

SCG DEVELOPMENTS PTY LTD

SUSTAINABILITY AND RESILIENCE REPORT

40 The Retreat, Bringelly NSW 2556

Project Number: 118517
Report Type: ESD Report
Revision: 1.1
Date: 14 June 2024

PREPARED FOR

Peter Mullen
petermullen@sathiogroup.com.au

PREPARED BY

Pari Elete
02 8484 4061
ParikshethElete@jensenhughes.com

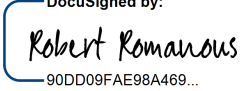


JENSEN HUGHES

Jensen Hughes Pty Limited, Trading as BCA Logic
Suite 302, Level 3, 151 Castlereagh St, Sydney NSW 2000
Postal Address: PO Box Q1440, Queen Victoria Building NSW 1230

Liability limited by a scheme approved under Professional Standards Legislation

Document Control

Revision	Issue Date	Issue Description	Prepared By:	Verified by:
118517-ESD Report-r1.1	14 June 2024	Sustainability and Resilience Report, Western Sydney Aerotropolis Precinct Plan	Pari Elete	Robert Romanous
	14 June 2024	Robert Romanous ESD Manager	Signed:	DocuSigned by:  90DD09FAE98A469...

Jensen Hughes Australia

Providing building regulations, fire engineering, accessibility, and energy consulting services to NSW for over 25 years

Our story begins in 1997 with the founding of BCA Logic to fulfill the demand of a consultancy company whose expertise expanded across the entire life cycle of a building, from consulting on the initial planning through to construction and occupation.

BCA Logic, SGA Fire and BCA Energy joined Jensen Hughes in 2021, a leading global, multi-disciplinary engineering, consulting and technology firm focused on safety, security and resiliency. We continue to be at the forefront of our industry and work thoroughly to preserve our position by ensuring the successful delivery of projects.

Jensen Hughes was launched in 2014 through the historic merger of Hughes Associates and Rolf Jensen & Associates (RJA), two of the most experienced and respected fire protection engineering companies at the time. Since then, we have gained market leadership in nuclear risk consulting and established commanding positions in areas like forensic engineering, security risk consulting and emergency management. Over the past 22 years, our integration of more than 30 privately held engineering and consulting firms has dramatically expanded our global footprint, giving us a powerful market presence ten times larger than our nearest competitor in some of our markets and extending our historical lineage back to 1939.

With more than 90 offices and 1500 employees worldwide supporting clients globally across all markets, we utilise our geographic reach to help better serve the needs of our local, regional, and multinational clients. In every market, our teams are deeply entrenched in local communities, which is important to establishing trust and delivering on our promises.

Glossary & Definition

Term	Definition
BASIX	Building Sustainability Index
COP	Coefficient of Performance
DCP	Development Control Plan
DTS	Deemed-to-satisfy
EMP	Environmental Management Plan
ESD	Ecologically Sustainable Development
GHG	Greenhouse Gas
HVAC	Heating, Ventilating and Air-Conditioning
LEP	Local Environment Plan
Lumens	Luminous flux, equal to the amount of light emitted per second from a uniform source of 1 candela
Lux	Light intensity in a specific area (1 lux = 1 Lumen/m ²)
NCC	National Construction Code
PV	Photovoltaic
R _t	Total R-value for the system
R-value (m ² .K/W)	The thermal resistance of a component calculated by dividing its thickness by its thermal conductivity
SA	Solar absorptance
SHGC	Solar heat gain coefficient
U-value (W/m ² K)	The thermal transmittance of the composite element allowing for the effect of any airspaces, thermal bridging and associated surface resistances
VLT	Visible Light Transmission
WELS	Water Efficiency Labelling and Standard
WSAPP	Western Sydney Aerotropolis Precinct Plan

Table of Contents

EXECUTIVE SUMMARY	5
1.0 BASIS OF ASSESSMENT	6
1.1 Location and Description	6
1.2 Design Documentation	7
1.3 Report Scope.....	8
1.4 Limitations.....	8
2.0 ESD FRAMEWORK REQUIREMENTS & STRATEGY	9
2.1 SEARS: Mixed-Use residential facilities	9
2.2 SECTION 193 OF THE EP&A REGULATIONS.....	10
2.2.1 The precautionary principle.....	10
2.2.2 Inter-generational equity	10
2.2.3 Conservation of biological diversity and ecological integrity	11
2.2.4 Improved valuation, pricing, and incentive mechanisms.....	11
2.3 Western Sydney Aerotropolis Precinct Plan 2023 – Section 4.7	12
2.3.1 Objectives.....	12
2.3.2 Requirements	12
2.4 Western Sydney Aerotropolis Development Control plan	14
2.4.1 Section 2.12 - Sustainability.....	14
2.5 NCC 2022 Volume One Section J Provisions	15
2.6 Building and Sustainability Index (BASIX).....	16
2.6.1 Nationwide House Energy Rating Scheme (NatHERS).....	19
2.7 Sustainable Buildings State Environmental Planning Policy 2022.....	20
2.8 ESD Framework	21
3.0 SUSTAINABLE DESIGN STRATEGIES.....	22
4.0 DESIGN SUMMARY	29

Executive Summary

Jensen Hughes Pty Limited (Jensen Hughes) has been engaged by SCG Developments Pty Ltd to provide a Sustainability and Resilience Report that outlines both regulatory and benchmarking design initiatives for the proposed project at 40 The Retreat, Bringelly NSW 2556. The project will be assessed under the following compliance provisions:

- + Western Sydney Aerotropolis Precinct Plan (May 2023) – Section 4.7
- + Aerotropolis Development Control Plan (DCP) – Section 2.12
- + National Construction Code 2022, Volume One – Section J
- + Building and Sustainability Index (BASIX) – Residential
- + Sustainable Buildings SEPP 2022

Beyond the compliance requirements, the project team is committed to its occupants, visitors, community, and the environment with a sustainably conscious development through design to operation.

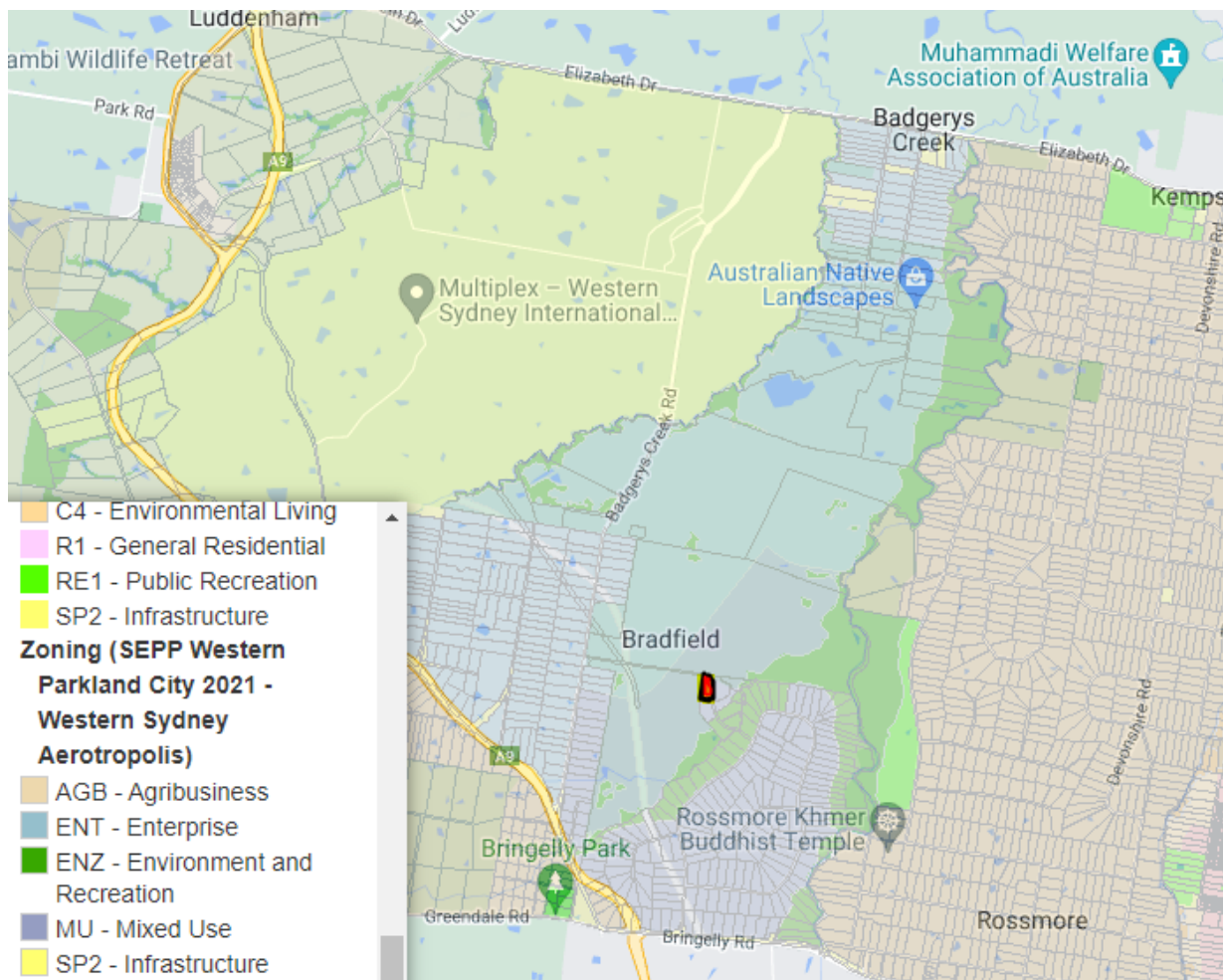


Figure 1- Project Location in Western Sydney Aerotropolis

1.0 Basis of Assessment

1.1 LOCATION AND DESCRIPTION

The building development, the subject of this report, is located at 40 The Retreat, Bringelly NSW 2556. This State Significant Development Application seeks consent for the detailed design and delivery (including construction and use) of a new mixed use residential development, to be developed in two (2) stages. Specifically, development consent is sought for:

Stage 1

- + Overall site clearing and preparation works, including demolition of all existing development on the Site;
- + The redevelopment of the northern portion of the Site, comprising:
 - Temporary Site access to the northern portion of the Site from The Retreat;
 - Temporary bin enclosure adjacent the temporary access;
 - Excavation works and construction of a shared two (2) storey basement to a maximum depth of RL 60.60, with capacity for 311 vehicle car spaces;
 - Construction of three (3) individual mixed use buildings, comprising:
 - Maximum building heights between 30.4m and 39.8m;
 - A total Gross Floor Area (GFA) of 26, 204sqm, comprising 25,744 sqm of residential GFA, 248 sqm of non-residential GFA and 212 sqm of retail GFA, distributed across the three buildings;
 - 254 residential units, distributed across the three buildings.
 - Associated landscaping, communal open space and embellishment works; and
 - Delivery and augmentation of services.

Stage 2

- + The redevelopment of the southern portion of the Site, comprising:
 - Removal of the Stage 1 temporary access from The Retreat;
 - Connection and access of the Stage 1 basement to the western boundary (to become a future Collector Road);
 - Excavation works and construction of a shared three (3) storey basement to a depth of RL 56.35, with capacity for 336 vehicle car spaces;
 - Site and basement access from the western boundary (to become a future Collector Road);
 - Construction of three (3) individual mixed use buildings, comprising:
 - Maximum building heights between 23.8m and 39.9m;
 - A total Gross Floor Area (GFA) of 29,126 sqm, comprising 28,540 sqm of residential GFA, 212 sqm of retail GFA and 374 sqm of non-residential GFA, distributed across the three buildings;
 - 279 residential units, distributed across the three buildings.
 - Associated landscaping, communal open space and embellishment works; and
 - Delivery and augmentation of services.

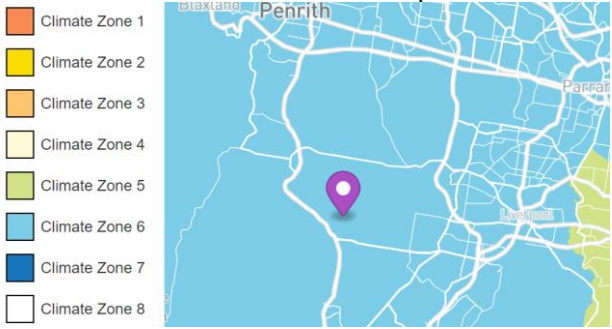
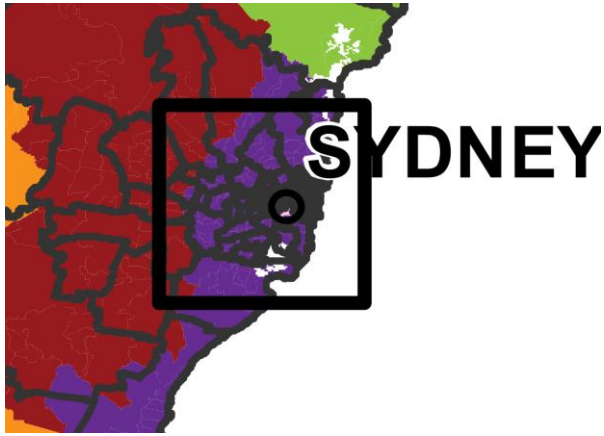
A detailed description of the proposed development is detailed in Section 3.0 of the Environmental Impact Statement prepared by Ethos Urban.

The building has been classified as shown in Table 1, and the location of the project is set within the following climate zones as shown in Table 2.

Table 1: Building Classifications

Class	Level	Description
Class 7a	Basement B1 – B3	Carparking & Plant rooms
Class 6	Ground	Retail
Class 2	B1-L12	Residential Units

Table 2: Climate Zones

Classification	Location	Climate Zone & Description
NCC Section J		<p>Climate Zone 5 - Warm temperature</p> 
Residential NatHERS	Bringelly	<p>Climate Zone 28</p> 

1.2 DESIGN DOCUMENTATION

This report has been prepared based on the following Design Plans and Specifications:

- + DKO Architecture, 27th May 2024 DA Issue Rev F

1.3 REPORT SCOPE

The purpose of this report is to assess the proposed design against the environmentally sustainable design strategy, energy, and water efficiency components in line with the local DCP planning standard. This report addresses:

- + Sustainability drivers stipulated from relevant regulatory and project requirements.
- + Project's design responses corresponding to the sustainability drivers.

1.4 LIMITATIONS

This report aims to provide high level ESD design guidance to the project in accordance with the Council DCP's objectives and controls provisions. It is intended that the options nominated in this report are subject to discuss, assess and workshop into the detailed design of the development. Section J compliance must refer to separate, designated assessment reports. Sections B, C, D, E, F, G, H and I of the NCC.

2.0 ESD Framework Requirements & Strategy

The following regulatory frameworks are incorporated to form part of the overarching ESD strategy for the development:

2.1 SEARS: MIXED-USE RESIDENTIAL FACILITIES

In accordance with section 4.39 of the Environmental Planning & Assessment Act 1979 (EP&A Act), Secretary's Environmental Assessment Requirements (SEARs) for SSD 65729209 were issued on 18 November 2022. This report has been prepared to respond to the relevant issued SEARs, as set out in the table below.

SEARS	Response
<ul style="list-style-type: none"> + Identify how ESD principles (as defined in section 193 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development. 	<ul style="list-style-type: none"> + The principles of ecologically sustainable development are the following— <ul style="list-style-type: none"> - the precautionary principle, - inter-generational equity, - conservation of biological diversity and ecological integrity, - improved valuation, pricing, and incentive mechanisms.
<ul style="list-style-type: none"> + Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards. 	<ul style="list-style-type: none"> + Western Sydney Aerotropolis Precinct Plan + Western Sydney Aerotropolis Development Control Plan + National Construction Code 2022, Volume One – Section J + BASIX and NatHERS compliance
<ul style="list-style-type: none"> + Demonstrate how the development minimises greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources. 	<ul style="list-style-type: none"> + Western Sydney Aerotropolis Precinct Plan + Western Sydney Aerotropolis Development Control Plan + Sustainable Buildings SEPP 2022

2.2 SECTION 193 OF THE EP&A REGULATIONS

Detailed in the below table are project commitments which addresses the principles highlighted in Section 193 of the EP&A 2021.

2.2.1 The precautionary principle
<p>The precautionary principle is if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</p> <p>In applying the precautionary principle, public and private decisions should be guided by—</p> <ul style="list-style-type: none"> + Careful evaluation to avoid, wherever practicable, serious, or irreversible damage to the environment, and + An assessment of the risk-weighted consequences of various options.
<p>Construction will comprise predominantly of concrete, with non-loadbearing internal walls providing opportunities for insulation between apartments. This also allows for a degree of adjustability during the lifecycle of the building whilst the waste management and recycling accords with waste management principles.</p> <p>This is to be completed in coordination with landscape plans, from which, decisions should be justified with risk-weighted consequences to mitigate degradation to the environment. The below reports are recommended to achieve this principle:</p> <ul style="list-style-type: none"> + Environmental Impact Statement + Geotech Engineer to determine requirements of: <ul style="list-style-type: none"> ▪ Surface and groundwater impact report ▪ Salinity management and/or acid sulphate soils management plan + Stormwater Engineer to determine requirement of: <ul style="list-style-type: none"> ▪ Flood risk report + Stormwater management plan + Contamination & Remediation assessment + Air quality impacts assessment, prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. This assessment shall address mitigating emissions from construction works and air pollutants. A management plan to monitor and mitigate risks of pollutants should be carried out.
2.2.2 Inter-generational equity
<p>The principle of inter-generational equity is that the present generation should ensure the health, diversity, and productivity of the environment are maintained or enhanced for the benefit of future generations.</p>
<p>The below reports are recommended to achieve this principle:</p> <ul style="list-style-type: none"> + Trees and Landscaping plans to mitigate the urban heat island effect and increase urban tree canopy cover for perspective occupants. + Social Impact report, prepared in accordance with the Social Impact Assessment Guidelines for SSDA + CPTED Report + NCC22 Section J9 provisions for PV and EV infrastructure to accommodate future progression towards renewable energies and EVs to assist in facilitating a reduction in GHG emissions.

2.2.3 Conservation of biological diversity and ecological integrity

The principle of the **conservation of biological diversity and ecological integrity** is that the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making, including in the formulation, adoption and implementation of any economic and other development plan, program or project.

The below reports are recommended to achieve this principle:

- + Biodiversity Development Assessment Report or BDAR Waiver
- + Trees and Landscaping plans to ensure conservation of the local flora and dependent fauna and maximise green infrastructure.
- + The development includes ample landscape area within all setbacks and deep soil planting overall, which will enhance the site's appearance. This positively contributes to the character of the site generally.

2.2.4 Improved valuation, pricing, and incentive mechanisms.

The principle of **improved valuation, pricing and incentive mechanisms** is that environmental factors should be included in the valuation of assets and services, such as—

- + Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance, or abatement, and
- + The users of goods and services should pay prices based on the full life cycle of the costs of providing the goods and services, including the use of natural resources and assets and the ultimate disposal of waste, and
- + Established environmental goals should be pursued in the most cost-effective way by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

All fundamental appliances are to be provided and installed to ensure their appropriateness and efficiency. Fixtures specified also comply with water-saving requirements.

Building owner/tenant(s) should bear the costs of constructing and on-going operations/maintenance of central systems. For a thorough unit valuation and on-going strata rates, the previously discussed principles from Section 193 of the EP&A are to be considered.

2.3 WESTERN SYDNEY AEROTROPOLIS PRECINCT PLAN 2023 – SECTION 4.7

The design of buildings should follow the *Sustainable Design Strategies* and the general principles of Section 4.7 - 'sustainability and resilience', thereby achieving the objectives and requirements listed below.

2.3.1 Objectives

Objectives	
SR01	Development is to support the transitioning to a net zero or net positive outcome over the medium to long term. This will be measured around performance regarding waste management, water management and carbon consumption benchmarks that are provided in the DCP or other relevant legislation.
SR02	Development should seek to exceed the water and energy requirements of BASIX.
SR03	Green infrastructure is effectively used through the provision of water treatment and retention, urban cooling, ecosystem services and amenity and integrated into built, landscaped and natural environments.
SR04	Buildings, infrastructure, and public domain elements maximise the recycling and reuse of materials.
SR05	Facilitate the design, construction and operation of environmentally sustainable buildings and precincts, including energy efficiency, renewable energy, efficient resource and energy use and reduced emissions and waste.
SR06	Effectively uses waste as a resource through its collection, transport and recycling in a manner that is safe, efficient, cost effective and does provide a positive impact on liveability and the environment.
SR07	Measures to mitigate urban heat island effects are integrated in the design of the built form and public domain, for example the use of light-coloured roofs.
SR08	Planning is to provide sustainable and resilient approaches to development and is to incorporate circular economic principles found in the NSW Circular Economy Policy Statement.

2.3.2 Requirements

Requirements	
SR1	Energy, water, and waste systems are to use a circular economy approach to improve efficiency and result in low-carbon developments.
SR2	Effectively use renewable energy supply including solar, wind, green hydrogen, and bioenergy.

SR3	Plan for, and achieve, leading industry targets by 2025 and from 2026 beyond to achieve sustainable regenerative targets:														
	<table border="1"> <thead> <tr> <th rowspan="2">Description</th> <th>Leading industry practice</th> <th>Sustainable regenerative</th> </tr> <tr> <th>Target 2020 and 2025</th> <th>Target 2026 and beyond</th> </tr> </thead> <tbody> <tr> <td>BASIX</td> <td>BASIX (Energy) – 45-60 BASIX (Water) - 60</td> <td>BASIX (Energy) – 45-60 BASIX (Water) – 60</td> </tr> <tr> <td>Non-residential uses (subject to final modelling)</td> <td>Green Star Communities – 5+ stars Green Star – 5+ stars NatHERS – 7 star</td> <td>Green Star Communities – 6+ stars Green Star – 6+ stars NatHERS – 8+ star/ Passive home</td> </tr> <tr> <td>Circular economy targets</td> <td>10% reduction of waste generation 85% reduction in construction waste</td> <td>100% recovery and re-use of organic waste 90% reduction in construction waste</td> </tr> </tbody> </table>	Description	Leading industry practice	Sustainable regenerative	Target 2020 and 2025	Target 2026 and beyond	BASIX	BASIX (Energy) – 45-60 BASIX (Water) - 60	BASIX (Energy) – 45-60 BASIX (Water) – 60	Non-residential uses (subject to final modelling)	Green Star Communities – 5+ stars Green Star – 5+ stars NatHERS – 7 star	Green Star Communities – 6+ stars Green Star – 6+ stars NatHERS – 8+ star/ Passive home	Circular economy targets	10% reduction of waste generation 85% reduction in construction waste	100% recovery and re-use of organic waste 90% reduction in construction waste
	Description		Leading industry practice	Sustainable regenerative											
		Target 2020 and 2025	Target 2026 and beyond												
	BASIX	BASIX (Energy) – 45-60 BASIX (Water) - 60	BASIX (Energy) – 45-60 BASIX (Water) – 60												
Non-residential uses (subject to final modelling)	Green Star Communities – 5+ stars Green Star – 5+ stars NatHERS – 7 star	Green Star Communities – 6+ stars Green Star – 6+ stars NatHERS – 8+ star/ Passive home													
Circular economy targets	10% reduction of waste generation 85% reduction in construction waste	100% recovery and re-use of organic waste 90% reduction in construction waste													
SR4	<p><i>Circular economy</i> activities must be located with consideration of:</p> <ol style="list-style-type: none"> Nearby land uses, considering the likely construction and operational impacts of the proposed development Proximity of the proposed development in relation to the Western Sydney Airport, and associated risks to airport and aircraft operations (in reference to the proposed development’s risk assessment) Proximity to land in the Environment and Recreation Zone and impacts on the environmental values of that land Potential impacts on the amenity and use of open space Proximity to major transportation routes, considering safe transportation of extractive and waste materials 														
SR5	Incorporate accessible Circular Economy Infrastructure into mixed use developments to ensure adequate opportunity for people to participate in reuse and recycling schemes.														
SR6	<p>In deciding whether to grant development consent for the purposes of commercial premises, industrial premises or residential accommodation, the consent authority must consider whether:</p> <ol style="list-style-type: none"> The façade and roof of the proposed buildings and paved surfaces are designed to reduce adverse effects of solar heat on the surrounding land, including open space and the public domain, including a requirement for light-coloured roofs, and The awnings and eaves of the building are designed to provide shelter from the sun and improve public comfort at street level, and Building plant and equipment is designed to minimise the release of heat in the direction of open space and the public domain, and The development accommodates tree canopy, pervious surfaces and landscaped areas to minimise solar heat absorption and reflection by hard surfaces. 														

2.4 WESTERN SYDNEY AEROTROPOLIS DEVELOPMENT CONTROL PLAN

2.4.1 Section 2.12 - Sustainability

Performance Outcome		Benchmark Solution
PO1	Incorporate renewable energy systems to ensure all buildings can achieve a 100% renewable energy supply by 2030.	<ul style="list-style-type: none"> + All developments demonstrate how 100% renewable energy supply can be achieved by 2030, whether on or off site. + Where the net zero energy target cannot be accommodated on site, the proponent must provide an offset e.g., with a Power Purchase Agreement.

2.5 NCC 2022 VOLUME ONE SECTION J PROVISIONS

The primary objective of Section J provisions is designed to reduce greenhouse gas emissions through improved performance of building fabric elements and operational services systems in the following categories. Deemed-to-Satisfy (DtS) compliance is mandated for project's minimum provision, but it is recommended to exceed the baseline requirement where reasonable. The project is committed to meeting and exceeding, where possible, the standards of performance within Section J.

- + J4 Building Fabric (**Non-Residential Only**)
- + J5 Building Sealing
- + J6 Air-conditioning & ventilation systems
- + J7 Artificial lighting & power
- + J8 Heated water supply
- + J9 Facilities for energy monitoring and on-site distributed energy resources

Table 3: Building Fabric Requirements (**Non-Residential**)

Building Element	DTS Compliance Requirements	Compliance Recommendation (Refer to Section J)
Concrete Roof	Rt3.20 (downwards) SA < 0.45	+ 40mm R1.75 Rigid Board + min 60mm reflective airgap, or + 150mm R3.00 Bulk ceiling batts
Concrete External Walls	Rt1.40	+ Bulk Insulation 75mm R1.50 or equivalent. R0.2 Thermal break tape on metal frame exterior.
Concrete Internal Walls (Conditioned to non-conditioned internal)	Rt1.40	+ Bulk Insulation 75mm R1.50 or equivalent. R0.2 Thermal break tape on metal frame exterior.
Floor – Suspended Concrete (Non-conditioned below)	Rt2.00	+ Additional thermal Insulation of R1.60 required to underside of slab.

Table 4: Glazing Requirements (**Non-Residential**)

Types of Glazing to Conditioned spaces	Max System U-Value	Max System SHGC	Compliance Recommendation
External Glazing (Conditioned space to external)	5.10	0.39	+ Single Glazed Low-e Grey, or + Double Glazed toned.

2.6 BUILDING AND SUSTAINABILITY INDEX (BASIX)

The Building Sustainability Index (BASIX) aims to deliver equitable, effective water and greenhouse gas reductions across the state of New South Wales. BASIX is implemented under the Environmental Planning and Assessment Act. BASIX applies to all residential dwelling types and is part of the development application process in New South Wales.

BASIX reduces water and energy consumption in residential dwellings. These environmental outcomes also provide a long-term financial saving for the homeowner – and a valuable contribution to the sustainable future of our communities.

Table 5 - BASIX Water Commitments

BASIX Target:		40% - Target Met
WSAP Target:		60% – Target not met
Water Score: 56%		Comments
Rainwater Tank	RWT 1 – Blocks A, B, C 50kL Collection water from roof of Blocks A, B, C (2,572m ²) RWT 2 – Blocks D, E, F 30kL Collection water from roof of Blocks D, E, F (3,064m ²) Rainwater tank water use for <ul style="list-style-type: none"> - All non-low water use landscape, - 1 Car washing bay, and - All unit toilets. 	
Common Landscape	Lawn: 1,058m ² Garden: 7,541m ² , of which 3,371m ² are low water use species	
Private Landscape	Nil	
Fire Sprinkler Systems	All closed loop test systems	
Bathroom Taps	6 Star	Highest rating possible
Kitchen Taps	6 Star	Highest rating possible
Showerheads	4 Star (4.5-6.0L/min)	Highest rating possible
Toilet Flusher	4 Star	Highest rating possible for residential use
Dishwasher	6 Star (Water)	Highest rating possible
Washing Machine	5 Star (Water)	Highest rating possible
Common Pool	Max 160kL	
End of Water		

Table 6 - BASIX Energy Commitments

BASIX Target:		45% – Target met	
WSAP Target:		60% – Target met	
Energy Score: 61%			Comments
Common Area	Ventilation / Type	Lighting	
Gym area	Air-conditioning w/ time clock	LED w/ manual switch	
Car park area	Supply + exhaust w/ CO monitor + VSD fan	Fluorescent w/ zoned switching and motion sensors	
Switch and control rooms	Supply only w/ thermostatically controlled	Fluorescent w/ motion sensors	
Garbage and waste rooms	Exhaust only	Fluorescent w/ motion sensors	
AC services rooms	No mechanical ventilation	Fluorescent w/ motion sensors	
Pump room and fire tank	Supply only w/ thermostatically controlled	Fluorescent w/ motion sensors	
Fire stairs	No mechanical ventilation	Fluorescent w/ motion sensors	
Amenity	Air-conditioning w/ time clock	LED w/ motion sensors	
Ground floor lobbies	Supply only w/ time clock	LED w/ motion sensors	
Lobbies and corridors	Supply only w/ time clock	LED w/ motion sensors	
Lift	Gearless Traction w/ VVVF motor and regenerative drive 20 residential lifts (1000-1500kg)	LED w/ connected to lift call button	
Solar PV	Min 100kW peak system connected to common area / central systems		
Pool	<ul style="list-style-type: none"> - Electric heat pump heating - Pump on timer 		

Dwellings		
Hot Water	<ul style="list-style-type: none"> - Central hot water systems - Electric heat pump w/ COP above 3.0 - R1.0 insulation around all internal and external piping 	
Dwelling Ventilation	Bathroom fans <ul style="list-style-type: none"> - Externally ducted w/ Interlock to light and timer off Kitchen fans <ul style="list-style-type: none"> - Externally ducted w/ manual switch Laundry fans <ul style="list-style-type: none"> - Externally ducted w/ Interlock to light 	
AC Cooling and Heating <i>If Individual</i>	System Type – 1 Phase AC Efficiency – EER/COP 3.0 – 3.5	Option 1
AC Cooling <i>If Central</i>	System Type – VRV Energy Source – Electric driven compressor Heat Rejection – Air cooled condenser Efficiency – COP above 3.5	Option 2
AC Heating <i>If Central</i>	System Type – VRV Energy Source – Electric driven compressor + air sourced evaporator Efficiency – COP above 3.5	
Lighting	LED throughout all units	
Appliances	<ul style="list-style-type: none"> - Electric oven - Electric or Induction cooktop - 4 Star Dishwater - 9 Star Clothes Dryer (Heat pump - condenser) 	
End of Energy		

2.6.1 Nationwide House Energy Rating Scheme (NatHERS)

The Nationwide House Energy Rating Scheme (NatHERS) provides energy ratings for new dwellings. This is helping create energy efficient, resilient, and comfortable homes for the future that cost less to run.

Table 7 - Thermal NatHERS Commitments (**Residential Only**)

Thermal Comfort - All Buildings	
Glazing	
Spec 1 – Primary	
Sliding / Fixed / Louvre Max U-value 4.50 SHGC 0.61 (± 10%) Single Glazed Aluminium Frame – Low-e Clear, or Double Glazed Aluminium Frame – Clear	Awning and Casement Max U-value 4.50 SHGC 0.50 (± 10%) Single Glazed Aluminium Frame – Low-e Clear, or Double Glazed Aluminium Frame – Clear
Spec 2 – B1001, B1003, D605, ELG02, FLG01, FUG13	
Sliding / Fixed / Louvre Max U-value 3.20 SHGC 0.49 (± 10%) Double Glazed Aluminium Frame – Low-e Clear	Awning and Casement Max U-value 3.20 SHGC 0.46 (± 10%) Double Glazed Aluminium Frame – Low-e Clear
External Walls	
External Walls of Units	Concrete Panel - Additional 90mm R2.50 insulation within metal frame Various Cladding - Additional 90mm R2.50 insulation within metal frame - <i>Note external walls to have an air gap between external skin and metal frame, otherwise an R0.20 thermal break will be required.</i>
Internal Walls	
Unit walls to Corridors and Lobbies	Hebel Panel - Additional 70mm R1.50 insulation within metal frame - <i>Note this wall to have an air gap between Hebel and metal frame, otherwise an R0.20 thermal break will be required.</i>
Unit walls to Lifts, Fire Stairs, Plant and Services	Concrete - Additional 70mm R1.50 insulation within metal frame <i>Note this wall to have an air gap between concrete and metal frame, otherwise an R0.20 thermal break will be required.</i>
Intertenancy Walls	No thermal additional insulation modelled
Internal Walls Inside Units	No thermal additional insulation modelled
Unit Floors	
Floors To Unconditioned Internal Areas (Service and plant rooms, corridors, lobbies, etc)	Concrete - Additional R2.00 insulation board
Floors To Basement and External Areas	Concrete - Additional R2.00 insulation board
Intertenancy units	Concrete - No Additional Insulation
Unit Roof	
Roof To Unconditioned and External Areas	Concrete - Additional R2.70 insulation soffit board
End of Thermal	

2.7 SUSTAINABLE BUILDINGS STATE ENVIRONMENTAL PLANNING POLICY 2022

Chapter 2 of the Sustainable Buildings State Environmental Planning Policy 2022 (SB SEPP), standards for residential development - BASIX, provides governance to assess the development with Schedule (1) of SB SEPP, dictating energy and water use, in addition to thermal performance.

Minimising consumption of GHG Emissions, energy, water, and material resources can all be achieved via BASIX. As described in BASIX and NatHERS Compliance above, BASIX aims to deliver equitable, effective water and greenhouse gas reductions across the state of New South Wales for residential buildings.

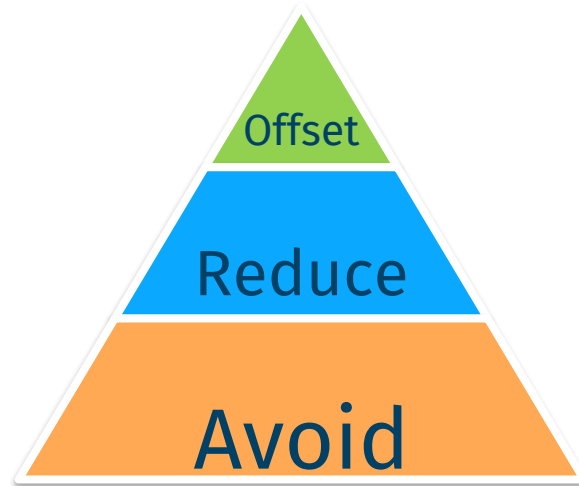
The commitments set out in the BASIX and NatHERS Compliance, including electric services and appliances, efficiency controls, water efficient fixtures, rainwater reuse, and high levels of passive design and thermal comfort, will ensure that every possible effort is made to minimise the consumption of GHG Emissions, energy, and water to a market leading level.

Chapter 2.1(5) of the SB SEPP, states that “development consent must not be granted to development... unless the consent authority is satisfied the embodied emissions attributable to the development have been quantified”.

Embodied emissions (material resources) reporting is integrated into the BASIX and must be quantified and report on to produce a valid certificate. The use of low embodied energy materials will be investigated and evaluated during the detailed design stages of the project.

2.8 ESD FRAMEWORK

Based on ESD frameworks in 2.1 and 2.2, our interpretation of the requirements is to ensure the project's energy and water resource reduction targets are achieved through means of *avoid*, *reduce*, and *offset* design hierarchy action; where the foremost effective strategy is to minimise resource demand through building element design, followed by improving the efficiency of building systems and finally replace non-renewable sources with alternative substitutes. The combined design principles shall reduce the consumptions for energy and water resources, which will minimise the overall building's environmental impact and cost over its lifetime.



- + **Offset** – Provide alternative energy sources. i.e., ENERGY - onsite generation, renewable systems, waste heat reclaim or green power purchases; WATER - rainwater harvesting for landscape, toilet and laundry uses.
- + **Reduce** – Minimise resource demand with improved efficiency requirement to building operational systems, i.e., ENERGY - mechanical and electrical equipment star rating; WATER - high star rating taps, shower head and toilets.
- + **Avoid** – Eliminate consumptions through passive design and user behaviour. i.e., ENERGY - building orientation, solar access, natural cooling, glazing/fabric requirement and improve occupant awareness to building feature uses; WATER - use native, drought tolerant species for landscape, avoid the water-base cooling tower and utilise waterless urinal for common amenities.

3.0 Sustainable Design Strategies

With the intent to satisfy the sustainability objectives from the Western Sydney Aerotropolis Precinct Plan (WSAPP) and Aerotropolis DCP, and minimise the project's environmental impact, the following ESD strategies are proposed. These strategies will guide the design, construction, and operational phases of the project. The proposed design strategies below intend to address the objectives and requirements of Section 4.7 Sustainability and resilience of WSAPP and is to be implemented within the DA stage where relevant and applicable.

Table 8 – WSAPP Section 4.7 Objectives and Design Strategies

Objective	Design Strategy	Impact
<p>SR01 – Performance regarding waste management, water management and carbon consumption.</p>	<p>+ Liverpool DCP 2008 used for waste strategy. Residential:</p> <ul style="list-style-type: none"> • General waste: 110L/Week/Dwelling • Recycling: 110L/Week/Dwelling • Green waste: 240L shared bins provided by council (Engaged waste management team to determine) <p>Non-Residential:</p> <ul style="list-style-type: none"> • Council does not provide waste services to non-residential premises. Owners and operators of non-residential premises must engage a private commercial waste contractor to remove and legally dispose of the waste their premises generates. <p>+ Water Strategy Residential:</p> <ul style="list-style-type: none"> • Refer to BASIX water commitments. <p>Non-residential:</p> <ul style="list-style-type: none"> • Refer to Liverpool DCP 2008 Water management plan pertaining to section 6.8 criteria and for commercial use. <p>+ Energy Strategy Residential:</p> <ul style="list-style-type: none"> • Refer to BASIX Energy, embodied emissions, and thermal comfort commitments. <p>Non-residential:</p>	<p>Implement waste management plans that facilitate the reuse, upcycling, or conversion of waste into energy, and stewardship of items to reduce the quantity of outgoing waste.</p> <p>Waste management plan required by specialist waste consultant.</p>

	<ul style="list-style-type: none"> Refer to NCC 2022 Section J Requirements 	
SR02 – Development should seek to exceed the water and energy requirements of BASIX.	Building and Sustainability Index (BASIX) details the water and energy design strategy which is required to be met. Exceeding the design specifications detailed is recommended in this development.	BASIX Energy score of 60 and Water score of 60 will be targeted to reduce overall Energy and Water consumption.
SR03 – Green infrastructure is effectively used through the provision of water treatment and retention, urban cooling, ecosystem services and amenity and integrated into built, landscaped and natural environments.	<p>The following consultants are responsible for providing provisions to appropriately incorporate green infrastructure into the built environment which includes blue infrastructure and ecosystem services/amenity:</p> <ul style="list-style-type: none"> + Landscaping + Services + Stormwater <p><u>Green infrastructure</u> refers to all vegetation that provides environmental, economic, and social benefits such as clean air and water, climate regulation, erosion control and places for recreation. This also includes parks and reserves, wetlands and stream corridors, trees and roadside verges, gardens and vegetable patches, bikeways/pedestrian trails and rooftop gardens.</p>	<p>Promote better environmental practice and encourage a cohesive sustainable design for the project through design, construction and occupancy with industry recognised green rating tools.</p> <p>Rainwater harvesting system can be used to collect rainwater from the roofs of the building and reduce potable water demand for the following uses (where practical):</p> <ul style="list-style-type: none"> + Garden taps and landscape irrigation systems + Toilet flushing
SR04 – Buildings, infrastructure and public domain elements maximise the recycling and reuse of materials.	<ul style="list-style-type: none"> + Appropriate measures to be taken to reduce construction waste and reuse material where applicable. This contributes to circular economy, reduction on carbon footprint by avoiding GHG emissions associated with disposing wasted materials, and hence can also reduce cost of construction by salvaging, recycle and repurposing material for the development. 	<p>Reduce construction waste going to landfill by reusing or recycling building materials.</p> <p>Include building materials that are responsibly sourced or have a sustainable supply chain to reduce carbon footprint of the project.</p> <p>Ensure responsible construction practices that manages and minimises the environmental impacts, enhance staff health and wellbeing and improve sustainability knowledge on site.</p>

<p>SR05 – Facilitate the design, construction and operation of environmentally sustainable buildings and precincts, including energy efficiency, renewable energy, efficient resource and energy use and reduced emissions and waste.</p>	<p>+ This ESD report, in conjunction with BASIX and Section J compliance, will outline the specific building specifications, commitments, and implementation methods for achieving energy efficiency. These methods will include utilizing large-capacity solar photovoltaic (PV) systems for onsite renewable energy generation, as well as strategies for reducing waste and emissions.</p>	<p>By combining effective building fabric insulation with high-grade glazing, the conditioned space can retain its internal energy and maintain desired temperatures for a longer duration. This reduces the dependence on heating or cooling systems operating at full capacity for lengthy periods, resulting in increased energy efficiency.</p> <p>Maximize renewable energy use (Solar PV) to significantly reduce greenhouse gas emissions, while minimising reliance on non-renewable resources by only using electricity on site.</p> <p>Implement construction practices that proactively manage and minimise environmental impacts, prioritize staff health and well-being, and foster a culture of ongoing sustainability learning on site.</p>
<p>SR06 – Effectively uses waste as a resource through its collection, transport and recycling in a manner that is safe, efficient, cost effective and does provide a positive impact on liveability and the environment.</p>	<p>+ A Waste management plan (WMP) must be submitted with a Development Application for any relevant activities generating waste.</p> <p>+ The WMP is provided in three sections:</p> <ul style="list-style-type: none"> - Demolition - Construction; and - On-going waste management <p><i>Refer to Liverpool DCP 2008 Part 1 section 25.</i></p>	<p>Reducing demand new landfills, by a focus on preventing waste in the first place. This not only reduces landfill use, but also cuts down on greenhouse gases and other harmful pollutants.</p>

<p>SR07 – Measures to mitigate urban heat island effects are integrated in the design of the built form and public domain, for example the use of light-coloured roofs.</p>	<ul style="list-style-type: none"> + The proximity of the residential buildings to each other will locally contribute to heat island effects. + Application of roof colour with a Solar Absorptance of <0.45 is recommended as materials with high thermally capacity can continue to release heat after air temperatures have cooled, leading to higher evening temperatures. + This can be a benefit in winter, however, if not properly managed using light colours it can lead to overheating during summer. + Vegetation can also help to naturally cool the site by releasing moisture into the atmosphere. 	<p>Implement passive solar heating by storing thermal energy within the building mass during winter to offset heating requirements. In summer, employ light-coloured facades and roofs for enhanced solar reflectance, reducing cooling loads.</p>
<p>SR08 – Planning is to provide sustainable and resilient approaches to development and is to incorporate circular economic principles found in the NSW Circular Economy Policy Statement.</p>	<p>Incorporate the key principles of NSW Circular economic policy:</p> <ul style="list-style-type: none"> + Sustainable management of all resources. + Valuing resource productivity + Design out waste and pollution + Maintain the value of products and materials + Innovate new solutions for resource efficiency + Create new circular economy jobs + Foster behaviour change through education and engagement <p>Principles are about shifting from a resource-intensive model to one that maximizes value creation while minimising environmental impact.</p>	<p>Reduce reliance on resources and minimise the end-of-life waste stream through strategies like reuse, repair, and remanufacturing.</p> <p>Reduces dependency on international markets, including the impacts of commodity price fluctuations.</p> <p>Encourage the use of recyclable materials, longer product lifespans, and responsible manufacturing processes.</p> <p>Promotes practices like sustainable resource management, biodiversity conservation, and regenerative agriculture.</p> <p>Encourage initiatives like recycling, composting, and energy recovery from waste.</p>

<p>PO1 (DCP) - Incorporate renewable energy systems to ensure all buildings can achieve a 100% renewable energy supply by 2030.</p>	<ul style="list-style-type: none"> + While BASIX compliance commits to installing 100kW of on-site solar PV to reduce operational energy use, it alone won't achieve 100% renewable energy supply by 2030. + Since achieving net zero energy generation directly on-site is not feasible in this case, the client must compensate for the remaining emissions. This can be done through various means, such as through a Power Purchase Agreement with a renewable energy provider or by acquiring Large-scale Generation Certificates (LGCs). 	<p>Reduce load on the grid and the use of non-renewable energy by offsetting energy consumption with on-site renewables.</p> <p>Ensure electricity usage on site and minimise gas usage to commercial cooking.</p> <p>Offset to meet discrepancy in achieving 100% renewables by 2030 by purchasing LGCs.</p>
--	--	---

Table 9 - WSAPP Section 4.7 Requirements and Commitments

Requirements		Commitment												
SR1	Energy, water, and waste systems are to use a circular economy approach to improve efficiency and result in low-carbon developments.	<ul style="list-style-type: none"> + Liverpool DCP 2008 used for waste strategy. + Energy and water features as specified by BASIX will be ethically and responsibly sourced. Use innovative products as observed on the WELLS website with the minimum required star rating. + Commit to and adhere to the <i>Waste management plan</i> to avoid waste, recover resources add value to end-of-life materials through reuse, repurposing and recycling. 												
SR2	Effectively use renewable energy supply including solar, wind, green hydrogen, and bioenergy.	Minimum 100kW on-site Solar PV to offset residential common areas and central systems, with commitment for the whole development to be carbon neutral by 2030 by either expanding on on-site renewable energies and/or purchasing LGCs or entering a power purchase agreement.												
SR3	<p>Plan for, and achieve, leading industry targets by 2025 and from 2026 beyond to achieve sustainable regenerative targets:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #003366; color: white;">Description</th> <th style="background-color: #003366; color: white;">Leading industry practice Target 2020 and 2025</th> <th style="background-color: #003366; color: white;">Sustainable regenerative Target 2026 and beyond</th> </tr> </thead> <tbody> <tr> <td style="background-color: #e6f2ff;">BASIX</td> <td style="background-color: #e6f2ff;">BASIX (Energy) - 45-60 BASIX (Water) - 60</td> <td style="background-color: #e6f2ff;">BASIX (Energy) - 45-60 BASIX (Water) - 60</td> </tr> <tr> <td style="background-color: #e6f2ff;">Non-residential uses (subject to final modelling)</td> <td style="background-color: #e6f2ff;">Green Star Communities - 5+ stars Green Star - 5+ stars NatHERS - 7 star</td> <td style="background-color: #e6f2ff;">Green Star Communities - 6+ stars Green Star - 6+ stars NatHERS - 8+ star/ Passive home</td> </tr> <tr> <td style="background-color: #e6f2ff;">Circular economy targets</td> <td style="background-color: #e6f2ff;">10% reduction of waste generation 85% reduction in construction waste</td> <td style="background-color: #e6f2ff;">100% recovery and re-use of organic waste 90% reduction in construction waste</td> </tr> </tbody> </table>	Description	Leading industry practice Target 2020 and 2025	Sustainable regenerative Target 2026 and beyond	BASIX	BASIX (Energy) - 45-60 BASIX (Water) - 60	BASIX (Energy) - 45-60 BASIX (Water) - 60	Non-residential uses (subject to final modelling)	Green Star Communities - 5+ stars Green Star - 5+ stars NatHERS - 7 star	Green Star Communities - 6+ stars Green Star - 6+ stars NatHERS - 8+ star/ Passive home	Circular economy targets	10% reduction of waste generation 85% reduction in construction waste	100% recovery and re-use of organic waste 90% reduction in construction waste	<ul style="list-style-type: none"> + BASIX energy score: 61% + BASIX water score: 56% - please refer to BASIX Water Score memo. + Commit to thermal comfort specifications of the development in reaching an average NatHERS Star rating of 7. + Waste Management Plan to show 10% reduction of waste generation, and 85% reduction in construction waste.
Description	Leading industry practice Target 2020 and 2025	Sustainable regenerative Target 2026 and beyond												
BASIX	BASIX (Energy) - 45-60 BASIX (Water) - 60	BASIX (Energy) - 45-60 BASIX (Water) - 60												
Non-residential uses (subject to final modelling)	Green Star Communities - 5+ stars Green Star - 5+ stars NatHERS - 7 star	Green Star Communities - 6+ stars Green Star - 6+ stars NatHERS - 8+ star/ Passive home												
Circular economy targets	10% reduction of waste generation 85% reduction in construction waste	100% recovery and re-use of organic waste 90% reduction in construction waste												

SR4	<p><i>Circular economy</i> activities must be located with consideration of:</p> <ul style="list-style-type: none"> A. Nearby land uses, considering the likely construction and operational impacts of the proposed development B. Proximity of the proposed development in relation to the Western Sydney Airport, and associated risks to airport and aircraft operations (in reference to the proposed development's risk assessment) C. Proximity to land in the Environment and Recreation Zone and impacts on the environmental values of that land D. Potential impacts on the amenity and use of open space E. Proximity to major transportation routes, considering safe transportation of extractive and waste materials <p>Refer to commitments in <i>Development's Risk Assessment & Waste Management Plan</i></p>	
SR5	<p>Incorporate accessible Circular Economy Infrastructure into mixed use developments to ensure adequate opportunity for people to participate in reuse and recycling schemes.</p>	<ul style="list-style-type: none"> + Buildings' common area on each floor to be provided accessible garbage chute for waste disposable and recycling. + Garbage rooms and non-residential garbage disposable rooms to be accessible. + Appropriate information provided in the waste and recycling rooms to engage occupants in participating in correct waste management schemes.
SR6	<p>In deciding whether to grant development consent for the purposes of commercial premises, industrial premises or residential accommodation, the consent authority must consider whether:</p> <ul style="list-style-type: none"> A. The façade and roof of the proposed buildings and paved surfaces are designed to reduce adverse effects of solar heat on the surrounding land, including open space and the public domain, including a requirement for light-coloured roofs, and B. The awnings and eaves of the building are designed to provide shelter from the sun and improve public comfort at street level, and C. Building plant and equipment is designed to minimise the release of heat in the direction of open space and the public domain, and 	<ul style="list-style-type: none"> + Responsible use of reflective material on the façade to avoid deflecting harsh sun light onto radiance sensitive occupants, vegetation, and infrastructure. + Use medium or less than 0.60 solar absorptance paints on facades, and less than 0.45 solar absorptance paint on roof. + Pavement and some accessible lawns have been provided with adequate eaves at ground level, with the ground floorplate being recessed in reference to the building envelope above. Local shading from the surrounding buildings also provides shading. + Plant and equipment are positioned strategically to eject heat away from trafficable areas, and into open/external space, so as not to result in thermal heating effects to adjacent conditioned spaces. + As seen below development provides sufficient tree canopies over pathways. And pavements are also inherently in the local shade of the surrounding residential buildings.

<p>D. The development accommodates tree canopy, pervious surfaces, and landscaped areas to minimise solar heat absorption and reflection by hard surfaces.</p>	
--	--

4.0 Design Summary

The design outlined in this report follows the guidelines of the Western Sydney Aerotropolis Precinct Plan (WSAPP), the Aerotropolis Development Control Plan (DCP), Sustainable Buildings SEPP, and Section 193. This report provides a high-level overview of the environmentally sustainable design principles incorporated into the design, as well as specific proposals for maximizing energy and water efficiency within the project.

Addressing the applicable sustainability objectives of the above, the report incorporates:

- + Effective passive design features, high-performance energy and water systems, alternative resource options, and sustainable construction practices. These elements directly address the energy efficiency and water conservation criteria outlined.
- + A plan to fulfill the WSAPP and Aerotropolis DCP requirements. This plan aligns with the ESD framework and outlines specific strategies to achieve the "AVOID, REDUCE, OFFSET" approach.

In summary, this report details the project's commitment to achieving the objectives and requirements outlined. By fulfilling these commitments, the project will meet the SEARS objective for sustainable performance, energy and water efficiency, and material resource use.