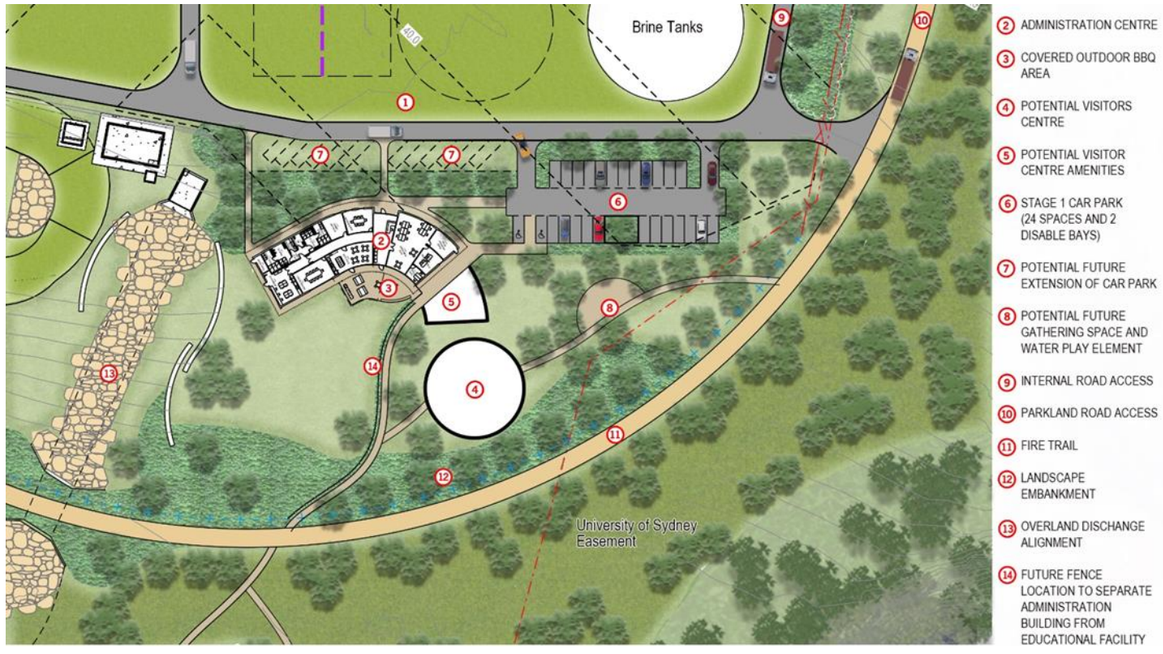

Figure 105 Administration Centre precinct – Future opportunities

11.5 Crime Prevention Through Environmental Design

Crime Prevention through Environmental Design (CPTED) is a crime prevention strategy that focuses on the planning, design and structure of cities and neighbourhoods. It reduces opportunities for crime by using design and place management principles that reduce the likelihood of essential crime ingredients (law, offender, victim or target, opportunity) from intersecting in time and space (NSW Police Force 2001).

The four key CPTED strategies have been incorporated into the design of the AWRC site. These are territorial re-enforcement, surveillance, access control and space/activity management. All CPTED strategies aim to create the perception or reality of capable guardianship.

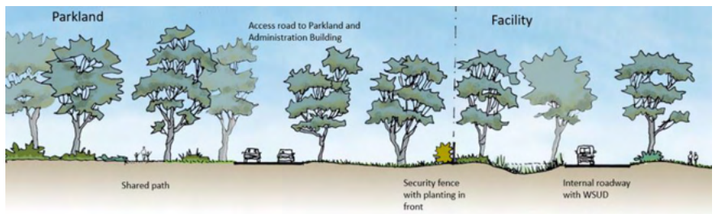

Figure 106 Entry drive interface with the facility showing access control/separation of Operational area from green space

Territorial Reinforcement

The proposed management and ownership of the AWRC green space is yet to be determined but community use will send positive signals as the green space feels owned and cared and is more likely to be used, enjoyed and revisited. As the restoration of the Wianamatta South Creek environs and future trails evolve connecting to the broader open space network, visitors will provide effective supervision through being spatially 'connected' to the site.

Surveillance

A well supervised place ensures people feel safe in public areas where they can see and interact with others. Natural surveillance is achieved when place users can see and be seen by others. This is achieved through site planning layouts and design, landscape, and lighting.

At the AWRC, CPTED principles have been used to inform the urban design. The Operations and Administration Centre precinct is fenced from the green space limiting access to operators and approved visitors. The road layout provides passing trucks and vehicles as a surveillance asset. The landscape design considers clear lines of sight and surveillance at the vehicle entry point and around the Administration Centre.

A CCTV monitoring system is in place at the entry.

Access Control

Well-designed access control treatments will restrict, channel and encourage people and vehicles into, out of and around the AWRC. Managed wayfinding, desire-lines and formal/informal routes are important crime prevention considerations. At the AWRC, access control can has been achieved by using physical and symbolic barriers that direct user groups into particular areas, separating operational from educational/recreational uses. A combination of natural access control includes the use of landforms, existing creeks, design measures including building configurations, pathways, landscaping and fencing.

Space/Activity Management

In the development of the AWRC, space/activity management strategies will be an important way to develop and maintain natural community control. Space management involves the formal supervision, control and care of the development. The proposed future green space needs to be effectively used and maintained to maximise community safety. An activation strategy for the site should be developed and aligned with future implementation strategies.

Lighting

External lighting within the Operational Zone consists of pole-mounted street lighting and lights on buildings to deter people from vandalizing assets. The lighting on the AWRC site access road is designed to meet the Sydney Water Electrical Specification CPDMS0022 Rev 12 E4.3.3, with a minimum horizontal illuminance of 3 lux around plant and storage areas and minimum of horizontal illuminance of 1 lux and minimum vertical illuminance of 3 lux in less important perimeter areas. The average horizontal illuminance along the access road is 5 lux and floodlights are cut-off type to minimise glare and unwanted spill into the surrounding landscape. Exterior vandal resistant light fittings will also be installed over external doors. This will minimise impacts on the airport operations.

Furthermore, the overall lighting plan for Stage 1 is designed to meet the Infrastructure Sustainability Council Rating: Achieve Env-5 Light Pollution Level 2 which requires no more than 1 horizontal lux level over the project boundary and 1% upward light ratio. The lighting arrangement is designed in such a way as to not be mistaken as airport lighting to reduce the potential impact on airport operations. A security fence separates the operational site from the broader future green space. Entry to the facility is controlled and only operational staff will be on site at night. A Greenspace Masterplan is being developed and Sydney Water will confirm the future level of access. CPTED principles will be incorporated into the detailed design of the Greenspace.

12 AWRC Stormwater Management Measures

12.1 Stormwater Management

Qualitative Assessment

A qualitative assessment of potential flood impacts has been undertaken based on the available flood studies and modelling results. Figure 107 presents the existing case 1% Annual Exceedance Probability (AEP) flood extent (intersecting with the existing ground surface) overlaid on the existing case and design case ground contours at the AWRC site. The 1% AEP flood level varies from 38.0m AHD at the northern end of the site to 38.9m AHD at the southern end of the site.

At the western side of the site, the toe of the proposed filled embankment is situated outside the existing 1% AEP flood extent. Hence, there is no interaction of the filled embankment with the existing case 1% AEP flood and therefore no flooding impacts are expected.

There is a proposed drainage channel for the AWRC local outfall and stormwater discharge from the AWRC site stormwater detention basin, which discharges to Wianamatta South Creek. The channel would be excavated into the existing terrain. The channel will not pose an obstruction to flood flows in Wianamatta South Creek and no significant or widescale flooding impacts are expected. There may be minor and localised impacts in small flood events near the channel outlet to Wianamatta South Creek.

The Probable Maximum Flood (PMF) event flood level varies from 39.3m Australian Height datum (AHD) at the northern end of the site to 40.2m AHD at the southern end of the site. The PMF would inundate small portions of the filled areas of the AWRC site on the eastern and western sides of the site, refer to Figure 107. The EIS amended flood impact assessment (Sydney Water 2022) for the USC AWRC reported minor flood impacts in the PMF event of up to 0.1m on the AWRC site and up to 0.05m outside the AWRC site, refer to Figure 107. The detailed design has been further developed such that there is a reduced volume of filling and reduced encroachment of the AWRC filled areas on the PMF extent. Figure 108 compares the areas of encroachment into the PMF extent by the current earthworks design and by the reference design, showing that the area of encroachment by the Stage 1 design (blue hatched areas) is minor and significantly less than in the reference design (red hatched areas).

Of particular note is that the red hatched areas of the reference design at the northern end of the site jut out laterally (eastward and westward) into the floodplains of Wianamatta South Creek and Kemps Creek, which would result in a greater impedance of flood flows in the PMF event, compared to the smaller impedance of the blue hatched areas for the current design. The red hatched areas for the reference design are also significantly larger at the northern end of the site which would result in greater loss of flood storage. Hence, it is expected that the potential flood impacts by the AWRC on the PMF would be less with the current design than those reported for the reference design in the EIS amended flood impact assessment (Sydney Water 2022).

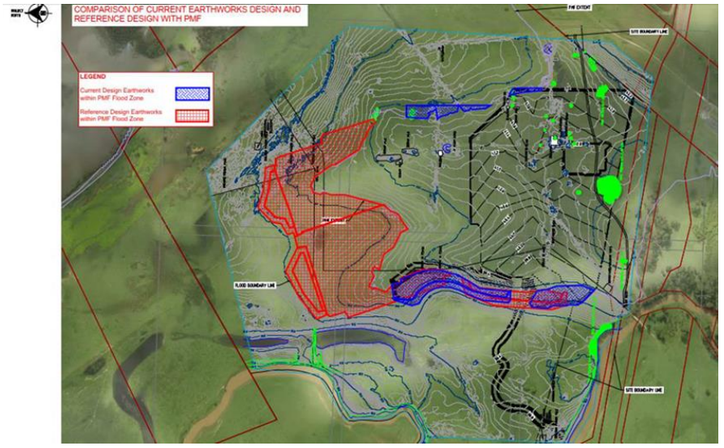

Figure 107 Flood extent line for pre-development case 1% AEP event with existing and developed case ground surface contours GHD Jacobs

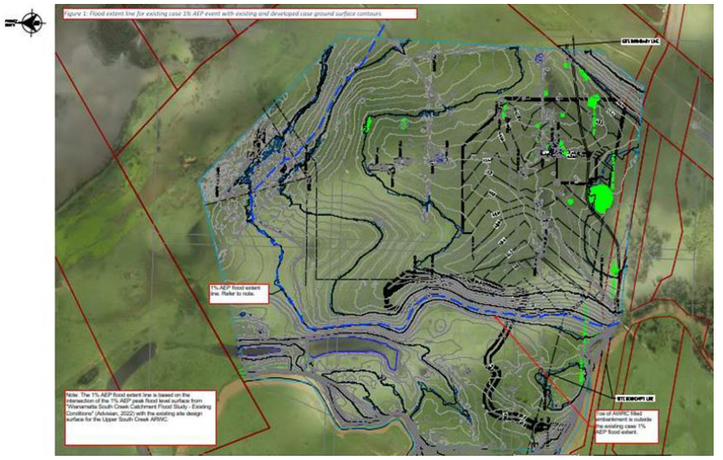

Figure 108 Comparison of encroachment into the PMF extent by the current earthworks design and by the reference GHD Jacobs

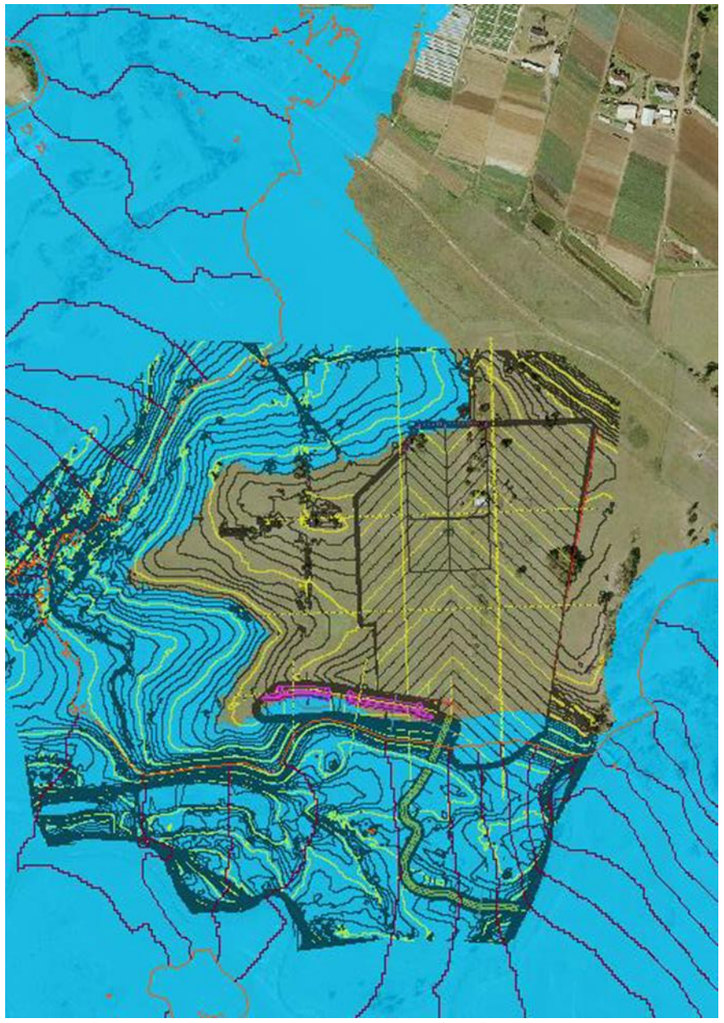

Figure 109 Existing case PMF event extent and inundation of AWRC site

12.2 Water Sensitive Urban Design

Sydney Water is telling a story about water and its importance to how we live. The design integrates stormwater management and water reuse and ongoing management of the site.

The Green Space Masterplan demonstrates an integrated stormwater management system that includes water quality protection, stormwater retention and detention and the creation of public open space and habitats. The AWRC will help protect the environment by improving the quality of stormwater runoff from the sites' catchment to help achieve local water quality and health objectives.

Our design includes the following Stage 1 WSUD initiatives:

- Slowing of stormwater runoff from hardstand, road pavements and the fire trail by runoff initially draining to grass swales within the landscape to recharge soil moisture.
- Most of the treatment Plant zone will be grassed and therefore permeable to ensure groundwater remains charged.
- The removal of contaminants and sedimentation from stormwater runoff through a bioretention basin. The basin will attenuate peak runoff, remove stormwater pollutants and plant with species suitable for intermittent inundation and dry periods The bioretention basin is within a larger onsite detention system.
- The onsite detention will store the polished water from the bioretention basin and slowly release to the system and reduce peak runoff. The overflow spill way will disperse water across the landscape.
- New planting will retain water in the landscape for cooling and greening and contribute to improved microclimates across the site.
- To slow reduce erosion and pressure on the creek environments, the creek edge will be restored with suitable plant communities.
- The restoration and revegetation along the creeks will improve the waterways and natural systems.
- The restoration of the billabong will retain and filter water on the site.

The above WSUD elements have been incorporated into the Green Space Masterplan to ensure they are fully integrated with the landscape design, amenity and aesthetic provisions.

Beyond the Stage 1 upgrades, there is an opportunity for expanding the billabong towards the treatment plant facility to include deep water, wetland filtration and biofiltration areas (ephemeral and dry). Onsite detention overflow can be directed to the billabong to ensure existing surface flows are maintained. These systems can be incorporated into the educational experience of the site.

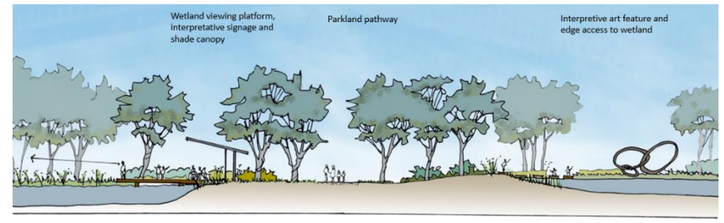

Figure 110 Section through billabong/artificial wetlands (future green space)

Figure 111 Sydney Park precedent wetlands play

Figure 112 Sydney Park wetlands

13 Visual Impacts, Lighting and Security

13.1 Visual Impact of AWRC site

Minimising visual impacts

Landscape and visual impacts are important considerations for the development of the AWRC. Our design will sensitively enhance landscape and visual outcomes and reduce physical and visual impacts. The site is at a low point within two creeks and on a relatively flat open flood plain. The AWRC is a new development within a relatively even floodplain and will be slightly visible from various catchments (see Figure 48).

The proposed elevated M12 Motorway will dominate the southern edge. Housing to the northwest is separated by open green space and ecological zones. The sensitive receivers are predominately to the east, i.e., rural residential dwellings on the hillsides at Mount Vernon and Kemps Creek.

Our approach to landscape and visual impacts includes:

- Minimising the degree of visual impact (i.e., the proposed operational facility does not contrast with the landscape character set by the parkland)
- Minimising visibility of the AWRC.
- Providing mitigation measures where visibility is inevitable.

Very few people will view the AWRC up close after Stage 1 construction. A palisade fence is proposed to the entry road frontage that will be planted with shrubs in keeping with the Asset Protection Zone requirements.

The built form of the site will adjoin a large green space to the west and the proposed M12 Motorway at an elevated position to the south which will form the major visual termination and receiver of visual impacts. The M12 Motorway, however, can celebrate the location of the AWRC through the careful integration of the tanks as visual markers. The scale and arrangement of the facility will be within a proposed landscape setting at the north, west and eastern edges. When mature, the planting will screen the facility from sensitive receivers.

Mitigation strategies with recommended principles or treatments for managing the identified landscape character and visual impacts are embedded in the design and be further investigated in the Green Space Master Plan development to reinforce urban design outcomes.

Preliminary ideas include artwork murals for the brine tanks (Stage 2) which are visible from the M12 Motorway and to clad or paint buildings, tanks and other elements in colours in keeping with the proposed landscape.

Landscaping of the AWRC will be implemented to achieve outcomes guided by the urban design principles.

As the AWRC is located within eight kilometres of the future international airport, the landscaping for the AWRC will factor in airport safeguarding approaches, including those in relation to wildlife attraction.

There will be operational and maintenance constraints associated with the AWRC which may place revegetation limitations on some areas.

Key Mitigation Measures

The urban design approach for the AWRC to manage potential visual and landscape impacts will be considered in the development of the future Green Space Masterplan. Stage 1 incorporates appropriate architectural treatments and the development of a landscape within an ecological and heritage context.

The AWRC is in an area that is expected to change over time to industrial and employment land uses and adjoining M12 Motorway. This change in surrounding visual environment will likely reduce the significance of the impact of the AWRC over time. In addition, a landscape-led approach to urban design provides opportunities to positively enhance the visual impact of the AWRC.

Once completed, the AWRC will introduce large buildings and infrastructure into what is currently a rural setting. The visual impact will be high from some nearby viewpoints such as the M12 but there will also be some nearby locations from which the AWRC visual impacts will be low. Most close views will be from users of the M12 Motorway and the minority of receptors identified as high impact will have low impacts due to the intervening developments as the result of the Western Sydney Aerotropolis Plan.

Our approach to landscape and visual impacts includes:

- Minimising the degree of visual impact (i.e., the proposed facility does not contrast with the landscape character set by the parkland)
- Minimising visibility of the proposal
- Providing mitigation measures where visibility is inevitable.
- A palisade fence is proposed to the green space road frontage that will be planted with shrubs in keeping with the Bushfire Risk Asset Protection Zone requirements.
- The built form of the site will adjoin a large green space to the west.
- The M12 Motorway at an elevated position to the southeast will form the major visual termination and receiver of visual impacts. The M12 Motorway, however, can celebrate the location of the AWRC through the careful integration of the tanks as visual markers.
- The scale and arrangement of the facility within a landscape setting to the north, west and eastern edges will assist in the screening of the facility from sensitive receivers.
- Mitigation includes the strategic placement of trees in staggered clusters to screen the facility.
- Ideas that can be further investigated with the community include artwork murals for the brine tanks which are visible from the M12 Motorway and colour other elements in colours in keeping with the proposed landscape.

The semi-rural, gently undulating topography surrounding the site will permit the AWRC to be observed as filtered distant views from the adjoining rural residential properties within the visual catchment. Clusters of existing trees along the waterways and in the recreational and environmental zones adjoining the site contribute to the filtering of views.

The facility's proposed future green space landscape will filter views. The planting will create a middle-distance greening band that will obscure the operational site from distant viewpoints. Views along Wianamatta South Creek and Kemps Creek provide localised views of water, in particular under the dual bridge spans of the M12 Motorway which allow views out from the site to the south.

The elevated M12 Motorway will have views into the site and there are opportunities to use the brine tanks as AWRC markers for motorists. The entry point to the site at Clifton Avenue will also be marked as a gateway to the facility.

Figure 113 Potential interpretation murals on the brine tanks

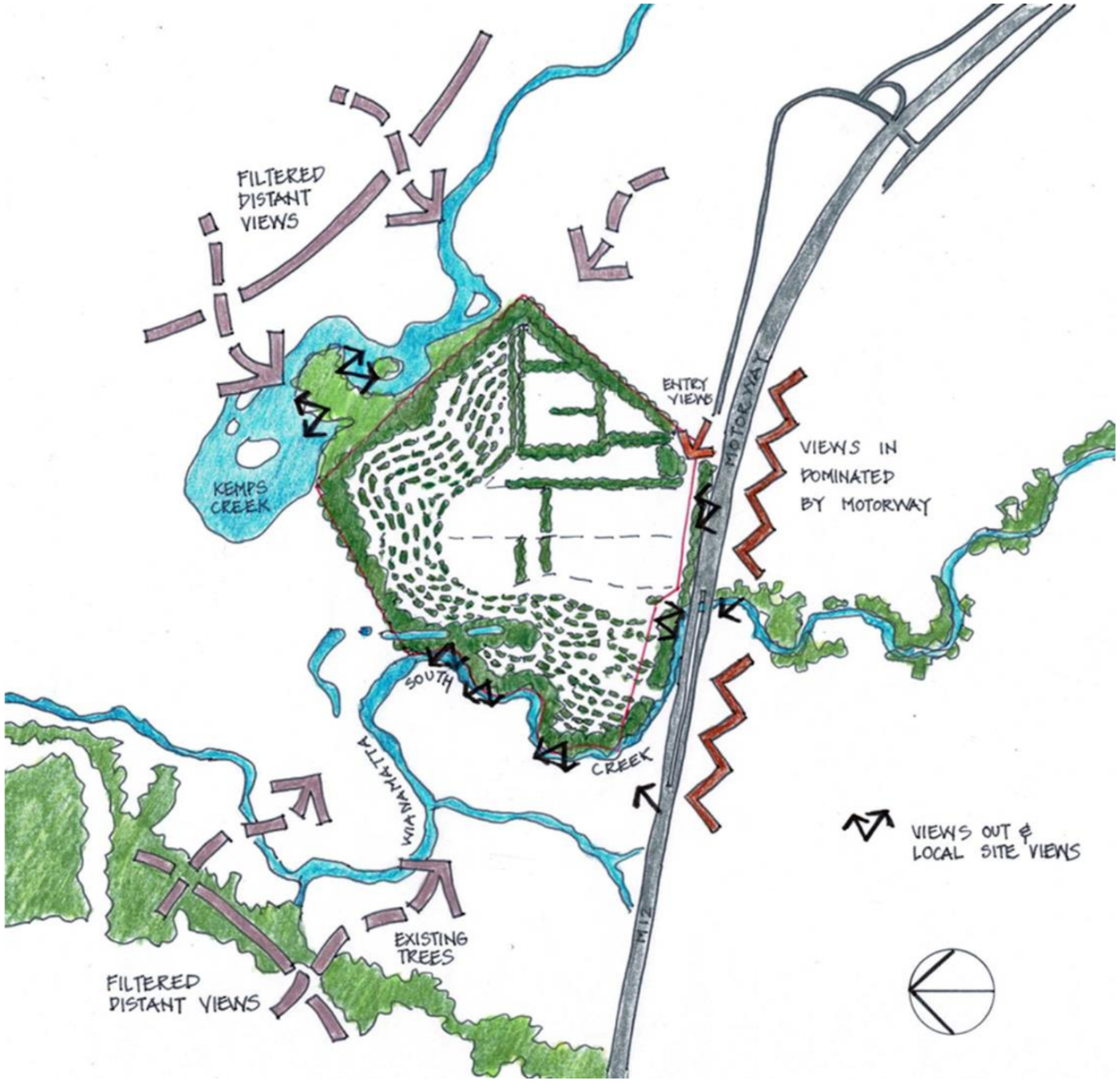

Figure 114 Visual impact amelioration and proposed green space and landscape.

13.2 Lighting Impacts/Compliance

All lighting associated with the operational site will be constructed and function with minimal light spillage to surrounding properties and risk to pilots and in accordance with the following requirements.

AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting, and National Airports Safeguarding Framework (NASF) Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports.

The setting of the AWRC has limited lighting impacts due to the rural landscape character. Refer section 13.1 Visual impact of AWRC site. The Project Site is sensitive to the introduction of new lighting, however, the operational lighting impacts for the AWRC will not generate significant levels of lighting, given its distance from existing sensitive receptors and the majority of lighting to be narrow focused downlights and restricted to security and access requirements. Mitigation measures include the arrangement of downlighting will be scattered and is not likely to be mistaken as airport lighting. Therefore, the lighting impacts for the Project are low.

The lighting at AWRC will not be configured in lineal patterns that can be mistaken as being ground lighting associated with an airport. Additionally, the intensity of light emission will meet the requirement of regulation 94 of CAR 1988.

Detailed documentation outlining specific locations, fittings and fixtures for all external lighting will be prepared to meet the requirements of Appendix B of *AS/NZS 4282:2019*.

14 Community and Stakeholder Engagement

14.1 Background

Past EIS engagement outcomes

The Department of Planning and Environment received 30 submissions during the exhibition of the project EIS. Only four of these submissions were from individuals from the community. The submissions included comments on the AWRC, the new treated water pipeline from the AWRC to the Nepean River and the new brine pipeline connecting to the Malabar Wastewater Treatment Plant. Analysis of these submissions is provided in the Submissions Report March 2022 and has been considered in the preparation of this UDLP. The majority of issues raised related to economic, environmental, and social impact. Most of these across the entire project related to:

- hydrodynamics and water quality
- flooding
- terrestrial biodiversity
- surface water
- aquatic ecology
- noise and vibration
- Aboriginal heritage

Engagement approach

We have set project objectives and engagement initiatives in line with the *Recognise Country: Guidelines for Development in the Aerotropolis,* the Minister's Conditions of Approval (MCoA) and the highest-level benchmarks from the Infrastructure Sustainability Council. The MCoA relating to the Urban Design and Landscape Plan (UDLP) are explained in Chapter 4.

The engagement approach for the UDLP was also guided by the Community and Stakeholder Engagement Plan for the project, which includes analysis of community and stakeholder issues and concerns based on past engagement activities and the exhibition of the EIS. The staging of the Stage 1 CSSI Works was also considered - the UDLP focuses on the AWRC operational site, the landscaping within and surrounding the operational site and the riparian planting corridor along Wianamatta-South Creek.

Opportunities for the community and stakeholders to influence aesthetic outcomes for the broader site will come during the Green Space master planning process. The UDLP will be subsequently revised to include the consultation outcomes captured during the development of the Green Space Masterplan.

Another factor in deciding the engagement approach was the level of stakeholder interest, the ability for stakeholders to influence decisions and the expected level of public interaction with the operational facility area. For example, despite an extensive community and stakeholder engagement program, there was limited interest from the wider community in the AWRC urban design and landscaping during the preparation and exhibition of the EIS. And decisions about the type, height, position and colour of AWRC operational structures have mostly already been made by Sydney Water based on planning regulations and technical requirements.

The engagement approach for the UDLP sought to provide the nearby community and project stakeholders the opportunity to learn and ask questions about the planned design and landscaping at the site, noting that further engagement about the Green Space area would occur at a late stage.

Engagement on the UDLP

Engagement with the community and project stakeholders was done through:

- A community information session in the Aerotropolis (with multiple government agencies and councils present)
- A community newsletter drop and email inviting people to review the draft UDLP
- Website information (on Sydney Water Talk)
- Phone calls

Additional engagement activities about the proposed urban design and landscaping occurred with stakeholders who either had a particular interest in the AWRC site or who may be affected by the permanent built works and/or landscaping. These included Aboriginal stakeholders, City of Penrith Council, aviation stakeholders and nearby landowners including Transport for NSW and the University of Sydney. Additional engagement with these stakeholders included:

- Aboriginal stakeholder engagement including a Walk on Country event and a stakeholder workshop with representatives from the project's advisory group (which was formed after seeking interest from any Aboriginal person living in Western Sydney with strong cultural connections or interest in the project area including Traditional Custodians, Local Aboriginal Land Councils and Registered Aboriginal Parties for the project)
- Emails inviting people to review the draft UDLP
- Workshop with government agencies and City of Penrith Council
- Follow up emails and phone calls with nearby landowners and businesses

The conversation with interested and impacted stakeholders is ongoing and will extend beyond the plans described in the UDLP. These stakeholders will be invited to review the urban design, landscaping and riparian planting designs and, like the wider community, will be invited to participate in the master planning for the Green Space area later this year.

What you have told us

There has been limited interest so far, particularly from the wider community, in the urban design within the AWRC operational area. This is to be expected given many of the decisions relating to buildings and structures have already been made by Sydney Water due to planning conditions and its own technical and operational requirements. There is some interest however in the operation of the AWRC including odour and traffic management and interfaces with adjacent properties.

Stakeholders from the Aboriginal community, as well as some government agencies and landowners nearby, have expressed an interest in learning more about landscaping designs and the proposed riparian planting along Wianamatta South Creek.

There is strong interest in the master planning process for opportunities within the Green Space. Aboriginal stakeholders have already emphasised the need to protect flora and fauna, restore the natural flow of water through the site, explore the possibility of improving land and water management across the area and not just within the AWRC site, consider some interpretation and education about Caring for Country and increase awareness of local Aboriginal language.

Table 11 Walk on Country and Stakeholder Workshop Feedback

WALK ON COUNTRY AND STAKEHOLDER WORKSHOP FEEDBACK		
Theme	**Comment/Question**	**Recommended action**
Cultural Values Mapping	• Will Sydney Water continue the Cultural Values Mapping work?	• Advise on intention to continue/finalise Cultural Value Mapping work.
Aboriginal Heritage Investigations	• Why was the area in the green space salvaged? • Request for a map to identify areas that have been investigated/salvaged across the site. • Is there opportunity to put salvaged artefacts back on Country? • What was the salvage methodology, bulking or layers? • Requested to review a copy of the Heritage Report.	• Provide methodology for identification of salvage pits as well as for the salvage itself (i.e., bulking or layers). • Provide a map outlining the areas across the site that have been investigated/salvaged. • Investigate opportunity and process for returning the salvaged artefacts to Country. • Provide a copy (when completed) of the Heritage Report
Significant flora	• Noted a potential scar tree on the side of the access road as driving past during walk on Country. • Questioned the point of bunting the significant ecological communities (i.e. paperbark trees) for slashing if they are being removed for the construction of the AWRC centre. • Is there opportunity to relocate the paper bark trees on site, if they can't be retained? Potential relocation site at Salvage pit. • If they can't be relocated can the tree material be reused on site (i.e. habitat for fauna)	• Identify scar tree and investigate opportunity to protect scar tree on side of access road. • Investigate opportunities for relocation and/or reuse/seed collection of the paperbark trees that have been identified for removal (noting damp soil type requirements). • If relocation is possible, investigate if the paperbark trees could be relocated to the salvage pit along Kemps Creek to avoid disturbing more Country.
Water Management	• Questions and concerns regarding the impact of pumping water into the Nepean River. • Questions around the intentions for water reuse and recycling in the Aerotropolis, how will this be implemented?	• Bring a member of the Sydney Water team that is looking at the broader water management for the Aerotropolis to an upcoming workshop.
Connecting with neighbours	• Can the billabongs be returned to their natural state with the removal of the dam wall in the middle? • Can the dam at the top end of Kemps Creek be removed to allow natural water flow? • Opportunity to have connected walking/cycling paths in/out of the site to surrounding areas.	• Consult with neighbouring properties and understand potential downstream impacts and opportunities to return Kemps Creek and billabongs to natural water flows. • Consult with neighbouring properties to understand opportunities for walking/cycling paths and green space connectivity and continuity.
Caring for Country/ land management	• Opportunity for a cultural burn to support clearing of overgrowth and non-native plant species on the site. • Questions around relocation of animals (e.g., red belly black snake) and provision of habitat during construction.	• Investigate opportunity to undertake a cultural burn as part of the site clearing prior to construction. • Investigate and advise on approach for clearing/relocation of fauna prior to construction as well as provision of habitat on site for relocation.
Purpose of green space	• Questions regarding the purpose of the green space. • Noted opportunity for potential cultural space.	• Dedicate a focus group of Traditional Custodians to discuss the purpose and potential use of the green space (i.e., for public use or reserved for cultural use) and what that could look like.
Dark Sky	• Noted the site currently has good access to dark sky Country and it would be good to retain this.	• Revise DPE's Dark Sky Planning Guideline | Planning (nsw.gov.au) • Consider access to dark sky Country in lighting plan for the site and green space.
Language	• Noted design team queries around use of language and pointed out that there is already the opportunity to use the word 'Wianamatta' instead of South Creek.	• Investigate opportunity to update collateral and project documentation moving forward to refer to South Creek as 'Wianamatta'

Future Green Space Masterplan

Opportunities for upcoming engagement around the future Green Space will be flagged with relevant stakeholders to ensure a seamless transition from the development of the UDLP to the start of the master planning process for the Green Space.

Sydney Water, John Holland, Trility and Tract will engage with stakeholders as part of a master planning process to develop a concept for the future Green Space. The purpose of the engagement activities is mainly to 'consult'. We will seek feedback, consider it, address it and report back on how feedback was used during the decision-making process. There is the opportunity in this process for stakeholders to influence decision making but Sydney Water will make the final decision on the concept, which would then be included in a revised UDLP and subject to further financial review and planning approvals. Formal agreements may then be required with partner organisations to implement the concept.

Engagement activities will include:

- Meetings and workshops with Aboriginal stakeholders (ongoing)
- Liaison with representatives from NSW Department of Planning and Environment interested in Wianamatta South Creek (underway)
- Opportunity and constraint mapping workshops with a wider range of potentially interested or affected government stakeholders including Liverpool City Council, Greater Sydney Parklands, Western Parkland City Authority and other government agencies
- Ongoing community updates, individual meetings and community information sessions for nearby landowners and businesses

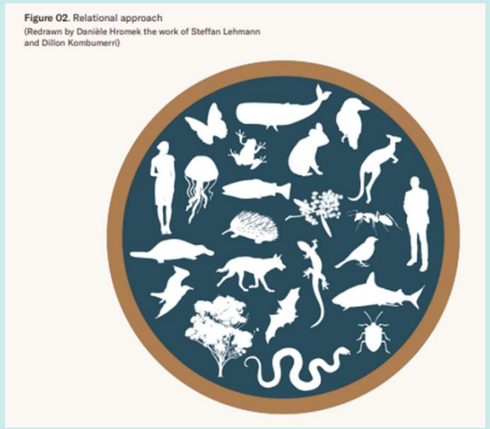

Figure 115 Approach to Country with rational approach

Figure 116 Photo taken during the Walk on Country (June 2023)

Figure 117 Site photo taken during the Walk on Country (June 2023)

15 Independent Review

15.1 Purpose and Objective

Infrastructure Sustainability Council

This UDLP supports the requirements of *Pla-2 Urban and Landscape Design* in the *ISCA IS v2.1 DESIGN: CRITERIA FOR PLA-2 CREDIT* for the following criteria.

Level 1

DL1.1 An urban and landscape design plan has been developed and design options implemented (this UDLP and Detailed Design Documentation).

The requirements for *DL.1.1 – An urban and landscape design plan has been developed and design options implemented* is achieved through the delivery of detailed design and documentation of the design elements in this UDLP. The detailed design process provides documentation that will be constantly refined throughout t the Project up until the point the design is 'Issued for Construction' stage. The design will then be implemented in construction.

DL1.2 The maintenance arrangements for the project's urban and landscape design components have been reviewed. (Chapter 17)

Level 2

The requirements for Level 1 have been achieved.

DL2.1 An urban and landscape design statement has been prepared (this UDLP).

DL2.2 The urban and landscape design plan and statement have been independently reviewed at key stages throughout the design (this Chapter).

Independent review

An independent review has been undertaken of the ECI phase urban design package to provide independent advice to support placemaking objectives. This UDLP and project documentation will be reviewed at key stages to evaluate the implementation of the ULDP. The reviews will continue to be undertaken by an Independent Qualified Individual (IQI).

The purpose of the design reviews is to provide expert and impartial design advice to the project team against accepted urban and landscape design principles.

Four independent reviews will occur at the following milestones.

Review 1 - ECI Phase documentation

Review 2 – Urban Design and Landscape Plan (this document)

Review 3 – 80% Detailed Design Documentation

Review 4 – 100% Detailed Design Documentation

Agreed, recommendations from each review will be incorporated into the subsequent stage documentation. Key recommendations from Review 1 have been incorporated into the development of the design and this UDLP.

Documents reviewed include:

- *Scoping Report Upper South Creek Advanced Water Recycling Centre* (Sydney Water 2020)
- *Upper South Creek Advanced Water Recycling Centre Urban Design Report* (Aurecon Arup 2021)

Upper South Creek Advanced Water Recycling Centre Final Submission ECI Deliverables:

07-24 Architecture & Urban Design Brief,

07-25 Site Master Plan,

07-27 Landscape and Biodiversity Plan and

07-28 Architectural Design and Drawings.

Table 12 captures the independent review recommendation and responses.

Table 12 Independent Review Recommendations and Responses

INDEPENDENT REVIEW 1 - RECOMMENDATIONS AND RESPONSES	
Recommendations	**Response**
Engagement	
1. **Consider engaging with the surrounding residential and university groups for community/educational riparian corridor rehabilitation projects both within and to the external boundary of the site.**	The engagement strategy for the Project identifies key stakeholders including State and Local Government agencies and community groups. Sydney Water's engagement process will continue for the duration of the Project and outcomes associated with the urban design of Project and opportunities for community /educational initiatives will be captured and potentially implemented into the ongoing maintenance, management, operation and development of the site. The engagement on the development of the Green Space Masterplan will incorporate opportunities around this recommendation.
Place	
1. **Consider the incorporation of urban design principles of place through a review of the colours of the metal clad buildings within the treatment plant zone. This will encompass the opportunity to utilise light colours for roofs and wall cladding to minimise heat loading.**	Chapter 11 identifies potential opportunities in the incorporation of lighter cladding colours and refining the response to Place. During the 80% Detailed Design Phase, consideration of these finishes will be undertaken.
2. **Consider further opportunities for Connection to Country, through cultural practice, education, art and social enterprise.**	Continuing engagement will Traditional Custodians and Registered Aboriginal Participants (RAP) will occur for the development of the Green Space Masterplan where opportunities for cultural practice, education, art and social enterprise will be further explored and incorporated where appropriate.
3. **Consider hard landscape elements including furniture and pavement materiality as part of the wayfinding and signage elements and cultural and heritage identity outcomes for both stages of the project. Clearly identify the relationship of the Fleurs Antenna cross arrays and their relationship to the road layout design through interpretation on site as part of stage 1.**	Refinement of material selections and elements will occur during the 80% Detailed Design Documentation Phase and identified during the preparation of the Green Space Masterplan. The UDLP identifies an on-ground treatment to mark the location of the crossing point of the Fleurs antennae cross arrays. Details of the treatment and interpretation will occur during the 80% Detailed Design Documentation stage.
Functionality	
1. **Consider whether public amenities required as part of the Stage 1.**	Visitors will be able to access the amenities in the Administration Centre. Visitor access will be controlled, and they will be accompanied by facility staff.

INDEPENDENT REVIEW 1 - RECOMMENDATIONS AND RESPONSES	
Recommendations	Response
Biodiversity Further review and incorporate opportunities to maximise biodiversity, by:	
1. **Consider environmental solutions like floating wetlands to reduce water evaporation from wetlands, waterways and to assist in filtration and limit algal blooms.**	No permanent water bodies are proposed for Stage1 The bioretention and retention systems are designed to process stormwater during rainfall events and to ensure water quality and flows from the development of the site do not impact Wianamatta South Creek or Kemps Creek. The system is designed to filter and slow flows and does not permanently retain water. The billabongs are associated with the ephemeral nature of the flood plain and may at times hold water and at other times dry out. Floating wetland systems are not required for Stage 1 but can be considered for the future green space development where there are permanent water bodies that are part of the Kemps Creek system. During The 80% Detailed Design Documentation, plant species will be nominated for the bioretention and billabong precincts.
2. **Incorporate plant species which aid soil health and removing contaminants from the topsoil and bioretention areas**	During The 80% Detailed Design Documentation stage, plant species will be considered for their contribution to improving soil networks.
3. **Maximise the planting opportunities (numbers, layering and mix of species to exploit biodiversity opportunities) with a focus on the continuing management and monitoring required around fire and aviation risk.**	During The 80% Detailed Design Documentation stage, plant communities will be considered for their contribution to improving biodiversity outcomes. Detailed review of planting opportunities with consideration of the site's constraints. .
4. **Implement planting and habitat zones for key local fauna which do not contribute to aviation risk.**	As per item 3 above
5. **Existing billabong within revegetation zone adjoining Wianamatta South Creek. Consider removing the artificial bund to reconnect the two billabongs into one connected system to improve environmental outcomes**	80% Detailed Design Documentation will incorporate the regrading of the bund to reconnect the two billabongs as one system. .
6. **Reduce hard surfaces within the treatment plant zone and replace with more permeable natural treatments to allow absorption of moisture to support plant growth, micro species and movement of micro fauna through connected soil networks**	80% Detailed Design Documentation will incorporate these opportunities and document outcomes from a detailed review in conjunction with Sydney Water and the operations team. .

16 Creating a Sustainable Place

16.1 Sustainable Infrastructure

Sustainable infrastructure can be defined as infrastructure that allows society to adapt and optimise to changing social, ecological and economic outcomes in the long term. The Infrastructure Sustainability Council (ISC) has developed an Ecological Sustainable Development (ESD) tool to drive and measure sustainability on infrastructure projects and assets. The tool aims to improve the productivity and liveability of industry and communities through sustainability in infrastructure. By obtaining an ISC rating, the construction and operational impacts of the AWRC with respect to sustainability will be minimised.

Approach to achieving the ISC Rating

Restoration of the site with a diverse environment that will become more inclusive and ecological will help enrich wildlife and biodiversity while improving water quality and soil degradation.

An improved soil biodiversity promotes healthy microfauna biodiversity. The trees will sequester carbon and assist the soil in capturing and storing carbon as we face Climate Change.

Restoring and sustaining natural systems in and around the AWRC

Our urban design vision for the AWRC is directly linked to achieving the circular economy principle of regenerating natural systems. In connecting to Country and taking a landscape-led approach to site development, beneficial natural system outcomes include:

- Retaining water in the landscape through soil amelioration, contour planting and water sensitive urban design initiatives
- Enabling regeneration of the Cumberland Plain Woodland communities throughout the site
- Restoring the riparian ecological landscape and preventing erosion by stabilising creek embankments
- Providing biodiversity by establishing continuous landscaped corridors that support diverse species.

For the AWRC to reach its full potential, we must ensure it achieves the environmental, social and economic values outlined in Table 13. The table is based on the Infrastructure Sustainability Council's (ISC) Ecological Sustainable Development (ESD) tool to drive and measure sustainability on infrastructure projects and assets.

Table 13 Environmental, Social and Economic Values

Aspect	Values
Environmental	• Retaining water in the landscape to create green vibrant places that mitigate urban heat to meet Western Parkland City's objectives. • Integrated water sensitive urban design and natural processes, including accommodating overland drainage flow paths within constructed wetlands and maximising permeable surfaces. • A landscape that is appropriate, contextual, considers climate and reinforces biodiversity with the introduction of edible and medicinal Indigenous plants. • Connection to wider landscape and networks beyond the AWRC • Architecture that is sustainable and fits within its environment. • Considers carbon solutions
Social	• Environment that promotes socialisation through active and passive experiences • Connectivity throughout the site and with the broader neighbourhood • Playful and educational spaces for interaction that are adaptable, flexible and provide variety. • Sensitively designed place with beautiful detail • Integrated heritage interpretation that is contextual • Accessible, safe place for all. • Leave a lasting legacy, beyond the purpose of the Project (Noting this is an objective of ISC v2.1 too – LEG-1)
Economic	• Optimised recovery of wastewater to offset potable supplies. • Design layout for project staging to allow flexibility and resilience with consideration for future expansion and adaptability. • Resource recovery by maximising energy recovery from process and beneficially reusing biosolids • Accessible to the broader community • Robust materials with long life cycles • Initial capital costs and ongoing maintenance must be sustainable • Potential partnerships with local businesses, training and vocational and industry groups

Figure 118 USC AWRC site looking south

17 Management, Maintenance and Reviews

17.1 Operations and Maintenance – managing the landscape

Aligning with Urban Design Objectives and Principles

Connecting to Country, Culture and People Objectives and aligning with urban design principles around Placemaking, Leading edge environmental design responsiveness and Urban Renewal and Liveability identified in Section 3 will be reinforced with on-going management, maintenance and reviews.

A Landscape Management Plan (LMP) will be developed as part of the ongoing landscape monitoring and maintenance activities for the long-term care of the AWRC site.

General management principles will focus on the development of the specific landscape character types identified in the UDLP and landscape management activities which support the goals and objectives of the UDLP. This will include the management of the entire site and the green space to be masterplanned.

The Vegetation Management Plan for the Wianamatta South Creek guides the detailed implementation of creek restoration and billabong zones, as per the Guidelines for Vegetation Management Plans on Waterfront Land (NSW Office of Water, DPI 2022) and the Draft Western Sydney Aerotropolis Riparian Revegetation Strategy in the Western Sydney Aerotropolis (Initial Precincts) Riparian Corridors Assessment (Sydney Water 2021).

The tree planting provisions in the Western Sydney Aerotropolis Development Control Plan – Phase 2 has been considered.

O1. Utilise stormwater for passive irrigation of street trees to promote healthy trees, optimise canopy cover and contribute to streetscape and amenity.

- Water Sensitive Urban Design (WSUD) has been included in the creation of drainage swales, bioretention and detention basins.

O2. Facilitate canopy street tree planting that reaches a mature height that is commensurate with the width of the street and the height of development fronting that street, to enhance the amenity and identity of the street.

- Due to wildlife hazards and bushfire risk, tree planting has been restricted within the asset protection zone. Outside of this zone, canopies in groups of three to five are proposed.

O3. In preparation for planting the site is to be de-compacted to ensure that a growing environment capable of supporting the sustainable growth of a tree is provided.

- De-compaction of the soil for tree planting is not recommended based on soil testing, as it will release excessive amounts of manganese causing water logging that is detrimental to tree survival.
- Our methodology will follow the advice in the Soil Re-Use Assessment (SESL 2023).

Overall site management is required for fire and aviation risk and to prepare for the development of green space grassland landscape.

Sydney Water retains ownership of the green space and will establish after the preparation of the future Green Space Masterplan if any assets are to be transferred to the relevant authority. The Green Space will be managed by Sydney Water whilst the Operations side will be managed and maintained by the operator Trility for the duration of their contract.

Vegetation Management Plan

The preparation of the Vegetation Management Plan includes the incorporation of the comments and actions identified in the Net Ecological Gain paper to be prepared by Biosis (Ecologist) and meets the requirements of the MCoA E64(g). Figure 119 shows the management zones along the Wianamatta South Creek included in this Plan.

Preliminary works

The VMP details how the restoration and rehabilitation will be carried out. During the Preliminary works stage (Stage 1), construction management actions will be undertaken to ensure the buffering and retention of existing native vegetation from construction impacts. These include fencing to prevent sediment from running into the VMP site, cleaning of equipment, footwear, and vehicles before entering the site, and certifying any soil, plants and other materials are free of weeds and pathogens before entering the site.

Weed management

Prior to planting, primary weed control for each vegetation management zone will consist of appropriate eradication methods for the specific weed species found on site. Secondary weed control will occur after planting, throughout the establishment and maintenance periods, including follow-up treatments of all weed seedling growth, and overlooked weeds after initial weed treatment.

Planting and installation

Tube stock plants and seed embedded jute mats will be installed in each vegetation management zone to restore and rehabilitate the native ecology. A variety of trees, shrubs, forbs, grasses, and groundcovers are specified to meet biodiversity requirements. At the time of planting a native slow-release fertiliser is to be applied to each plant.

Water regime

After planting and installing the seed embedded jute mats across the management zones, the proposed watering program specifies watering to occur once a day from weeks 1-4, once a fortnight from months 2-4 and once a month from months 5-6. The necessity for watering during the above program will be dependent upon rainfall. The frequency of watering will be gradually reduced as the plantings mature and it is anticipated that after period of 4 to 6 months the planting will be sufficiently established such that supplementary watering will no longer be required.

Monitoring and maintenance

Planting areas are to be monitored during the establishment and maintenance period to ensure that climatic conditions are not negatively affecting the newly planted tube stock and sprouting seeds. If climate or environmental conditions are affecting the plants a watering program may be reinstated pending the approval by the environmental manager.

Monitoring will be undertaken by photo monitoring and vegetation surveys. Monitoring will be implemented before works commencing to establish a benchmark for performance, and to occur every six months until the completion of the project. Each six-month survey will be accompanied by brief correspondence with the Bush Regeneration contractor and the proponent/ project manager regarding the progress of the vegetation management works and highlight any areas of concern or merit.

Landscape Management Principles for AWRC

The following landscape management principles are to be incorporated into the Landscape Management Plan for monitoring and reporting:

- Incorporate actions and outcomes identified by Biosis and captured in the Vegetation Management Plan to ensure an adaptive regenerative process is applied and monitored.
- Minimise environmental impacts that may result from landscape management activities and utilise environmentally sustainable practices.
- Enhance and promote the Cumberland Plain character of the site.
- For new and replacement plantings, use of endemic plant species.
- Provide a safe environment, minimising potential risks to people, buildings, and property.
- Continue to incorporate water sensitive urban design (WSUD) techniques to manage stormwater, slow runoff, recharge groundwater, store for re-use and to passively irrigate landscape areas.
- Apply best practice bush regeneration in revegetated areas and best practice landscape maintenance in the Treatment Plant zone.
- Provide a high-quality path network that provides for safe, equitable movement.
- Ensure that all new works comply with the requirements of AS 1428 Access and Mobility Design.
- Target noxious weeds and feral animals using integrated pest management approaches.
- Provide opportunities for Aboriginal, environmental, and informal learning and study in the landscape.
- Maintain high quality outdoor spaces and public interfaces.
- Manage bushfire risk in accordance with recognised guidelines.
- Manage wildlife hazard risks in accordance with the Wildlife Management Plan.
- Provide opportunities for greater community involvement.
- Appropriately fund, plan and manage landscape maintenance to provide a measurable improvement of the AWRC landscape appearance, safety and amenity.
- Maintenance and monitoring process will be documented and planned.

Continuous improvement and change management will be incorporated into the Landscape Management Plan to achieve the design outcomes of the UDLP.

17.2 Review and Evaluation

Regular intervals for review and evaluation of UDLP implementation by an independent suitably qualified professional from the proponent (client) organisation or a third party will be specified within the LMP.

Independent Review - Quality Inspections

Independent review and reporting will occur to monitor and manage the landscape at the following times: three (3) inspections during construction, one (1) inspection at practical completion and one (1) inspection at final completion.

After each inspection, detailed reports and photographic evidence outlining aspects of the project that require attention due to non-conformance and rectification actions to meet performance specification and documentation outcomes will be issued. Each follow up inspection will monitor that identified issues have been rectified.

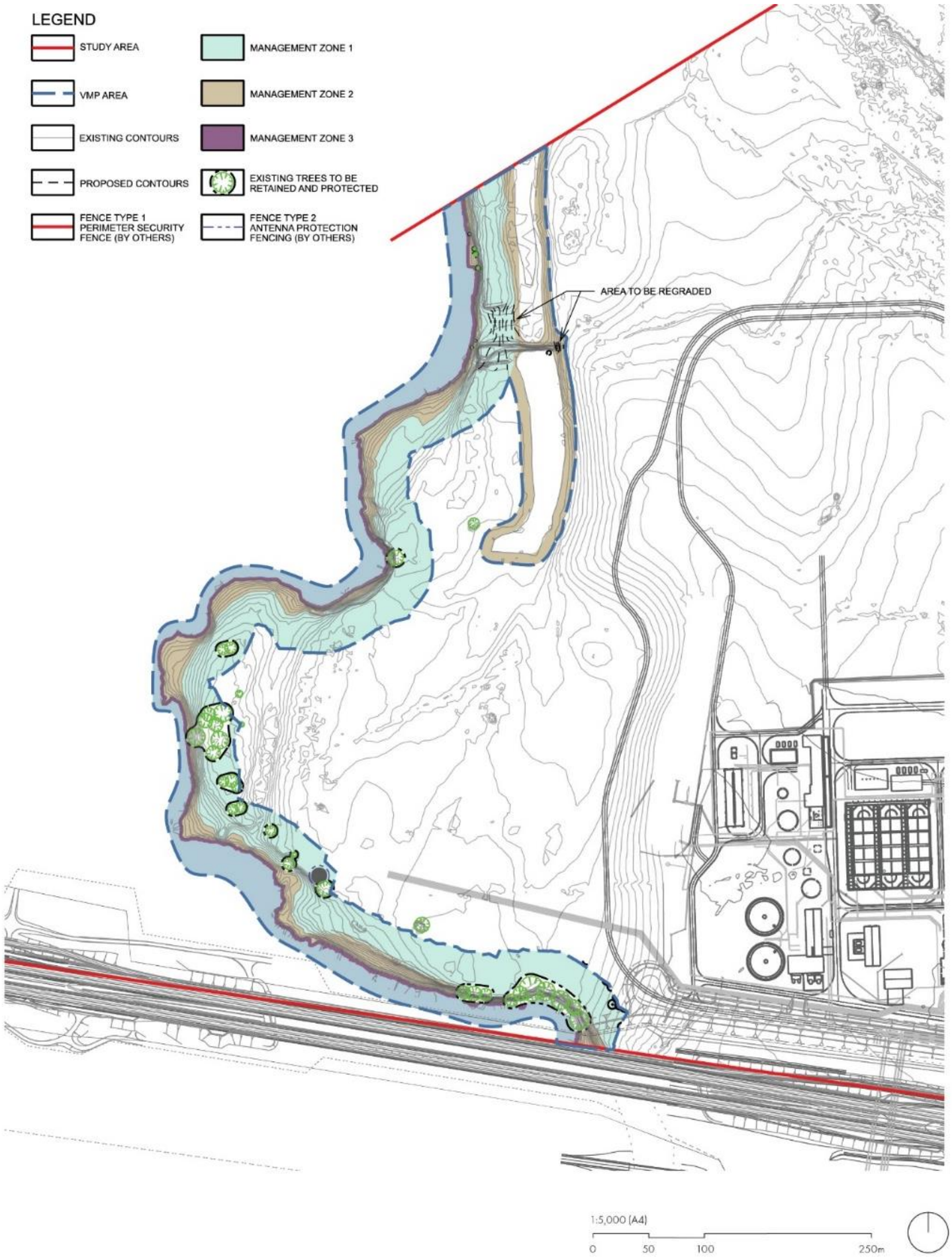

Figure 119 Vegetation Management Zones for Wianamatta South Creek