MOTT MACDONALD

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Eden Street, Arncliffe

Ecologically Sustainable Development Report

March 2022


EDEN
PLACE

ISSUE AND REVISION RECORD

Revision	Date	Originator	Checker	Approver	Description
-	19.05.21	N. Tsang	M. Kobacker	A. Davis	Draft for Review
A	01.06.21	N. Tsang	M. Kobacker	A. Davis	Final for Submission
B	02.06.21	N. Tsang	M. Kobacker	A. Davis	Final Development Mix
C	29.06.21	N. Tsang	M. Kobacker	A. Davis	Revised Development Mix
D	28.03.22	N. Tsang	M. Kobacker	A. Davis	Design Amendment

CONTENTS

0. EXECUTIVE SUMMARY

Mott MacDonald has been engaged by Arncliffe Eden Property Pty Ltd to prepare an Ecologically Sustainable Development (ESD) report to be submitted to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSDA-11429726) for the development of land identified at 26-42 Eden Street and 161-179 Princes Highway, Arncliffe (the site) for the purposes of redeveloping the site into a mixed-use precinct with retail and residential uses, comprising both market and social housing (the Project) in partnership with the NSW Land and Housing Corporation (LAHC).

This ESD report identifies and responds to relevant state and local government policy and planning instruments in support of the Project including:

1. Key issue 12 of the State Environmental Assessment Requirements (SEARs)
2. LAHC Sustainability Plan
2. Rockdale Local Environment Plan (RLEP) 2011 and the Bayside Design Excellence Guidelines, May 2011
3. Bayside West Precincts 2036 Plan
4. Rockdale Development Control Plan (DCP) 2011, Amendment 7

Climate Orientated Design

Resiliency is fundamental to decision making. Property development must take account of science-based climate modelling to ensure investment in social and community infrastructure is secure and assets can service the community long into the future.

The building massing has been designed with consideration of the prevailing wind conditions. Summer breezes will permeate the public open spaces in support of the dominant north-south pedestrian movement through the centrally located publicly accessible park. Buildings B and C act to shelter the publicly accessible park from cold winter winds.

An enhanced urban tree canopy and dense landscaping, built form, and a combination of horizontal windbreaks (canopies/pergola) and vertical screening will act to shelter the public, communal and private open spaces.

The built form effectively enhances the useability of the public, communal and private open spaces, creating a comfortable outdoor environment by shading the spaces in summer.

In winter, the northern and western elevations of all buildings maintain high levels of direct sunlight.

Project Response

The design response to the relevant state and local government policy and planning instruments sets the ESD framework for the Project.

To present a concise Project response, the relevant requirements are categorised as follows:

- Management
- Ecology
- Water
- Energy
- Waste
- Pollution
- Sustainable Transport
- Urban Strategy

The ESD strategy responds at the various project scales:

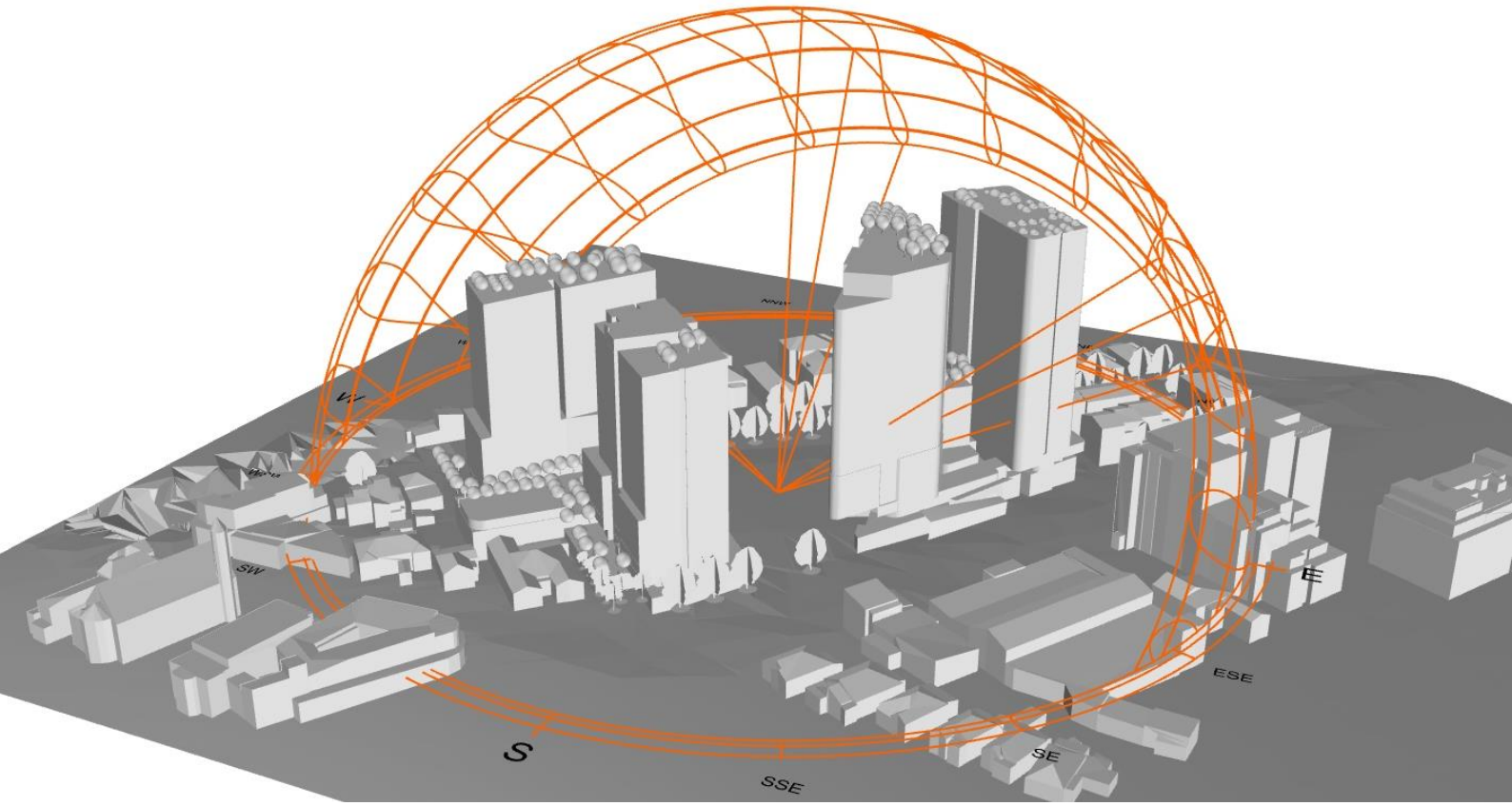
1. Precinct – Equitable | Resilient | Enabled
2. Built Form – Resource Regeneration | Health + Wellbeing | Whole of Life
3. Integrated Design – Thermal Comfort | Energy | Water

Key ESD initiatives include:

1. Implementing passive design measures that achieve a NatHERS rating for all housing that exceeds the performance requirements of the National Construction Code (NCC), NSW Part 2.6 Energy efficiency performance provisions
2. Embedding energy efficiency measures that achieve a BASIX Energy score that exceeds the BASIX Energy Target for high-rise residential flat buildings
3. Meeting the deemed to satisfy (DTS) provisions of National Construction Code (NCC) 2019, Section J Energy efficiency for all retail premises
4. Deploying on-site renewable energy in the form of site-wide solar photovoltaic (PV) systems
5. Integrating water efficiency measures and alternative water reuse strategies that achieve a BASIX Water score that exceeds the BASIX Water Target for high-rise residential flat buildings
6. Diverting at least 85% of construction waste from landfill

7. Preparing an operational waste management plan that promotes responsible source separation to reduce the amount of waste that goes to landfill by implementing convenient and efficient waste management systems
8. Integrating an embedded network to empower consumer and businesses to make sustainable choices
9. Bulk purchasing carbon neutral energy and selling electricity and hot water services to residents at competitive utility rates
10. Making use of materials with a low environmental impact
11. Evaluating measures to reduce the embodied carbon of construction materials and activities
12. Minimising pollution during and after construction
13. Implementing effective stormwater management strategies, including waster sensitive urban design solutions to deliver enhanced discharge water quality
14. Incentivising a modal shift away from private car ownership/use

By identifying and embedding precinct and built form opportunities and initiatives, the Project response will deliver integrated design outcomes. The ESD strategy presents an holistic, interdependent response to realise optimal development outcomes.



1. INTRODUCTION

Mott MacDonald has been engaged by Arncliffe Eden Property Pty Ltd to prepare an Ecologically Sustainable Development (ESD) report to be submitted to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSDA-11429726) for the development of land identified at 26-42 Eden Street and 161-179 Princes Highway, Arncliffe (the site) for the purposes of redeveloping the site into a mixed-use precinct with retail and residential uses, comprising both market and social housing (the Project) in partnership with the NSW Land and Housing Corporation (LAHC).

SSDA-11429726 seeks approval for the following development:

- Demolition of all existing buildings and structures on the site
- Site preparation works, excavation and tree removal
- The construction of a mixed-use development comprising:
    - 744 apartments across four (4) buildings between 20-23 storeys in height, including:
        - 186 market housing apartments in Building A
        - 202 market housing apartments in Building B
        - 180 social housing apartments in Building
        - 176 market housing apartments in Building D
    - 3,113 m² retail gross floor area
    - 240 m² for a future childcare centre
    - 3,706 m² of communal open space
    - 813 spaces of lower ground and basement car parking
    - 4,870 m² of publicly accessible open space including a 4,000 m² park, an 870 m² public plaza (meeting space), and through site link connecting Eden Street and the Princes Highway

This ESD report identifies and responds to relevant state and local government policy and planning instruments in support of the Project.

The design response to the policy and planning instruments identified below sets the ESD framework for the Project.

1. In response to key issue 12 of the State Environmental Assessment Requirements (SEARs), the Project must:
    - Identify how ESD principles, as defined by clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000, will be incorporated in the design and ongoing operation phases of the Project
    - Demonstrate how the Project will meet or exceed the relevant industry recognised building sustainability and environmental performance standards
    - Demonstrate how to the Project will incorporate measures to minimise carbon emissions, reflecting the NSW Government's goal of net zero emissions by 2050
2. Demonstrate how the Project meets or exceeds the LAHC Sustainability Plan
3. Demonstrate how the Project is aligned with clause 6.14 Design excellence of the RLEP 2011 and the Bayside Design Excellence Guidelines, May 2011
4. Demonstrate how the Project responds to the Arncliffe precinct vision in the Bayside West Precincts 2036 Plan
5. Demonstrate how the Project will embed ESD initiatives to address objectives and controls outlined in the Rockdale DCP 2011, Amendment 7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2. DESIGN PRINCIPLES

2.1 Climate Analysis

Resiliency is fundamental to decision making. Property development must take account of science-based climate modelling to ensure investment in social and community infrastructure is secure and assets can service the community long into the future.

Future Climate

To affect sound decision making, RCP (Representative Concentration Pathway) 8.5 (high emissions scenario) climate modelling, in line with the NARCliM (NSW and ACT Regional Climate Modelling) Project, has been considered. A 2070 timeline horizon (far future) has been selected based on the Project design life (40 years).

The following future climate projections impact the Project:

1. Maximum temperatures are projected to increase by 1.9 ºC and minimum temperatures are projected to increase by 2.0 ºC (see Figures 1 and 2)
2. More hot days and fewer cold nights are projected; the number of hot days (above 35 ºC) is projected to increase by up to an additional 11 days per year; the number of cold nights (below 2 ºC) is projected to decrease by 12 days per year (see Figures 1 and 2)
3. Rainfall is projected to increase in autumn and decrease in spring
4. Average fire weather and severe fire weather days are projected to increase

Figure 1: Current annual hourly ambient dry bulb temperature

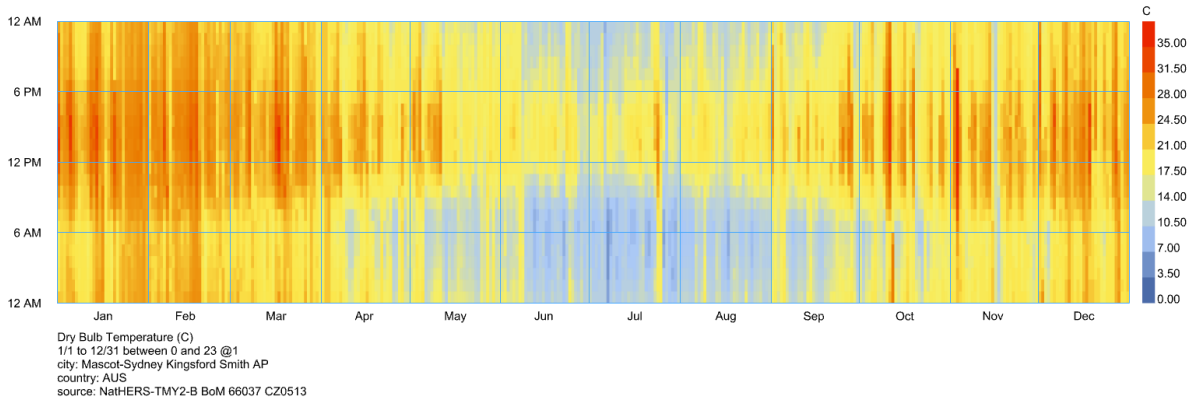
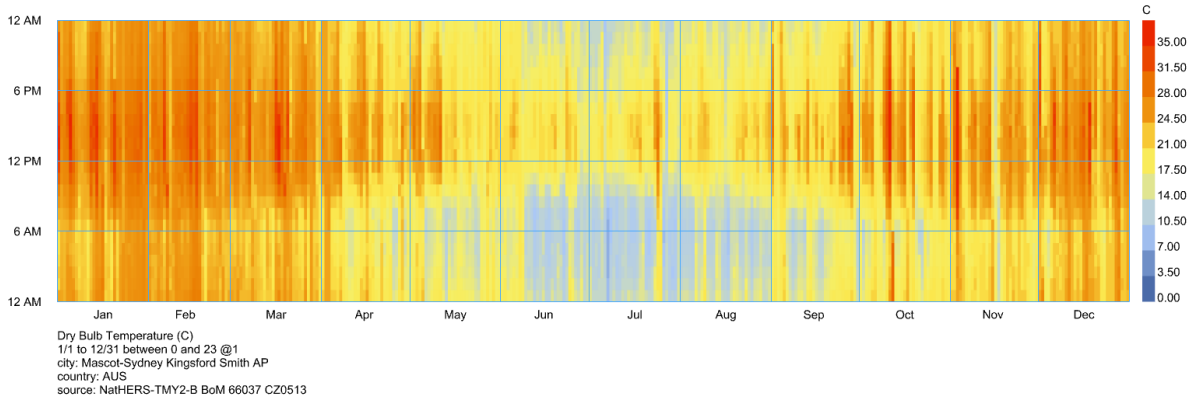


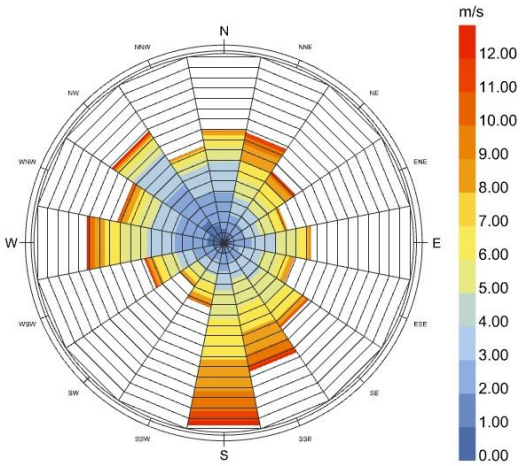
Figure 2: Projected 2070 annual hourly ambient dry bulb temperature



Wind

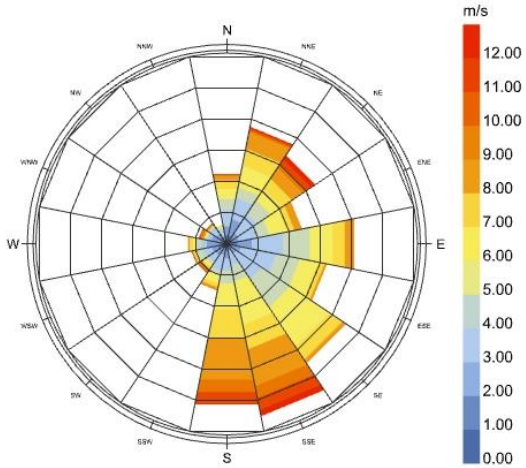
The site experiences a predominately southerly wind (see Figure 3). Similar conditions are observed in the summer months (see Figure 4). These observations changes in winter, with a prevailing westerly wind observed (see Figure 5).

Figure 3: Annual prevailing wind conditions



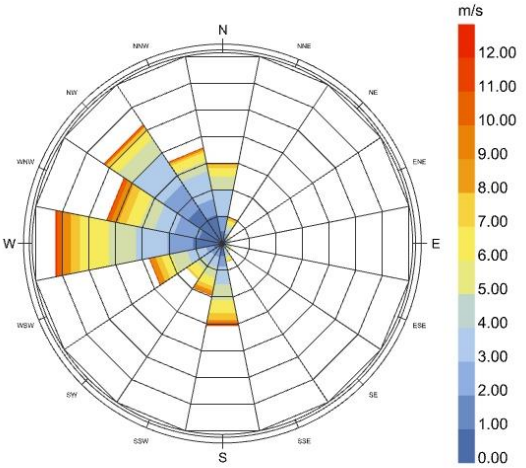
Wind Speed (m/s)
city: Mascot-Sydney Kingsford Smith AP
country: AUS
source: NatHERS-TMY2-B BoM 66037 CZ0513
period: 1/1 to 12/31 between 0 and 23 @1
Calm for 10.95% of the time = 959 hours.
Each closed polyline shows frequency of 0.6% = 50 hours.

Figure 4: Summer prevailing wind conditions



Wind Speed (m/s)
city: Mascot-Sydney Kingsford Smith AP
country: AUS
source: NatHERS-TMY2-B BoM 66037 CZ0513
period: 12/1 to 2/28 between 0 and 23 @1
Calm for 3.75% of the time = 81 hours.
Each closed polyline shows frequency of 2.4% = 50 hours.

Figure 5: Winter prevailing wind conditions



Wind Speed (m/s)
city: Mascot-Sydney Kingsford Smith AP
country: AUS
source: NatHERS-TMY2-B BoM 66037 CZ0513
period: 6/1 to 8/31 between 0 and 23 @1
Calm for 20.02% of the time = 442 hours.
Each closed polyline shows frequency of 2.8% = 50 hours.

2.2 Passive Design

Passive design principles respond to the local climate, with consideration given to:

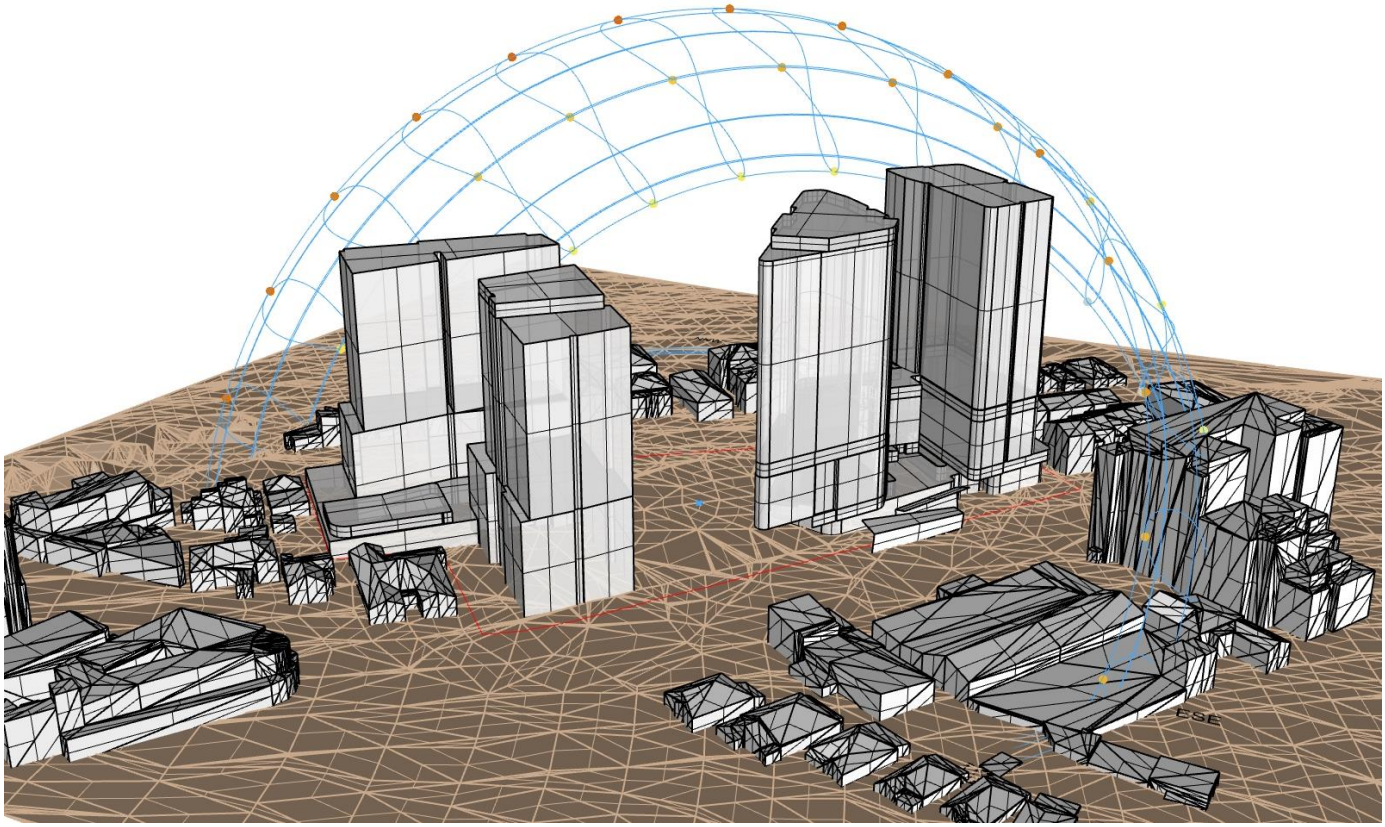
1. Building massing, separation and permeability to mitigate the urban wind canyon effect, including sheltering the urban environment from the prevailing west-east winter wind and leveraging the prevailing south-north summer breeze
2. Optimising the urban form to provide good urban thermal comfort for improved useability of the public, communal and private open spaces, including shading and enhanced urban tree canopy coverage
3. Building massing and orientation to optimise solar and daylight access, and mitigate/manage visual discomfort for residents and businesses

Wind Effects

The building massing has been designed with consideration of the prevailing wind conditions. Summer breezes will permeate the public open spaces in support of the dominant north-south pedestrian movement through the centrally located publicly accessible park. Buildings B and C act to shelter the publicly accessible park from cold winter winds.

An enhanced urban tree canopy and dense landscaping, built form, and a combination of horizontal windbreaks (canopies/pergola) and vertical screening will act to shelter the public, communal and private open spaces.

Figure 6: Microclimate analysis model



Urban Thermal Comfort

UTCI (Universal Thermal Comfort Index) is a metric applied to indicate the urban thermal comfort experienced by a pedestrian for a specific site location with regard to the built form, ground type (reflectivity of materials) and climate-specific conditions.

A UTCI simulation was conducted for a projected 2070 design year, and summer and winter periods were selected for evaluation.

The urban form effectively enhances the useability of the public, communal and private open spaces, creating good urban thermal comfort for the community. The public accessible park, on average, typically experiences no thermal stress in summer (21ºC) (see Figure 7) or winter (10ºC) (see Figure 8).

Table 1: UTCI performance table

UTCI Range	Stress Category
+46ºC	Extreme heat stress
+38 to +46ºC	Very strong heat stress
+32 to +38ºC	Strong heat stress
+26 to +32ºC	Moderate heat stress
+9 to +26ºC	No thermal stress
+9 to 0ºC	Slight cold stress
0 to -13ºC	Moderate cold stress
-13 to -27ºC	Strong cold stress
-27 to -40ºC	Very strong cold stress
-40ºC	Extreme cold stress

Figure 7: Summer performance (December to February); [top] north view; [bottom] south view

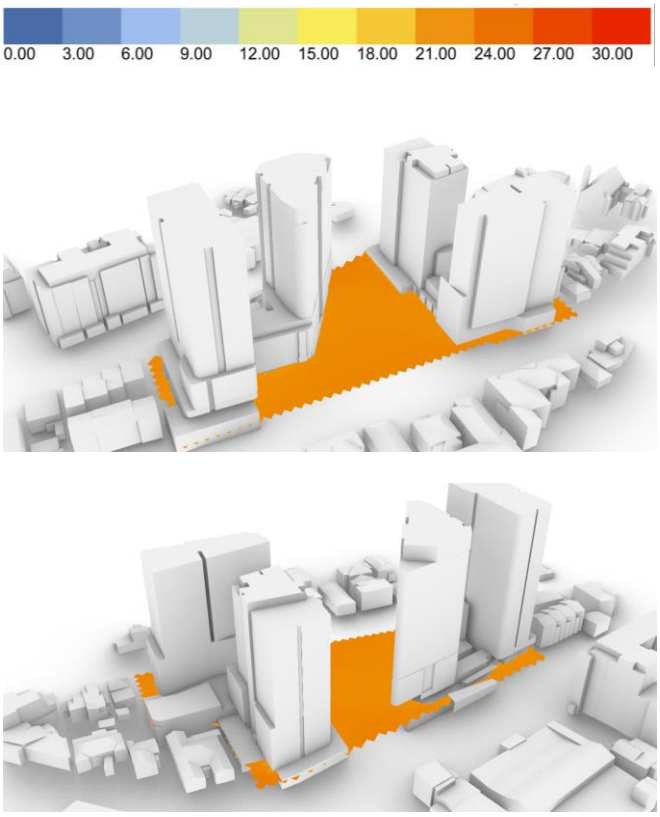
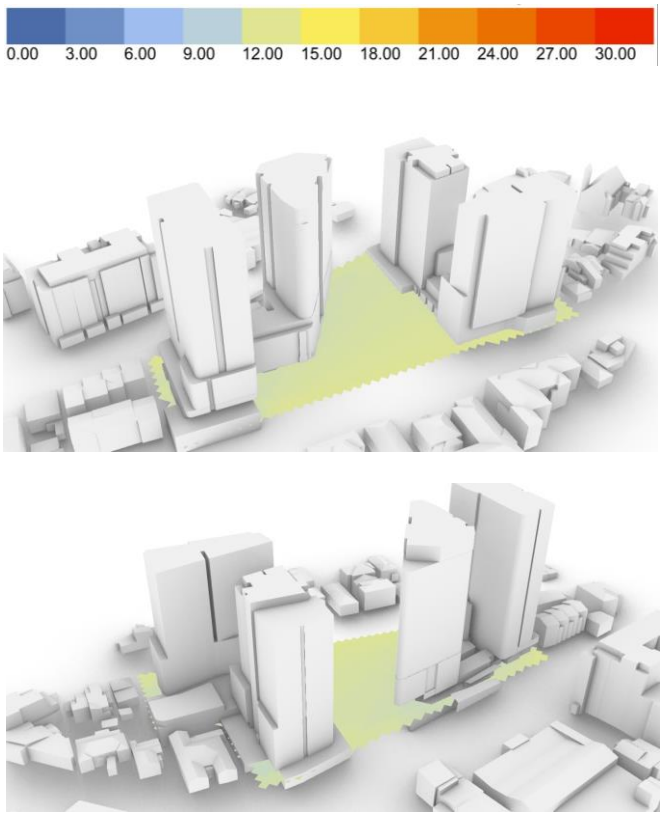


Figure 8: Winter performance (June to August); [top] north view; [bottom] south view



Sun Hours

A sun hours simulation was conducted to identify the amount of direct sun exposure on the buildings and open spaces. The sun hours analysis indicates all buildings receive high levels of direct sunlight to all elevations in summer (see Figure 9). In winter, the northern and western elevations of all buildings maintain high levels of direct sunlight (see Figure 10).

The built form effectively enhances the useability of the public open spaces, maintaining high levels of direct sunlight throughout the year. The built form acts to shade the public open spaces in summer, enhancing the comfort and liveability of the Project (see Figures 9 and 10). This correlates with the findings of the UTCI analysis.

Figure 9: Sun hours for a typical summer day; [top] north view; [middle-top] east view; [middle-bottom] south view; [bottom] west view

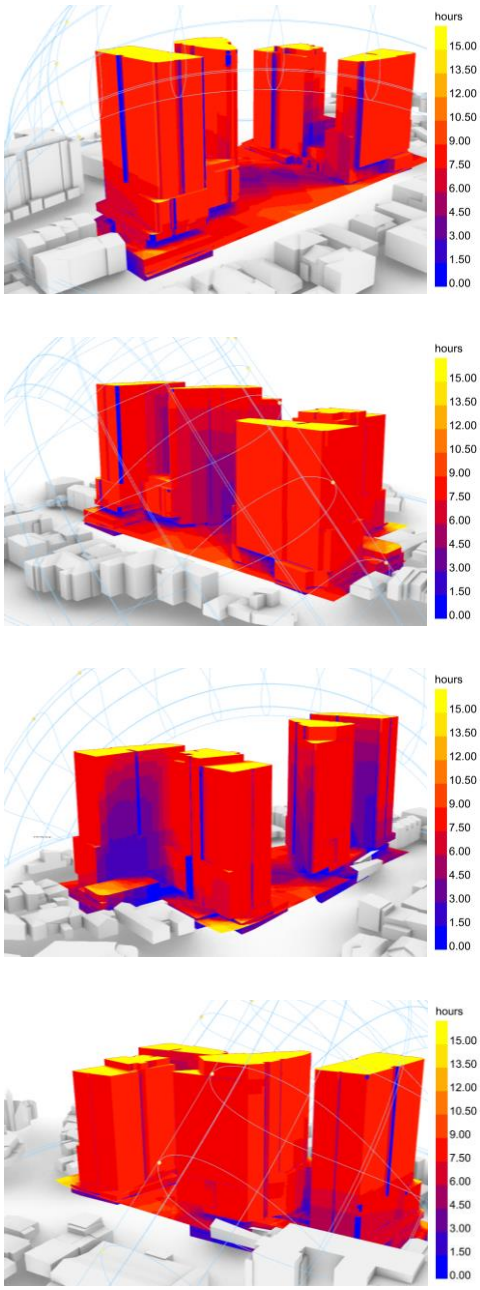
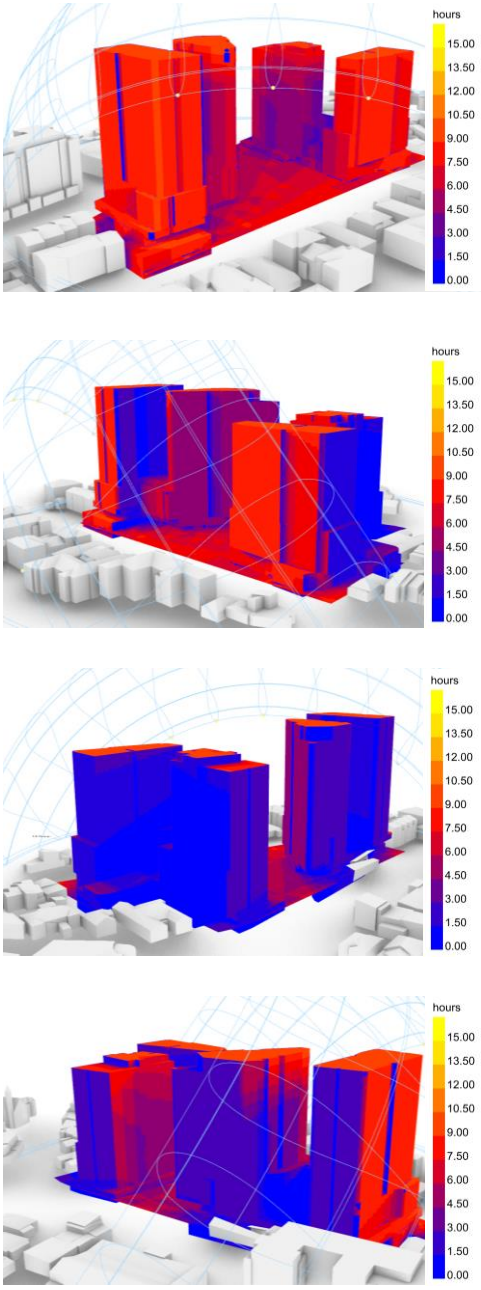


Figure 10: Sun hours for a typical winter day; [top] north view; [middle-top] east view; [middle-bottom] south view; [bottom] west view



3. PROJECT RESPONSE

3.1 State Environmental Assessment Requirements

- ***Identify how ESD principles, as defined by clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000, will be incorporated in the design and ongoing operation phases of the Project***

(a) The Precautionary Principle

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. In the application of the precautionary principle, public and private decisions should be guided by:

i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

ii. an assessment of the risk-weighted consequences of various options.

Project Response

The Project involves a mixed-use development comprising 744 apartments across four (4) buildings between 20-23 storeys in height, retail premises, communal open space, lower ground and basement car parking, and a publicly accessible park and meeting space. The Project does not pose a threat of serious or irreversible environmental damage.

Proactive measures to prevent environmental degradation will be included within the design, construction and operation phases of the Project. During construction, the main contractor will implement an independently certified Environmental Management System (EMS) that will demonstrate a formalised systematic and methodical approach to planning, implementing and auditing for environmental management. During operation, adherence to procedures that account for environmental risk and mitigation measures will be met.

(b) Inter-Generational Equity

The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

Project Response

The Project will maintain the health, diversity and productivity of the environment for future generations by minimising the consumption of energy and water, and waste generation.

This will be demonstrated by:

1. Implementing passive design measures that achieve a NatHERS rating for all housing that exceeds the performance requirements of the National Construction Code (NCC), NSW Part 2.6 Energy efficiency performance provisions
2. Embedding energy efficiency measures that achieve a BASIX Energy score that exceeds the BASIX Energy Target for high-rise residential flat buildings
3. Meeting the deemed to satisfy (DTS) provisions of National Construction Code (NCC) 2019, Section J Energy efficiency for all retail premises
4. Deploying on-site renewable energy in the form of a site-wide solar PV system
5. Integrating water efficiency measures and alternative water reuse strategies that achieve a BASIX Water score that exceeds the BASIX Water Target for high-rise residential flat buildings
6. Diverting at least 85% of construction waste from landfill
7. Preparing an operational waste management plan that:
    - Promotes responsible source separation to reduce the amount of waste that goes to landfill by implementing convenient and efficient waste management systems
    - Ensures adequate waste provisions and robust procedures that will cater for potential changes during operation

(c) Conservation of Biological Diversity and Ecological Integrity

The conservation of biological diversity and ecological integrity should be a fundamental consideration.

Project Response

The Project is considered highly unlikely to have significant biodiversity impacts as the development is limited to highly modified areas, containing planted native and exotic vegetation only.

The site may comprise potential and marginal foraging habitat within the broad habitat ranges of highly mobile native fauna. However, no suitable roosting or breeding habitat within the buildings to be removed was identified.

(d) Improved Valuation, Pricing and Incentive Mechanisms

Environmental factors should be included in the valuation of assets and services, such as:

i. Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

ii. The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste, and

iii. Environmental goals, having been established, 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.

Project Response

Environmental factors are considered by the Project through the implementation of an ESD framework.

An EMS will be in place throughout construction to ensure that pollution is prevented and waste is minimised through effective waste stream handling, collection and recycling.

- ***Demonstrate how future buildings will meet or exceed the relevant industry recognised building sustainability and environmental performance standards***

Project Response

Passive design - An average 7 star NatHERS rating is targeted for all housing. Passive design measures will be implemented such that the building design demonstrates reduced heating and cooling loads when compared to the current national standard (6 star) to maintain indoor thermal comfort.

Energy efficiency - A BASIX Energy score of 35 for social housing and 31 for market housing is targeted. Energy efficiency measures will be embedded such that building design demonstrates reduced energy consumption when compared to the current standard (25).

Water efficiency - A BASIX Water score of 42 for social housing and 53 for market housing is targeted. Water efficiency measures and alternative water reuse strategies will be integrated such that the building design demonstrates reduced water consumption when compared to the current standard (40).

- ***Demonstrate how to the proposal incorporates measures to minimise carbon emissions, reflecting the Government's goal of net zero emissions by 2050***

Project Response

The Project will:

1. Take advantage of proven emissions reduction technologies to reduce the cost of living. A total site-wide solar PV array of greater than 150 kWp will be installed across public and communal open spaces as integrated shade structures. The solar PV array will provide an average electricity generation of 600 kWh per day; equivalent to the average daily common area power consumption for Building A + one car parking level.
2. Empower consumer and businesses to make sustainable choices. An embedded network will be integrated into the Project. The embedded network retailer/operator, Evergy, will bulk purchase carbon neutral energy and sell electricity and hot water services to residents. This buying power will benefit residents by providing carbon neutral energy at competitive utility rates.
3. Invest in the electrification of space heating services and residential cooking to accelerate the decarbonisation of the built environment. A future transition to full building electrification has been enabled through adequate electrical infrastructure sizing.

3.2 Sustainability Plan

The Project, comprising social and market housing, forms part of the NSW LAHC 'Communities Plus' program. A sustainability plan was established at the time of the development tender. This includes targets and requirements across the following categories:

1. Energy and greenhouse gas emissions
2. Water
3. Transport and connectivity
4. Resource use - materials and waste
5. Living costs

Energy and Greenhouse Gas Emissions

The Project will:

1. Achieve the deemed to satisfy (DTS) provisions of National Construction Code (NCC) 2019, Section J Energy efficiency for all retail premises
2. Implement passive design measures that achieve an average 7 star NatHERS rating for all housing, reducing the heating and cooling loads to maintain indoor thermal comfort (see Table 2)
3. Embed energy efficiency measures that achieve a BASIX Energy score of 35 for social housing and 31 for market housing, exceeding the BASIX Energy Target for high-rise residential flat buildings (see Table 3)
4. Deploy on-site renewable energy in the form of a site-wide solar photovoltaic PV systems (see Table 3)

Table 2: Implemented passive design measures

Passive Design Measures	
1	Envelope wall - R 3.5 insulation
2	Envelope floor - R 2.0 insulation
3	Floor finish - tile (wet areas + kitchens)
4	Floor finish - carpet (bedrooms, living/dining rooms)
5	Envelope roof + R 3.5 insulation
6	Roof colour - medium
7	Fixed/slider window - U 3.4 | SHGC 0.40
8	Awning/bifold window - U 3.9 | SHGC 0.33
9	Window shading - fixed devices, eaves, overhangs
10	Weather stripping - all external doors and windows
11	Roof light - U 3.4 | SHGC 0.40
12	Ceiling light penetration - insulated
13	Ceiling fan - bedrooms, living rooms (Building C)

Table 3: Embedded energy efficiency design measures

Energy Efficiency Measures	
1	Building management system - Yes
2	Heating / cooling - Building A, B and D only
3	Heating / cooling efficiency - EER > 4.0 / EER > 3.5
4	Mechanical exhaust - fan to façade / manual switch
5	Car park ventilation - CO sensors + VSD fans
6	Hall / lobby ventilation - BMS controls
7	Lighting (unit) - ≥ 80% LED fittings in all rooms
8	Lighting (common areas) - LED fittings + controls
9	Clothes washer - 4.0 star (Building C - not specified)
10	Dishwasher - 3.5 star (Building C - not specified)
11	Clothes dryer - 4.0 star (Building C - not specified)
12	Clothes drying line - Yes, internal
13	Hot water piping insulation - Yes, R 1.0
14	Lift - VVVF gearless traction
15	Solar PV - > 150 kWp

Renewable Energy

The Project has sought to maximise the extent and capacity of the proposed site-wide solar PV systems. This consists of deploying PV systems across:

1. Public open space in locations that are efficient for renewable energy generation (i.e. not subject to overshadowing) and offer effective shading amenity to residents, workers and visitors
2. Communal open space in locations where there is no loss of amenity to residents
3. Above plant areas where systems can be accommodated without impact to plant and equipment operation

Table 4 details the location and capacity of the proposed PV systems. This demonstrates a comprehensive and varied PV system application.

Figure 11 presents an example PV system configuration.

The extent and capacity of the site-wide solar PV systems enable the BASIX Energy score for both social and market housing to exceed minimum requirements.

Figure 11: Proposed solar PV system - Building B, Level 22 rooftop

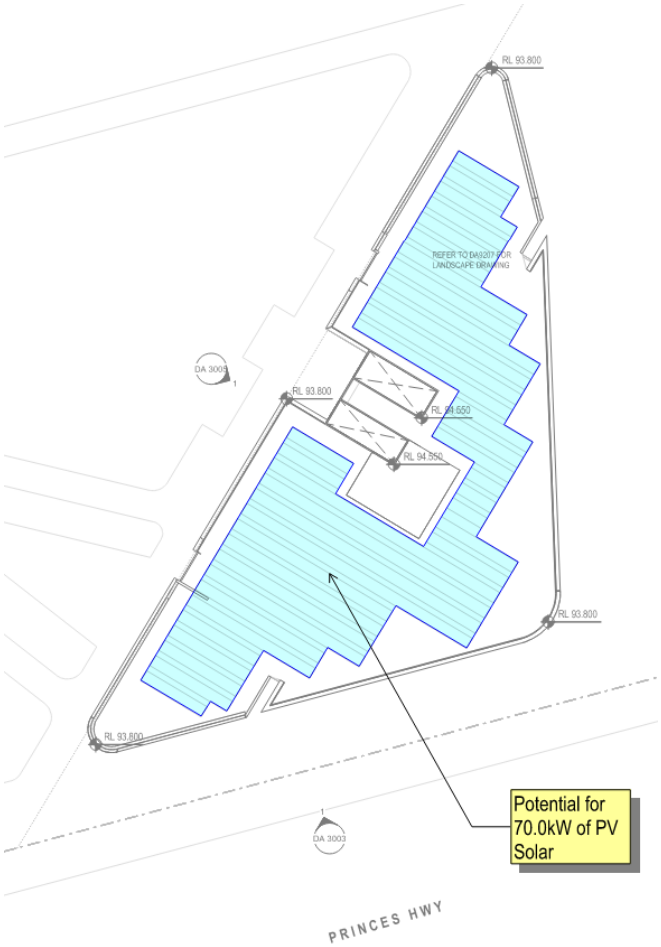


Table 4: Extent and capacity of the proposed PV systems

Location	Capacity
Building A, Level 21 rooftop	35.6 kWp
Building B, Level 22 rooftop	70.0 kWp
Building C, Level 21 rooftop	9.0 kWp
Building D, Level 21 rooftop	28.1 kWp
Plantroom rooftop, Level 3	27.0 kWp
Pergola, Level 2	3.7 kWp
Plantroom rooftop, Level 1	7.1 kWp
Pergola, Upper Ground Floor	2.7 kWp
TOTAL	**183.2 kWp (375 W PV module)**

Water

The Project will:

1. Integrate water efficiency measures and alternative water reuse strategies that achieve a BASIX Water score of 42 for social housing and 53 for market housing, exceeding the BASIX Water Target for high-rise residential flat buildings (see Table 5)

Table 5: Integrated water efficiency measures

	Water Efficiency Measures
1	Shower - 4.0 star
2	Toilet - 4.0 star
3	Kitchen tap - 5.0 star
4	Bathroom tap - 6.0 star
5	Clothes washer - 4.5 star (Building C - not specified)
6	Dishwasher - 4.5 star (Building C - not specified)
7	Landscape - ≥ 75% native planting
8	Rainwater harvesting – 6 x 22.7 kL rainwater tanks
9	Rainwater reuse - irrigation + car wash bay
10	Fire sprinkler test water - closed loop

Transport and Connectivity

The Project will:

1. Maintain and enhance pedestrian and cycle networks by:
    - Providing a shared pedestrian / cycle path along the western Princes Highway footway
    - Upgrading the eastern Eden Street footpath adjacent to the site, including the provision of a widened footpath
    - Providing a raised marked pedestrian crossing over Eden Street adjacent to The Arcade
    - Upgrading of the existing pedestrian refuge provided over Eden Street at Forest Road
2. Use ground surfaces throughout the pedestrian network that are slip-resistant, traversable by wheelchairs and indicate changes of grade by use of materials that provide a visual and tactile contrast
3. Make pedestrian access legible and separate from vehicular access
4. Enhance accessibility to public transport (bus and train) by:
    - Providing new publicly accessible through site pedestrian links between Princes Highway and Eden Street
    - Providing a raised and marked pedestrian crossing over Eden Street adjacent to The Arcade, linking with Arncliffe Railway Station
5. Provide safe and convenient pedestrian access from car parking and other public areas, with well coordinated signage, lighting, security, direct paths of travel with stairs and disabled access ramps
6. Design secure bicycle parking to cater to the various users, including residents and staff, and visitors. Visitor parking will be located to minimise obstruction to pedestrian movement and in areas with passive surveillance.
7. Provide basement resident bicycle parking in the form of individual bicycle lockers
8. Promote sustainable transport outcomes by:
    - Providing dedicated small car parking spaces within the retail customer parking area
    - Providing dedicated shared car spaces adjacent to the site
    - Installing EV charging infrastructure throughout the public and private parking areas
    - Providing dedicated and convenient motorcycle and bicycle parking
    - Reducing reliance on private motor vehicle trips through the provision of mixed residential, retail, community, recreational and employee generating use within one concentrated precinct
    - Reducing reliance on private motorist vehicle trips through a reduction in on-site resident and residential visitor vehicle parking provision
    - Preparing and implementing a site-specific Green Travel Plan and ensuring future monitoring to support effective modal shift

Resource Use - Materials and Waste

The Project will:

1. Divert at least 85% of construction waste from landfill
2. Prepare an operational waste management plan that:
    - Promotes responsible source separation to reduce the amount of waste that goes to landfill by implementing convenient and efficient waste management systems
    - Ensures adequate waste provisions and robust procedures that will cater for potential changes during operation
3. Install a waste chute in each residential building with access on all occupied levels. A dual chute for the disposal of waste and recyclables will be installed in Building C.
4. Provide a separate cupboard near the waste chute for interim storage of commingled recyclables for later transportation by the building caretaker to the chute discharge room
5. Provide a retail waste room for the storage of general waste, paper/cardboard and commingled recyclables
6. Make use of materials with a low environmental impact. This is expected to include:
    - Extensive use of precast concrete walls, fabricated in a precast facility using reusable formwork
    - Use of reusable formwork for internal floors and core walls on site
    - Low emissions paints of all internal flat and low-sheen areas
    - Water-based paints for all internal, gloss or semi-gloss finishes
    - Sustainably sourced timber for skirting, architraves, etc.
7. Evaluate measures to reduce the embodied carbon of construction materials and activities, including:
    - Implement the partial replacement of Portland cement with supplementary cementitious materials, reduction in raw aggregate use with recycled aggregate, and the use of recycled water in the mix water
    - Investigate a carbon neutral temporary electricity supply for on-site construction activities

Living Costs

The Project will:

1. Integrate an embedded network for market housing to empower consumer to make sustainable choices
2. Bulk purchase carbon neutral energy and sell electricity and hot water services to market housing residents at competitive utility rates

3.3 Design Excellence

The Project will have regard to:

1. Environmental impacts
2. Achievement of the principles of ecologically sustainable development
3. Appropriate balance between resilient materials, embodied energy, and resource consumption and dependence
4. Pedestrian and cycle access

Project Response

The Project will:

1. During construction, the main contractor will implement an independently certified Environmental Management System (EMS) that will demonstrate a formalised systematic and methodical approach to planning, implementing and auditing for environmental management. During operation, adherence to procedures that account for environmental risk and mitigation measures will be met.
2. Meet or exceed the Land and Housing Corporation (LAHC) Sustainability Plan, including:
    - Energy consumption and greenhouse gas (GHG) emissions reduction
    - Water consumption reduction
    - Construction and operational waste management and minimisation
3. Make use of materials with a low environmental impact
4. Evaluate measures to reduce the embodied carbon of construction materials
5. Divert at least 85% of construction waste from landfill
6. Prepare an operational waste management plan that:
    - Promotes responsible source separation to reduce the amount of waste that goes to landfill by implementing convenient and efficient waste management systems
    - Ensures adequate waste provisions and robust procedures that will cater for potential changes during operation
7. Make pedestrian access legible and separate from vehicular access
8. Maintain and enhance pedestrian and cycle networks

3.4 Precinct Plan

The Project will have regard to the precinct vision to:

1. Create comfortable environments for walking and cycling
2. Enhance urban tree canopy to support better shade and thermal comfort to enhance liveability, heath and wellbeing of both the community and the environment
3. Improve habitat and biodiversity
4. Improve existing and provide new areas of open space
5. Implement effective stormwater management strategies

Project Response

1. The building massing has been designed with consideration of the prevailing wind conditions. Summer breezes will permeate the public open spaces in support of the dominant north-south pedestrian movement through the centrally located publicly accessible park. Buildings B and C act to shelter the publicly accessible park from cold winter winds.
2. An enhanced urban tree canopy and dense landscaping, built form, and a combination of horizontal windbreaks (canopies/pergola) and vertical screening will act to shelter the public and private open spaces
3. The built form effectively enhances the useability of the public, communal and private open spaces, maintaining high levels of direct sunlight throughout year and creating a comfortable outdoor environment by shading the public open spaces in summer
4. In winter, the northern and western elevations of all buildings maintain high levels of direct sunlight
5. The Project is considered highly unlikely to have significant biodiversity impacts as development is limited to highly modified areas, containing planted native and exotic vegetation only
6. On-site detention (OSD) tanks have been sized according to their respective catchment areas to meet the maximum Permissible Site Discharge (PSD) for all storm events up to and including the 100-year ARI storm event
7. Stormwater quality treatment exceeds the water quality targets specified in the Rockdale DCP 2011, Amendment 7
8. Water sensitive urban design (WSUD) treatment terrain includes a grassed swale along the deep soil area of the publicly access park

3.5 Project Controls

The Project will have regard to:

1. Providing a comfortable urban environment
2. Reducing environmental impact
3. Implementing best practice sustainability principles
4. Achieving water management objectives
5. Sustaining and enhancing biodiversity
6. Enhancing environmental amenity
7. Promoting quality landscape design solutions
8. Promoting passive design, energy efficiency and renewable energy
9. Developing effective waste minimisation and management strategies regarding construction waste and ongoing management waste facilities

Project Response

The Project will:

1. Provide a comfortable urban environment through a climate responsive urban massing design that responds to prevailing wind conditions, enhances the useability of the public and private open spaces by creating a comfortable outdoor environment, and maintains high levels of sunlight to residents and pedestrians
2. During construction, the main contractor will implement an independently certified Environmental Management System (EMS) that will demonstrate a formalised systematic and methodical approach to planning, implementing and auditing for environmental management. During operation, adherence to procedures that account for environmental risk and mitigation measures will be met.
3. Achieve the deemed to satisfy (DTS) provisions of National Construction Code (NCC) 2019, Section J Energy efficiency for all retail premises
4. Implement passive design measures that achieve an average 7 star NatHERS rating for all housing, reducing the heating and cooling loads to maintain indoor thermal comfort
5. Embed energy efficiency measures that achieve a BASIX Energy score of 35 for social housing and 31 for market housing, exceeding the BASIX Energy Target for high-rise residential flat buildings
6. Deploy on-site renewable energy in the form of a site-wide solar PV systems
7. Integrate water efficiency measures and alternative water reuse strategies that achieve a BASIX Water score of 42 for social housing and 53 for market housing, exceeding the BASIX Water Target for high-rise residential flat buildings
8. Provide an enhanced urban tree canopy and dense landscaping, built form, and a combination of horizontal windbreaks (canopies/pergola) and vertical screening to shelter the public, communal and private open spaces
9. Divert at least 85% of construction waste from landfill
10. Prepare an operational waste management plan that promotes responsible source separation by implementing convenient and efficient waste management systems, and ensures adequate waste provisions and robust procedures that will cater for potential changes during operation
11. Make use of materials with a low environmental impact
12. Evaluate measures to reduce the embodied carbon of construction materials and activities
13. Divert at least 85% of construction waste from landfill
14. Prepare an operational waste management plan that promotes responsible source separation to reduce the amount of waste that goes to landfill by implementing convenient and efficient waste management systems
15. Ensure adequate waste provisions and robust procedures are in place that will cater for potential changes during operation
16. Incentivise a modal shift away from private car ownership/use
17. Install OSD tanks to meet the maximum Permissible Site Discharge (PSD) for all storm events up to and including the 100-year ARI storm event
18. Specify stormwater quality treatment solutions to exceed the water quality targets specified in the Rockdale DCP 2011, Amendment 7
19. Integrate WSUD treatment terrain includes a grassed swale along the deep soil area of the publicly access park
20. Ensure no significant biodiversity impacts

4. ESD FRAMEWORK

Requirement	Reference	Project Response	Responsible Party
Management			
• Avoid serious or irreversible damage to the environment • Environmental factors should be included in the valuation of assets and services • Reduce environmental impacts	• SEARs, Key issue 12, EP&A Regulation, Precautionary Principle • SEARs, Key issue 12, EP&A Regulation, Improved Valuation, Pricing and Incentive Mechanisms • LAHC Sustainability Plan, Living costs • RLEP 2011 and the Bayside Design Excellence Guidelines, May 2011 • Rockdale DCP 2011, Amendment 7, Part 2 Urban Strategy	• During construction, implement an independently certified Environmental Management System (EMS) that will demonstrate a formalised systematic and methodical approach to planning, implementing, auditing for environmental management • During operation, adhere to procedures that account for environmental risk and mitigation measures	• During construction - Main Contractor • During operation - Strata Management
• Minimise carbon emissions, reflecting the Government's goal of net zero emissions by 2050 • Reduce living and operating costs	• SEARs, Key issue 12	• Install a site-wide solar PV array of greater than 150 kWp • Integrate an embedded network. The embedded network retailer/operator will bulk purchase carbon neutral energy and will sell electricity and hot water services to residents at competitive utility rates. • Invest in the electrification of space heating services and residential cooking to accelerate the decarbonisation of the built environment	• Developer • Electrical Engineer • Structural Engineer
Ecology			
• Conservation of biological diversity and ecological integrity should be a fundamental consideration • Sustain biodiversity	• SEARs, Key issue 12, EP&A Regulation, Conservation of Biological Diversity and Ecological Integrity • Rockdale DCP 2011, Amendment 7, Part 4.1 Site Planning	• The Project is considered highly unlikely to have significant biodiversity impacts as development is limited to highly modified areas, containing planted native and exotic vegetation only • No suitable roosting or breeding habitat within the buildings to be removed was identified	• Landscape Architect
• Enhance environmental amenity • Promote quality landscape design solutions	• Rockdale DCP 2011, Amendment 7, Part 4.3 Landscape Planning and Design	• Provide an enhanced urban tree canopy and dense landscaping, built form, and a combination of horizontal windbreaks and vertical screening to shelter the public, communal and private open spaces	• Landscape Architect
Water			
• Maintain the health, diversity and productivity of the environment for future generations by minimising the consumption of water • Achieve the principles of ecologically sustainable development • Implement best practice sustainability principles	• SEARs, Key issue 12, EP&A Regulation, Inter-Generational Equity • LAHC Sustainability Plan, Water • RLEP 2011 and the Bayside Design Excellence Guidelines, May 2011 • Rockdale DCP 2011, Amendment 7, Part 2 Urban Strategy • Rockdale DCP 2011, Amendment 7, Part 4.1 Site Planning	• Integrate water efficiency measures and alternative water reuse strategies that achieve a BASIX Water score of 42 for social housing and 53 for market housing, exceeding the BASIX Water Target for high-rise residential flat buildings	• Hydraulic Engineer • Civil Engineer

Requirement	Reference	Project Response	Responsible Party
Energy			
• Maintain the health, diversity and productivity of the environment for future generations by minimising the consumption of energy • Achieve the principles of ecologically sustainable development • Implement best practice sustainability principles • Promote passive design, energy efficiency and renewable energy	• SEARs, Key issue 12, EP&A Regulation, Inter-Generational Equity • LAHC Sustainability Plan, Energy and Greenhouse Gas Emissions • RLEP 2011 and the Bayside Design Excellence Guidelines, May 2011 • Rockdale DCP 2011, Amendment 7, Part 2 Urban Strategy • Rockdale DCP 2011, Amendment 7, Part 4.4 Sustainable Building Design	• Achieve the deemed to satisfy (DTS) provisions of National Construction Code (NCC) 2019, Section J Energy efficiency for all retail premises • Implement passive design measures that achieve an average 7 star NatHERS rating for all housing, reducing the heating and cooling loads to maintain indoor thermal comfort • Embed energy efficiency measures that achieve a BASIX Energy score of 35 for social housing and 31 for market housing, exceeding the BASIX Energy Target for high-rise residential flat buildings • Deploy on-site renewable energy in the form of a site-wide solar PV system of greater than 150 kWp	• Passive design - Architect • Energy efficiency - Services Consultants • Renewable energy - Electrical Engineer
Materials			
• Achieve an appropriate balance between resilient materials and embodied energy	• LAHC Sustainability Plan, Resource Use – Materials and Waste • RLEP 2011 and the Bayside Design Excellence Guidelines, May 2011	• Make use of materials with a low environmental impact • Extensively use of precast concrete walls, fabricated in a precast facility using reusable formwork • Use reusable formwork for internal floors and core walls on site • Use low emissions paints of all internal flat and low-sheen areas ,and water-based paints for all internal, gloss or semi-gloss finishes • Sustainably source timber for skirting, architraves, etc. • Evaluate measures to reduce the embodied carbon of construction materials and activities • Implement the partial replacement of Portland cement with supplementary cementitious materials, reduce raw aggregate use with recycled aggregate, and use recycled water in the mix water • Investigate a carbon neutral temporary electricity supply for on-site construction activities	• Main Contractor

Requirement	Reference	Project Response	Responsible Party
Waste			
• Maintain the health, diversity and productivity of the environment for future generations by minimising waste generation • Ensure waste is minimised through effective waste stream handling, collection and recycling • Achieve the principles of ecologically sustainable development • Implement best practice sustainability principles	• SEARs, Key issue 12, EP&A Regulation, Inter-Generational Equity • SEARs, Key issue 12, EP&A Regulation, Improved Valuation, Pricing and Incentive Mechanisms • LAHC Sustainability Plan, Resource Use – Materials and Waste • RLEP 2011 and the Bayside Design Excellence Guidelines, May 2011 • Rockdale DCP 2011, Amendment 7, Part 4.7 Site Facilities	• Divert at least 85% of construction waste from landfill • Prepare an operational waste management plan that promotes responsible source separation to reduce the amount of waste that goes to landfill by implementing convenient and efficient waste management systems • Ensure adequate waste provisions and robust procedures are in place that will cater for potential changes during operation	• Construction waste - Main Contractor • Operational waste - Architect / Waste Consultant
Pollution			
• Ensure that pollution is prevented • Minimise pollution during and after construction • Implement effective stormwater management strategies	• SEARs, Key issue 12, EP&A Regulation, Improved Valuation, Pricing and Incentive Mechanisms • Bayside West Precincts 2036 plan • Rockdale DCP 2011, Amendment 7, Part 4.1 Site Planning • Rockdale DCP 2011, Amendment 7, Part 4.3 Landscape Planning and Design	• On-site detention (OSD) tanks have been sized according to their respective catchment areas to meet the maximum Permissible Site Discharge (PSD) for all storm events up to and including the 100-year ARI storm event • Stormwater quality treatment exceeds the water quality targets specified in the Rockdale DCP 2011, Amendment 7 • Water sensitive urban design (WSUD) treatment terrain includes a grassed swale along the deep soil area of the publicly access park	• Civil Engineer
Sustainable Transport			
• Encourage public transport use • Incentivise a modal shift away from private car ownership/use • Provide high levels of bicycle parking for residents and visitors • Enhance existing pedestrian, cycle and public transport networks	• LAHC Sustainability Plan, Transport and Connectivity • RLEP 2011 and the Bayside Design Excellence Guidelines, May 2011 • Bayside West Precincts 2036 plan • Rockdale DCP 2011, Amendment 7, Part 4.6 Access and Movement	• Maintain and enhance pedestrian and cycle networks • Enhance accessibility to public transport (bus and train) • Make pedestrian access legible and separate from vehicular access • Use safe and visually contrasting ground surfaces throughout the pedestrian network • Design secure and appropriately located bicycle parking to caters to the various users • Provide basement resident bicycle parking in the form of individual bicycle lockers • Promote sustainable transport initiatives	• Transport Planner / Architect / Landscape Architect / Electrical Engineer

Requirement	Reference	Project Response	Responsible Party
		Urban Strategy	
• Create comfortable environments for walking and cycling • Enhance urban tree canopy to support better shade and thermal comfort to enhance liveability, heath and wellbeing of both the community and the environment • Improve habitat and biodiversity • Improve existing and provide new areas of open space • Promote quality landscape design solutions	• Bayside West Precincts 2036 plan • Rockdale DCP 2011, Amendment 7, Part 4.3 Landscape Planning and Design	• Provide an enhanced urban tree canopy and dense landscaping, built form, and a combination of horizontal windbreaks (canopies/pergola) and vertical screening to shelter the public, communal and private open spaces • Design the building massing with consideration of the prevailing wind conditions. Leverage summer breezes to permeate the public open spaces in support of the dominant north-south pedestrian movement through the centrally located publicly accessible park. Shelter the publicly accessible park from cold winter winds. • Develop an urban form that effectively enhances the useability of the public and private open spaces, maintaining high levels of direct sunlight throughout year and creating a comfortable outdoor environment by shading the public open spaces in summer • Enhance the comfort and liveability of the Project	• Urban/building massing - Architect • Landscape design - Landscape Architect


KIDS ZON

5. ESD STRATEGY

A precinct wide approach is adopted across core imperatives: equitable | resilient | enabled. Interdependent strategies deliver a high quality public realm that responds to urban heat, water quality and comfort.

Priorities are integrated at a built form scale: resource regeneration | health + wellbeing | whole of life. These act to seamlessly address the triple bottom line; delivering health benefits by reducing resource consumption and improving liveability by managing energy costs.

EQUITABLE

Access _ high quality public open space
Minimise _ running costs
Connect _ to good public transport
Incentivise _ active mobility and walkability

RESOURCE REGENERATION

Air _
- Energy efficient
- Improved air quality

Water _
- Reduced potable water use
- Enhanced water quality

Waste _
- Diverted from landfill
- Reduced, reused, recycled

RESILIENT

Adapt _ to a changing climate
Mitigate _ urban heat
Create _ a comfortable outdoor environment

HEALTH + WELLBEING

Enhance _ comfort and liveability
Optimise _ building envelope

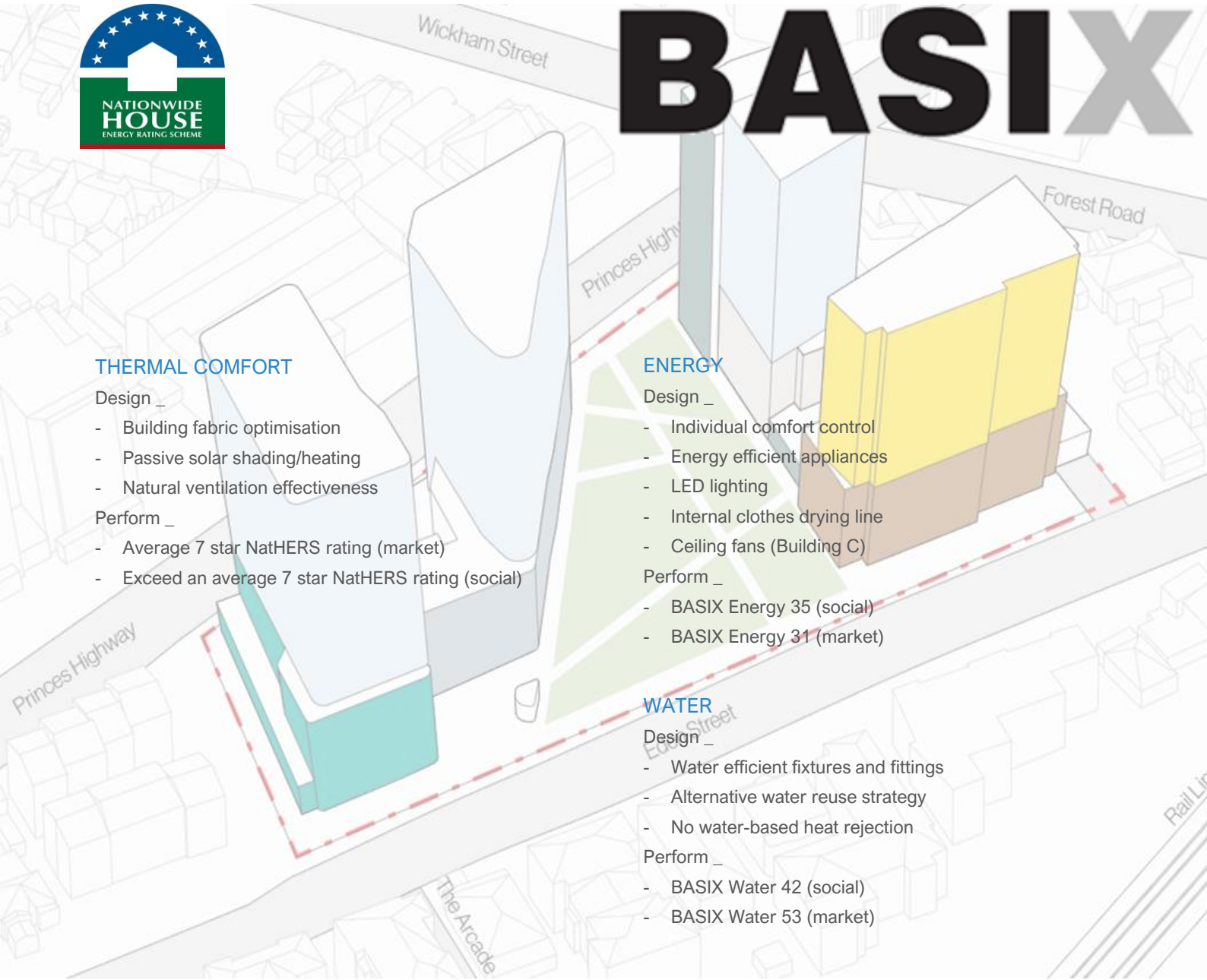
ENABLED

Decarbonise _ through building electrification
Manage _ demand for grid resilience
Generate _ on-site renewable energy

WHOLE OF LIFE

Reduce _ whole life carbon
Address _ construction and operation
Manage _ monitor, target and control

Precinct and built form opportunities and initiatives translate to a development response that delivers integrated design outcomes that benefit all residents and businesses.



NATIONWIDE HOUSE ENERGY RATING SCHEME

BASIX

THERMAL COMFORT

Design _

- Building fabric optimisation
- Passive solar shading/heating
- Natural ventilation effectiveness

Perform _

- Average 7 star NatHERS rating (market)
- Exceed an average 7 star NatHERS rating (social)

ENERGY

Design _

- Individual comfort control
- Energy efficient appliances
- LED lighting
- Internal clothes drying line
- Ceiling fans (Building C)

Perform _

- BASIX Energy 35 (social)
- BASIX Energy 31 (market)

WATER

Design _

- Water efficient fixtures and fittings
- Alternative water reuse strategy
- No water-based heat rejection

Perform _

- BASIX Water 42 (social)
- BASIX Water 53 (market)

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