

2 Chifley Square

Sydney

Ecologically Sustainable Development Strategy



CLIENT

Charter Hall



PLANNER

Ethos Urban

**ETHOS
URBAN**

ARCHITECT IN ASSOCIATION

Architectus

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Amendment Register

Rev. No	Section & Page No.	Issue/Amendment	Author	Project Engineer	Checked	Date
A	-	Draft Planning Proposal Submission	AM	TB	WL	16/07/2020
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EXECUTIVE SUMMARY

This Ecologically Sustainable Development Strategy has been prepared by Floth in support of a Planning Proposal to amend the *Sydney Local Environment Plan 2012* (Sydney LEP). This report has been prepared on behalf of Charter Hall Holdings (the Proponent) and it relates to the site at 2 Chifley Square, Sydney (the site).

To support the City of Sydney's requirements to achieve net-zero carbon, zero waste and water efficient outcomes, Charter Hall's new development is proposed to showcase world-leading performance in sustainable design, construction and operational practices.

Sustainability Vision

A primary aim of the new development will be to create a commercial office tower with leading yet practical sustainable design and construction for a temperate climate. Significant work has been undertaken to date to firmly establish leading practice sustainable design into the proposed development.

Superlative sustainability performance is proposed to be achieved by the holistic integration of ESD elements throughout the building and site design. Wherever possible the ESD elements will be integrated into the building function to achieve the desired level of sustainable performance.

It is anticipated that the extent of ESD integration proposed for the new development will place it at the forefront of Sydney's sustainable commercial office sector.

Environmental Certifications

The following ESD certifications are proposed to be targeted by the new commercial tower development:

- **6-star Green Star Design & As Built v1.3 certified rating**
- **5.5 Star NABERS Energy rating (Commitment Agreement)**
- **4 Star NABERS Water rating (Target)**
- **5 Star NABERS Waste rating (Target)**
- **Climate Active Carbon Neutral Building certification**

To meet and exceed the City of Sydney net-zero carbon, zero waste and water efficient outcomes requirements, Climate Active Carbon Neutral Building certification is proposed to allow the building to achieve net-zero greenhouse gas emissions related to energy, water, waste and refrigerants during operation.

ESD Strategies Summary

The following summary outlines the ESD strategies and initiatives proposed to be considered for the new development organised under the categories of the new development's holistic 6 Star Green Star - Design & As Built v1.3 "World Leadership" targets, which generally exceeds the City of Sydney ESD requirements.

- Management strategies include:
 - Engagement of a Green Star Accredited Professional
 - Engagement of an Independent Commissioning Agent (ICA)
 - Extended building commissioning and tuning
 - Climate adaptation and resilience planning and implementation
 - Provision of complete building information
 - Building owner and tenants' commitments to performance
 - Comprehensive building control, metering and monitoring systems
 - Best practice construction environmental management procedures
 - Provision of waste facilities as per the City of Sydney's *Guidelines for Waste Management in New Developments*.
- Indoor environmental quality strategies include:
 - Outdoor air systems sized to provide improved outdoor air rates and controlled in response to space CO2 sensors to maintain high indoor air quality
 - Effective exhaust systems and elimination of indoor pollutants
 - Comprehensive architectural and mechanical design measures to improve acoustic comfort conditions
 - Flicker-free, high colour rendering, glare reducing lighting compliant with best practice general illuminance standards
 - Low VOC and low formaldehyde materials
- Energy strategies include:
 - High-performance facades incorporating low-e double glazing allowing excellent daylight and views access
 - Insulated constructions, with air-tightness testing of building envelope, to minimise thermal losses and leakage to the external environment.
 - Shading of glazing areas to reduce solar penetration to be considered as required, informed by dynamic thermal modelling approaches.
 - Best-in-class energy efficient mechanical air conditioning, ventilation systems and controls
 - Low-energy LED lighting and controls systems
 - Power factor correction
 - High efficiency hydraulic systems
 - A maximised roof-mounted photovoltaic array
 - High efficiency lift services

- Transport strategies include:
 - Reduced car parking provision compared to existing
 - Low emission vehicle parking including electric vehicle charging stations
 - State-of-the-art end of trip facilities and bicycle parking to encourage the uptake of cycling
 - Good pedestrian and public transport access afforded by the site's proximity to amenities and public transport routes
- Water strategies include:
 - High WELS rated fixtures and fittings including showerheads, water tap outlets, urinals and toilet cisterns
 - Rainwater harvesting and reuse for irrigation and toilet flushing.
 - Air handling unit condensate recovery and low water consumption cooling towers
 - Fire test water recovery and reuse
- Materials strategies include:
 - Life cycle impacts optimisation including reuse of existing podium facades
 - Responsibly sourced building materials and sustainable products
 - Best practice remediation of pre-existing hazardous materials
 - Maximum recycling of demolition and construction waste targeting landfill diversion rate of 90%
- Land use and ecology strategies include:
 - Reuse of previously developed site
 - Improvement of native planting in landscaping
 - Consideration of heat island effect reduction in roofing materials
- Emissions strategies include:
 - Water sensitive urban design principles to reduce peak stormwater discharge reduction and improve stormwater discharge quality
 - External light pollution controls
 - Reduced impact refrigerants
- Innovation strategies include consideration of:
 - Improved Stormwater Pollution Targets
 - Ultra Low VOC Paints
 - Supplementary or Tenancy Fitout Systems Review
 - Over 12% sustainable products
 - Community benefits
 - Universally accessible design
 - Reconciliation action plan

The ESD strategies and detailed sustainability initiatives presented in this report are proposed to be further developed and validated through the design and delivery of the new development.

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1. INTRODUCTION

1.1 Project Background

This Ecologically Sustainable Development Strategy has been prepared by Floth in support of a Planning Proposal to amend the *Sydney Local Environment Plan 2012* (Sydney LEP). This report has been prepared on behalf of Charter Hall Holdings (the Proponent) and it relates to the site at 2 Chifley Square, Sydney (the site).

The purpose of this Planning Proposal is to amend the site's Floor Space Ratio (FSR) and Maximum Building Height development standards to align with the Domain Sun Access Plane contained within the Central Sydney Planning Proposal (CSPS) and accompanying Planning Proposal: Central Sydney 2020. The subject Planning Proposal will facilitate the development of a new commercial tower on the southern portion of the existing Chifley site, up to a height of RL 214.2 (being a height above ground level of approximately 188.1m). When combined with the existing north tower and podium, the new, refurbished and existing floor space will total approximately 131,391m² of Gross Floor Area (GFA).

This Planning Proposal supports the City of Sydney Council's CSPS by unlocking additional employment generating floor space within a designated tower cluster. The proposed Sydney LEP amendment is part of the broader redevelopment plan for the site to facilitate a new commercial office tower. It will also facilitate significant public benefits through additional site activation of Chifley Square, improved pedestrian accessibility and a commitment to sustainable design.

The Planning Proposal is accompanied by amendments to the Sydney Development Control Plan 2012 (Sydney DCP). The site specific DCP amendments reflect the proposed outcome to retain the existing tower on the northern portion of the site, with a new commercial office tower proposed on the southern portion of the podium. This is reflected in the accompanying reference design prepared by Architectus which serves as a baseline proof of concept for this Planning Proposal.

The uplift being sought is consistent with the strategic intent of the CSPS, which contains the City's requirements and expectations for projects pursuing this pathway. Following the Planning Proposal, the planning approval pathway involves a competitive design process and a detailed Development Application. As such, this report reflects the concept stage of the proposal, and may be embellished as the detailed design and required works evolve.

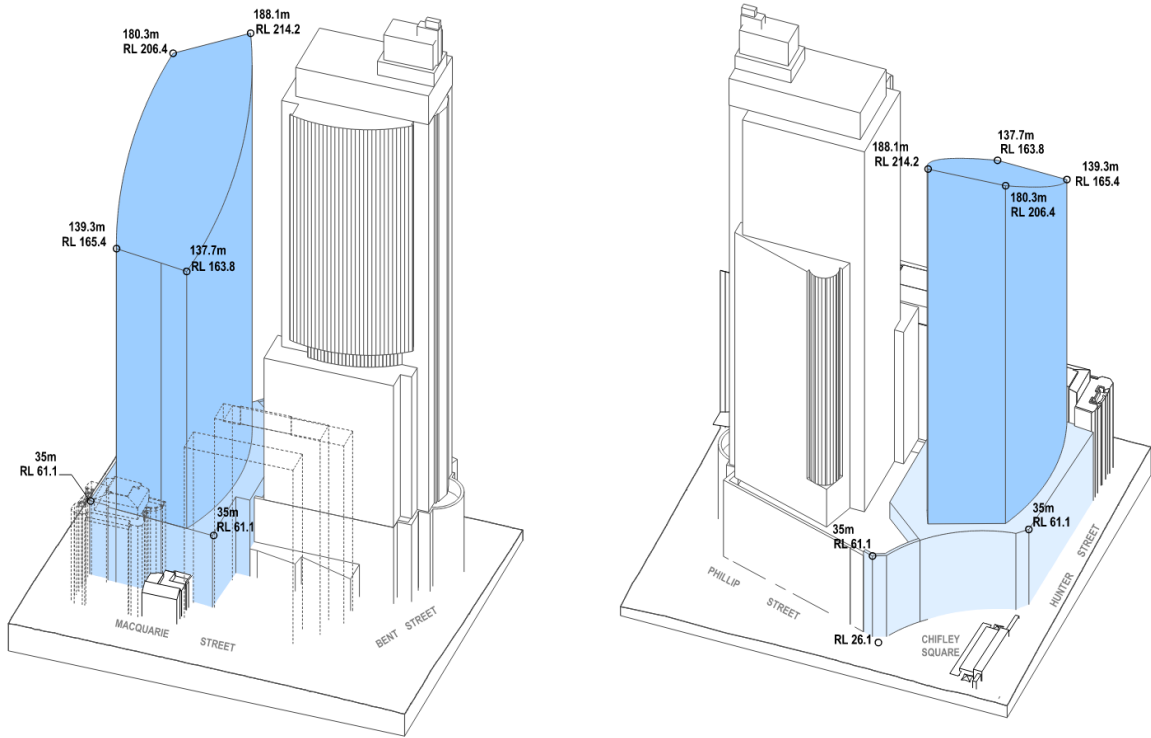


Figure 1: Proposed Building Envelope

1.2 General

This Ecologically Sustainable Development Strategy summarises the sustainability targets and strategies that will be used to minimise the new development's environmental impact throughout design, construction and operation. This document was commissioned by Charter Hall in support of the Planning Proposal prepared by Ethos Urban for the new development.

The design and construction of the new development will be informed by the following requirements as related to sustainability as current at time of writing:

- Sydney Local Environmental Plan (LEP) 2012
- City of Sydney Development Control Plan (DCP) 2012
- Central Sydney Planning Strategy (Draft)
- Proposed Central Sydney Planning Proposal – amendments to the Sydney LEP 2012
- Proposed Amendments to the Sydney DCP 2012
- Draft Guideline for Site Specific Planning Proposals in Central Sydney

The sustainability strategy proposes to firmly establish best practice ESD principles into the proposed new development and includes the following environmental certifications:

- 6-star Green Star Design & As Built v1.3 certified rating.
- 5.5 Star NABERS Energy rating (Commitment Agreement).
- 4 Star NABERS Water rating (Target).
- 5 Star NABERS Waste rating (Target).
- Climate Active Carbon Neutral Building certification

This report is structured as follows:

- A synopsis of the new development and sustainability vision;
- A discussion of the current Green Star, NABERS and Climate Active Carbon Neutral certification schemes; and
- A list of the initiatives targeted by the design to achieve the above environmental targets.

2. DEVELOPMENT DESCRIPTION AND SUSTAINABILITY VISION

This section summarises the proposed development location, components and sustainability vision.

2.1 Development Location

The development is located in area 5 within City of Sydney planning controls map and it is part of the Sydney Local Environmental Plan (LEP) 2012 planning control as shown below.

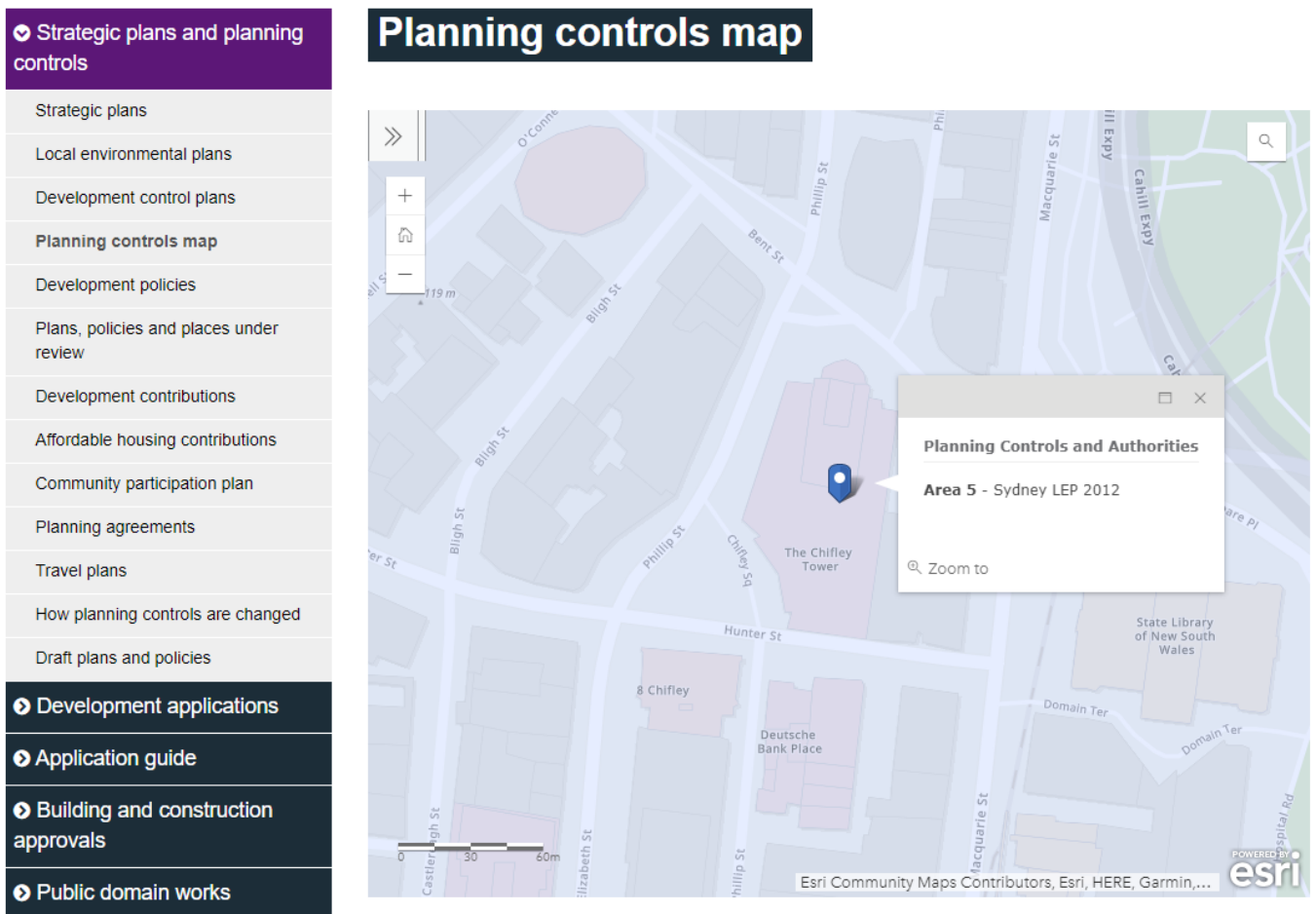


Figure 2: Development location on Sydney planning controls map

More specifically, the project site is located at the eastern end of the Sydney Central Business district and is bounded Chifley Square, Phillip street, Bent Street and Hunter Street.

The location of the development site is shown on the figure overleaf.

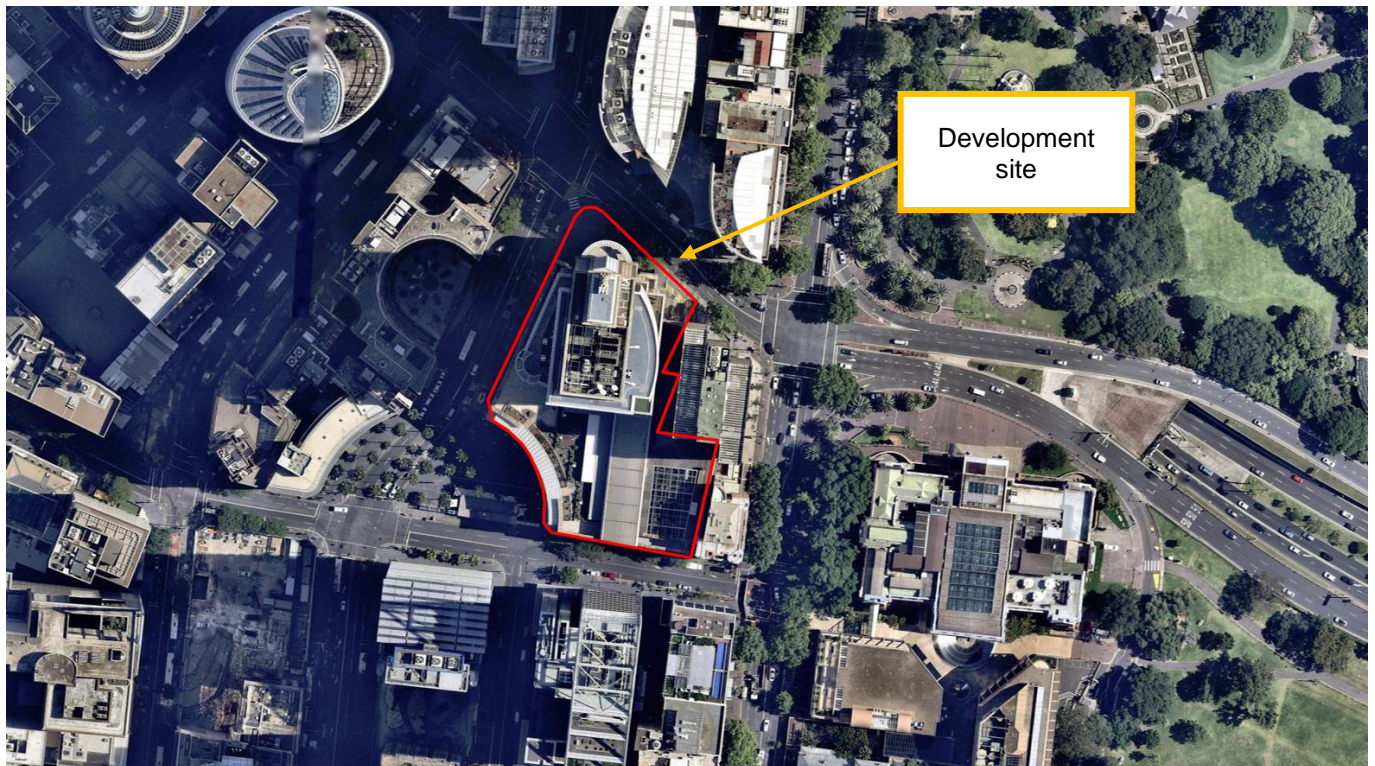


Figure 3: Development location satellite image

2.2 Project Synopsis

The proposed 2 Chifley Square, Sydney project will consist of the construction of a new commercial office tower and partial refurbishment of the associated existing retail and commercial podium.

Incorporating leading sustainable design and construction features, the new development is proposed to incorporate the following works:

- Basement Levels 1-4 - Retention and partial refurbishment works to existing carpark to incorporate proposed ramp extensions, upgraded loading and back of house areas as required. Demolition and rebuild of some sections of basement to accommodate new vehicle access ramp B1-B2 and construction of new tower core and structure
- Podium Lower and Upper Ground Levels - Refurbishment of existing to incorporate new entry lobby, retail tenancies, wellness tenancies, bicycle parking and end of trip facility. Likely demolition and rebuild of majority of the southern portion of the podium to enable construction of new tower structure and provide additional commercial office space

- Podium Levels 1 – 5 – Partial refurbishment of existing Commercial Office areas as required. Likely demolition and rebuild of majority of the southern portion of the podium to enable construction of new tower structure and provide additional commercial office space
- Levels 6 to 35 - New Commercial Office Tower including plant levels as required
- Levels 36 and 37 - Plant levels and Roof

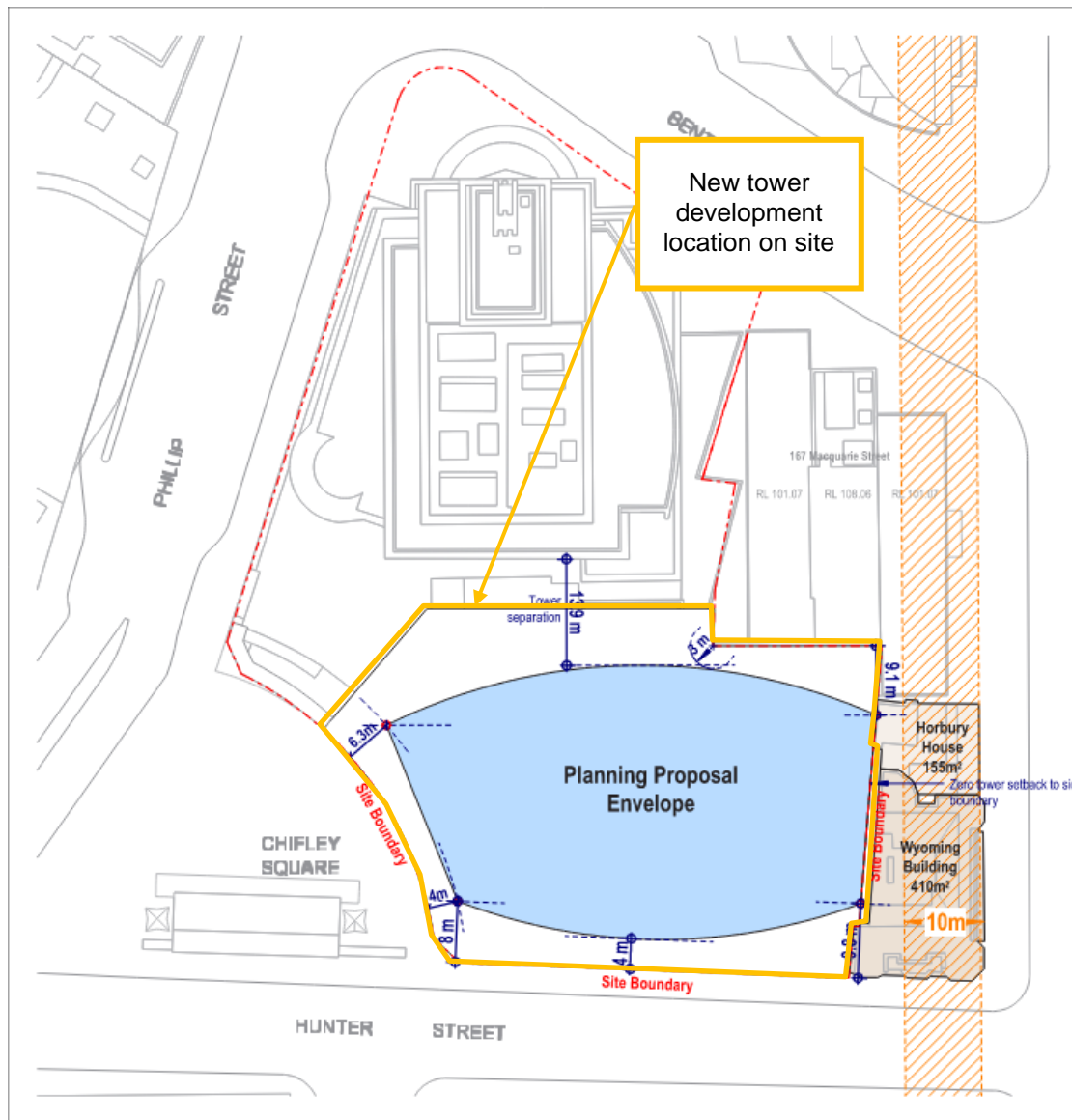


Figure 4: Proposed site plan indicating new tower location on site

2.3 Sustainability Vision

At its core, the success of a compelling and sustainable “place” is related to two factors:

- To its physical characteristics – its location, how it looks, its facilities and infrastructure and how efficiently and sustainably it operates;
- To the human experience of place - how people derive economic, social, environmental and wellbeing benefits by their interactions with a particular place.

Beyond the critical importance of its physical characteristics, a sense of place evolves from this multitude of human experiences, both shared and individual. These experiences occur on a range of scales, from macro to micro, but always relate to the interaction of people and place. The new development aims to set a new sustainable benchmark for future workplaces through innovative design, to create a space of superior interaction between people and place.

The Charter Hall development team has the vision to create a world-leading sustainable development for the benefit of the building occupants, the Chifley Square precinct and the wider City of Sydney community. The environmental impact of the construction of the proposed development is proposed to be minimised through deep and pervasive environmentally sustainable development initiatives embedded throughout the design and construction of the new development.

The ongoing environmental impact of the new development is proposed to be reduced through passive design features incorporated in the building facades and architecture, reducing the energy required to service the building. Best-in-class building services are proposed to further reduce the energy and water use of the building by optimising energy and water conservation in the design and equipment selections.

The sustainable nature of the proposed new development will be further enhanced by making it a place where people will want to work. This will be done by addressing issues such as the indoor environment, materials selection, transport, ecology and the development’s sense of community using sustainable design initiatives.

Superlative ESD performance is anticipated to be achieved by the holistic integration of ESD elements throughout the new building design. Wherever possible the ESD elements are proposed to be integrated into the new building function to achieve the desired level of ESD performance.

To support City of Sydney’s net-zero carbon requirement, the new commercial tower development is proposed to be designed to significantly reduce operational carbon emissions below that of an equivalent 2019 NCC Section J energy efficiency building code compliant reference building, with maximised onsite renewable energy generation also provided by a roof mounted solar photovoltaic system. The building will also incorporate leading sustainable mobility features to reduce carbon emissions not only by its superior location for public transport accessibility but also by including features such as a high-quality end of trip facility, and electric vehicle charging car parks.

To support City of Sydney’s zero waste requirement, the new development is proposed to go beyond providing operational waste facilities and minimising construction waste by using a comprehensive life cycle analysis to optimise its cradle-to-cradle materials and construction-related environmental impacts, incorporating the existing podium facades and retained structural elements into the new development, implementing responsible material selection and sustainable products, with all initiatives maximising reused and recycled content in construction, as well as reducing embodied carbon in construction.

To support City of Sydney’s water efficient outcomes requirement, the new development is proposed to be designed with best practice water efficiency fixtures and fittings into the design and equipment selections, low bleed rate cooling towers, as well as a number of water capture and recycling systems to maximise recovery and reuse of rainwater, air handling unit condensate and fire test water.

To meet and exceed the City of Sydney net-zero carbon, zero waste and water efficient outcomes requirements, Climate Active Carbon Neutral Building certification is proposed to allow the building to achieve net-zero greenhouse gas emissions related to energy, water, waste and refrigerants during operation.

What it means to be carbon neutral

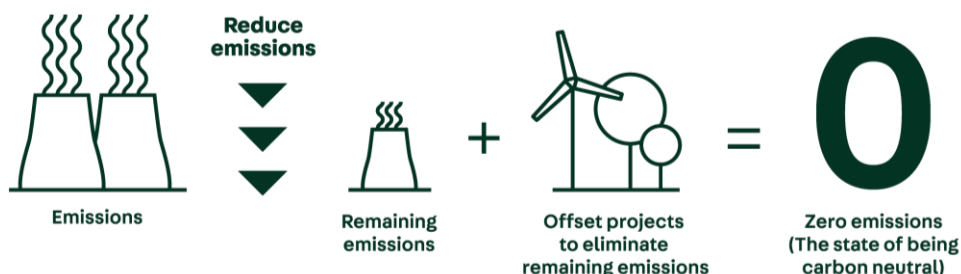


Figure 5: Climate Active Carbon Neutral concept

3. ENVIRONMENTAL CERTIFICATIONS

Buildings produce carbon dioxide emissions and other emissions that reduce air quality and contribute to global warming. Buildings also generate waste during construction and operation and can have poor indoor environment quality that harm occupants' health.

A green building minimises the environmental impact and is healthy and comfortable for its occupants. The Green Building Council of Australia has defined a green building as one that incorporates design, construction and operational practices that significantly reduce or eliminate the negative impact of development on the environment and occupants with strategies for addressing:

- Energy efficiency
- Greenhouse gas emission abatement
- Water conservation
- Waste avoidance, reuse and recycling
- Pollution prevention – noise, water, air, soil and light
- Enhanced biodiversity
- Reduced natural resource consumption
- Productive and healthier environments and
- Flexible and adaptable spaces

This section outlines the environmental certification strategies proposed for the new development.

3.1 Green Star – Design and As-Built Sustainable Building Rating Scheme

Green Star is a comprehensive, national, voluntary environmental rating system administered by the Green Building Council of Australia¹ that evaluates the



environmental design and construction of buildings. With more than 26 million square metres of Green Star-certified space around Australia, Green Star has transformed Australia's property and construction market.

Green Star covers the following nine categories to assess the environmental impact that is a direct consequence of project site selection, design, construction and maintenance:

- Management;

¹ <http://www.gbca.org.au>

- Indoor Environment Quality;
- Energy;
- Transport;
- Water;
- Materials;
- Land Use and Ecology;
- Emissions; and
- Innovation.

Green Star certification is subject to meeting four (4) eligibility criteria: Spatial Differentiation, Space Use, Conditional Requirements, and Timing of Certification. If one or more of the eligibility criteria are not achieved, the project cannot be certified.

Each category is divided into credits, each of which addresses an initiative that improves or has the potential to improve environmental performance. Points are awarded in each credit for actions that demonstrate that the project has met the overall objectives of Green Star.

The following Green Star certified ratings are available:

- 4 Star Green Star Certified Rating, signifies ‘Best Practice’ in environmentally sustainable design and construction;
- 5 Star Green Star Certified Rating, signifies ‘Australian Excellence’ in environmentally sustainable design and construction;
- 6 Star Green Star Certified Rating, signifies ‘World Leadership’ in environmentally sustainable design and construction.

The new commercial tower base building is proposed to target a 6 Star Green Star - Design and As-Built v1.3 certified rating.

The proposed strategy is for the new development to target a 6 Star Green Star - Design and As-Built v1.3 certified rating, demonstrating ‘World Leadership’, with a buffer of credit points to provide a nominal design margin. Green Star certification is subject to meeting the prescribed eligibility criteria and assessment of the design by the Green Building Council of Australia.

Green Star certification is awarded by the Green Building Council of Australia on the basis of a Green Star Assessment undertaken by an Independent third-party Assessor. The optional Green Star Design Review rating is assessed by the Green Building Council of Australia independent assessor on the basis of the Tender or For Construction documentation. The Green Star - Design and As-Built certified rating is assessed on the basis of As-Built documentation together with commissioning data. The Green Building Council of Australia will grant a certificate to confirm the rating achieved, which will be effective for the life of the building.

3.2 NABERS Operational Sustainable Building Rating Scheme

NABERS – the National Australian Built Environment Rating System – is a performance-based rating system for operational buildings. NABERS rates a building on the basis of its measured operative impacts on the environment, and provides a simple measure of how well these environmental impacts are managed compared with peers and neighbouring buildings.



NABERS was originally developed by the Australian Department of Environment and Heritage and is currently administered by the NSW Department of Planning, Industry and Environment (DPIE).

NABERS for offices currently incorporates four components

- NABERS Energy: assess Greenhouse Gas (GHG) emissions as a measure of energy efficiency;
- NABERS Water: assess potable and non-potable water use as a measure of water efficiency;
- NABERS Waste: assess general and recyclable waste generation rates as a measure of waste and recycling efficiency;
- NABERS Indoor Environment: assess thermal and acoustic comfort, indoor air quality, lighting and layout as a measure of indoor environment efficiency.

The new commercial tower base building is proposed to target the following NABERS ratings relating to energy, water and waste efficiency during operation:

- **5.5 Star NABERS Energy rating (Commitment Agreement).**
- **4 Star NABERS Water rating (Target).**
- **5 Star NABERS Waste rating (Target).**

The new commercial tower is proposed to be registered with the National NABERS Administrator for a NABERS Office Energy (Base Building) Commitment Agreement at a 5.5 star rating level, approaching “Market Leading”.

The proposed strategy will be to target in excess of a 5.5 star modelled Energy rating in order to provide a design margin that will best satisfy NABERS independent design review expectations.

Upon reaching the planned date for the NABERS ratings, an independent NABERS accredited assessor will be arranged to carry out the performance assessment of the premises. The National NABERS Administrator will grant a certificate to confirm the rating achieved, which will be effective for a 12 month period. Building management will be required to manage and undertake annual NABERS ratings to maintain their currency during building operation.

3.3 Climate Active Carbon Neutral Building Certification Scheme

The Climate Active Carbon Neutral Standard for Buildings is a voluntary standard to manage greenhouse gas emissions and to achieve carbon neutrality, backed by the Australian Government.



Climate Active certification is able to be achieved as an extension of a building’s NABERS ratings. It measures the carbon emissions associated with the operational energy and water consumption, waste to landfill generation and refrigerant emissions of a building then and then offsets these by purchasing carbon offsets to achieve net zero emissions. In this way, Climate Active Carbon Neutral certification allows a building to achieve net-zero greenhouse gas emissions related to energy, water, waste and refrigerants during operation.

Carbon Neutral certification is only available for buildings with current NABERS Energy ratings of 4 stars and above.

Climate Active Carbon Neutral certification is proposed to be articulated out of the new development’s NABERS Energy, Water and Waste ratings via a concurrent Carbon Neutral Assessment of the buildings annual operational scope 3 emissions (chiefly refrigerant emissions) and retirement of certified carbon offsets to offset the final building annual operational carbon emissions.

Upon reaching the planned date for the NABERS ratings, an accredited Carbon Neutral assessor will be arranged to carry out the performance assessment of the premises and the required number of carbon offsets will be purchased and retired. The National NABERS Administrator will administer certification which will be effective for a 12-month period. Building management will be required to manage and undertake annual Carbon Neutral assessments and carbon offset procurement to maintain their currency during building operation.

4. ECOLOGICALLY SUSTAINABLE DEVELOPMENT STRATEGY

This section of the report addresses the sustainability components of the new development and summarises the associated sustainability benefits. Best practice sustainable development principles will be implemented throughout the design, construction and operation of the new development, to generally exceed the City of Sydney ESD requirements.

4.1 Management

The new development would be committed to the appropriate management and implementation of the sustainability strategies by establishing and maintaining a rigorous, transparent and third-party certified ESD framework.

Management initiatives will include engagement of a Green Star Accredited Professional, preparation of a climate adaptation plan, engagement of an Independent Commissioning Agent (ICA), extended building commissioning and tuning, smart energy and water metering and monitoring system (EMS), comprehensive construction environmental management and maximised recycling of operational waste. These strategies are described in further detail below.

4.1.1 Green Star Accredited Professional

Green Star Accredited Professionals have been involved in the preparation of this sustainability strategy and would be retained to provide sustainability advice throughout the design, construction and initial operation of the building in order to ensure that the ESD strategy is applied effectively and as intended.



4.1.2 Commissioning and Tuning

Comprehensive commissioning, handover and tuning activities would be implemented that ensure all building services operate to their full potential, including:

- Setting of environmental performance targets nominated in the Owner’s Project Requirements.
- Preparation of a detailed "Service and Maintainability Review" with coverage of commissionability, controllability, maintainability, operability and safety, led by the Independent Commissioning Agent.
- Preparation of a detailed commissioning plan.
- Thorough commissioning of all building services and building envelope in accordance with recognised international standards to obtain optimum performance and energy savings throughout their operational life, to be overseen by an Independent Commissioning Agent.
- Building tuning will be undertaken for all nominated building systems with at minimum quarterly monitoring and reporting during the first 12 months of full occupation.
- Building air tightness testing.

4.1.3 Climate Adaptation and Resilience

A project-specific climate adaptation plan will be developed based on Australian Standard AS 5334:2013 Climate Change Adaptation for Settlements and Infrastructure. The project would provide all coordination and documentation required to complete the plan. Solutions will be included into the building design and construction that specifically address the risk assessment component of the plan.

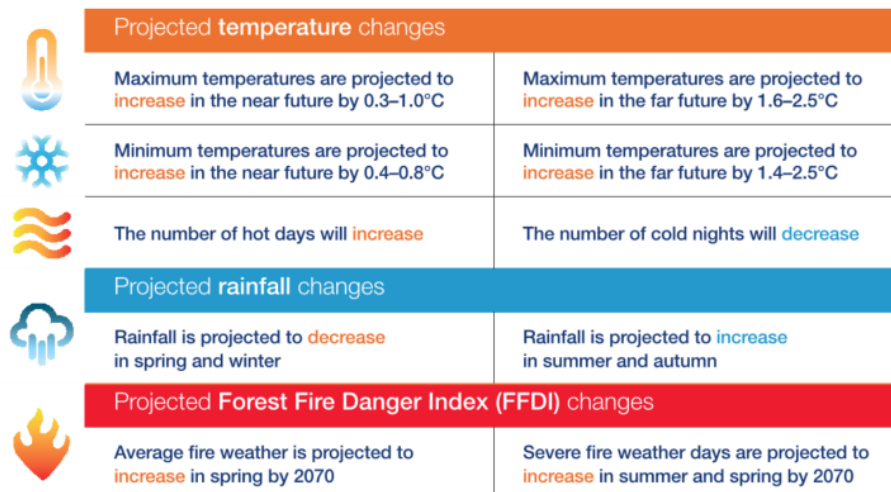


Figure 6: NSW OEH Metropolitan Sydney Climate Change Snapshot excerpt

Climate adaptation planning will be implemented to optimise the resilience of the building, its infrastructure and community to the risks and impacts of climate change and extreme weather events. The climate adaptation plan will include the following activities:

- Engage with stakeholders to confirm inputs for reference in preparation of the Climate Adaptation Plan.
- Assess site, climate change scenarios and impacts on the project using at least two time scales relevant to the projects anticipated lifespan. This must include a summary of potential direct and indirect climate change impacts (environmental, social and economic) on the project.
- Identify the potential climate change risks (likelihood and consequence) for the project and the potential risks to impacted parties. This risk assessment is to be based on a recognised standard (AGO Guide, ISO 31000 Standard and / or AS 5334:2013 as applicable).
- Review the project design and prepare a list of actions, responsibilities to respond to all ‘high’ and ‘extreme’ risks identified.
- Engage with stakeholders as required to incorporate issues raised and appropriate design responses as required.
- Finalise risk assessment outcomes and incorporate appropriate project design responses.

The climate adaptation plan will be developed during design development and implemented in the construction of the building.

4.1.4 Building Information

Comprehensive facilities management information would be developed for all nominated building systems and be made available to the facilities management team. These will be in the form of operations and maintenance manuals and a building log book and will facilitate understanding of a building's systems, operation and maintenance requirements, and the environmental targets to enable the optimised performance.

A simple Building Users' Guide, which includes information relevant for the building residents and management, will be developed and made available to the building owner and occupants.

4.1.5 Commitments to Performance

To encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way and thereby optimise ongoing environmental performance, a "Best Practice Lease" Agreement, Memorandum of Understanding (MoU), or similar formal document between the building owner and the tenants are proposed to be in place to demonstrate commitments to achieve:

- Best practice NABERS Energy rating (whole building or base building) and NABERS Water rating (whole building).
- Best practice 'make good' following industry recognised standards or guidelines (such as Greening Make Good, RICS Oceania, and Better Buildings Partnership), committing to reducing construction waste at the end-of-life of a fitout or base building component.



Figure 7: RICS Greening Make Good Australia cover

4.1.6 Building Control, Metering and Monitoring

The following best practice building control, metering and monitoring facilities are proposed to be incorporated in the design to assist the building managers to optimise the operation of the various building services systems and therefore avoid energy and water wastage:

- Building management and control system (BMCS) incorporated to optimise building control.
- Dedicated energy metering and management system (EMS) incorporated to optimise utilities consumption.

- Extensive electrical, thermal energy, gas and water metering connected to the EMS to facilitate management of utilities usage, including energy sub-metering to each tenant as well as to any significant end uses that will consume more than 10,000 kWh/annum.
- Energy metering integrity by validation and monitoring of accuracy of EMS to ensure that data captured is valid and notifying the building manager in the case of any out-of-range readings indicating faults, leakage or poor performance.
- Facilities for offsite monitoring of the building performance via the internet.



Figure 8: Building control, metering and monitoring systems concept

4.1.7 Construction Environmental Management

The Head Contractor will develop and implement a comprehensive project-specific Environmental Management Plan (EMP) that will be in place for construction. The Contractor will hold a valid accreditation certificate under ISO 14001 and the environmental performance, conditions and impacts of construction works will be actively managed.

As part of the EMP, the Head Contractor will be required to put high quality staff support practices in place that:

- Promote positive mental and physical health outcomes of site activities and culture of site workers, through programs and solutions on site; and
- Enhance site workers' knowledge on sustainable practices through on-site, off-site, or online education programs.

The Head Contractor will carry out a needs analysis of site workers and contractors to determine appropriate actions, which will be made relevant to all construction workers on site for the duration of construction.

4.1.8 Waste Management

In order to encourage and facilitate the maximum recycling of waste material generated on site and therefore reduce the volume of waste going to land fill, significant effort will be made for best-practice provision of separation, collection and recycling of demolition, construction and operational waste on site.

An Operational Waste Management Plan (OWMP) for the building will be produced and implemented in accordance with best practice approaches to comply with The City of Sydney's Policy for Waste Minimisation in New Developments 2005.

The OWMP will provide guidance on how to optimise management and maximise recycling of operational waste to building management, their cleaning- and waste contractors.

As a minimum, the OWMP must:

- Identify the site boundary, the waste streams relevant to the project, and the individual roles responsible for delivering and reviewing the OWMP;
- Set diversion from landfill targets and/or targets for reducing total materials generation (general waste materials and recyclable/reusable materials), as well as monitoring and measurement procedures for waste and recycling streams by weight;
- Outline methods for encouraging the separation of waste streams, such as bins, storage areas, or recycling facilities in public areas as required;
- Identify storage areas for all waste streams and outline best practice safety and access requirements for their collection;
- Identify safe methods for vehicle access and transfer of waste; and
- Incorporate a review process to assess the success of the OWMP and make improvements, based on operational experience.

Recycling streams to be collected by the building’s waste collection service, including paper and cardboard, glass, and plastic may be collected in separate bins or in the same bin where commingled recycling is available.

Each waste stream will be provided with separate bins which must be clearly labelled. The size of the total required storage rooms for recycling and rubbish combined must be determined by a qualified waste consultant through development of the compliant Operational Waste Management Plan.

Access requirements for waste collection areas will adhere to best practices.

The new development will be designed to enable a 5-Star NABERS Office Waste rating for the base building, which is reliant on building management and tenants operational waste management practices achieving 60 – 74% waste recycling.

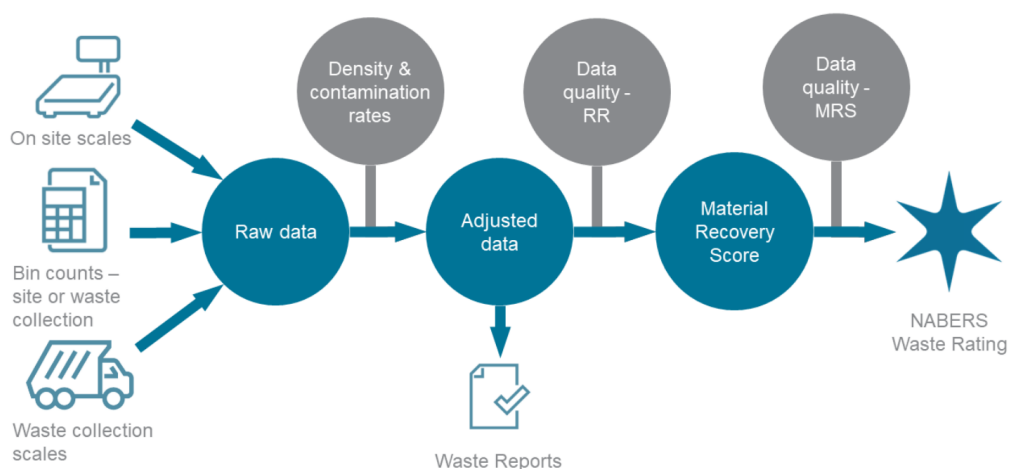


Figure 9: NABERS Waste rating process concept

4.2 Indoor Environment Quality

In order to ensure that the Indoor Environmental Quality (IEQ) is achieved to a high standard, strategies to optimise indoor air quality, acoustic, lighting, visual and thermal will be considered throughout the new developments design and construction. These strategies are described in further detail below.

4.2.1 Quality of Indoor Air

The entry of outdoor pollutants into mechanical ventilation systems will be mitigated by designing to provide minimum separation distances between outdoor air intakes and pollution sources.



Figure 10: IEQ concept

Air conditioning systems will also be designed to provide adequate access for maintenance, to both sides of all moisture and debris-catching components, within the air distribution systems.

An Indoor Air Quality (IAQ) Management Plan shall be in place during construction as part of the Environmental Management System to protect ductwork during construction to minimise contamination with debris and moisture prior to occupation.

The building design will control the Quality of Indoor Air to provide a high-quality indoor environment. The indoor air quality will be controlled through both fixed design details and HVAC system controls to ensure that building occupants enjoy high levels of indoor air quality.

Any sources of pollutants shall be exhausted directly to the outside of the new development by dedicated exhaust systems.

4.2.2 Acoustic Comfort

The building façade will have a maximum average sound pressure level from outside noise intrusion that does not exceed 50 dBA.

The new development will provide appropriate and comfortable acoustic conditions for occupants and will consider acoustic comfort in terms of internal noise levels, reverberation and acoustic separation.

4.2.3 Lighting Comfort

Artificial Lighting levels within each space type will be flicker free and comply with best practice guidelines for lighting levels, colour perception and uniformity. Glare from lamps will be limited to optimise lighting comfort.

4.2.4 Visual Comfort

Design will consider solar glare control initiatives such as blinds, daylight availability and access to external views.

4.2.5 Indoor Pollutants

In order to minimise indoor air contamination and promote occupant health, paints, adhesives, sealants and floor coverings will be selected to have low Volatile Organic Compound (VOC) emissions, and engineered wood products to have low formaldehyde emissions.

4.2.6 Thermal Comfort

The building will be designed to provide improved levels of thermal comfort to building occupants through high performance insulated façade systems and air-conditioning system design approaches.

4.3 Energy

The ongoing energy consumption and the associated carbon emissions of the new development will be reduced through high performance building facades designed to optimise the passive performance of the building architecture, thereby reducing the energy required for cooling, heating and lighting for the occupants. Best-in-class building services will further reduce the energy and water use of the building by optimising energy and water conservation in the design and equipment selections, and will also be actively controlled to operate only as and where required.

The new development will be designed to significantly reduce operational carbon emissions below that of an equivalent 2019 NCC Section J energy efficiency building code compliant reference building, with maximised onsite renewable energy generation also provided by building integrated solar photovoltaic systems.

The new development will also be designed to achieve a 5.5-Star NABERS Office Energy rating for the base building.

The following key passive design and building services initiatives are proposed to be incorporated into the new development.

4.3.1 Building Façade Strategies

- High performance low-e IGU glazed façade system with optimised solar heat gain coefficient (SHGC) and visual light transmittance (VLT) that can control solar ingress while providing excellent daylight penetration.
- Insulated constructions, with air-tightness testing of building envelope, to minimise thermal losses and leakage to the external environment.

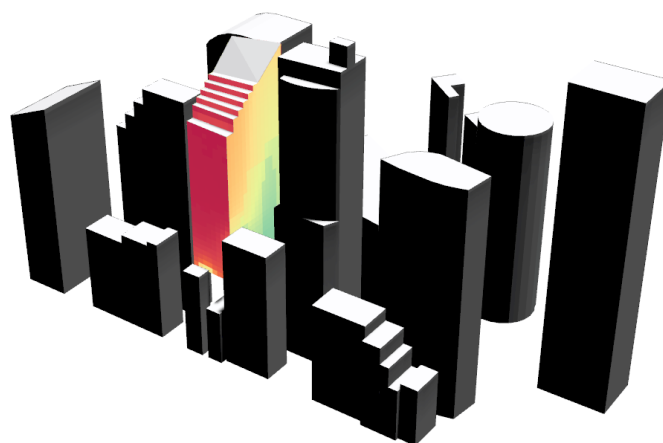


Figure 11: Dynamic thermal modelling concept

- Shading of glazing areas to reduce solar penetration to be considered as required, informed by dynamic thermal modelling approaches.

4.3.2 Building Services Strategies

To complement the passive design initiatives incorporated into the built form the following energy and water efficiency measures will be implemented in the engineering services provided within the new development to minimise utilities consumption and therefore greenhouse gas emissions and peak demands.

4.3.2.1 Mechanical Services

The air conditioning systems will be best-in-class energy efficient and designed to respond to the environmental performance of the building’s façade in order to maximise thermal comfort and reduce energy costs.

The following energy initiatives will be considered:

- High efficiency electric centrifugal variable speed chillers in series counterflow arrangement for optimised system coefficient of performance.
- Variable speed chilled and condenser water pumps controlled so that they always operate at the minimum possible speed to satisfy the load.
- Variable speed fans controlled so that they always operate at the minimum possible speed to satisfy the load.
- Low temperature variable-air volume air conditioning system that matches the air supply to the actual load (not the peak load).
- Separate air handling units for each façade and the interior zone to eliminate re-heat and maximise economy cycle operation.
- Outside air quantity demand controlled in response to CO2 sensors to adjust outside air rates to occupancy rates while maintaining high indoor air quality.
- Fresh air dampers shut during early morning warm-up.
- Variable speed car park ventilation fans controlled by CO sensors.
- Unoccupied areas isolated to prevent air conditioning to these areas.
- High efficiency motors, pumps and fans used throughout.

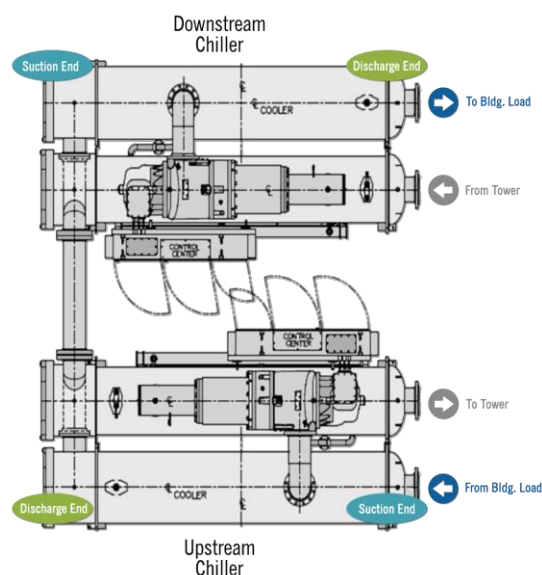


Figure 12: Chiller arrangement concept

- Multiple chillers including a small capacity (low load) machine used to allow the chillers to operate at an efficient band during medium and low cooling load periods.
- Low duct velocities employed to reduce fan energy.

4.3.2.2 Photovoltaic Solar System

A photovoltaic (PV) solar array will be included in the design to generate renewable energy for base building uses. The PV system will be optimised to the extent of appropriately oriented and available roof area.

4.3.2.3 Lighting

The following lighting efficiency initiatives are intended to be adopted:

- Energy efficient LED light sources will be used for the office lighting. Power for lighting will be less than 5 W/m².
- Intelligent programmable, digitally addressable lighting control system incorporating movement and ambient light sensors and enabling individual occupant control by commercial office tenants.

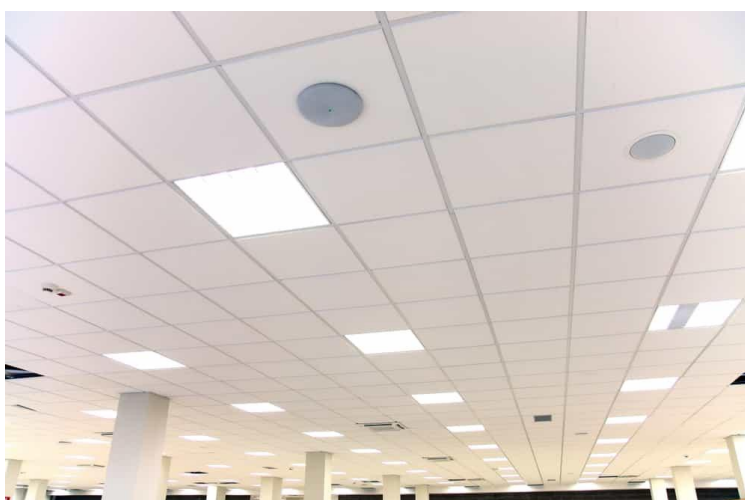


Figure 13: LED general office lighting concept

- Amenities on office floors will be activated by movement sensors in the access corridors.
- Lighting in car parks will be controlled after hours by movement sensors.

4.3.2.4 Power Factor Correction

Power factor correction plant will be provided as required to reduce the kVA electrical demand of the building on the external electricity distributor's network.

4.3.2.5 Hydraulic Services

The energy used for the hydraulic services is low in an office building. Domestic hot water will be provided by efficient heat pump equipment for the End of Trip facilities.

Water efficient fittings and fixtures will reduce the amount of hot water and pumping otherwise required (refer also Section 4.5).

Circulating pumps will be a shut off after business hours.

4.3.2.6 Lift Services

The lifts can be significant energy consumers in an office building. The following features are proposed to be incorporated:

- High efficiency drives with a power factor greater than 0.9.
- Sophisticated control system to optimise the movement and speed of the lifts to minimise energy consumption.
- Re-generative electrical control which recovers braking energy.
- Switching off lift car lights and ventilation during period of inactivity.



Figure 14: Regenerative drive lift concept

These features will combine to reduce the energy consumption and carbon emissions associated with the building's lifts.

4.4 Transport

The building is proposed incorporate leading sustainable mobility features to reduce carbon emissions not only by its superior location for public transport accessibility but also by including features such as a high-quality end-of-trip facility, and electric vehicle charging car parks.

In order to reduce dependence on high polluting personal transport options and encourage active transport, the following strategies are proposed.

4.4.1 Reduced car parking provision

The existing basement carpark is not proposed to be increased for the new development. Hence there will not be any new car parks, furthermore it is likely that carparks would significantly reduce through the proposed development. Therefore number of car spaces per occupant will be reduced accordingly compared to existing provision.

4.4.2 Low Emission Vehicle Infrastructure

Dedicated low emission vehicle parking including the retrofitting of electric vehicle chargers will be favourably considered.

4.4.3 Active and Public Transport

The project is proposed to include provision of full cyclist end of trip facilities and staff and visitor bicycle parking areas with appropriate accessibility and including showers, lockers, and changing amenities with appropriate drying space.

Good pedestrian and public transport access is afforded by the site's proximity to amenities and public transport routes, with Phillip and Elizabeth Streets facilitating north-south movement of buses and functioning as locations for modal

change from rail to bus via Martin Place station. The site is also located adjacent to the future Metro extension as shown overleaf.



Figure 15: Development location plan with transport links

4.5 Water

The new development is proposed to be designed with best practice water efficiency fixtures and fittings into the design and equipment selections, low bleed rate cooling towers, as well as a number of water capture and recycling systems to maximise recovery and reuse of rainwater, air handling unit condensate and fire test water.

The new development will be designed to achieve a 4-Star NABERS Office Water rating for the whole building. This benchmark is equivalent to a usage of less than 0.682 kL/m²/year). This meets Sydney Water’s Best Practice Guidelines which nominates a maximum of 0.84 kL/m²/year for projects with cooling towers.

4.5.1 Water Conservation Strategies

The following features will be incorporated to significantly reduce potable water consumption:

- 6 Star WELS rated urinals
- 4 Star WELS rated toilets
- 6 Star WELS rated tapware
- 3 Star WELS rated showers for EOT facilities
- Rainwater and condensate harvesting
- Low-bleed rate cooling towers
- 80% of the routine fire protection system test water and maintenance drain-downs to be stored for reuse on-site and each floor fitted with a sprinkler system with isolation valves or shut-off points for floor-by-floor testing.
- Where landscape irrigation systems are provided, they will be automatically controlled via a system, of timers and sensors to minimise water consumption.



Figure 16: WELS rating label

4.6 Materials

The new development is proposed to go beyond simply sustainable material selection by using a comprehensive life cycle analysis to optimise its cradle-to-cradle materials and construction-related environmental impacts, incorporating the existing podium facades and retained structural elements into the new development, implementing responsible material selection and sustainable products, with all initiatives maximising reused and recycled content in construction, as well as reducing embodied carbon in construction.

4.6.1 Sustainable Materials Strategies

To reduce the resource depletion, carbon emissions, water consumption and waste generation impacts of construction materials compared to a standard development, the following material sustainability strategies are proposed:

- Conducting and implementing a comprehensive life cycle analysis to optimise the new developments cradle-to-cradle materials and construction-related environmental impacts.
- Incorporating existing building elements including podium facades and retained structural elements into the development to preserve the embodied resources, energy and carbon in construction.
- Targeting 20% Portland cement replacement, 50% reclaimed water content and 25% alternative aggregates in concrete mixes to the extent possible.

- The use of structural steel sourced from responsible steel maker and a high proportion of reinforcing steel made using energy reducing processes and assembled using optimal fabrication techniques to the extent possible.
- Targeting 90% of the total cost of PVC in permanent formwork, pipes, flooring, blinds, cables on the new development is replaced by a non-PVC product or is best practice PVC compliant.
- Targeting 95% of new timber used in the construction of the building shall be PEFC or FSC certified.
- Targeting at least 9% of the new development construction value in specified materials (including concrete, steel, flooring, joinery and internal walls used) to have a reduced environmental impact.
- Demolition and construction waste management is proposed to target 90% reduction in waste to landfill with a high level of verification by the associated waste contractors and waste facilities.



Figure 17: Construction & demolition waste recycling facility

4.7 Land Use and Ecology

The new development proposes to improve biodiversity by reuse of a previously developed site that already has minimal ecological value, and improving on this by additional native planting in landscaping to the extent possible. Consideration will be given to additional initiatives, including internal and terrace planting.

Reduction in heat island effect will be considered through the assessment of roofing materials with regard to solar reflectance.

A comprehensive hazardous materials management plan including abatement of asbestos, lead (in paints) and polychlorinated biphenols (PCB's in fluorescent lighting magnetic ballasts) will be implemented through demolition and construction works.

4.8 Emissions

In order to minimise emissions from the site, the following strategies are proposed:

4.8.1 Stormwater Strategies

A Stormwater Management Plan will be prepared for the new development which incorporates achievement of the below requirements. This Stormwater Management Plan and supporting civil and hydraulic documentation will be updated as required to ensure compliance with the below requirements is achieved.



Figure 18: Stormwater runoff

- **Reduced Stormwater Peak Discharge** - The post-development stormwater peak event discharge rate from the site will not exceed the pre-development peak event stormwater discharge rate using a 5 year Average Recurrence Interval (ARI).
- **Reduced Stormwater Pollution Targets** - All stormwater discharged from the site will meet reduced Pollution Reduction Targets for total suspended solids, gross pollutants, total nitrogen, total phosphorus, petroleum hydrocarbons and free oils as applicable.

4.8.2 Light Pollution

The external lighting design will comply with AS4282:1997 Control of the Obtrusive Effects of Outdoor Lighting.

The external lighting design is proposed to demonstrate that no external luminaire has an upward light output ration (ULOR) that exceeds 5% relative to its actual mounted orientation.

4.8.3 Refrigerant Impact

Refrigerants in air-conditioning systems will have zero ozone depletion potential. Consideration will be given to the combined Total System Direct Environmental Impact (TSDEI) of the refrigerant systems in the building being less than 35 and provision of leak detection system with automated refrigerant recovery.

4.9 Innovation

The following innovations are proposed to be investigated to further distinguish the new development’s leading environmental aspirations:

- Improved stormwater pollution reduction targets
- Commissioning and Tuning supplementary or tenancy systems review
- Ultra low VOC paints with 50% of internally applied paints having no more than 5g/L TVOC content
- Over 12% sustainable product content



Figure 19: Sustainable product databases and labels

- Community benefits by developing solutions that encourage healthy social interaction and involvement.
- Universally accessible design
- Reconciliation action plan

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