Sydney Swans HQ and Community Centre

Ecologically Sustainable Design Report

Sydney Swans C/O APP

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Document prepared by:

Aurecon Australasia Pty Ltd
ABN 54 005 139 873
Level 5, 116 Military Road
Neutral Bay NSW 2089
PO Box 538
Neutral Bay NSW 2089
Australia

T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

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Author signature		Approver signature	
Name	Maeve Molins	Name	Anthony Badr
Title	Sustainability Consultant	Title	Project Leader

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1.1 Introduction

This Ecologically Sustainable Design (ESD) report has been prepared on behalf of the Sydney Swans Limited in support of a State Significant Development (SSD) application for the proposed adaptive reuse of the Royal Hall of Industries for a high-performance sport and community facility. The facility will enable a range of land uses, including a new home for the Sydney Swans and NSW Swifts. It will accommodate a multi-purpose facility available for community uses, sporting, medical and rehabilitation areas, administration and office spaces and associated plant and store rooms

This report serves to outline the Environmentally Sustainable Design (ESD) initiatives and principles that are embedded in the project in response to relevant legislative requirements and the owner's commitment to sustainability.

1.2 Site

The site is located at 1 Driver Avenue, Moore Park and comprises a portion of two separate lots, legally described as Lot 3, DP861843 and Lot 52 of DP1041134. The site is owned by the Centennial Park and Moore Park Trust and is leased to the Sydney Swans for the purposes of the development.

The proposed application will relate to the Royal Hall of Industries (RHI) building, and the associated courtyard area to the immediate south of the building. The development area is located in the south-western corner of the Entertainment Quarter precinct and has a direct frontage to Driver Avenue to the west, Lang Road to the south and Errol Flynn Boulevard to the east, an access road within the Entertainment Quarter precinct.

The RHI has in recent times been utilised as an exhibition space. The building has a rectilinear plan form with symmetrically placed entrances on all four sides, four to the east and west, and two to each of the north and south facades. The building has a gross floor area of approximately 5,700sqm at ground level with basement toilets at the southern end of the building.

The courtyard to the south of the building currently accommodates loading and general plant services associated with the RHI building and storage sheds. The building and courtyard area is surrounded by a 6.95m high brick wall. The total area of the subject site extends to approximately 1.9ha and is illustrated at **Figure 1** below.

Figure 1 Site Location

1.3 Regional Context

The site is located within the southwestern corner of the Moore Park Showground Precinct, a major recreational area in the eastern suburbs of Sydney. Measuring approximately 28.7 hectares in area, the precinct includes a range of passive and active recreational areas with a focus on cultural, entertainment, and sporting uses. Key land uses include the Entertainment Quarter, Centennial Parklands Equestrian Centre and Fox Studios.
The location of the site is strategically significant due to its proximity to a number of key land uses within Sydney, including:

- Royal Randwick Racecourse – 1.8km
- UNSW and Prince of Wales Hospital – 3.7km
- Sydney CBD – 4.5km
- Sydney Airport – 11.9km

1.4 Local Context

The site is located in the City of Sydney Local Government Area (LGA). The predominant character of the area is associated with entertainment, leisure and recreational land uses, with infrastructure changes associated with the CSELR (CBD and South East Light Rail) construction.
The site has a direct frontage to Driver Avenue to the west, Lang Road to the south and Errol Flynn Boulevard to the east, an internal access road within the Entertainment Quarter precinct. Mature fig trees are located along Lang Road, Driver Avenue and Anzac Parade.

The land uses in the immediate surrounding area comprise the following:

- The Hordern Pavilion is located to the immediate north of the site, which operates as a live music and entertainment venue with an associated pedestrianised forecourt area.

- The Entertainment Quarter, to the immediate east of the site, is an entertainment, dining and leisure precinct with cinemas, restaurants, bars and an outdoor sporting, performance and event space. A 2,000-space car park is also provided.
- To the immediate south of the site is the Centennial Parklands Sports Centre, comprising netball and tennis courts with a large area of open space.
- The SCG and Allianz Stadium is located further north of the site. Allianz Stadium is currently undergoing demolition associated with the construction of a new sports stadium on the site, expected to be completed by mid-2022.
- Moore Park is located on the west and east of Anzac Parade, and Centennial Park and Queens Park are located to the south-east of the site. Collectively known as the Centennial Parklands, the parks measure 360ha in area.

1.5 Overview of the Proposed Development

This application seeks approval for the proposed adaptive reuse of the Royal Hall of Industries (RHI) for a high-performance sport and community facility. The development will maintain the structural integrity and façade of the RHI, whilst re-purposing the interior of the building to support a number of compatible uses and utilise the space effectively.

In addition to the repurposing of the RHI, an extension of the building will be constructed to the south of the building in the current service and courtyard area. The built form of the extension is consistent in height, scale and material with the RHI and will be largely concealed behind the existing courtyard wall.

The facility will include:

- Home of the Sydney Swans;
- Home of the NSW Swifts;
- Multi-purpose indoor facility available for community use and public events such as junior club nights, school graduations, functions
- An indoor netball court for the NSW Swifts Netball Team and netball community
- Facilities for a Swans team in the AFL National women's competition
- Player change areas, lockers and wet areas;
- Wet recovery – pool and hot/cold hydrotherapy;
- Go Foundation and Clontarf Foundation for indigenous education;
- Australian Red Cross Blood Service Donation Centre;
- Medical, rehabilitation and sport science areas;
- Gymnasium, museum, media centre and auditorium
- Back of house offices and café/canteen;
- Entry foyer and retail/shop units;
- Plant and store rooms; and
- Sydney Swans Academy.

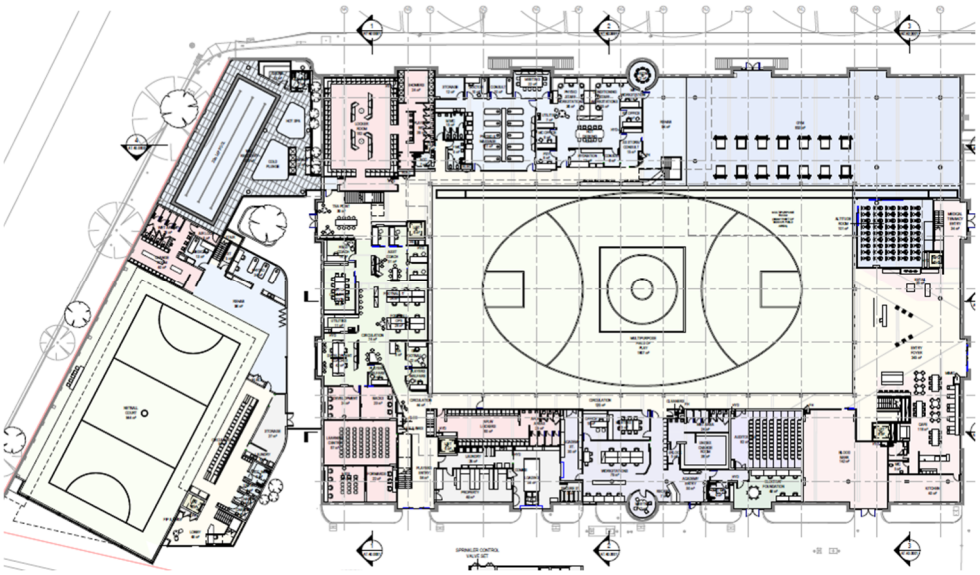


Figure 2 Populous Ground Floor Plan

	Royal Hall of Industries	Swifts Annex (inc pool)
General Staff	135 (including sub-tenants)	11
Players	46	14
GFA	8498	2090

Figure 3 Area and Population Schedule

2 ESD Principles

2.1 Definition of Sustainability

Sustainability is a broad and all-encompassing term which is often understood to mean different things by different people. This section of the report aims to provide the relevant background and context to understand what is meant by 'Ecologically Sustainable Design' in the context of the Sydney Swans HQ and Community Centre

The definition of sustainability that this strategy is working toward is:

The principles of ecologically sustainable development are as follows:

(a) "precautionary principle"

(b) "inter-generational equity"

(c) "conservation of biological diversity and ecological integrity"

(d) "improved valuation, pricing and incentive mechanisms"

This is as defined in clause 7(4) of Schedule 2 of the EP&A Regulation 2000.

The key sustainability focus areas for this project which respond to this definition are:

a) Minimising greenhouse gas emissions from operational energy consumption, onsite emissions and transport to and from the site;

b) Extending the life of the Royal Hall of Industries

c) Minimising consumption of natural resources such as water and materials;

d) Maximising biodiversity on site through selection of native vegetation; and

e) Designing for comfort and wellbeing for occupants and visitors

2.2 Legislative context

The Sydney Swans HQ and Community Centre is located in the Sydney Suburb of Moore Park, and falls under the local planning requirements of Sydney City Council.

Planning and design has been undertaken in accordance with the City of Sydney Development Control Plan, which sets out a number of ESD requirements.

The project is a refurbishment of an existing building constructed in 1913. The previous design of the building predates Section J of the NCC, However, any new works, will be design and constructed in accordance with the requirements of energy efficiency stipulated in Section J of the NCC 2016.

2.3 Secretary's Environmental Assessment Requirements (SEARs)

This report addresses the following SEARs:

Assessment requirement	Section
Ecologically Sustainable Design principles detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design, construction and ongoing operation phases of the development	2.1
Best Practice Sustainability demonstrate how the proposed development responds to best practice, sustainable building principles and improves environmental performance through energy efficient design, technology and renewable energy	3.1 3.2.1 3.2.2
Responsible use of resources include a description of the measures that would be implemented to minimise consumption of resources, water and energy.	Energy – 3.2 Water – 3.4 Resources – 3.5

Design of Resilience to Climate Change demonstrate how the climate change projections of the NSW Government's Regional Climate Modelling (NARCliM) are used to inform the building design, adaptive reuse and asset life of the project.	Section 4

3 Ecologically Sustainable Design Strategy

3.1 Sustainable Building principles

3.1.1 Sustainability Framework

The development aspires to meet current best practice in terms of sustainable design.

The Green Star – Design & As Built v1.2 tool, developed and administered by the Green Building Council of Australia, will be used as a reference guide to drive the sustainability outcomes of the project. This framework sets meaningful benchmarks for design and construction outcomes over 9 categories and is used to assess best practice for new developments across Australia. The tool, which is most commonly used to rate commercial office buildings, presents several challenges for heritage buildings and indoor sports facilities, and as such a formal rating is not being targeted at this stage.

The unique nature of the Royal Hall of Industries offers the opportunity to extend the life of an iconic building that has served a variety of uses since its original construction in 1913. While the vision for this development has inherently been shaped around options for reducing impact on resources, there are also certain limitations around the use of an existing building more than 100 years old.

The following chapters identify the key sustainability impact areas that the project will seek to address.

3.2 Energy

3.2.1 Operational Energy Targets

The design of the proposed development will seek to promote efficiency and minimize operational energy. Comparative benchmarking will inform the design, using the NABERS (National Australian Built Environment Rating System) tool. NABERS can be used to measure a building's energy efficiency and inform targets for electricity and gas consumption over a 1-year period and compare this to buildings of a similar size and location. While the unique space use for this project is unlikely to be appropriate for obtaining a formal NABERS rating, the required energy efficiency for each star bracket will inform an assessment of operational consumption in line with best practice.

The NABERS for offices tool (whole building) is the most appropriate for this building type, and as such our assessment has excluded specialist areas such as the playing fields, pool and gymnasium, resulting in an included NLA of 6782m^2 and an estimated 97 workstations.

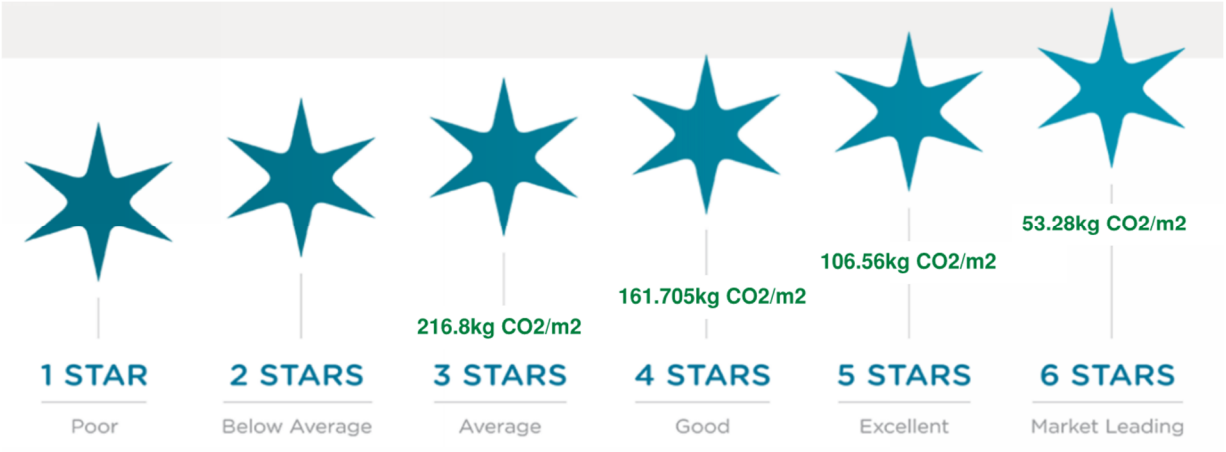


Figure 4 NABERS Star benchmarks estimated for the office component

3.2.2 Renewable Energy

Rooftop space is currently being investigated for the suitability of solar photovoltaic panels as a renewable energy source for the project.

It has been identified that the most suitable location is the roof for the new Swifts HQ to the south of the RHI. This has taken into account:

- More availability of roof space, with the majority of RHI required for mechanical plant
- More structural capacity, with limitations placed on the existing RHI roof due to it's age
- Minimised visual impact, which is a requirement for the Moore Park lease
- Easier, safer access for installation and maintenance

The roof of this portion of the building has approximately 500m2 available for mounted photovoltaic panels, which would safely allow for approximately 240 modules (1m x 1.6m). The project could therefore target a maximum peak array size of approximately 70 kWp.

As the design develops the energy profile of the building will be further investigated in order to confirm the feasibility of a solar installation.

3.2.3 Façade performance

Facade design in this instance is restricted to what is possible within the scope of the refurbishment works. The current design does not propose any significant changes to the primary structure of the existing Royal Hall of Industries. The new portion housing the netball court and Swifts' offices will be designed to a high level of performance for energy efficiency, and will meet or exceed all glazing, building fabric and building sealing requirements of Section J 2016.

Within the existing structure, the intention is to replace the existing frosted glazing with clear glazing. This presents the opportunity to deliver higher quality natural lighting for occupants whilst also improving the glazing performance and meeting glazing requirement of the NCC.

3.2.4 Lighting performance and Natural lighting opportunities

The project will utilise energy efficient lighting throughout to reduce operational energy demand and running costs. Use of LED fixtures will be used throughout. Motion detector/timing sensors are to be fitted where

applicable e.g. bathrooms. Individual lighting control systems for office spaces are currently being investigated by lighting designers.

New clear glazing to produce natural lighting is expected to reduce reliance on artificial lighting during daylit hours. The will be achieved by skylights, to be installed on the roof above the field, gym, dining hall and pool to add daylighting and a comfortable user experience for athletes and other users. The sizing of these skylights is to consider the impact of heat gains from glazing and be sized appropriately, with glazing selection and shading currently being explored.

3.2.5 HVAC

Chilled Water System

The Swans HQ will be supplied with chilled water from a new high efficiency chiller.

A water-cooled system will be used with a chiller located in the proposed plant space on Level 1 and a cooling tower at roof level. Chilled water will be distributed to AHUs and FCUs located on the Ground and Level 1 floors

Heating Hot Water System

A centralised gas fired heating hot water generator system provides heating hot water to the AC units for space heating.

Heating hot water will be distributed by variable-speed primary hot water pumps (duty/stand-by), serving the entire building.

Trim heating to the perimeter zones shall be avoided wherever possible.

Cooling and Heating Distribution

Chilled water pipework will reticulate from the roof-mounted chiller and be distributed throughout the Swans building via chilled water pipework and risers. A separately metered branch will also extend to serve the tenancy areas on Ground and Level 1.

Similarly, hot water will be distributed throughout the building via heating water pipework and risers.

Office Areas

Each level of the Swans and Swifts HQ areas will be conditioned by a combination of perimeter zone and centre zone FCUs installed in the ceiling void.

Where FCUs are serving areas with a false ceiling, it is proposed that air distribution is via ceiling mounted swirl diffusers. In the areas where there is not ceiling, the proposal is to install jet swirl diffusers whose angle of discharge is automatically controlled for heating/cooling.

Each of the zones shall be divided into perimeter and centre zones, each with a temperature sensor for zone control.

Central Pitch

The Swans training central pitch shall be served by a dedicated AHU with supply and return air ductwork at high level.

The AHU shall be sized to operate under two modes:

- ‘sports training’ and

- ‘function mode’.

Given the higher population and outside air loads associated with function mode, the AHU and ductwork will need to be sized accordingly.

It is proposed that air distribution is via jet swirl diffusers mounted on the supply air ductwork, with adjustment of discharge angle based on operation mode (heating or cooling).

Netball Court

The Swifts netball court will be air conditioned via a dedicated air-cooled DX rooftop package unit located on the roof. The package unit will be equipped with supply and return air ductwork at high level.

It is proposed that air distribution is via jet swirl diffusers mounted on the supply air ductwork.

Wet Recovery Pool

The wet recovery natatorium will be served by a dedicated, specialised pool air conditioning packaged DX unit complete with heat recovery. This is so desirable temperature and humidity levels for the area can be maintained. It is proposed to locate the unit on the roof adjacent to the natatorium with supply and return ductwork reticulating at high level.

The current advice from the pool consultant is that the following pool temperatures apply:

- Lap pool – 27^{o}C
- Cold plunge – 10^{o}C
- Hot spa – 38^{o}C

The pool air conditioning unit will be sized to maintain air temperature at +1 or 2^{o}C above the lap pool temperature.

Gym

The Gym in the Swans HQ will be served by a dedicated AHU with high level ductwork and jet swirl diffusers. The feasibility of heat recovery will be investigated at the next stage of design.

Sub-Tenancies

The proposed sub-tenancies will be provided with capped-off outside air supply, relief, and metered chilled water and heating hot water provisions for future connections by tenant

Server Room

The server room shall be provided with dedicated DX air conditioning units in duty/standby arrangement. Should UPS systems with batteries be installed, dedicated ventilation in accordance with code shall be provided.

3.2.6 Hot water

Gas hot water units will provide hot water for showers and taps. Solar hot water will be investigated however due to the heritage and structural limitations of the RHI roof may be challenging to implement. The options for this are currently being investigated.

3.2.7 Metering

An electrical metering strategy will be developed as the electrical design develops. Metering is to address each significant function and area of the building, including separately supply meters for the Swans and Swifts portions of the building. All major uses (over 100KvA) will also be metered individually. Lighting, power and mechanical services are to be separately metered. Sub tenancies are also to include separate metering.

An automatic monitoring system will be provided, which is capable of producing alerts for irregularities in energy use and will connect to the Building Management System. This is also intended to facilitate ongoing reporting for the tenants in order for them to optimize operational practices.

For mechanical systems, energy meters are to be provided in the risers. A separately metered branch for chilled and heated water will also extend to serve tenancy areas on Ground and Level 1.

3.3 Refrigerant System

The Swifts HQ and office areas will be served by air-cooled refrigerant DX or VRV units. Refrigerant for these units and the air-cooled chiller will be specified in line with the following:

- Low Global Warming Potential (GWP)
- The project has an aspirational target of meeting equivalency to the Refrigerant Impacts credit from Green Star which seeks to minimise the environmental impacts of refrigeration equipment by utilising refrigerants which have an ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than or equal to 10.

3.4 Water

3.4.1 Efficient fixtures and fittings

Fittings and fixtures will be selected with water efficiency performance in line with best practice standards defined within Green Star The WELS rating scheme applies to toilets, taps, showers and urinals. The project will implement the following WELS targets for new fittings and fixtures:

Taps	5 Star
Urinals	5 Star
Toilet	4 Star
Dishwashers	5 Star

As aspirational target of 3 stars for showers will be implemented however this will need to be done in consultation with the specific requirements for the players, and will be confirmed at a later stage in the design.

3.4.2 Rainwater tanks

The project is aspiring to recapture rainwater, which is to be used for toilet flushing and irrigation where possible.

Ongoing site investigations are being conducted to determine a suitable location and size for rainwater capture and storage.

3.4.3 Cooling water

A central water-cooled chiller will be installed to serve the whole building. The design will endeavour to maximise number of recirculation cycles before water must be removed by blowdown, reducing the quantity of make-up water required.

3.4.4 Metering

Appropriate water metering is to be provided to monitor consumption and detect irregularities. Separate metering is to be provided for Swans and Swifts portions and meters for mains water and for reclaimed rainwater.

3.5 Waste

3.5.1 Heritage Refurbishment

Heritage refurbishments offer a unique opportunity to create an entirely new functional space without the consumption of resources and energy associated with constructing a new building.

It is the intention of the project team to maximise reuse of the building structure to avoid generation of unnecessary waste and retain the unique heritage values of the Royal Hall of Industries.

3.5.2 Operational Waste

A project specific waste management Plan (WMP) has been developed to establish requirements of the building and occupants in regard to waste and recycling storage, consolidation and collection.

A waste storage area is located on the east side of the project boundary, adjacent to the Loading Dock.

The City of Sydney's 'Policy for Waste Minimisation in New Developments' has been a reference point to guide best practice waste management solutions.

Refer to Operational Waste Management Plan prepared by Dickens Solutions for further information.

3.6 Ecological Value

The refurbishment is to include substantial landscaping to the exterior of the building and in the public realm which is used by visitors to the Moore Park precinct. As the current condition of the adjacent site includes little green space, this was an opportunity to produce a net gain in vegetated space.

This has a number of benefits, including:

- promoting urban biodiversity;
- enhancing the surrounding public amenities;
- reduced solar reflection from dark surfaces, positively contributing to cooling of the area and urban heat island mitigation; and reducing the total area of impervious surface which introduces natural filtration to treat rainwater and reduce runoff.

Figure 5 Aerial Site Plan of existing site (left) and draft landscape plan for proposed development (right)

3.7 Transport

Reduced reliance on private vehicles is a key consideration for new developments, and best practice sustainable transport opportunities are an opportunity for the development to reduce the impact.

3.7.1 Public Transport

The project is located in a well-connected area and offers a number of options for staff and visitors to commute to the SSHQ by public transport:

- The Sydney Light Rail is set to open in 2020 and will include a stop on Anzac Parade at Moore Park, just metres from the Royal Hall of Industries, offering direct services to Randwick, Kingsford and the Sydney CBD.
- Buses run from Anzac Parade with frequent services to various locations within the CBD (Circular Quay, Central Station), Leichardt and Drummoyne. Buses run from Land Road to Bondi Junction and Marickville Metro.

3.7.2 Cycle Facilities

The project will aim to make cycling an appealing option for travelling to and from the venue. Staff who choose to cycle to the facility will be accommodated by showers, lockers and change facilities in line with best practice requirements.

The Green Star Design & As Built v1.2 transport category prescriptive pathway requirements have been used as a reference point to ensure best practice requirements are met .

	Staff bike parking	Visitor bike parking	Showers	Lockers
Swans Staff – 139 Players – 85 Visitors -75	20	4	6	17
Swifts Staff – 11 Players - 14 Visitors - 25	2	2	2	5
Minimum Requirement (as per Green Star 17B.4)	22	6	8	22
Allowed for in design	**22**	**15**	**8**	**54**

Figure 6 Bike parking requirements applied

Note:

- General staff figures have been included in calculations, it is noted that the way that players use the building will differ significantly from that of regular staff, this is not expected to be consistent with commuting by bike.

Anticipated location

Staff Bike Parking – At the southern courtyard, undercover

Visitor Bike parking – Along the east side of the project boundary, close to entrance and in a visible and signposted location

Lockers and Showers – Swans, level 1 above the player's entrance. Swifts, ground floor at the South Easter corner.

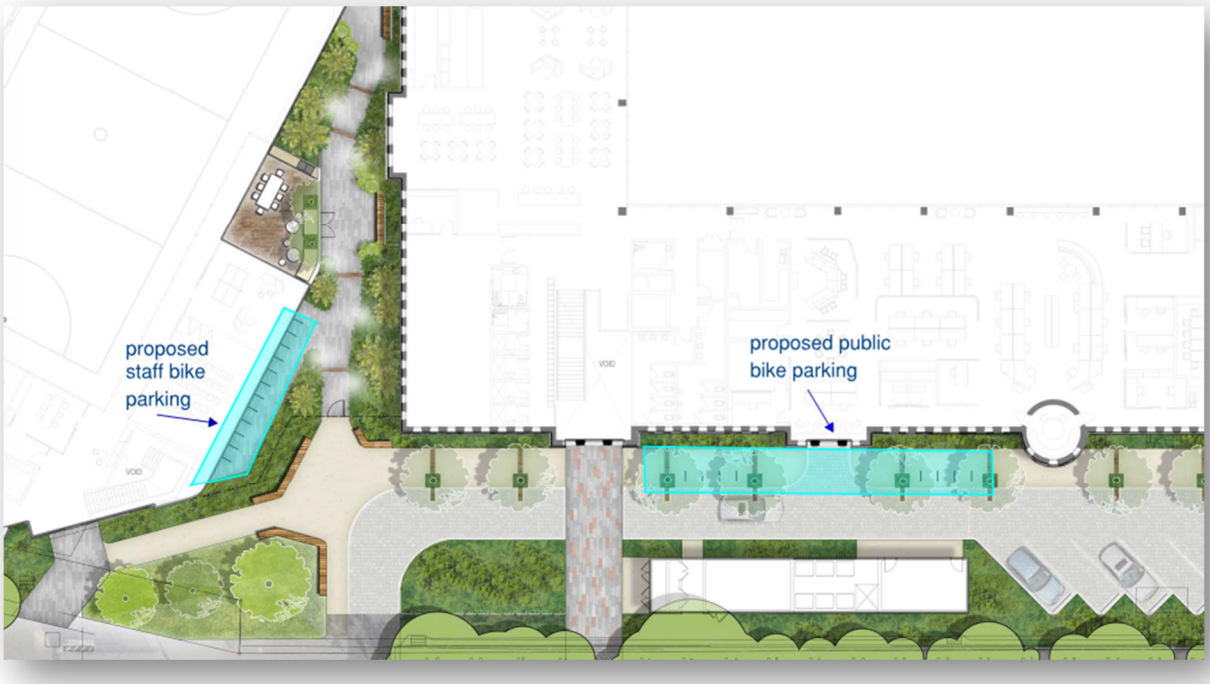


Figure 7 Bike parking location

4 Climate Change adaptation

4.1 Context

Given the widely understood implications that Climate Change will have on Sydney, responsible planning must consider how developments are to respond to changes over the next 30 to 50 years. With information on climate data and modelling increasingly available, the development has considered climate change prediction to design for adaptation and resilience over the project lifetime.

The project acknowledges its role to play in the broader context of the City of Sydney and has considered the Resilient Sydney (2018) framework in order to align the response with the values of the broader region and community.

4.2 Risk assessment process

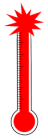
To understand and address regionally specific risks, the project has used Climate change projections of the NSW Government's Regional Climate Modelling (NARCliM) as a basis for the design response. The NARCliM project is designed to create regional scale climate projections for use in climate change impacts and adaptation studies, and ultimately to inform climate change policy and decision making. Climate change projections are presented for the near future (2030) and far future (2070), compared to the baseline climate (1990–2009) For the Sydney Region, where the SSCCHQ is located, the predictions are summarised in the 'Metropolitan Sydney Climate change snapshot' 2014 report released by the NSW Office of Environment & Heritage and Adapt NSW.

The available data has been considered in conjunction with the project specific circumstances to most effectively manage risk and adaptive measures, notably:

- Strategies to address risk should be considered within the limitations that apply to the building in terms of the refurbishment.
- Given the lifetime of the development is 35 years, the risk analysis focuses on climate risks within this specific timeframe.
- Best practice climate change risk management requires ongoing monitoring and evaluation once the building is in operation
- While rising sea levels and storm surge are almost certainly a considerable risk in the context of climate change management in Australia, this was not considered a risk in this project given the substantial distance from this building to the coast.

4.3 Design Response

The following tables summarises each risk identified in the NARCLIM models as applicable to the Sydney region. The likelihood has been considered in terms of the potential for the risk to disrupt the operational requirements of the project in comparison to a scenario where the climate did not change at all.

Risk		Likelihood of Impact on project	SSCCHQ Response
Extreme heat days 	Increase number of extreme heat days in the near future.	High	• Addressing the Urban heat island effect to minimise impact of heat radiating from the building and align with best practice strategies, including: - Increase in green spaces, which have cooling properties to the adjacent areas. - Solar PV being investigated
Rainfall 	Decrease in overall rainfall as well as seasonal shifts in rainfall	High	• Sizing of rainwater tanks to consider opportunities to store more rainwater to be used in drier periods. • Drought tolerant species to be included in landscaping design.
Increase in temperature 	Continual annual increase in average temperatures	Medium	• Air conditioning being provided throughout, to provide comfortable conditions year-round. • Strategies to reduce energy/CO_2 emissions (refer section 3.2) considered throughout design as part of overall commitment to respond to the changing climate
Fewer cold nights 	an average of approximately five fewer cold nights per year in the near future	Low	• This has been identfied as low risk given buiding will not be operating at night.
Fire danger 	An increase of severe fire weather, particularly in spring (Sept – Nov)	Low	• This has been identfied as low risk given the absense of any substantial bush areas surrounding the project.

Document prepared by

Aurecon Australasia Pty Ltd
ABN 54 005 139 873
Level 5, 116 Military Road
Neutral Bay NSW 2089
PO Box 538
Neutral Bay NSW 2089
Australia

T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

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