ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD) REPORT

APPENDIX S

Sydney Metro City & Southwest: Waterloo Over Station Development

Ecologically Sustainable Development (ESD) Report

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1.0 Introduction

1.1 Purpose of this report

This report accompanies a concept State Significant Development Application (concept SSD Application) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The concept SSD Application is made under Section 4.22 of the EP&A Act.

This report should be read in conjunction with the Nominated State Significant Precinct (SSP) Study – Waterloo, submitted to the Minister for Planning (the Minister) in July 2018. That study proposes new planning controls to facilitate the development proposed.

Sydney Metro is seeking to secure concept approval for over station development (OSD) above and adjacent to Waterloo Station including a podium and three taller buildings which include commercial, residential, and community land uses. The concept SSD Application seeks consent for a building envelope and use for residential, retail, commercial, entertainment, community and recreational purposes, maximum building height, maximum gross floor area (GFA), pedestrian and vehicular access, circulation arrangements and associated car parking and the strategies and design parameters for the future detailed design of development.

Sydney Metro proposes to procure the construction of the OSD as part of an integrated station development package, which would result in the combined delivery of the station, OSD and public domain improvements. The station and its public domain elements form part of a separate planning approval for Critical State Significant Infrastructure (CSSI) approved by DPE on 9 January 2017.

As the development is within a rail corridor, is associated with railway infrastructure and is for “commercial premises or residential accommodation” with a Capital Investment Value of more than $30 million, the project is identified as State Significant Development (SSD) pursuant to Schedule 1, 19(2)(a) of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP).

This report has been prepared to outline the ESD requirements and specifically respond to the Secretary's Environmental Assessment Requirements (SEARs) issued for the concept SSD Application on 29th June 2018 which states that the Environmental Impact Statement (EIS) is to address the following requirements:

Reference	SEARs Requirement	Where Addressed in Report
1	***Environmental Planning Instruments, Policies and Guidelines*** *Address the relevant statutory provisions applying to the site contained in the relevant EPIs, including:* • *State Environmental Planning Policy (BASIX) 2004*	Section 4.3
13	***Ecologically Sustainable Development (ESD)*** *Detail how ESD principles (as defined in clause 7(4) Schedule 2 of the EP&A Regulation 2000) will be incorporated in the design, construction and ongoing operation of the development.*	Section 4.1
	Include a framework for how the proposed development will reflect best practice sustainable building principles to improve environmental performance, including energy and water efficient design and technology and use of renewable energy. This shall include commitments to relevant ESD benchmarks.	Section 4.1 and 4.2

1.2 Overview of the Sydney Metro in its context

Sydney Metro is Australia's biggest public transport project. A new standalone metro railway system, this 21st century network will deliver 31 metro stations and 66km of new metro rail for Australia's biggest city — revolutionising the way Sydney travels. Services start in the first half of 2019 on Australia's first fully-automated railway.

Sydney Metro was identified in *Sydney's Rail Future*, as an integral component of the *NSW Long Term Transport Master Plan*, a plan to transform and modernise Sydney's rail network so it can grow with the city's population and meet the future needs of customers. In early 2018, *the Future Transport Strategy 2056* was released as an update to *the NSW Long Term Transport Master Plan* and *Sydney's Rail Future*. Sydney Metro City & Southwest is identified as a committed initiative in the *Future Transport Strategy 2056*.

Sydney Metro is comprised of three projects:

Sydney Metro Northwest — formerly the 36km North West Rail Link. This $8.3 billion project is now under construction and will open in the first half of 2019 with a metro train every four minutes in the peak.

Sydney Metro City & Southwest — a new 30km metro line extending the new metro network from the end of Sydney Metro Northwest at Chatswood, under Sydney Harbour, through the CBD and south west to Bankstown. It is due to open in 2024 with an ultimate capacity to run a metro train every two minutes each way through the centre of Sydney.

Sydney Metro West – a new underground railway connecting the Parramatta and Sydney central business districts.

This once-in-a-century infrastructure investment will double the rail capacity of the Parramatta to Sydney CBD corridor and will establish future capacity for Sydney's fast growing west. Sydney Metro West will serve five key precincts at Westmead, Parramatta, Sydney Olympic Park, The Bays and the Sydney CBD. The project will also provide an interchange with the T1 Northern Line to allow faster connections for customers from the Central Coast and Sydney's north to Parramatta and the Sydney CBD.

Sydney's new metro, together with signalling and infrastructure upgrades across the existing Sydney suburban rail network, will increase the capacity of train services entering the Sydney CBD – from about 120 an hour currently to up to 200 services beyond 2024. That's an increase of up to 60 per cent capacity across the network to meet demand.

Figure 1: Sydney Metro alignment map

Sydney Metro City & Southwest includes the construction and operation of a new metro rail line from Chatswood, under Sydney Harbour through Sydney's CBD to Sydenham and on to Bankstown through the conversion of the existing line to metro standards.

The project also involves the delivery of six (6) new metro stations, including at Waterloo, together with new underground platforms at Central. Once completed, Sydney Metro will have the ultimate capacity for a train every two minutes through the CBD in each direction - a level of service never seen before in Sydney.

On 9 January 2017, the Minister approved the Sydney Metro City & Southwest - Chatswood to Sydenham application lodged by TfNSW as a CSSI project (reference SSI 15_7400).

The CSSI Approval includes all physical work required to construct the CSSI, including the demolition of existing buildings and structures on each site. Importantly, the CSSI Approval also includes provision for the construction of below and above ground structures and other components of future OSD (including building infrastructure and space for future lift cores, plant rooms, access, parking and building services, as relevant to each site). The rationale for this delivery approach, as identified within the CSSI application is to enable the OSDs to be more efficiently built and appropriately integrated into the metro station structures.

The EIS for the Chatswood to Sydenham alignment of the City & Southwest project identified that the OSD would be subject to a separate assessment process.

Since the CSSI Approval was issued, Sydney Metro has lodged four modification applications to amend the CSSI Approval as outlined below:

- Modification 1 - Victoria Cross and Artarmon Substation which involves relocation of the Victoria Cross northern services building from 194-196A Miller Street to 50 McLaren Street together with inclusion of a new station entrance at this location referred to as Victoria Cross North. The modification also involves the relocation of the substation at Artarmon from Butchers Lane to 98 – 104 Reserve Road. This modification application was approved on 18 October 2017.
- Modification 2 - Central Walk which involves additional works at Central Railway Station including construction of a new eastern concourse, a new eastern entry, and upgrades to suburban platforms. This modification application was approved on 21 December 2017.
- Modification 3 - Martin Place Station which involves changes to the Sydney Metro Martin Place Station to align with the Unsolicited Proposal by Macquarie Group Limited (Macquarie) for the development of the station precinct. The proposed modification involves a larger reconfigured station layout, provision of a new unpaid concourse link and retention of the existing MLC pedestrian link and works to connect into the Sydney Metro Martin Place Station. It is noted that if the Macquarie proposal does not proceed, the original station design remains approved. This modification application was approved on 22 March 2018.
- Modification 4 - Sydenham Station and Sydney Metro Trains Facility South which incorporated Sydenham Station and precinct works, the Sydney Metro Trains Facility South, works to Sydney Water's Sydenham Pit and Drainage Pumping Station and

ancillary infrastructure and track and signalling works into the approved project. This modification application was approved on 13 December 2017.

The CSSI Approval as modified allows for all works to deliver Sydney Metro between Chatswood and Sydenham Stations and also includes upgrade of Sydenham Station.

The remainder of the City & Southwest alignment (Sydenham to Bankstown) proposes the conversion of the existing heavy rail line from west of Sydenham Station to Bankstown to metro standards. This part of the project, referred to as the Sydenham to Bankstown upgrade, is the subject of a separate CSSI Application (Application No. SSI 17_8256) for which an EIS was exhibited between September and November 2017. A Response to Submissions and Preferred Infrastructure Report was submitted to DPE in June 2018 for further exhibition and assessment. This application is subject to assessment and determination by DPE, taking into consideration a further Response to Submissions Report which was submitted to DPE in September 2018.

1.3 Nominated State Significant Precinct - Waterloo

Following the decision to locate a metro station in Waterloo, the Minister determined that parts of Waterloo are of State planning significance which should be investigated for urban renewal through the SSP process. Study requirements for such investigations were issued by the Minister on 19 May 2017.

Investigation of the Precinct is being undertaken by UrbanGrowth NSW Development Corporation (UrbanGrowth NSW), in partnership with Sydney Metro and the Land and Housing Corporation (LAHC). The outcome of the SSP process will be new planning controls that will enable future development applications for renewal of the Precinct.

The Precinct includes two separate but contiguous and inter-related parts:

- The Waterloo Metro Quarter (the Metro Quarter)
- The Waterloo Estate (the Estate)

A separate SSP Study for the Metro Quarter was lodged in July 2018 in advance of the SSP Study for the Estate to provide a planning framework for the construction of OSD within the Metro Quarter. The staged submission of the Metro Quarter SSP Study also facilitates the proposed development to be delivered concurrently with the metro station, as an integrated station development.

As this concept SSD Application relies upon the planning framework proposed in the Metro Quarter SSP Study, it is anticipated that the SSP Study and the EIS for the SSD Application will be exhibited concurrently.

1.4 Planning relationship between Waterloo Station and the OSD

While Waterloo Station and the OSD will form an integrated station development, the planning pathways defined under the EP&A Act require separate approval for each component of the development. In this regard, the approved station works (CSSI Approval) are subject to the provisions of Part 5.1 of the EP&A Act (now referred to as Division 5.2) and the OSD component is subject to the provisions of Part 4 of the EP&A Act.

For clarity, the approved station works under the CSSI Approval included the construction of below and above ground structures necessary for delivering the station and also enabling construction of the integrated OSD. This includes but is not limited to:

- demolition of existing development
- excavation
- integrated station and OSD structure (including concourse and platforms)
- lobbies
- retail spaces within the station building
- public domain improvements associated with the station

- access arrangements including vertical transport such as escalators and lifts
- space provisioning and service elements necessary to enable the future development of the OSD, such as lift cores, plant rooms, access, parking, retail, utilities connections and building services.

The vertical extent of the approved station works above ground level is defined by the 'transfer level' level (which for Waterloo is defined by approximately RL 33.1 over the northern station box and RL 35.1 over the southern station box), above which would sit the OSD. An example of this delineation is illustrated in **Figure 2**.

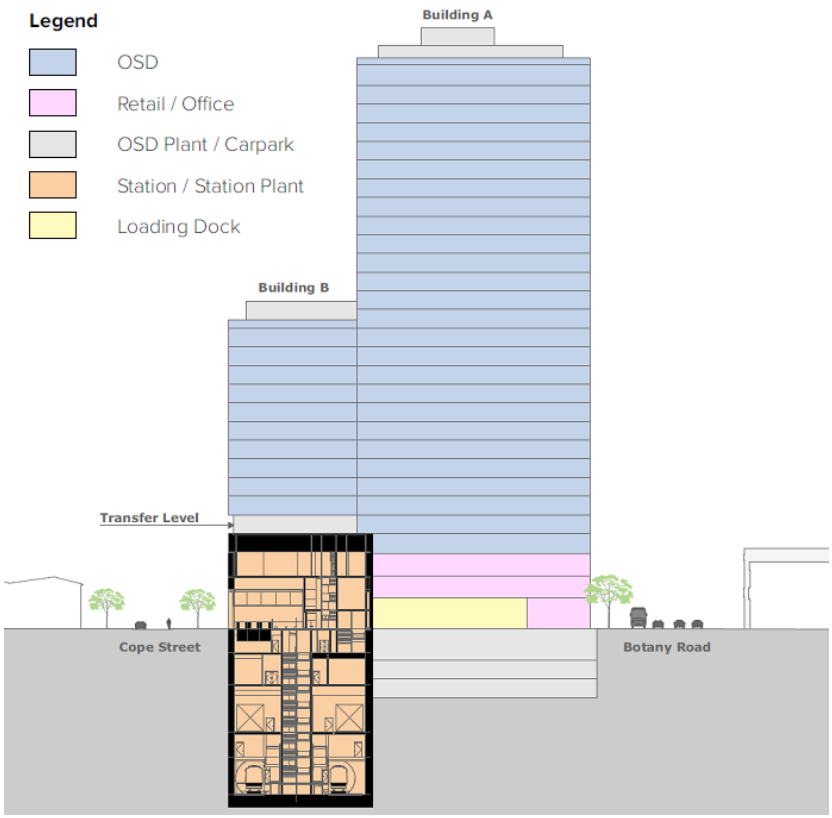


Figure 2: Delineation between the Metro station and OSD

It is noted that the structural and service requirements and space provisioning to support OSD vary from station to station. For example, based on the current level of design, Waterloo Station is not expected to provide for OSD lobbies, end of trip facilities and plant rooms. However, the detailed design may be amended to incorporate these elements as part of the integrated station development.

The CSSI Approval also establishes the general concept for the ground plane of Waterloo Station including access strategies for commuters, pedestrians and workers. In this regard, the main pedestrian access to the station would be via an entry located at the corner of Raglan and Cope Streets. The station design has continued to be developed having regard to its integration with the Metro Quarter OSD, and as a result, a second entrance to the

station is to be provided from a proposed public plaza adjacent to Cope Street. Retail uses (approved under the CSSI Approval) would be located on the ground floor of the station development along the Cope Street frontage of the site.

Since the issue of the CSSI Approval, Sydney Metro has undertaken design work to determine the technical requirements for the structural integration of the OSD with the station. This level of design work, together with the planning and design undertaken for the remainder of the Metro Quarter has informed the concept proposal for the OSD. It is noted that ongoing design development of the works to be delivered under the CSSI Approval would continue with a view to developing an Interchange Access Plan (IAP) and Station Design Precinct Plan (SDPP) for Waterloo Station to satisfy Conditions E92 and E101 of the CSSI Approval. The detailed design for the Metro Quarter would continue to evolve having regard to the IAP and SDPP.

Public domain improvement works immediately adjacent to Waterloo Station would be delivered as part of the CSSI Approval to support pedestrian movements between transport modes (including to new and relocated bus stops, bike parking on Cope Street, and taxi and kiss-and-ride bays on Cope Street), while other public domain works within the Metro Quarter are proposed as part of the OSD. Final details of public domain works for the OSD will be provided with the detailed SSD Application(s) following finalisation of the SDPP and IAP for the CSSI Approval.

1.5 The site

1.5.1 Location

The site is located within the City of Sydney Local Government Area (LGA). The Metro Quarter comprises land to the west of Cope Street, east of Botany Road, south of Raglan Street and north of Wellington Street. The heritage listed Waterloo Congregational Church located at 103–105 Botany Road is within this block but is not part of the site. The site has an approximate area of 1.287 hectares (refer to Figure 3).

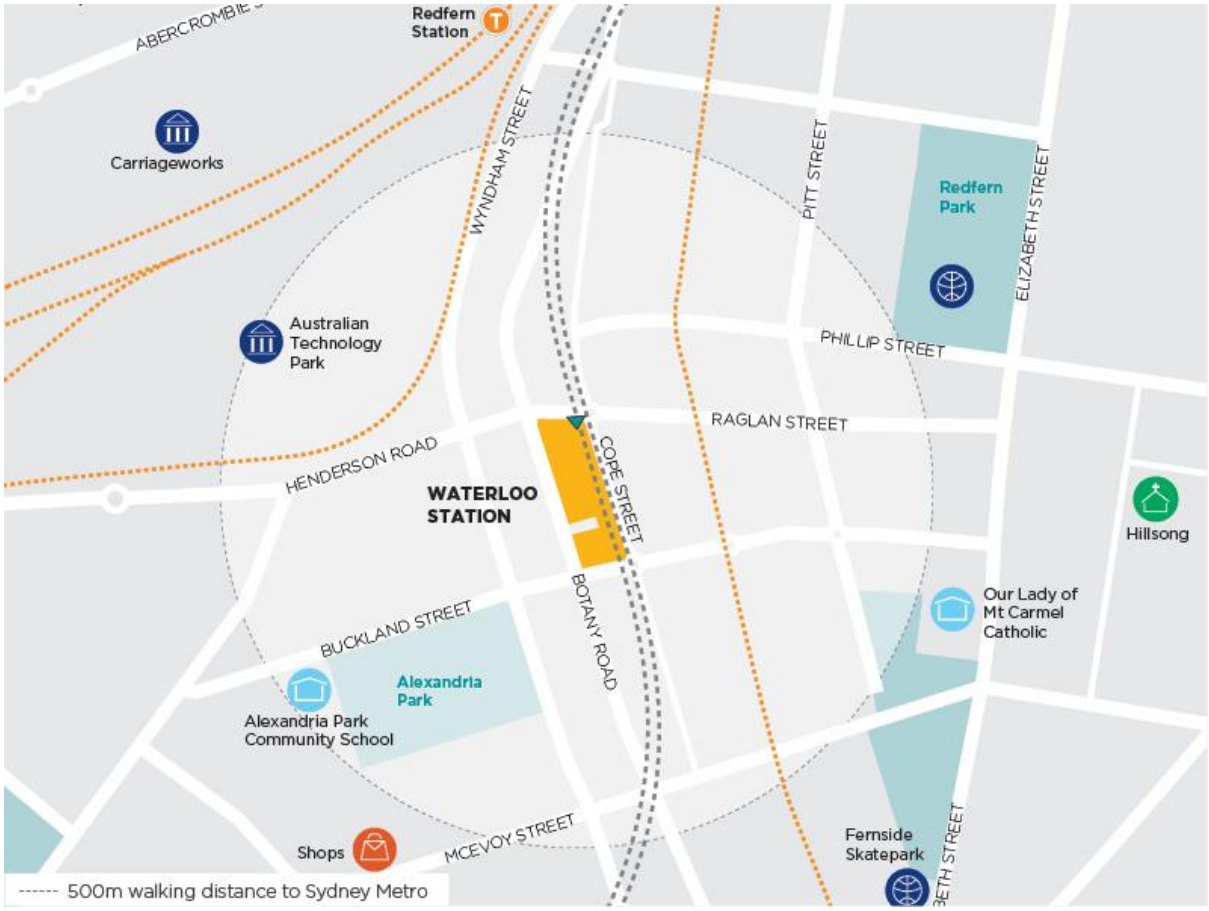


Figure 3: Waterloo Station location plan

1.5.2 Site context

The Metro Quarter is located in Redfern Street Village (see Figure 4) in the City of Sydney LGA approximately 3.3 kilometres south of Sydney CBD, 1 kilometre north of Green Square and less than 1 kilometre south of Redfern Station.

Directly east is the Waterloo Estate, which is owned by the NSW Government and is under the management of NSW LAHC. The Waterloo Estate comprises 2,012 social housing dwellings and a small number of private dwellings in medium and high density forms, ranging from single storey attached dwellings to apartment buildings of up to thirty storeys.

The Metro Quarter is less than 1km south-east of the Australian Technology Park (ATP), a technology micro-cluster that currently contains around 3,000 – 3,500 workers with a range of businesses in technology and creative industries; and a start-up/business incubator hub. It is set to grow into a business park that will soon accommodate new premises currently under construction (i.e. Commonwealth Bank Australia (CBA) has committed to two major office towers).

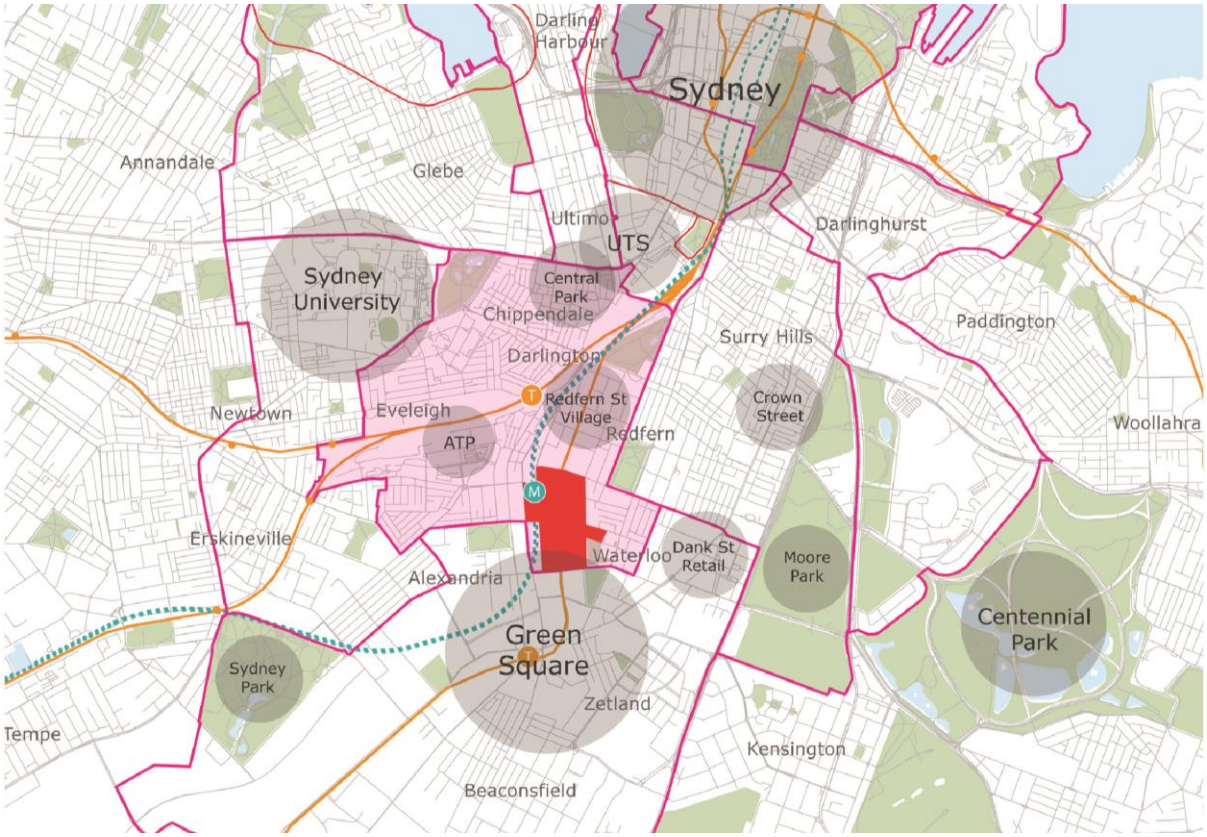


Figure 4 **Location and site plan of the Waterloo State Significant Precinct (in red) and Redfern Street Village (in pink)**

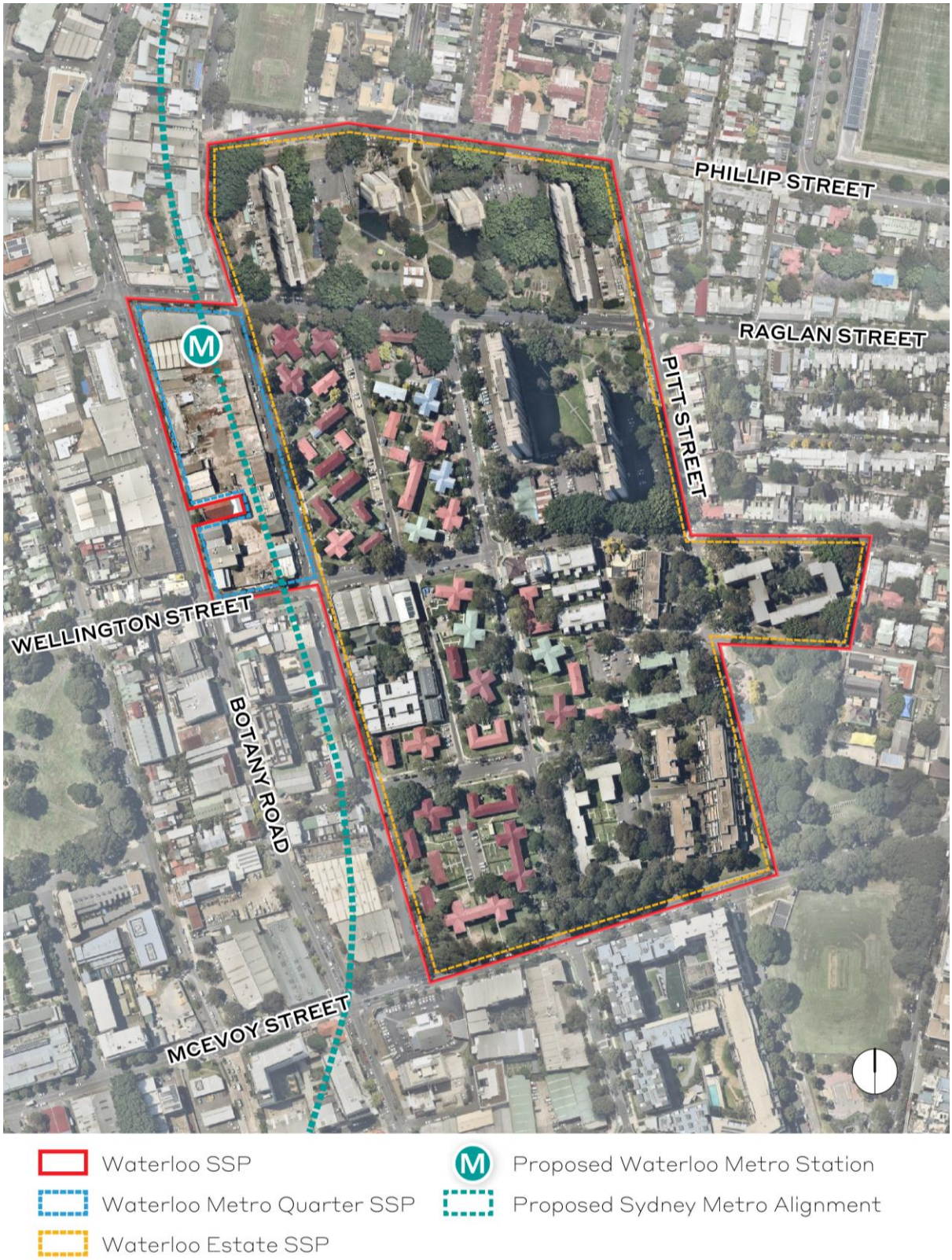


Figure 5 Nominate State Significant Precinct - Waterloo

The site comprises the following properties:

- 136B Raglan Street — Lot 4 DP 215751
- 59 Botany Road — Lot 5 DP 215751
- 65 Botany Road — Lot 1 DP814205
- 67 Botany Road — Lot 1 DP228641
- 124-128 Cope Street — Lot 2 DP228641
- 69-83 Botany Road — SP75492
- 130-134 Cope Street — Lot 12 DP399757
- 136-144 Cope Street — Lots A-E DP108312
- 85 Botany Road — Lot 1 DP27454
- 87 Botany Road — Lot 2 DP27454
- 89-91 Botany Road — Lot 1 DP996765
- 93-101 Botany Road — Lot 1 DP433969 & Lot 1 DP738891
- 156-160 Cope Street — Lot 31 DP805384
- 107-117A Botany Road — Lot 32 DP805384 & Lot A DP408116
- 119-121 Botany Road — Lot 1 DP205942 & Lot 1 DP436831
- 170-174 Cope Street — Lot 2 DP205942

The buildings and structures on the site are now demolished in accordance with the CSSI Approval with the exception of one building which is being used to support construction.

1.6 Overview of the proposed development

This concept SSD Application follows the submission of a SSP Study which supports a proposal to amend existing controls to facilitate the proposed development. The concept SSD Application will in turn comprises the first stage of seeking SSD development consent for the Waterloo OSD project. It will be followed by a future detailed SSD Application(s) for the design and construction of the OSD built form.

This concept SSD Application seeks approval for the planning and development framework and strategies to inform the future detailed design of the OSD. It specifically seeks approval for:

- maximum building envelopes, including maximum building heights, street-wall heights and ground and upper level setbacks
- a maximum gross floor area (GFA) of 68,750 square metres, comprising:

  - approximately 56,200 square metres GFA of residential accommodation, with potential to deliver approximately 700 dwellings, comprising a mix of housing including 5 to 10 percent affordable housing and 70 social housing dwellings
  - approximately 3,905 square metres GFA of retail premises and entertainment facilities
  - approximately 8,645 square metres GFA for business and commercial premises and community, health service and recreational facilities (indoor), including at least 2,000 square metres of floor space for community uses
- a three storey podium and a free standing building located within a public plaza, accommodating non-residential land uses
- residential uses above podium level in various building forms including three taller buildings of 23, 25 and 29 storeys (Relative Level (RL) 96.9, 104.2 and 116.9 metres Australian Height Datum (AHD) respectively)
- use of OSD space provisioning within the footprint of the CSSI Approval
- public domain works, through-site links, footpaths, provision for cycle facilities and enhanced pedestrian crossings and roads
- car parking for up to 427 vehicles
- loading, vehicular and pedestrian access arrangements
- strategies for utilities and services provision
- strategies for managing stormwater and drainage
- a strategy for the achievement of ecologically sustainable development
- a public art strategy
- Provision for future signage zones
- a design excellence framework
- the future subdivision of parts of the OSD footprint (if required).

It is noted that the Sydney Metro comprises GFA of approximately 8,415 square metres on the site, approved under CSSI Approval. The total GFA for the integrated station development, including the station GFA is approximately 77,145 square metres, which is equivalent to an FSR of approximately 6:1.

Key parameters of the concept proposal based on the current level of design development are indicated at Figure 5 and Figure 6.

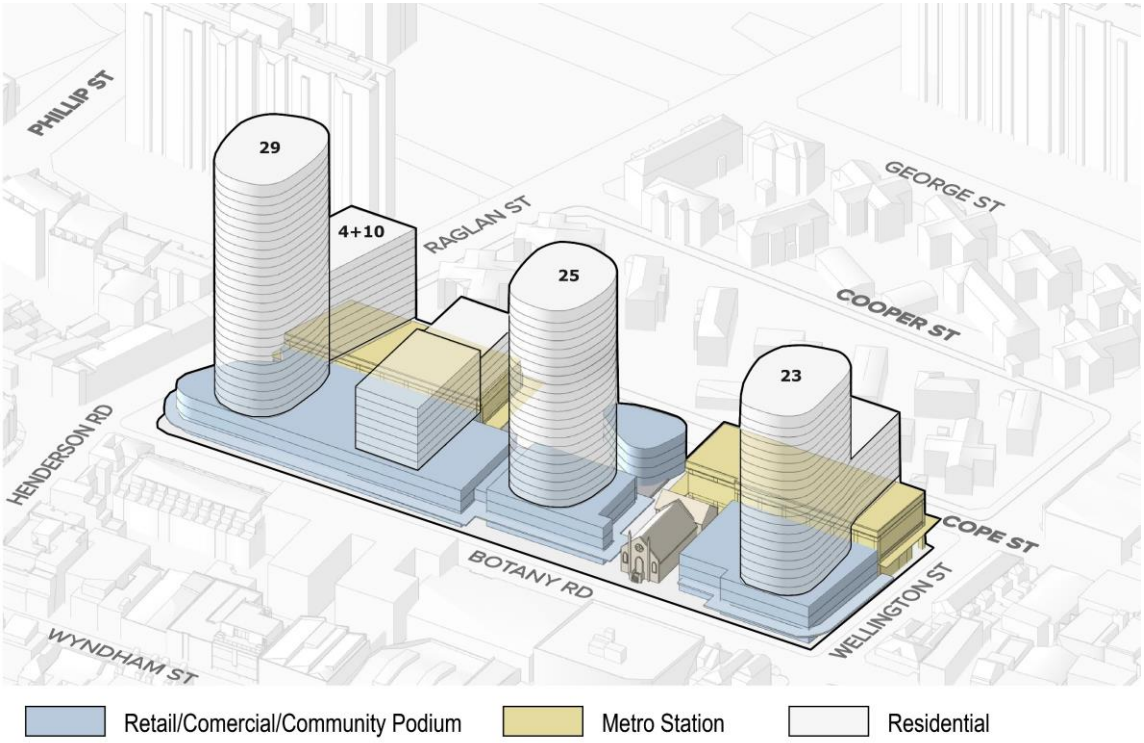


Figure 6 Proposed massing, viewed from the west

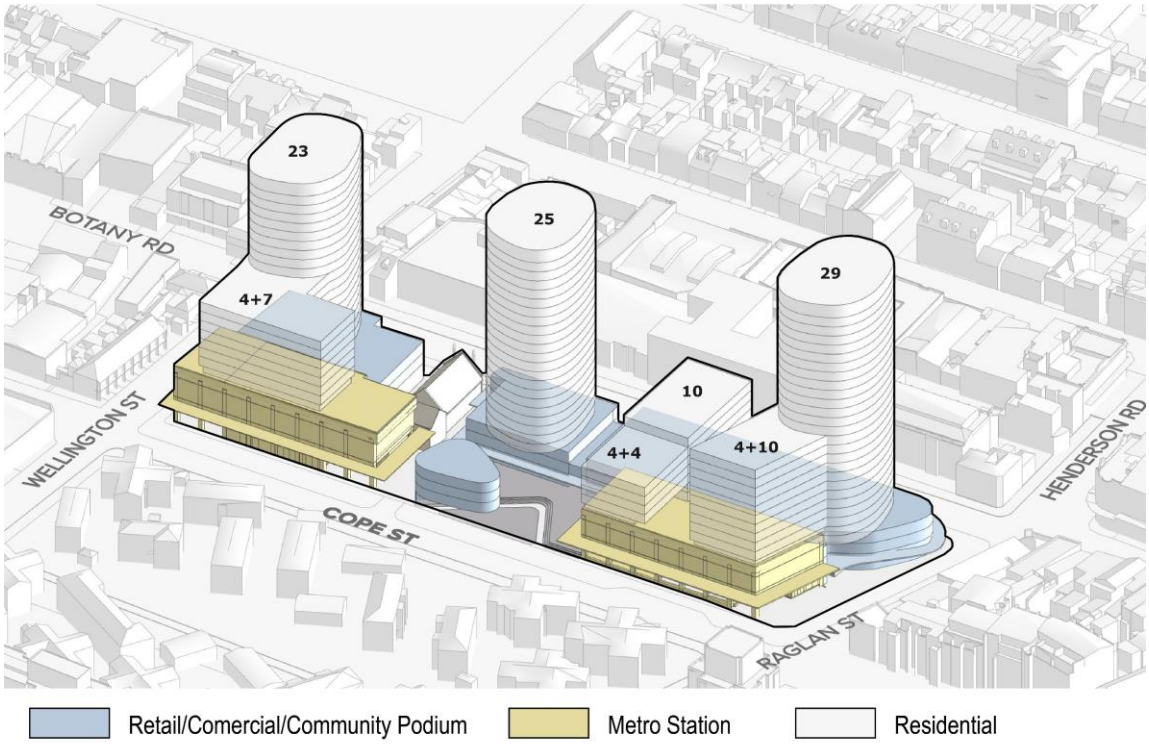


Figure 7 Proposed massing, viewed from the east

The proposal is a significant opportunity to contribute to the urban renewal process for the Waterloo SSP. The objective to deliver the Metro Quarter project as soon as reasonably possible after completion of the Sydney Metro works (earmarked to open 2024) would ensure buildings within the Metro Quarter are occupied to support maximum patronage of the proposed metro station.

The Metro Quarter would contain a mix of uses including residential, commercial, retail, community facilities and services and cultural opportunities sufficient for daily life to be provided for within the wider neighbourhood and to support the activation of the precinct. This would help make Waterloo one of the most connected and attractive inner-city places to live, work and visit.

2.0 Scope of assessment

This ESD report responds to the relevant SEARs as stated in Section 1.1.

The Metro Quarter site is part of the broader Waterloo SSP study area which includes the adjacent Waterloo Estate. Waterloo Station on the Sydney Metro City & Southwest line will be constructed within the Metro Quarter. This scope of assessment is specific only to the Metro Quarter development outside of the Waterloo Station box.

Section 0 provides the contextual background for consideration of ESD and sustainability in the Metro Quarter. The policy context highlights some of the relevant regulatory and compliance requirements at the national and international, state, regional, and local levels of policy and planning. This context is further supported by a trend analysis based on a literature review providing some contextual considerations for energy, water and waste that may affect design and development of the Metro Quarter. The context review has informed the integration of sustainability into the design and planning of the Metro Quarter.

In framing sustainable design integration, the GBCA's Green Star Communities (GSC) National Framework was identified as the most appropriate framework for considering sustainability in urban developments. The guiding principles behind the framework are considered by the Australian industry as representative of market best practice. The GSC Framework was compared against several key frameworks, objectives and requirements including the EP&A ESD principles as defined in the EP&A Regulation 2000, the relevant SSD Application SEARs, and a number of policies covered in section 3.1. As such, sustainability initiatives have been developed and framed against the Green Star Communities National Framework.

The Green Star Communities rating tool; based on the Green Star Communities Framework, creates a means to set suitable sustainability performance benchmarks to achieve best practice sustainability outcomes. As such, the Metro Quarter is committed to Green Star as the ESD benchmarks, targeting a 6-star Green Star Communities rating for the precinct and 5-star Green Star Design & As-Built rating for buildings. It is also committed to delivering Building Sustainability Index (BASIX) requirements.

3.0 Sustainability Context

The following provides an overview of the key sustainability considerations within this study. They reference the SEARs requirements outlined in Section 1.1 as well as the wider policy and guidance relevant to this stage of the project as well as some of the future drivers influencing consideration of a more sustainable design response.

3.1 ESD Policy Context

To ensure alignment with government and community objectives and expectations, the following section provides a review of international, national, state and local policy drivers and context that inform or influence the sustainable development outcomes for Waterloo.

3.1.1 National and International Context

3.1.1.1 United Nations Sustainable Development Goals (SDG)

In 2015 the United Nations General Assembly passed a resolution on the global agreement of 17 Sustainable Development Goals (SDGs) to form a roadmap for global development efforts to 2030 and beyond (Figure 8). While non-binding, for Australia, the 2030 Agenda will be highly influential, shaping commitments, development cooperation and finance flows as well as global government and private sector reporting. Australia is to deliver its first Voluntary National Review on the SDG's at the High Level Political Forum in New York in 2018. Each SDG has been assigned to a particular federal agency for action and reporting.

Figure 8: Sustainable Development Goals

Some of the SDG's have a particular relevance to Waterloo. As an overarching theme, Australia's commitment includes an engagement on SDG 11 (Sustainable Cities and Communities) which is being driven by the Department of Infrastructure, Regional Development and Cities is leading the development of a chapter for Australia's Voluntary National Review on progress towards Sustainable Development Goal 11 (Sustainable Cities and Communities). Goal 11: Make cities inclusive, safe, resilient and sustainable. SDG 11

particular refers to *"by 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience..."(SDG 11).*

Other relevant SDG's include:

SDG 12 - Responsible consumption and production

- 12.1 Implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries
- 12.2 By 2030, achieve the sustainable management and efficient use of natural resources
- 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

SDG 7 - Affordable and clean energy

- 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services
- 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix
- 7.3 By 2030, double the global rate of improvement in energy efficiency

SDG 6 - Clean water and sanitation

- 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
- 6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
- 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

3.1.1.2 Paris Agreement – Framework Convention on Climate Change

The Paris Agreement formed by United Nations Framework Convention on Climate Change members, sets out a global action plan to reduce the impacts of climate change by limiting global warming to below 2°C and pursue efforts to keep warming below 1.5°C above pre-industrial levels. To limit global average temperature increase to 1.5 degrees Celsius means that all sectors of the economy need to achieve net zero emissions by 2050. Australia has set a target to reduce emissions by 26-28 percent below 2005 levels by 2030 which builds upon the current 2020 target of reducing emissions by 5 percent below 2000 levels under the Kyoto Protocol.

The planning and development of the Metro Quarter will occur under the carbon emissions trajectory set by Australia's involvement in the Paris Agreement. The planning and development of the Metro Quarter will occur under the carbon emissions trajectory set by Australia's involvement in the Paris Agreement. Flow-on carbon policies and regulation is expected to trickle through to the national, state and local levels of planning and government.

3.1.1.3 Renewable Energy Target (RET)

The Renewable Energy Target is a legislated target designed to ensure the increased uptake of renewable energy in Australia, and in the process, reduce overall GHG emissions. The current target is for 23.5 percent of Australia's energy, the equivalent of 33,000 GWh of electricity, to come from renewable sources such as wind, solar, and hydroelectric by 2020.

The RET allows both large-scale power stations and small-scale systems to create certificates for every megawatt-hour of energy they generate. Certificates are purchased by electricity retailers and surrendered to the Clean Energy Regulator to meet the retailers' legal obligations under the RET. This creates a market that provides financial incentives to both large-scale renewable energy power stations and the owners of small-scale renewable energy systems.

The RET, though not directly relevant to the Metro Quarter sets out the overall trajectory on renewable energy uptake from a policy perspective. The RET also enables any on-site renewable generators to claim certificates to improve its overall business case.

3.1.1.4 National Energy Productivity Plan (NEPP)

The National Energy Productivity Plan aims to improve Australia's energy productivity1 by 40percent by 2030. The energy market is undergoing rapid disruptive changes with new technologies, new customer expectations, rising prices, falling demand and pressure from climate change impacts. Energy supply has moved away from predictable patterns and energy markets have struggled to forecast and plan for this change. The inability to plan effectively has resulted in inefficient investment which has led to higher costs for customers.

Over recent years, Australia's energy productivity has improved, growing at around 1.8 percent per annum over the last decade. However, Australia is still lagging behind other countries such as Japan, Germany and the UK. To meet the 40 percent target, a doubling of the rate of energy productivity improvement compared to business-as-usual is required.

The NEPP itself does not mandate any particular development to achieve certain energy productivity targets. However, it acts as general guidance for energy efficiency and energy productivity measures that could be considered for the precinct.

3.1.1.5 National Carbon Offset Standards (NCOS) for Buildings and Precincts

The Department of Environment and Energy released the final version of the National Carbon Offset Standards for Buildings and Precincts in October 2017. The Department collaborated with the National Australian Built Environment Rating System (NABERS), the Green Building Council of Australia (GBCA), carbon accounting experts and property sector businesses to develop the Standards. These voluntary standards set rules for measuring, reducing, offsetting and reporting emissions required to make carbon neutral claims for building and precinct operations. Within precinct operations this includes energy, water, waste and transport emissions. These standards will frame the due diligence process and future carbon measurement and reporting efforts for the Metro Quarter and its buildings.

[1] Energy productivity is increasing the output using the same amount, or less, energy

3.1.1.6 Sustainability Rating Tools

There are a number of rating tools available to assess the sustainability performance of buildings and precincts that are relevant to the Metro Quarter. NABERS and NatHERS are government initiatives while Green Star is an industry developed rating tool.

National Australian Built Environment Rating Systems (NABERS)

NABERS is a national rating system that measures the environmental performance and impacts of Australian buildings, tenancies and homes in terms of energy efficiency, water usage, waste management and indoor environment quality of a building or tenancy. NABERS is mandated for the commercial floor space within the development at Waterloo where the office space is greater than 1000m^2 of space though the commercial developments through the Commercial Building Disclosure (CDB) program which requires all buildings on sale or leasing to have a NABERSs rating for their energy consumption. There may be opportunity to consider other NABERS benchmarking and monitoring for water, waste and indoor environment to enable effective benchmarking and reporting if considered appropriate.

Nationwide House Energy Rating Scheme (NatHERS)

The Nationwide House Energy Rating Scheme (NatHERS) rates the energy efficiency of a home on a 10-star rating system. NatHERS primarily focuses on the potential heating and cooling energy use, centred on thermal comfort of the building's inhabitants. NatHERS is built into the BCA and for multi-residential units must:

- Collectively achieve an average energy rating of not less than 6 stars; and
- Individually achieve an energy rating of not less than 5 stars

NatHERS will provide greater opportunity for the reduction of energy used in buildings for thermal comfort as well as provide means for better future-proofing from climate change and related temperature increases.

Green Building Council of Australia (Green Star)

Green Star is an internationally recognised rating system that delivers independent verification of sustainable outcomes throughout the life cycle of the built environment. It is designed to be a voluntary rating tool to incentivise better practice within the property development industry.

The Green Star Communities rating tool was released in 2012 and evaluates the sustainability attributes of the planning, design and construction of large scale development projects at a precinct, neighbourhood and/or community scale. It provides a rigorous and holistic rating across five impact categories; Governance, Liveability, Economic Prosperity, Environment, and Innovation and strives to incentivise more sustainable outcomes from master plans. Green Star Communities also rewards credit points for non-residential buildings on the precinct that are certified under building-scale rating tools.

Green Star Design & As Built assesses the sustainability outcomes from the design and construction of new buildings or major refurbishments, across nine holistic impact categories. Green Star – Design & As-Built can drive better sustainable outcomes for buildings and by extension the precinct by providing a framework for sustainable building design. This was released on 03/07/17. Green Star aimed to promote sustainability in design and construction. The Credits covered by this tool are:

- Management
- Indoor Environmental Quality
- Energy
- Transport
- Water
- Materials
- Land use and Ecology
- Emissions and
- Innovation.

Green Star Design & As Built can be applied to the retail, commercial and residential building elements within the development.

3.1.2 NSW State Controls and Guidelines

3.1.2.1 Environmental Planning and Assessment Act and Regulation 2000

The redevelopment of the Metro Quarter is subject to the requirements set under the EP&A Act 1979 and the regulations supporting the Act. The SEARs specifically call out the ESD principles set out in the EP&A Regulation and require a an Ecologically Sustainable Development Report which 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 of the development. The principles in the regulation are repeated below:

(4) The principles of ecologically sustainable development are as follows:

(a) the precautionary principle, namely, that 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,*

(b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) improved valuation, pricing and incentive mechanisms, namely, that 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,*
>
> *(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.*

This report has been developed to demonstrate specifically where the development has considered the items above will be required to meet the SEARs and the compliance with the definitions specified within the Act. See Section 4.1 for details.

3.1.2.2 Sydney Metro City & Southwest Sustainability Strategy 2017-24

The Sydney Metro City & Southwest project is the second stage of the Sydney Metro program, extending from Chatswood, under Sydney Harbour, through the Sydney central business district and beyond to Bankstown. It includes six new metro stations including at Waterloo, and the upgrade of other stations. The Metro Quarter is an integrated station development (referred to as 'Over Station Developments' in the Strategy) above and adjacent to the new Waterloo Station.

The City and Southwest alignment has a Sustainability Strategy for 2017-24 which demonstrates the integration of sustainability to date on the project and sets strong commitments to sustainability as the project progresses through detailed design and delivery.

The Sydney Metro project has also set out criteria to seek best-practice sustainable design sustainable design and governance outcomes for integrated station developments including:

- Achieving high benchmarks using Green Star Design & As Built ratings and Green Star Communities ratings where appropriate.
- Achieving high benchmarks using NABERS and BASIX ratings.
- Site-specific responses to the project's sustainability objectives.
- Investigation and inclusion of affordable housing where appropriate.

3.1.2.3 Building Sustainability Index (BASIX)

The Requirements identify performance benchmarks to allow sustainability to be considered in site planning, building design and in the construction and operational phases of the development to achieve best practice sustainability outcomes. BASIX controls are prescribed under a State Environmental Planning Policy (SEPP), which in turn is implemented under the *Environmental Planning and Assessment Act 1979*. It is a statutory requirement for all residential developments including new constructions and renovations worth $50,000 or more in NSW.

BASIX is one of the most stringent energy and water planning tools in Australia for residential development and sets energy and water design standards for all residential dwelling types through specific design strategies for lighting, heating, cooling and ventilation.

BASIX mandates sustainability standards in residential developments by assessing the consumption of mains-supplied water, energy and thermal performance. BASIX Targets were revised in June 2017. The following tables provide the current minimum statutory requirements for residential developments in Sydney.

Statutory BASIX Energy Targets

Table 1: Statutory BASIX Energy Targets

Building Type	BASIX Target
Detached and semi-detached	50
Low-rise (3-storey units)	45
Mid-rise (4-5 storey units)	35
High-rise (6-storey units and higher)	25

Table 2: Statutory BASIX Water Targets

Building Type	BASIX Target
Detached and semi-detached	40
Low-rise (3-storey units)	40
Mid-rise (4-5 storey units)	40
High-rise (6-storey units and higher)	40

BASIX Energy and Water targets will influence overall electrical demand in the Metro Quarter site, with an increase in BASIX targets implying decreased demand and more thermally efficient building envelopes and services required at later stages of development. This will ensure an extent of future-proofing from climate change and related temperature increases.

3.1.2.4 SEPP 65 and the Apartment Design Guide

The *State Environmental Planning Policy No 65 – Design Quality of Residential Apartment Development* (SEPP 65) and *Apartment Design Guide* (ADG) promote better apartment design across NSW through the establishment of a consistent approach to the design and assessment of apartments and the way they are assessed. The ADG provides guidance on features for apartment buildings through a number of key design criteria relating to the sustainability performance of the development including:

- Bicycle and car parking
- Solar and daylight access
- Natural ventilation
- Apartment size and layout
- Universal design
- Energy efficiency
- Water management and conservation
- Waste management
- Building maintenance

The ADG has been used to guide the overall design within the Metro Quarter to drive sustainable design for the benefit of the residents as well as reduce energy and water demand and waste generation.

3.1.2.5 Future Transport Strategy 2056

Future Transport Strategy 2056 is an overarching strategy, supported by a suite of plans to achieve a 40 year vision for NSW's transport system. The Strategy and Plans focus on the role of transport in delivering movement and place outcomes that support the character of the places and communities we want for the future. The Strategy recognises that transport infrastructure impacts every person, business and visitor in the state, and supports economic, social and environmental outcomes. The vision for future transport in NSW is built on the following outcomes:

- Customer focused
- Successful Places

- A Strong Economy
- Safety and Performance
- Accessible Services
- Sustainability

The *Future Transport Strategy* is responding to the way technology will change the way we travel and how transport infrastructure will be delivered. Traditional modes of travel such as buses, trains, cars and trucks are increasingly automated, safer, and will gradually need connection to a smarter network. The increasing availability of open data sources give rise to improved customer choice and flexibility in transport services.

The 2056 Strategy is highly relevant to the Metro Quarter as the design decisions being considered now will have implications on the precinct and its surrounds for decades to come. With the construction of the Waterloo Station, the Metro Quarter should consider how it can align with and assist in the achievement of the desired outcomes.

3.1.2.6 NSW Energy Efficient Policy

The *Energy Efficiency Action Plan* was developed with the goal of reducing the cost of living in NSW. It aims to put downward pressure on electricity bills by assisting households to reduce their energy use and improve energy productivity for business. The Action Plan aims to reach the following targets:

- Achieve 16,000 GWh in energy savings per year by 2020
- Support 220,000 low income households to reduce energy use by up to 20 percent by 2014
- Assist 50 percent of NSW commercial floor space achieve 4-star NABERS and water rating by 2020 through the delivery of high-standard building retrofit programs

The Energy Efficiency Action Plan sets out a number of actions ranging from educational programs, formation of partnerships with industry, and provides financial incentives for homes and businesses to participate in energy reduction schemes.

3.1.2.7 Urban Green Cover in NSW Technical Guidelines

The NSW Office of Environment and Heritage's (OEH) *Urban Green Cover in NSW Technical Guidelines* (2015) are also part of the NSW Government intent to minimise and accommodate the impacts of climate change to communities, health services and local infrastructure. The Guidelines recognise the need for urban environments to withstand projected increase in extreme heatwaves, intense storms and localised flooding. OEH includes among urban green cover a range of strategies such as vegetated and reflective roofs, green walls, street plantings, permeable and reflective road surfaces, and cool open spaces and parks. These are mostly low-cost approaches to cooling urban environments while providing ecosystem services such as stormwater management, clean air and biodiversity habitat in addition to reduced energy costs for cooling. The guidelines are meant for integration in strategic plans, development control plans, public domain guidelines or urban design studies.

3.1.2.8 NSW Waste Avoidance and Resource Recovery Strategy 2014-21

The *NSW Waste Avoidance and Resource Recovery Strategy* (WARR Strategy) provides a clear framework for waste management over the next few years and aligns with the NSW Government's waste reforms set out in '*NSW 2021: A Plan to make NSW number one'*.

The vision set by the WARR Strategy is to "*enable all of the NSW community to improve environment and community well-being by reducing the environmental impact of waste and using resources more efficiently. Using resources more efficiently and keeping materials circulating in the productive economy can also help to create jobs and grow the NSW economy*".

The WARR Strategy is financially supported by the '*Waste Less, Recycle More'* initiative. It has supported significant new recycling and waste infrastructure, litter programs and illegal dumping reduction strategies across the state.

The WARR Strategy's key objectives and targets are to: increase recycling across municipal, commercial/industrial and construction & demolition waste streams; divert waste from landfill; better manage problem wastes[2], reduce litter and illegal dumping.

WARR Strategy 2014-21 Targets	
Avoidance and reduction of waste generation	
By 2021–22, reduce the rate of waste generation per capita	
Reduce household chemicals, e-waste, organics and support collection for safe disposal and recycling drop-off facilities	
Increase recycling	**Divert from landfill**
Municipal solid waste from 52 percent (in 2010–11) to 70 percent	By 2021–22, increase the waste diverted from landfill from 63 percent (in 2010–11) to 75 percent
Commercial and industrial waste from 57 percent (in 2010–11) to 70 percent	
Construction and demolition waste from 75 percent (in 2010–11) to 80 percent	

As part of WARR, a draft WARR Infrastructure Strategy (2017-2021) was developed to guide planning and decision making to ensure NSW gets the correct mix of infrastructure to meet future needs. . It is imperative to understand the gap in existing capacity and the need for resource recovery facilities. The projected population growth is assumed to be the major driver for an increase in waste generated across the state. Should the 2021 75 percent

[2] For example, by providing appropriate facilities for disposal of household problem waste such as paint, batteries, gas bottles and hazardous household products

target for resource recovery diversion not be met, the demand for landfill capacity could increase. This could put a strain on the existing waste treatment infrastructure; hence there is an apparent need to increase the number of waste processing facilities.

3.1.2.9 Waste Less, Recycle More

The *Waste Less, Recycle More* initiative provides funding for business recycling, organics collections, market development, managing problem wastes, new waste infrastructure, local councils and programs to tackle illegal dumping and litter. The program seeks to encourage local communities to think differently about waste avoidance, recycling, littering and illegal dumping, deliver conveniently located, value-for-money waste infrastructure to make it easier to 'do the right thing', and drive innovative regulatory approaches to protect the environment and support investment in new waste programs.

3.1.2.10 Better Practice Guide for Waste Management in Multi-Unit Dwellings

The Guide has been developed with the intention of assisting council, architects, designers, developers and building management incorporate better practice in the design, establishment, operation and ongoing management of waste services in residential multi-unit developments. The guide applies specifically to multi-unit residential developments including residential blocks of 4-7 storeys, high-rise developments (>7 storeys) and mixed-use developments – all of which are appropriate to the Metro Quarter development. The outcome of the guide is to encourage appropriate resident behaviour regarding waste management and improves overall amenity, ease of use of waste services, environmental performance and the reputation of developments with well-managed waste facilities.

The guide provides a list of essential issues that should be considered when designing waste management services to ensure that better waste practices can be achieved, such as access to bins and containers, waste storage alternatives, collection points, composting, noise, odour, hygiene, visual amenity, signs and education, and security. It is intended to serve as a starting point to prompt further discussion between council, designers, developers and building management.

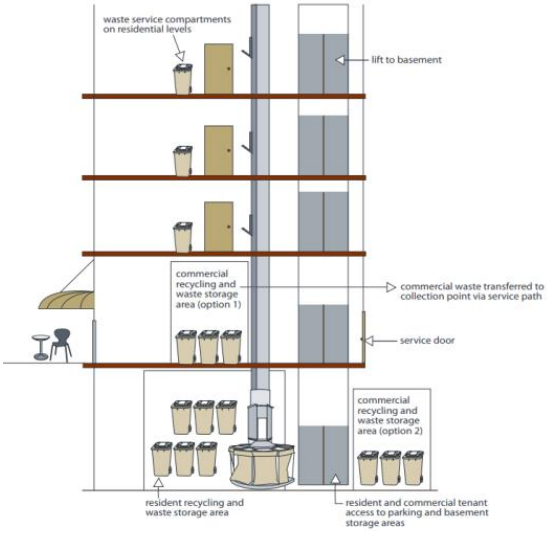


Figure 9: Example of a mixed use development with a chute system[1]

The following diagram is an example of a mixed use development with a chute system supported by recycling.

3.1.3 Regional Controls and Guidelines

3.1.3.1 Greater Sydney Commission (GSC) District Plan

The GSC is an independent organisation formed to coordinate and align planning to shape Greater Sydney in a 'one government' approach. The aim is to give rise to a productive, liveable and sustainable Sydney. The commission is underpinned by Environment, Social and Economic Commissioners with a focus on planning for improved futures across the triple bottom line. The Metro Quarter falls within the Eastern City District Plan which is characterised with high concentrations of jobs, with good road and public transport connectivity and high levels of interaction between business and people. The corridor contributed two-thirds of the State's economic growth over the 2015-16 financial year.

Urban renewal projects provide opportunity to improve the energy and water efficiency of new and existing buildings, incorporate building and precinct-scale renewables, and manage

waste more efficient to reduce greenhouse gas emissions and costs, and appeal to building owners and tenants. Better and more integrated design of such systems can encourage a more circular economy that focuses on improve efficiency.

The District Plan also identifies that people will want to live closer to jobs and services thus housing and jobs will need to be aligned with new or improved transport, education, health and other infrastructure. Better transport means people will be close to knowledge-intensive jobs, city-scale infrastructure and services, and lifestyle features. Walking and cycling will become an increasingly important part of daily travel, with well-designed paths in popular thoroughfares improving the sustainability of the region and the wellbeing of residents.

The *Eastern City District Plan* also includes the following planning priorities which are relevant to this strategy for Waterloo:

- Planning Priority E14 - Protecting and improving the health and enjoyment of Sydney Harbour and the District's waterways
- Planning Priority E19 - Reducing carbon emissions and managing energy, water and waste efficiently

Under these planning priorities, there are a number of objectives and corresponding strategies. The relevant ones include:

- Objective 33: A low-carbon city contributes to net-zero emissions by 2050 and mitigates climate change
- Objective 34: Energy and water flows are captured, used and re-used
- Objective 35: More waste is re-used and recycled to support the development of a circular economy

Some of the relevant actions include:

- Support initiatives that contribute to the aspirational objective of achieving net-zero emissions by 2050, especially through the establishment of low-carbon precincts in Planned Precincts, Collaboration Areas, State Significant Precincts and Urban Transformation projects.
- Support precinct-based initiatives to increase renewable energy generation, and energy and water efficiency, especially in Planned Precincts, Collaboration Areas, State Significant Precincts and Urban Transformation Projects.
- Encourage the preparation of low-carbon, high efficiency strategies to reduce emissions, optimise the use of water, reduce waste and optimise car parking provision where an increase in total floor area greater than 100,000 square metres is proposed in any contiguous area of 10 or more hectares.

3.1.3.2 Utilities

The project team engaged with the utilities providers through a number of workshops held by UrbanGrowth NSW to present and discuss some of the sustainability alternatives for utilities provision. This was part of the series of Technical Innovation Working Groups (TIWG's) that were coordinated by UrbanGrowth NSW in the development of the plan for Waterloo. The section below outlines some of the context of the utility providers within the precinct.

Energy - Ausgrid

Ausgrid is responsible for the energy networks for the Precinct connections. They will be involved with setting the requirements for the energy servicing for the Precinct. They will be key stakeholders for any significant energy efficiency, peak reduction and or onsite generation considerations. If any alternative network or internal distributed energy solutions are to be considered this would also need significant engagement with Ausgrid and the regulators.

Ausgrid is a key stakeholder involved in the planning and development of the Metro Quarter which is within their distribution network jurisdiction. Ausgrid will need to understand the overall electricity demand profiles of the precinct in order to develop and maintain the appropriate electricity infrastructure to service the precinct.

Energy - Jemena

Jemena owns and operates a diverse portfolio of energy and water distribution assets. In NSW, Jemena's gas network distributes natural gas to 1.3 million residential and industrial customers across Sydney, Newcastle, the Central Coast, Wollongong and several regional centres.

Waterloo is currently serviced by Jemena's gas network and is a key stakeholder involved in the planning and development of the Metro Quarter and energy servicing infrastructure. Jemena will need to understand the impact of connecting the Metro Quarter on their gas network servicing capacity. Consideration will need to be given to the carbon intensity of the fuel and the ability of Waterloo to progress toward a net-zero carbon emissions by 2050 target.

Water - Sydney Water

Sydney Water is Australia's largest water and wastewater service provider with an organisational commitment to enhancing Australian cities' sustainability and lifestyle. With Sydney's populations set to increase by 1.3 million residents in the next 20 years, Sydney Water recognises that population growth, increasing urban density, water security, and climate change will all affect the liveability and resilience of Sydney.

Sydney Water is a key stakeholder involved in the planning and development of the Metro Quarter which is within their network jurisdiction. Sydney Water will need to understand the overall water, stormwater and wastewater needs in order to develop and maintain the appropriate infrastructure to service the precinct.

Waste - City of Sydney

The City of Sydney controls domestic and public recycling and waste management. The *Environmental Action Plan 2016-2021* sets an objective for a Zero waste city. The strategy reflects the government targets of reduction which can be seen in Figure 10 below.

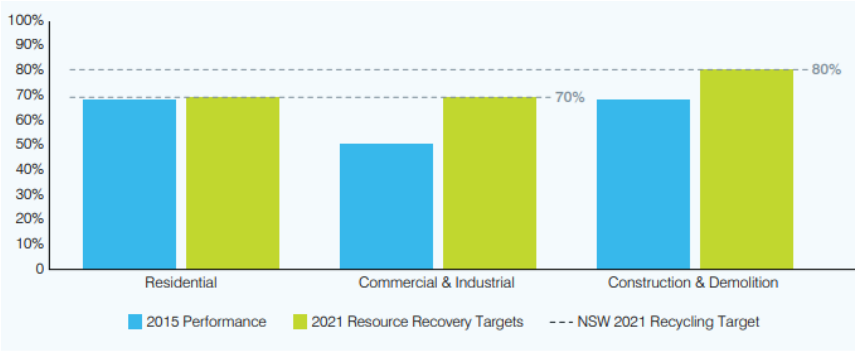


Figure 10: City of Sydney Waste Targets

Source: City of Sydney Environmental Action Plan 2016-2021

This is further supported by the *Leave Nothing to Waste – Waste Strategy and Action Plan 2017-2030* which sets targets and strategies for residents to divert 70 percent of waste (with a minimum of 35 percent as source-separated recycling) away from landfill. It also sets targets for businesses and to divert 70 percent of waste from operating businesses in the local government area away from landfill and 80 percent of waste from construction and demolition activities in the local government area away from landfill.

The City of Sydney's strategy for managing Sydney's waste to 2030 is set out in the plan and outlines waste management actions to achieve a zero waste target by 2030. It will help to respond more effectively to the increasing demand for resources.

The strategy sets clear targets and recommendations to maximise diversion from landfill, focusing on 6 priority areas:

- promote innovation to avoid waste
- improve recycling outcomes
- sustainable design
- clean and clear streets
- better data management
- future treatment solutions.

3.1.4 Local Controls

3.1.4.1 City of Sydney Sustainable Sydney 2030

Sustainable Sydney 2030 is the overarching program for the development of the city to 2030 and beyond. The overall themes within the strategy are 'Green', 'Global', and 'Connected'. The strategy ties together a number of plans covering the economy, carbon neutrality, green infrastructure, renewable energy, decentralised water, sustainable transport, light rail and car sharing. Some of the key targets set out are:

- Reduce carbon emissions within the Sydney LGA by 70 percent on 2006 levels by 2030, and by 2050 achieve carbon neutrality
- 50 percent of electricity demand met by renewable sources
- Zero increase in potable water use from 2006 baseline
- Total canopy cover increased by 50 percent from 2008 baseline

3.1.4.2 City of Sydney's Environmental Action Plan 2016-2021

The *Environmental Action Plan* falls under the *Sustainable Sydney 2030* strategy and sets out the short and medium term priorities and actions for the City. It focuses on defining actions to 2021 on the way to achieving 2030 environmental targets. By 2021, the City is committed to reducing emissions in its operations by 44 percent from 2006 levels and move to 50 percent renewable energy. And across the local government area, the City has set targets for 50 percent renewables by 2030, 70 percent reduction in 2006 greenhouse gas emissions levels by 2030 and net-zero emissions by 2050. The areas of impact of the Action Plan are:

- Excellence in new building design – which sets guidance on voluntary standards for excellence in environmental performance in new buildings, detailed in Table 3

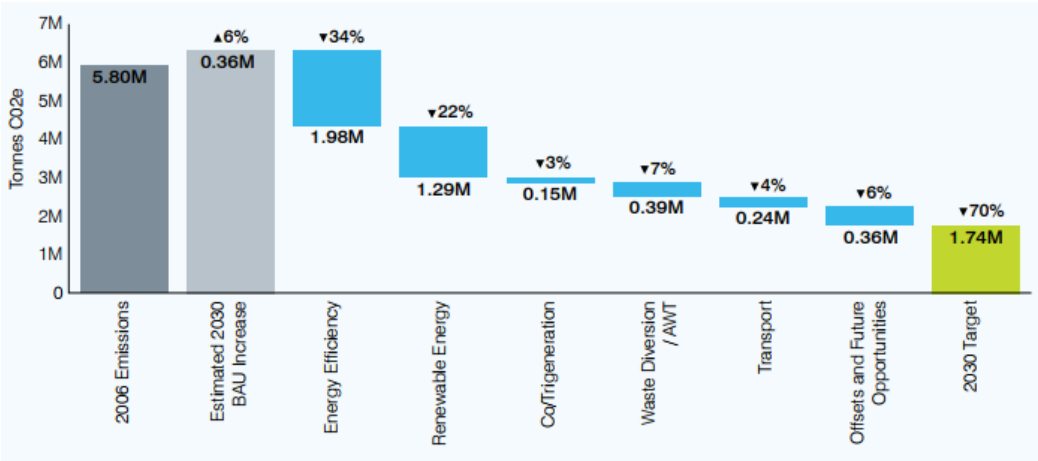
Table 3: City of Sydney guidance on voluntary standards for excellence in environmental performance in new buildings (as at 2017)

Energy and Emissions	Water Efficiency
Residential development • Single dwellings: BASIX 60+ • Apartments 2-3 storeys: BASIX 50+ • Apartments 4-5 storeys: BASIX 50+ • Apartments 6+ storeys: BASIX 40+ • Green Star Design & As-Built – 5 Stars+	Residential development • BASIX 50 • BASIX 60 where recycled water is available • Green Star Design & As-Built – 5 Star+
Commercial Office • NABERS Energy Commitment: 6 Stars • Premium office – Green Star Design & As-Built – 5 Stars+ • Non-premium office – Green Star Design & As-Built – 5 Stars+	Commercial office • Designed to meet Sydney Water Good Practice standard (w/o cooling towers 0.47kL/m^2/yr, w/ cooling towers 0.84kL/m^2/yr) • Green Star Design & As-Built – 5 Star+
Hotels and serviced apartments • Materially exceed BCA Section J • Green Star Design & As-Built – 5 Stars+ • Gold star LEED (build and construct) • Best Practice Earthcheck (planning and design)	Hotels and serviced apartments • With cooling tower and laundry (0.43kL/m^2/yr) • Without cooling tower and laundry (0.17kL/m^2/yr) • Green Star Design & As-Built – 5 Star+ • Gold Star LEED (build and construct)

• NABERS Energy Commitment (when available)	• Best Practice Earthcheck (planning and design) • NABERS Energy Commitment (when available)

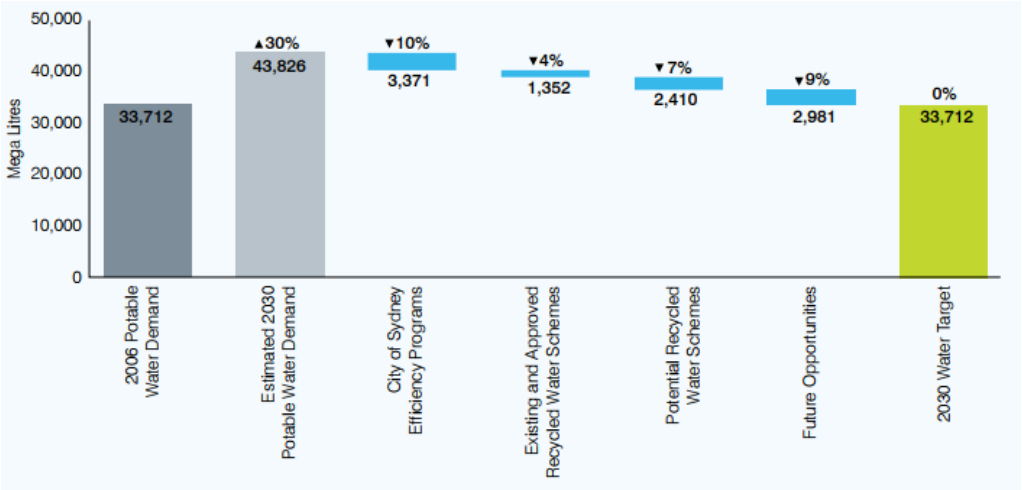
- Low-carbon city – sets a 2030 target to reduce emissions both across the city and in our operations by 70 percent below 2006. The identified reductions pathway:

Figure 11: Local government area greenhouse gas emissions



- Water sensitive city – an approach to drought-proof the city to ensure available water supply when it is hot and dry:

Figure 12: Local government area potable water use



- Green and cool city – aims to mitigate the urban heat island effect through increased urban canopy, raingardens, green roofs and walls. The City has set the following targets that are relevant to the energy and water scopes:
  - Average total canopy cover is increased by 50 percent by 2030 and increased by 75 percent by 2050 from a 2008 baseline.
  - Plant 700 street trees each year until 2021.
  - Tree species diversity will not consist of more than 40 percent of any particular plant family, 30 percent of any genus or 10 percent of any one species by 2021.
  - Plant 50,000 new trees and shrubs in City parks and street gardens each year until 2021.

3.1.4.3 City of Sydney's Urban Forestry Strategy

In 2013, the City also adopted an *Urban Forestry Strategy*, which aims to provide healthy and diverse landscaping into our streets and parks, and to create beautiful streets and public spaces that contribute to the health and wellbeing of everyone in the community. Urban Forestry helps the adaptation to climate change by reducing the urban heat island effect, generating fresh air, absorbing stormwater, and providing cool spaces and respite during extreme heat. Accordingly, the City's Greening Sydney Plan has overseen 10,250 new street trees planted since 2005 and 49,664 square meters of landscaping installed throughout the City of Sydney's streets and parks since 2008. A strategy has been developed in the Urban Forestry report by Arterra for the separate Waterloo SSP Study which details how the Metro Quarter will align with the City's *Urban Forestry Strategy*.

3.1.4.4 City of Sydney's Climate Change Adaptation Plan

The City of Sydney developed a *Climate Change Adaptation Plan* to provide a pathway towards improved resiliency. The Metro Quarter development will result in an increased population and intensity of use. In the context of climate and community resilience, this means the impacts of existing risks for the precinct are likely to increase, and the interdependencies of the precinct with the surrounding urban and natural environment must be considered. It is recognised that the City's Climate Change Adaptation Plan is likely to play into energy, water and waste thus should be considered.

3.1.4.5 City of Sydney Policy for Waste Minimisation in New Developments

The *Policy for Waste Minimisation in New Developments* seeks to encourage efficient waste minimisation and resource recovery for demolition, construction and ongoing facility management. In addition, it seeks to facilitate the efficient and safe waste and recycling collection from all premises in the City of Sydney LGA.

The Policy has been developed to ensure that Council's domestic waste and recycling collection services are available to all properties with a residential rating status. The policy is intended to assist all stakeholders (council staff, planners, architects, building management, etc) to design for sustainable, safe and healthy waste management systems.

The Policy references the outdated NSW Waste Avoidance and Resource Recovery Strategy 2003 (as opposed to 2014-21) and its waste reduction targets. However, we acknowledge that the principles and practices presented in the Policy are still relevant for consideration in the design for waste management in a new building today.

3.1.4.6 Development Control Plans (DCPs)

The Sydney DCP 2012 is a consolidation of the previously separate DCPs and policies in force within the City of Sydney LGA. The Sydney DCP does not apply to the Waterloo SSP as it is overridden by the SRD SEPP. However, the Waterloo SSP is surrounded land that is bound by the Sydney DCP. To enable connection with the surrounding urban fabric,

considerations will be made to the general provisions as detailed in the Sydney DCP 2012 in recognition that the Waterloo SSP interfaces with the City of Sydney LGA. There are a number of general provisions that will have a measureable effect on the physical quality of the environment in the Metro Quarter. In the context of energy, water and waste, the following general provisions should be considered:

- Streets, Lanes and Footpaths
- Defining the Public Domain
- Urban Ecology
- Ecologically Sustainable Development
- Water and Flood Management
- Waste

3.2 Trends and Drivers for Change

There are a number of market and industry drivers that will influence and act upon the overall outcome of the Metro Quarter from an Energy, Water and Waste perspective. These come from emerging market innovation, pricing trends, supply constraints, climate change or policy changes that present either potential opportunities or emerging risks for waterloo. If considered early these can be managed to improve the medium and long term future for Waterloo and the city from an environmental, social and economic sustainability perspective. These trends have been considered in setting the strategy and relevant initiatives for Waterloo. This section highlights some of those drivers.

3.2.1 Retail Electricity Prices

Retail electricity prices are projected to remain steady or grow very steadily at up to 2.6 percent[3] per annum under a neutral scenario. Between 2017 and 2020, retail electricity prices are expected to grow at a relatively fast rate due to the withdrawal of significant generators such as Hazelwood (brown coal-fired power plant in Victoria) from the National Electricity Market. The tightening supply is expected to drive prices up. From 2020 to 2030, falling demand due to the impact of energy efficiency schemes, increasing distributed generation and carbon price are expected cause price decline by up to 3 percent. Projections predict this trend to reverse from 2030 and beyond due to retightening of supply, stabilising retail electricity prices.

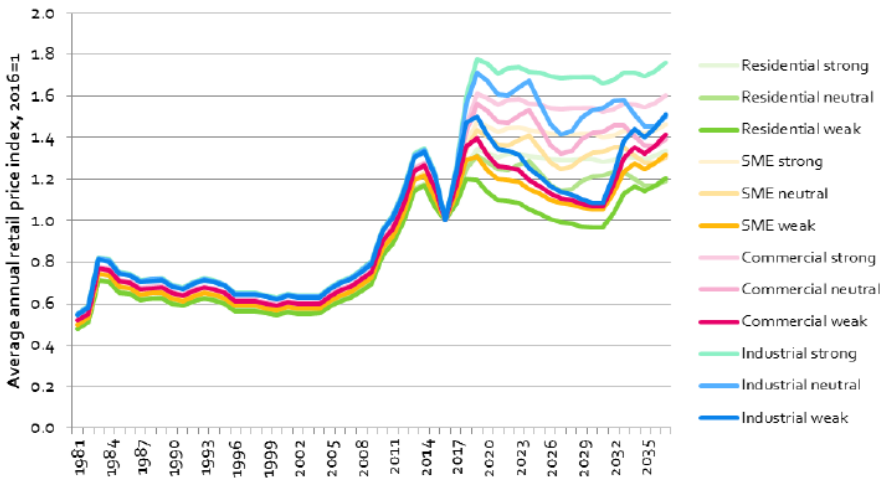


Figure 13: Comparison of NSW retail electricity prices by scenario and market

As retail electricity prices increase in the long run, price signals are created signalling the market to pursue other forms of energy generation such as on-site renewable generation and waste-to-energy initiatives.

[3] AEMO, Jacobs, 'Retail electricity price history and projected trends. Retail price series development', June 19 2017

3.2.2 Electric Vehicle Prices

Electric vehicles (EVs) have rapidly gone from concept through to market emergence, with prices declining year on year. The primary driver behind the price reduction has been the mass production of lithium-ion batteries which EVs are dependent on. Forecasts in the U.S. expect electric vehicles to reach price parity with conventional internal combustion engine (ICE) vehicles by 2025.

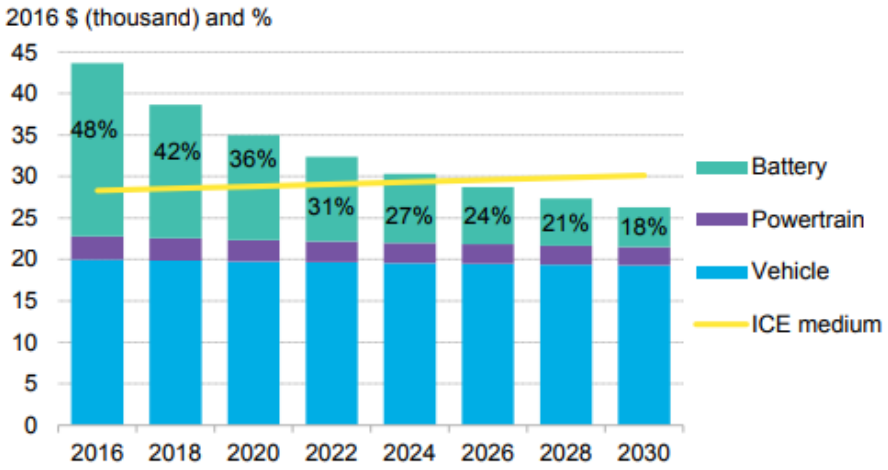


Figure 14: U.S. medium segment battery electric vehicle price estimates[4]

While EVs made up only 0.2 percent of 2015 annual vehicle sales in Australia, this is anticipated to sharply increase in coming years as cost of production is expected to decline, availability and range capacity of electric vehicles improve, and public charging infrastructure is developed. Under a neutral scenario, forecasted electric vehicle sales vary from 16 to 45 percent[5] of new light vehicle purchases, representing 9 to 33 percent of Australia's vehicle fleet under varying economic scenarios.

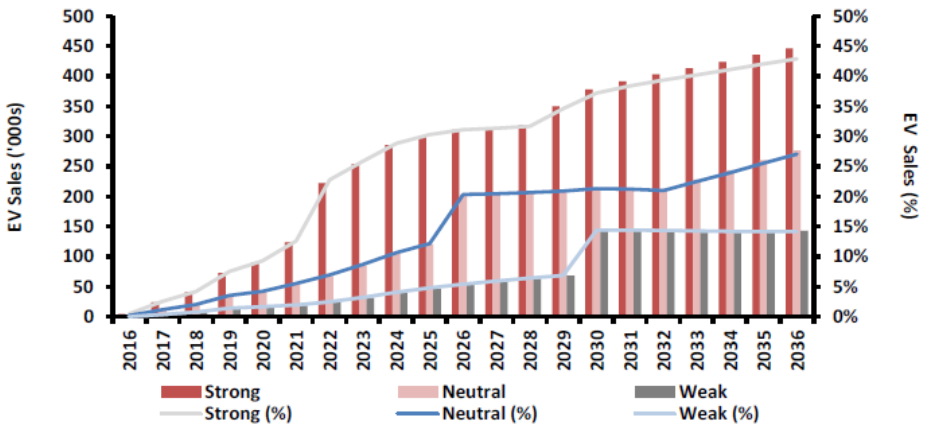


Figure 15: EV annual sales by sensitivity (NEM)

[4] BNEF, 'When will electric vehicles be cheaper than conventional vehicles?', April 12, 2017, https://data.bloomberglp.com/bnef/sites/14/2017/06/BNEF_2017_04_12_EV-Price-Parity-Report.pdf
[5] AEMO, Energeia, 'AEMO Insights: Electric Vehicles', August 2016

If the Metro Quarter is to be proactive in the uptake of electric vehicles then consideration should be made for the provision of electric vehicle charging infrastructure. However, this needs to be carefully managed with the impact of peak demand on electrical infrastructure. There is potential for EV charging behaviour to contribute to daily peak periods requiring costly augmentation of infrastructure. This can be managed through initiatives such as staggering of charging throughout the day or night to coincide with off-peak periods.

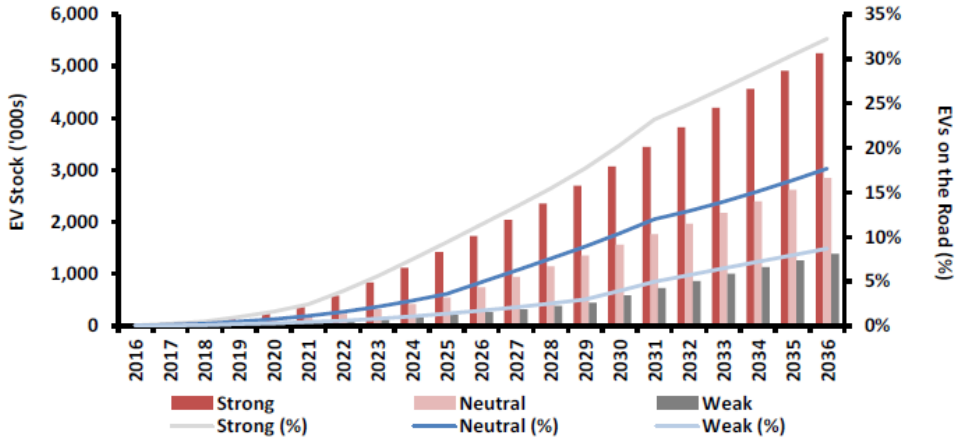


Figure 16: EV uptake by sensitivity (NEM)

3.2.3 Renewable Generation

Solar photovoltaic (PV) and wind generation have been in the market for some years. The price of solar PV panels has already reduced to a quarter of what it did in 2009, and is predicted to fall by another 66 percent by 2040. Similarly, the cost of onshore wind generation which has already declined by 30 percent over the past 8 years is anticipated to fall by a further 47 percent by 2040[6]. At this point, wind and solar combined is anticipated to form 34 percent of the world's total electricity generation, up from the current 5 percent, as older fossil-fuel generators are retired or withdrawn. The International Energy Agency has predicted that solar PV will be the world's largest source of electricity[7].

3.2.4 Domestic Gas Supply

Australia is a major exporter of liquefied natural gas (LNG), shipping approximately 1360PJ in 2014-15. The recent development of LNG infrastructure across all three major Australian gas markets, with new LNG capacity coming online gradually until 2020, is expected to reach a peak around 2019-20[8]. At peak LNG export, domestic wholesale gas prices are predicted to reach $10 per gigajoule, which is a 100 percent increase on two years ago[9].

[6] BNEF, 'Solar Power will Kill Coal Faster Than You Think', June 15 2017, https://about.bnef.com/blog/solar-power-will-kill-coal-sooner-than-you-think/
[7] IEA, 'How solar energy could be the largest source of electricity by mid-century', September 2014, https://www.iea.org/newsroom/news/2014/september/how-solar-energy-could-be-the-largest-source-of-electricity-by-mid-century.html
[8] Oakley Greenwood, 'Gas Price Trends Review', February 2016, https://industry.gov.au/Energy/Energy-information/Documents/Gas-Price-Trends-Report.pdf
[9] ABC News, 'Gas prices: Deal done but the days of cheap gas are long gone', 29 Sept 2017, http://www.abc.net.au/news/2017-09-28/gas-prices-deal-done-but-the-days-of-cheap-gas-are-long-gone/8998570

Similarly, tightening gas supply resulting in higher gas prices is likely to signal the market to explore other forms of energy. Waste-to-energy is likely an important factor as waste-generated methane can be a direct substitute for gas.

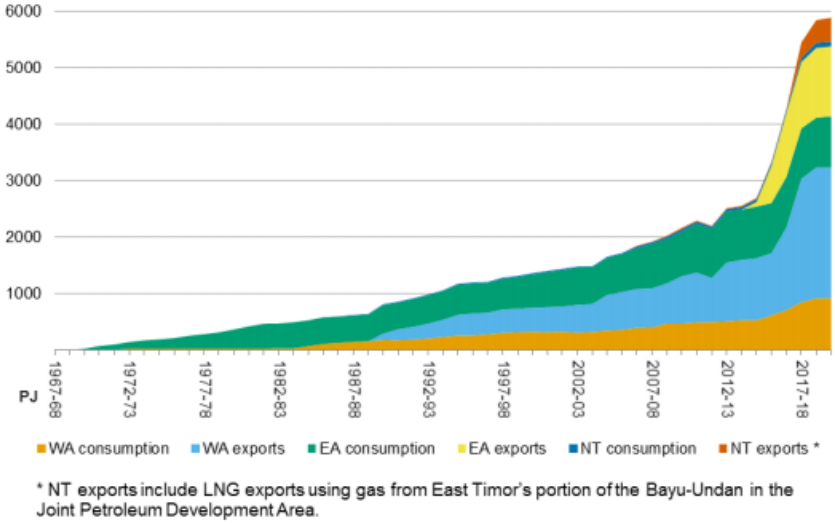


Figure 17: Domestic gas consumption and LNG exports

3.2.5 Grid Electricity Carbon Emissions

Grid electricity carbon emissions peaked in 2009 and are expected to fall until 2020, driven by the Renewable Energy Target, and the closure of high emissions intensity power plants such as Hazelwood in Victoria. After 2020, absolute carbon emissions are projected to grow steadily, but more slowly than historical rates. The retirement of coal-fired generators is expected to be replaced with existing coal and gas fired generators. In combination with increasing demand due to electric vehicles, overall electricity sector emissions are anticipated to rise by a small amount.

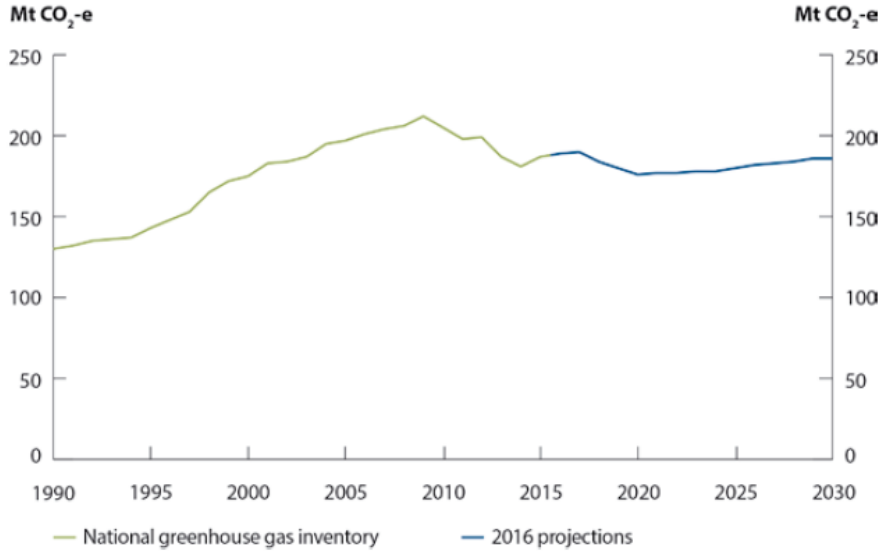


Figure 18: Electricity emissions from 1990 to 2030[10]

On a $kgCO_{2-e}$ per kWh generated basis, the grid to seen to be decarbonising. Under a low decarbonisation scenario, NSW grid electricity intensity is projected to be 0.74$kgCO_{2-e}$/kWh and 0.55$kgCO_{2-e}$ per kWh under a high decarbonisation scenario by 2030. Under either scenario, the NSW grid is unlikely to be completely decarbonised unless there is a radical shift in energy policy between now and 2050 to create a step-change in the carbon trajectory.

[10] Department of the Environment and Energy, 'Australia's emissions projections 2016'

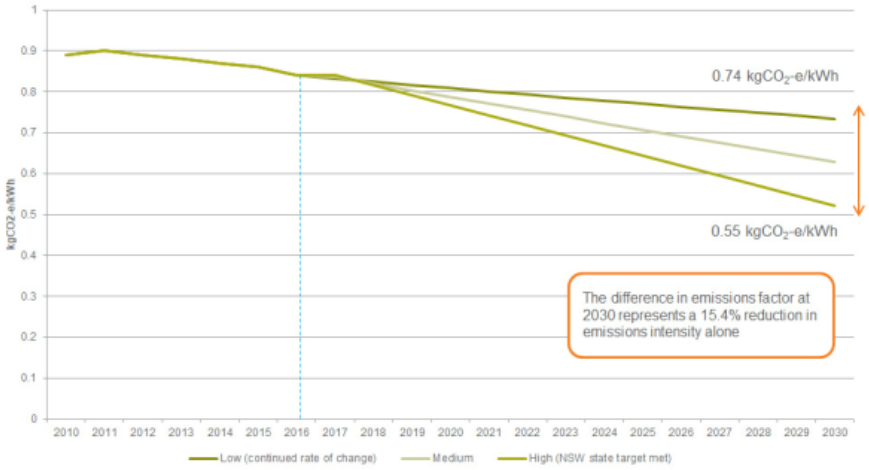


Figure 19: NSW electricity grid emissions factor ($kgCO_2e/kWh$) (Energetics, 2017)

With the Paris Agreement setting Australia on a net zero carbon trajectory by 2050, continued reliance on grid electricity under the current projections will leave the wider Waterloo SSP exposed to carbon liability. However, there is the opportunity to set the Metro Quarter onto an appropriate trajectory to become carbon neutral by 2050 during the early planning stages. It is also worth noting that the current carbon intensity of the grid does not fully account for all of the current growth in renewable energy as the current carbon pricing and RET mechanism effectively hides this carbon from the grid intensity as the carbon is accounted for elsewhere. If the policies change on the RET or carbon pricing (which is likely) the relative intensity of the carbon on the grid would change.

3.2.6 Building Codes and Standards

Driven by the Government's commitment to reduce its emissions by 26-28 percent on 2005 levels by 2030 and the National Energy Productivity Plan, the National Construction Code is expected to increase design stringency under Section J of the *Building Code of Australia*. The proposed changes are projected to reduce energy consumption of new buildings in the order of 40 percent[11] for commercial buildings initially. There are a number of changes including new constraints on the allowable window-to-wall ratios, glazing, thermal insulation and thermal bridging properties. Though currently these are focussed on commercial buildings, these standards are likely to be changed to include other building types and continue driving more stringent standards for buildings in the future.

3.2.7 Water Consumption

For Sydney Water, there are a number of potential future consumption scenarios being considered. The chart below presents some of the future water consumption scenarios forecast to 2022 based on existing consumption and projected future consumption. It is

[11] Australian Building Codes Board, NCC 2019 Review of Section J, https://www.abcb.gov.au/Resources/Videos/NCC-2019-Review-of-Section-J

important to note that average weather has a significant impact on potable water consumption with dryer weather leading to increased reliance on potable supply as water tanks run out and irrigation increases. Hot weather also has an impact on water consumption. As we move into warmer and more intermittent wet/dry periods this is likely to impact water consumption.

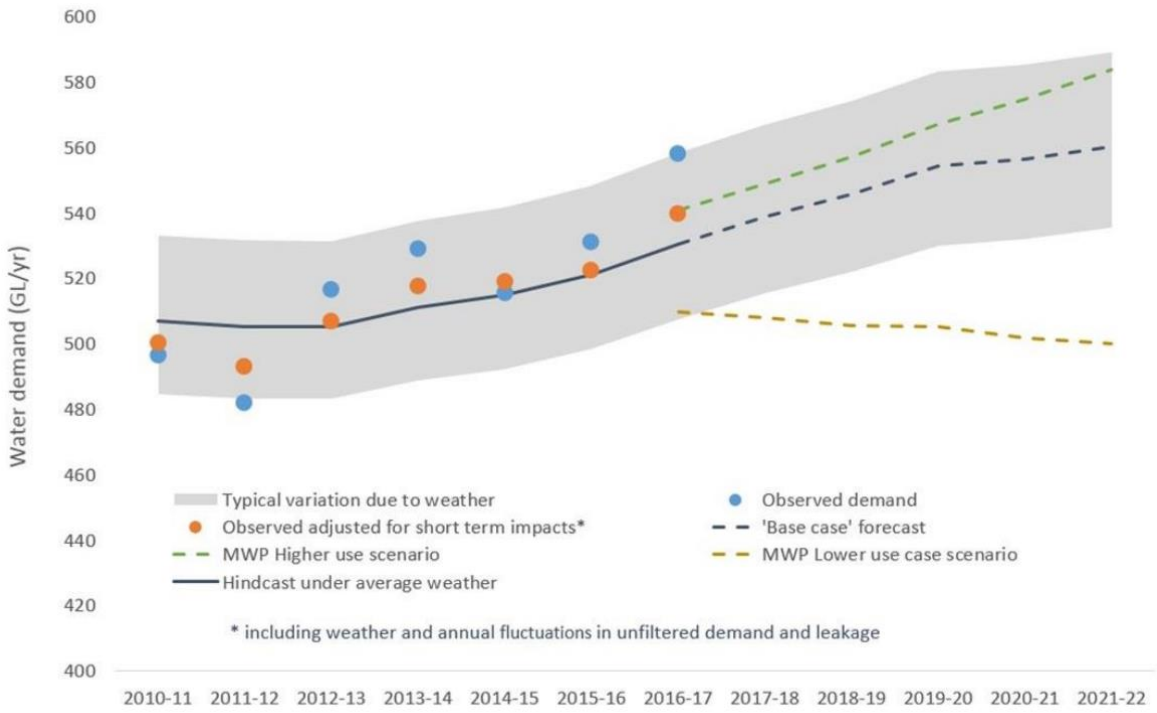


Figure 20: Water Consumption Future Scenarios [12]

3.2.8 Waste Generation

In 2014-15 Australia produced the equivalent of 565 kilograms per capita of municipal waste, 831 kilograms of construction and demolition waste, 459 kilograms of fly ash and 849 kilograms of other commercial and industrial waste. Masonry material, organic wastes and fly ash are the largest waste streams, representing nearly two-thirds of waste generated in 2014- 15. The historic trends across Australia for waste in terms of kilograms per capita are provided in the diagram below.

[12] Sydney Water Water Conservation Report 2016-2017
http://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdq3/~edisp/dd_047419.pdf

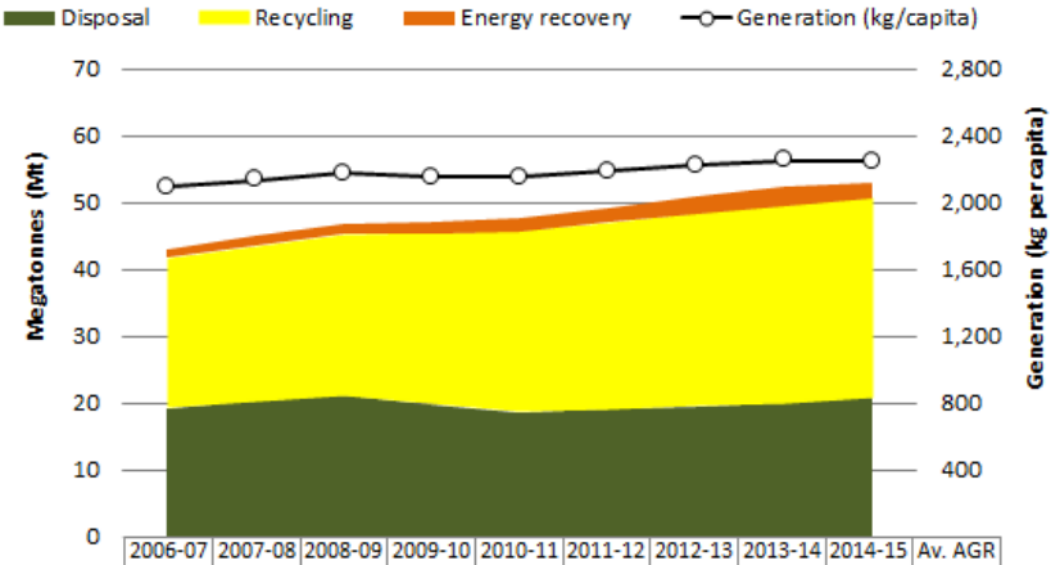


Figure 21: National Waste Consumption trends[13]

This shows a trend to increasing recycling, but more importantly, little change in the disposal (landfill) component and an overall increase in total kilograms per capita. With the recent changes in recycling rates being impacted by Chinas acceptance of Australian recycled material, this is likely to impact on national recycling rates in the medium term.

[13] Australian National Waste Report 2016 https://www.environment.gov.au/system/files/resources/d075c9bc-45b3-4ac0-a8f2-6494c7d1fa0d/files/national-waste-report-2016.pdf

4.0 Sustainable Design Integration

The Metro Quarter development will provide an asset for Sydney for the next 100+ years. It is situated on a very complex site from an economic, environmental and social perspective. The greatest opportunity to be realised at Waterloo will be achieved through its ability to provide long term value to the community through being more sustainable and resilient in the face of future opportunities and challenges. Careful consideration of the existing urban context, as well as an appreciation of stakeholder needs, expectations and impacts provides important historic and current baseline to drive driving more sustainable outcomes for the Metro Quarter. For this reason, existing sustainability frameworks, rating tools and ESD principles have been considered in the planning and design of Waterloo.

As well as responding to the current needs and policies, an effective sustainability response needs to be also considerate of the desired outcomes in the longer term. Given the future focus of sustainability integration, it is important to gain a sense of how decisions made now will impact the potential future benefits and impacts associated with the development. Figure 22 represents the uncertainty associated with given future outcomes over time. We are confident in the past and what we are doing today, however decisions we make now will influence our pathway to either a possible, plausible or probable future. Out of the three futures, there exists a 'preferable' future. We need to consider now what our current ability to influence to either include, or not preclude the preferable future to be realised. For Metro Quarter, this is in considering the actions we can take at this stage and how they inform a preferred future desired outcome.

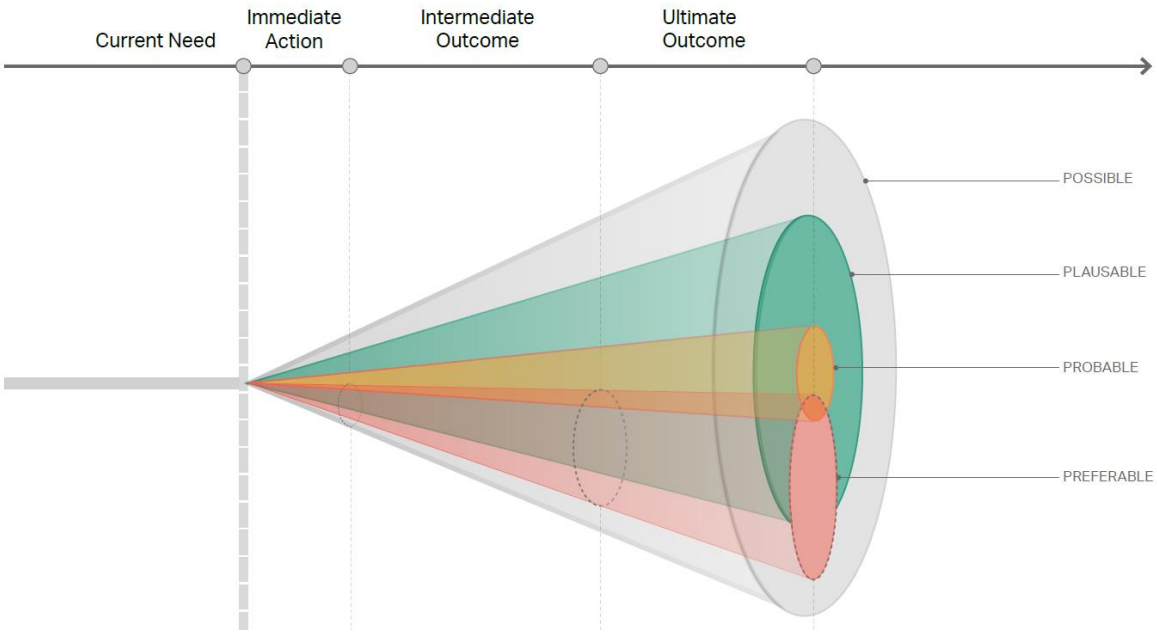


Figure 22: The Futures Cone: Probably, Plausible, Possible and Preferable Futures (Time)[14]

[14] Image: AECOM (Adapted from Hancock and Bezold 1994)

It is important that we spend time considering what long term outcomes we would like to see to ensure we are targeting a transition towards a preferable future outcome as our ability to influence the pathway erodes over time. The approach we have taken for the Metro Quarter is to set out the vision for a preferable long term future as the **Ultimate Outcome** which is targeted to 2050 and beyond and set that as the theoretical target for the project (as per Figure 22). From the Ultimate Outcome, **Intermediate Outcomes** have been developed that look at the medium term vision towards a preferable future to around 2030. While being considerate of the future vision, it is also critical to look at **Current Need** as defined by the existing 2018 policy, programs, site context and community needs to inform the direction and decisions for the project. The approach we have taken in this report is to ensure effective consideration of both the Current Need as well as the Ultimate Outcome in setting the direction for the sustainability response for the Metro Quarter. For the incorporation of sustainability principles across the project, these have been considered within the framework and initiatives.

4.1 Incorporation and Framing of ESD Principles

The SEARs for the Metro Quarter OSD specify the following:

Ecologically Sustainable Development (ESD)

Detail how ESD principles (as defined in clause 7(4) Schedule 2 of the EP&A Regulation 2000) will be incorporated in the design, construction and ongoing operation of the development.

Include a framework for how the proposed development will reflect best practice sustainable building principles to improve environmental performance, including energy and water efficient design and technology and use of renewable energy. This shall include commitments to relevant ESD benchmarks.

The principles of ecologically sustainable development as defined in clause 7(4) of Schedule 2 of the EP&A Regulation 2000, are as follows:

- *the "precautionary principle", namely, that 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:*
  - *careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
  - *an assessment of the risk-weighted consequences of various options,*
- *"inter-generational equity", namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations*
- *"conservation of biological diversity and ecological integrity", namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration*
- *"improved valuation, pricing and incentive mechanisms", namely, that environmental factors should be included in the valuation of assets and services, such as:*

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

The ESD principles have been considered thoroughly throughout the planning process and have yielded sustainability initiatives for further consideration and discussion. Through a series of workshops and meetings, engagement with discipline consultants and UrbanGrowth NSW enabled the sustainability initiatives to be integrated into the relevant designs. The decision making process took into account the context of site, the desired sustainability outcomes and cost-effectiveness of the initiative in achieving the outcomes.

In considering how to effectively demonstrate an alignment with the principles of ESD outlined above, the project team has sought to align the design response against the Green Star Communities National Framework which broadly covers the following themes:

- Enhance liveability
- Create opportunities for economic prosperity
- Foster environmental responsibility
- Embrace design excellence
- Demonstrate visionary leadership and strong governance

This is considered by the industry as one of the best practice frameworks for considering sustainability for urban development and in this case it has been applied to demonstrate a practical alignment of the design with principles of ESD as defined within the Regulation. As such, identified sustainability initiatives have been framed against the Green Star Communities National Framework.

4.1.1 Framework Development

The following framework was developed by AECOM in consultation with UrbanGrowth and the Study Team. It seeks to ensure alignment across the EP&A ESD principles of ecologically sustainable development, the Waterloo Precinct Objectives, the SEARs as well as other relevant policies. The framework has then been used in the next section to document initiatives that have been embedded into the current design that advance achievement towards the desired outcome. It also frames ideas for future consideration.

	EP&A ESD				Precinct Objectives					SSP Requirements								Other Policies															
	Precautionary Principle	Intergenerational Equity	Biodiversity & Ecology	Economic Mechanisms	Housing	Services & Amenities	Culture & Design	Open Space & Environment	Transport & Connectivity	Utilities 9.5	Climate Change & Adaptation 10.1	Climate Change & Adaptation 10.5	Climate Change & Adaptation 10.6	Ecologically Sustainable Design 16.1	Ecologically Sustainable Design 16.2	Ecologically Sustainable Design 16.3	Ecologically Sustainable Design 16.4	CoS Sustainable Sydney 2030	CoS Environmental Action Plan	CoS Greening Sydney Plan	CoS Urban Forest Strategy	CoS Climate Change Adaptation Plan	SEPP65 & Apartment Design Guide	Sydney Metro City & Southwest Sustainability Strategy 2017-24	Paris Agreement	NCC	RET	NEPP	NCOS	NABERS	NatHERS	City of Sydney LEP	City of Sydney DCP
Enhance Liveability																																	
Providing diverse and affordable living	✓	✓			✓													✓						✓				✓				✓	✓
Creating healthy, safe and secure communities		✓			✓	✓	✓	✓				✓						✓	✓	✓	✓												
Fostering inclusiveness and cohesiveness		✓			✓		✓											✓						✓									
Building community adaptability		✓				✓		✓										✓				✓											
Create Opportunities for Economic Prosperity																																	
Promoting education and learning		✓		✓		✓												✓															
Enhancing employment opportunities				✓		✓	✓		✓									✓						✓									
Attracting investment				✓		✓								✓		✓		✓						✓			✓	✓	✓				
Encouraging innovation				✓	✓	✓			✓		✓		✓			✓		✓	✓									✓	✓				
Promoting efficiency and effectiveness	✓			✓	✓	✓			✓	✓	✓		✓			✓		✓	✓				✓	✓		✓	✓	✓	✓				
Foster Environmental Responsibility																																	
Enhancing our natural environment	✓	✓	✓				✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reducing ecological footprint	✓	✓	✓	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Embrace Design Excellence																																	
Adopting effective planning practices					✓					✓				✓				✓	✓			✓		✓		✓			✓			✓	✓
Encouraging integrated design			✓				✓	✓	✓		✓	✓			✓	✓	✓	✓	✓				✓	✓		✓	✓		✓	✓	✓	✓	✓
Maintaining flexible and adaptable approaches	✓	✓		✓			✓			✓				✓				✓				✓			✓	✓							
Creating desirable places					✓		✓	✓	✓			✓						✓	✓		✓		✓	✓						✓	✓	✓	✓
Promoting accessibility	✓	✓			✓		✓		✓									✓	✓														✓
Demonstrate Visionary Leadership and Strong Governance																																	
Establish coordinated and transparent approaches										✓								✓	✓	✓	✓	✓			✓	✓						✓	✓
Build a commitment to implementation											✓							✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓
Engaging with stakeholders					✓		✓											✓	✓														
Fostering sustainable cultures and behaviours	✓	✓			✓		✓											✓	✓					✓									
Encouraging and rewarding innovation				✓			✓			✓	✓		✓			✓		✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓		

4.1.2 Sustainability Initiatives

The following table provides a set of desired outcomes against the framework principles. These desired outcomes have been developed from the context report and the trends and drivers relevant for the Metro Quarter. From these desired outcomes the project team has collaborated across separate design disciplines and Urban Growth NSW to seek out or summarise relevant actions that have been taken at this stage of the design process and been embedded into the design, or identify opportunities for future consideration as the design evolves. The initiatives have been based on Current Need but framed around the Ultimate Outcome, Immediate Action and with future considerations identified as the Intermediate Outcomes.

Table 4: Metro Quarter Sustainability Framework

Framework Principle	**Desired Outcome** (Ultimate Outcome)	**Embedded into Design** (Immediate Action)	**Future Considerations and Options** (Intermediate Outcome)
Enhance Liveability			
Affordability	- A diversity of housing choices to house people from a wide range of socio-economic backgrounds - A variety of effective and affordable transport options are made available to the community - Support is provided for affordable lifestyles, including work and play	- A commitment to an affordable housing target of up to 10%, and 10% social housing for the Metro Quarter - Social and affordable housing designed to maximise natural ventilation and capture solar gain for heating - Car parking has been separated from the property title to reduce the potential cost of the property and provide flexibility to the purchaser. - 15 car share-only parking spaces have been designated to provide residents access to another mode of transport on an on-demand basis - Potential for commercial co-working spaces provided to enable low-cost start-ups and small businesses - Provision of on-street or underground car parking dedicated to car share vehicles	- Green roofs designed to be capable of becoming community gardens to enable residents to grow their own fresh produce - Consider providing options for the property owner to install air conditioning units rather than including as default - Develop strategies to improve affordability of non-residential areas, such as subsidised leases for social enterprises and charity organisations - Provide a diversity of housing (household sizes, types, income levels) so people who provide vital City services can afford to live in the City - Consider a build to rent housing model where a property portfolio owner can realise and adapt both tenant affordability mix as well as operational efficiencies to drive down total costs
Healthy, Safe & Secure	- Physical activity and social engagements are encouraged and enabled in a safe and comfortable environment - A precinct that is attractive and safe for walking and cycling - The development is designed to minimise crime - Align transport infrastructure with precinct growth	- Traffic-separated cycleways are provided to allow cyclists to safely and more effectively travel in and out of the precinct - Local cycleways connect into the wider cycleway network to provide a means for workers to commute to work and for residents to visit local parks and sporting grounds - Over 1,300 bicycle parking spaces available within the Metro Quarter precinct, with 700 of the spaces accessible to residents only - End of trip facilities (showers and change rooms) provided in the basement for cyclists to use before and after trips - The precinct will have footpaths for pedestrian traffic in line with the street hierarchy - Master plan and urban design strategy has incorporated crime prevention principles - Ensure that all public areas are visible from at least one street to encourage passive surveillance and deter crime	- Consider means to ensure that local fresh food retail stores are within walkable distance to all habitable buildings - Provision of community gardens on green roofs to enable residents to grow their own fresh produce
Inclusiveness and Cohesiveness	- Uses and environments within the development are diverse and inclusive for all ages, abilities, cultures and socio-economic backgrounds of the community – a place where everyone belongs - The development has access to the services, employment opportunities and communities of the wider region - The community's shared vision of diversity, tolerance and respect for each other's rights and responsibilities is reflected in the built environment.	- New homes for social, affordable and private residents are not distinguishable and are modern, comfortable, efficient, sustainable and adaptable	- General access stairways between floors to create connection amongst residents and foster sense of community - Provision of breakout/open spaces every few floors to act as meeting points and recreational spaces, enhancing community connection - Consider allowing a community-led entity to manage the community facility at the Metro Quarter's central plaza - Consider allowing a community-led entity to manage at least one community program or service that serves the Metro Quarter - Create a pet-friendly public environment with appropriate fixtures and infrastructure such as walking paths, fenced areas, drinking fountains and pet amenities for residents and visitors with pets to use community facilities
Adaptability	- The development has flexibility to adapt to changing community and individual needs that may be influenced by economy, environment, culture or other circumstances	- Potential for co-working spaces to enable flexible workspaces/workhubs as well as create a 'start-up' culture - All building entry points, where possible, are oriented away from Botany Rd and Cope St where there is a greater risk of flooding	- The concept plan and underlying land use zoning provides some flexibility to permit change of uses as the needs of the community changes - Consider caged bicycle storage areas which can also act as general storage space

Framework Principle	Desired Outcome (Ultimate Outcome)	Embedded into Design (Immediate Action)	Future Considerations and Options (Intermediate Outcome)
	- The precinct will be prepared for the likely impacts of the changing climate	- Canopy coverage over paved surfaces serves a as cost-effect means of mitigating urban heat island effects – street trees provide areas of respite for pedestrians - Residential areas will be raised above the Probably Maximum Flood (PMF) level to enable an effective shelter in place strategy	- Develop a climate adaptation plan for the site in response to projected future climate scenarios - Develop a Community Resilience Plan that is specific to the Waterloo community. The Plan needs to address preparation, during- and post-disaster communication, safety, and response.
Create Opportunities for Economic Prosperity			
Education and Learning	- The development provides accessible education facilities and connection to other education facilities to suit the needs of the community.	- Local cycleways provide connection to nearby schools and universities	- Consider provision of future physical sustainability education facilities within the precinct to educate the community on the embedded sustainability initiatives - Screens in public open space showing live generation data and statistics from on-site renewable generator systems
Employment Opportunities	- Diverse local employment opportunities are available to meet the needs of the community - Diverse local employment opportunities are available to meet the needs of the community	- The provision of 12,500 m^2 of commercial, community and retail GFA will increase the total number of jobs available in the local area - Local cycleways connect into the wider cycleway network to provide a means for workers to commute to work - Integration with metro station to provide connection to other employment centres	- Consider facilities for startups and innovation clusters and small business ownership / security. - Consider affordability of commercial space to consider the needs of the residential / commercial and retail service jobs to have offices / work bases and amenities on site (e.g., cleaner HQ with storage, amenities and facilities).
Economic Investment	- Investment will be attracted into the area through the provision of key infrastructure to enable business and community connectivity.	- The Metro Quarter will have high speed broadband connection available to all residents, retail and commercial tenants	- Periodic community-run programs and events drawing visitors into the precinct and boosting the local economy
Innovation and Competition	- Facilitate new business opportunities to enhance competitiveness and innovation - Consideration is given to lifecycle impact to encourage resource and cost efficiency - Contribute to Sydney's global competitiveness	- Potential for co-working spaces in the Metro Quarter will attract and enable entrepreneurial start-ups and small businesses to set up and gain access to necessary business infrastructure	
Efficiency and Effectiveness	- Land use and infrastructure are tailored to meet forecasted demand efficiently - Consideration is given to lifecycle impact to encourage resource and cost efficiency - Highly optimised use of high-value spaces such as podiums and rooftops	- Optimised size and spatial configuration of rooftop elements such as building plants and lift overruns to maximise open up spaces for community use or solar PV. - Solar PV panels to be mounted on awnings to unlock rooftop space for community use - Car parking provisions are significantly below BAU standards for similar sized residential buildings - Kiss-and-ride zones will be available on precinct edges to allow rapid pick up and dropping off of commuters, residents, and visitors to the precinct without the need to park – reduces congestion on local roads	- Potential for inclusion of cooled storage drop off zones in residential complexes to accept food deliveries with short-term storage - Provision of a courier hub with dedicated parking and cycling infrastructure to minimise congestion on local roads - Consideration of bulk waste from moving houses and or renovation in terms of reuse, recycling, temporary storage / removal to avoid dumping
Foster Environmental Responsibility			
Environmental Enhancement & Conservation	- High quality native vegetation is protected and enhanced - Design and construction of the development has sought to minimise greenhouse gas emissions, contaminants and other pollutants to the environment.	- Green roofs considered on open podium areas to provide open space, recreation or community vegetable gardens and high quality native vegetation. - Water Sensitive Urban Design (WSUD) measures provided to retain and filter runoff from development areas prior to discharge into existing watercourses - Street tree canopy coverage maximised (minimum 20 percent coverage) to create a sense of place and improve microclimate conditions	- Consider soil depth and structural requirements for podiums to ensure future functionality to be realised. - Green walls considered along precinct edge facing Botany Rd if environmentally and financially appropriate.
Reducing Footprint	**Energy & Carbon** - Energy consumption and greenhouse gas emissions have been minimised as far as is reasonably possible (for more detail see the energy section 4.2)	- Solar PV system locations identified on rooftops and podiums have been estimated to generate renewable energy to provide minimum 5% of precinct electricity use - Buildings are rounded and oriented away from the west and Botany Rd to minimise undesirable solar gain and noise from the road - Building massing and spatial configuration designed to encourage cross ventilation through the Metro Quarter, alleviating the impact of urban heat island effects - High performance building envelope with shading on western façade to minimise undesirable summer afternoon solar gain - Common area hallways are naturally ventilated where possible, avoiding overall HVAC energy	- Examine the feasibility of centralised heat extraction systems which can enable efficiencies and provide a more cost-effective means of artificial cooling for split air conditioning systems to avoid dumping heat on the balcony and also allowing for centralised heat exchange for the hot water system. - Consider geothermal cooling and heating systems for the precinct as opposed to conventional fan-driven cooling systems - Identify locations for future expansion of on-site solar PV system to increase future renewable energy generation as it becomes more feasible

Framework Principle	Desired Outcome (Ultimate Outcome)	Embedded into Design (Immediate Action)	Future Considerations and Options (Intermediate Outcome)
		consumption	- Provision of real-time smart metering available to all residential units and commercial tenants so they can understand their energy usage patterns - Consider appropriate glazing options to improve thermal comfort and reduce heating and cooling loads - Provision of high energy efficiency appliances in residential apartments as part of apartment package, or offering financial incentive for residents to purchase high efficiency appliances
	Water - Potable water consumption and stormwater gross pollutant loads has been minimised as far as is reasonably possible (for more detail see the water section 4.3)	- Rainwater/stormwater harvesting tanks to meet BASIX Water Requirements and opportunities for additional tanks for beyond BASIX Water compliance. Rainwater can be used to irrigate public open spaces. - Commitment to beyond compliance target for BASIX Water - Detail water sensitive urban design considerations in the DCP	- Consider innovative means to increase amount of rainwater storage to achieve beyond BASIX Water compliance. - High efficiency (4, 5, 6 star WELS rated) water fixtures should be installed to reduce potable water consumption - Consider stormwater harvesting and recycling for irrigation of green roofs, green walls and open space - Selection of drought-tolerant vegetation for planting on green roofs, green walls and open space to reduce irrigation requirements
	Waste - Reduce waste generation, the impact of disposal and improve resource recovery from waste sources (for more detail see the waste section 4.4)	- Separated, but co-located residual waste and recycling chutes - Residential and commercial/retail waste disposal rooms separate to avoid overloading issues	- Provision of space for residents to temporarily store unwanted bulky items to be recycled or disposed of - Provision of waste and recycling bins in the public domain to reduce littering - Consider financial incentives/disincentives such as a 'pay-as-you-throw' waste management system or reduced waste levies/fees to reduce waste generation rates - Consider creating a 'Return and Earn' container collection point to allow the community to access a new income stream and promote recycling rates - Consider facilitation of local flea market to extend effective lifetime of goods and products, organic waste is reused locally - Consider recycling waste bins are readily available in all areas of the precinct, education material available to educate residents and visitors of recyclable products
	Transport - Sustainable transport options are available and encouraged to reduce the use and reliance on fossil fuels	- Direct access to metro station - 15 car share-only spaces provided in the parking basement - More than 1,300 bike parking spaces provided throughout the development - Traffic-separated cycleways provided and connected to the City of Sydney cycling network - Bus routes and stops have been incorporated into the overall precinct concept plan and located to allow efficient interchange between bus and metro services	- Provision of electric vehicle charging infrastructure to encourage uptake of electric vehicles - Consider caged bicycle parking spaces in the basement to provide peace of mind to bicycle owners - Consider in unit bicycle storage as an alternative or addition to the basement storage. - Consider lift or stair design to facilitate cycle access within the lifts. - Consider stairs for the first 4 levels in parallel to the lifts with thin side ramps to allow a bike wheel
	Materials - The development uses materials of high environmental quality	- Integrated design will seek to realise efficiencies in built form, facilities, amenities, parking and peak load shifting to drive up material efficiency in the build	- Consider use of low-embodied carbon materials such as recycled materials or timber products - Architectural design should consider ways to introduce and maximise the use of modularised and prefabricated components - Low VOC finishes, paints and products should be preferenced in the design
Embrace Design Excellence			
Effective Planning Practices	- The concept plan sets clear planning and design direction for the future of Waterloo	- The planning process for Metro Quarter provides for advanced approaches to delivering a more sustainable precinct through the State planning process.	- Consider setting planning controls or incentives to provide clear direction to the desired sustainability outcomes for the development.
Integrated Design	- The design of the development responds to the Waterloo's land, water and climatic characteristics, constraints and	- Centrally plumbed hot water system within building to provide more efficient delivery of hot water	- Proposed buildings within the precinct are committed to achieving Green Star Design & As-built ratings which will interface with the Green Star –

Framework Principle	Desired Outcome (Ultimate Outcome)	Embedded into Design (Immediate Action)	Future Considerations and Options (Intermediate Outcome)
	opportunities. - The development is consistent and sympathetic to the character of the surrounding neighbourhood - Residents, commuters and visitors are able to easily access essential services and facilities including health, wellbeing, community support, retail and government services	- Car parking basement is shared across buildings to optimise use of space - Urban structure is coherent and provides connectivity between places	Communities rating, NatHERs rating and BASIX - Consider researching and interpreting the culture, heritage and identity of the precinct as part of the masterplanning process
Flexibility & Adaptability	- Buildings and spaces are able to be changed to meet different needs or in response to changing community and environmental conditions.	- Car parking spaces in basement can be reconfigured to provide more bicycle storage space - Floor to ceiling heights of commercial and community spaces have been designed so that they can be adapted to meet different uses and tenancy sizes - Provision of adaptable dwellings to allow for different accessibility needs of residents	- Consider caged bicycle storage areas which can also act as general storage space - Consider design to enable potential for unit merger and de merger to create more household responsive housing needs
Desirable Places	- Development has a distinct and recognisable identity and character. - The development creates functional, vibrant, stimulating and memorable places that evolve for people to live, work and play. - The built form and landscapes are responsive to climate, context and heritage. - The development has good visual amenity and a sense of connection with nature. - The development has activity both day and night, where people feel safe, at ease an part of a cohesive and proud community	- Design of green walls and green roofs to provide amenity and improve microclimate conditions, creating comfortable spaces for recreation - Green walls on precinct edge facing high-traffic Botany Rd to improve usual aesthetic and provide ecosystem services such as air quality improvements and noise dampening	- Consider undertaking a microclimate / human comfort assessment of the public domain considering thermal and acoustic comfort
Accessible Places	- The development provides physical connections internally and to surrounding areas to meet both local and metropolitan needs - The new Waterloo Metro Station and other modes of transport is well-integrated such that residents, commuters and visitors can get around easily, safely and efficiently	- All streets are paved for ease of pedestrian and disabled access - Traffic separated cycleways to separate cyclists from pedestrians and vehicles - Through site links provided to improve accessibility across the site and between transport modes - Public domain areas to comply with applicable disability access standards	
Demonstrate Visionary Leadership and Strong Governance			
Coordination & Transparency	- The development shares the achievements of its vision in partnership with key stakeholders - The desired outcomes identified in this table are aligned with strategic objectives of the City of Sydney, the State Government and the Greater Sydney Commission	- Development and adherence to the ecologically sustainable development framework identified in this table	- The Site Planning, Layout and Urban Design for the Metro Quarter will undergo an in-house, mixed and then fully-independent design review before finalisation
Committed to Implementation	- The vision for Waterloo will be delivered through practical and market appropriate staging through utilising the governance embedded in the planning and approvals framework - Applications throughout the development process provide an assessment of the proposal against the provisions of this sustainability framework	- Optimise the planning system to provide certainty to future developers and users as to the sustainability expectations and desired outcomes for Waterloo	- Consider contractually engaging Green Star Accredited Professionals to lead and facilitate the Green Star – Communities rating process. - Set responsibility for establishing the next action towards achieving the desired sustainability outcomes is transferred to the next development phase - Significant property transactions or development agreements include an assessment against the desired outcomes set out in this framework
Engaged Stakeholders	- The shared vision for Waterloo has been built with the buy-in of the existing community, industry and government	- Stakeholder engagement has been undertaken through the Technical Working Groups with agencies and the City of Sydney. There have been community information and engagement sessions. Further engagement will continue through the planning and development phases.	- When developing community-related strategies, ensure that there is consultation with the community to enhance community culture, heritage and identity
Sustainable Cultures and Behaviours	- The development provides a case study for effective sustainability for the community and development industry - The community is educated and aware of their environmental impact and are encouraged to improve their environmental performance	Bike parking spaces have been maximised in the design to encourage uptake of cycling as a primary means of travel. - The inherent nature of the Metro Quarter as an integrated station development encourages residents and employees to travel via the metro as opposed to using private vehicles	- Consider contractually engaging Green Star Accredited Professionals to lead and facilitate the Green Star – Communities rating process to provide advice and information relating to the rating process to ensure the most sustainable outcomes are achieved
Rewarding	- The development provides the flexibility to support	- All residential units will have access to high-speed internet connection as part of the National	- Consider making free wireless internet access in all public activity

Framework Principle	Desired Outcome (Ultimate Outcome)	Embedded into Design (Immediate Action)	Future Considerations and Options (Intermediate Outcome)
Innovation	innovations in planning for improved liveability, economic and environmental outcomes	Broadband Network	centres within the precinct

4.2 Commitment to relevant ESD benchmarks

As part of the commitment to delivering a more sustainable development outcome at the Metro Quarter, UrbanGrowth NSW have sought to demonstrate alignment with the Green Star Communities framework and rating. Green Star Communities is a framework and rating scheme set up by the Green Building Council of Australia to guide and incentivise best practice sustainable urban development outcomes that considers environmental, liveability, economic and governance themes.

A number of nationally recognised ratings tools were considered by the wider project team and UrbanGrowth NSW with Green Star Communities being determined as the most appropriate tool for Waterloo. Each of the design team has been briefed on the intention to align with Green Star Communities and, where relevant, design initiatives have been taken into consideration at the early project phase. A Green Star Communities project rating is generally aligned with the stage of a Master Plan Development Application, hence the project is proposing to commit to the delivery of a 6 Star Green Star Communities rating (or similar) at the DA stage for the Metro Quarter. The final timing of the rating process would be considered at a later design stage.

Additionally, in response to both the requirements of Sydney Metro and UrbanGrowth NSW, the development also commits to delivering a 5 Star Green Star Design & As Built rating for the buildings within the precinct.

4.2.1 Recommendations

From the assessment above, we recommend that the following commitments are made at this planning stage:

- A commitment is made to delivering the “Embedded Design” initiatives identified within the framework.
- Father consideration is taken to the “Future considerations and options” within the framework
- 6-Star Green Star Communities (or equivalent) rating is achieved (based on 2018 submission guidelines)
- 5 Star Green Star Design and As Built is achieved for all buildings (based on 2018 submission guidelines)
- Consider NABERS for Retail, Commercial and for Apartment Buildings with the rating to be managed by body corporate/strata at the operational stage
- The sustainability framework be considered in preparing any future procurement decisions.

4.3 State Environmental Planning Policy (BASIX) 2004

4.3.1 BASIX Energy and Thermal Comfort

The residential buildings within the Metro Quarter are classified as 'high-rise' under BASIX and are required to demonstrate compliance with the minimum BASIX Energy target of 25. In comparison to the compliance target for a detached/semi-detached residential building within the same region, the BASIX Energy target is 50.

Going beyond compliance is reasonable and achievable, particularly given the reduced underground car parking provision. This results in reduced ventilation requirements which is typically very intensive and is a primary factor behind the lower compliance target for high rise buildings compared to detached buildings. In addition to this, there are a number of initiatives to consider to achieve beyond minimum compliance:

- Provision of centralised hot water, heating and cooling systems
- Installation of photovoltaics systems
- Optimising the number of lifts and installing stairs for general access
- Optimising design of common areas to minimise mechanical ventilation, HVAC and lighting requirements
- Design apartment dwellings to reduce need for heating and cooling though building orientation, building shape and appropriate building materials
- Provide high efficiency kitchen appliances

4.3.2 BASIX Water

The residential buildings within the Metro Quarter are classified as 'high-rise' under BASIX and are required to demonstrate compliance with the minimum BASIX Water target of 40. This target is the same as that of a detached residential building in the same region. Going beyond compliance may require concerted effort due to the competing residential, commercial and retail land uses and the site's physical constraints.

On-site rainwater or stormwater harvesting systems typically have high spatial uptake requirements, which is highly contested on the Metro Quarter. Rainwater tanks have been indicated in the concept plan but the size and volume are yet to be finalised. It is anticipated that non-potable water supply options will be limited by the amount of space available. However, there are opportunities to consider:

- Identification of potential options to harvest and store rainwater at an adjacent site for use on the Metro Quarter. There may be strong synergies with the Waterloo Estate which has greater spatial potential for large rainwater tanks
- Stormwater harvesting of the on-site water detention tanks could be considered although water treatment may be required before it can be reused
- Connecting into the district recycled water infrastructure at Australian Technology Park and Green Square Town Centre

- Recycling of greywater for reuse in irrigation. A cost-benefit analysis should be performed to assess the feasibility of a water treatment system. Consider sharing the system with the Waterloo Estate.

There are also initiatives on reducing potable water demand that should be pursued to meet and achieve beyond the BASIX Water compliance:

- Drought-tolerant, low water use vegetation in gardens & green roofs to reduce irrigation water use
- Designing in high efficiency water fixtures rated at 4, 5 or 6 star WELS, depending on the fixture type
- Inclusion of high water efficiency appliances such as dishwashers and laundry machines as a package with the apartment, or offer financial incentive for residents to purchase high efficiency appliances.

4.3.3 Recommendations

From the assessment above, we recommend that the following commitments are made at this planning stage:

- Commitment to beyond compliance target for BASIX

5.0 Draft Statement of Commitments

The recommended commitments made in the sections above are summarised below. They can be used to inform the development of the Metro Quarter.

Incorporation and Framing of ESD Principles

- A commitment is made to delivering the "Embedded Design" initiatives identified within the framework
- Further consideration is taken to the "Future considerations and options" within the framework
- A 6-star Green Star Communities rating (or equivalent)is achieved (based on 2018 submission guidelines)
- A commitment to achieving 5-star Green Star Design & As-Built rating for the buildings within the precinct (based on 2018 submission guidelines)
- The sustainability framework to be considered in preparing any future procurement decisions. It will ensure that sustainability considerations are made at the appropriate project stage such that more sustainable outcomes can be achieved.

Energy & Carbon

- Planning Controls:
  - Commitment to 6-star Green Star Communities for the precinct and 5-star Green Star Design & As-Built for buildings (based on 2018 submission guidelines)
  - Commitment to beyond compliance target for BASIX Energy and Thermal Comfort
  - Consider a planning control similar to the Merton Rule in the UK. It drives both energy efficiency and renewable energy outcomes
    - At DA stage for any building with over 2,000m^2 GFA must generate at least 5 percent of its forecast annual energy demand from on-site renewable energy (note: forecast annual is based on a post optimised building). Where this is not deemed possible then a cash in lieu contribution must be set to secure delivery of renewable energy supplies of the equivalent elsewhere in the LGA.
  - Engage with energy utilities to incentivise development peak shifting, reducing need for network augmentation
- Management Alternatives/Initiatives:
  - Consider micro-grid operator to manage peak demand and carbon emissions. An additional step may be to consider an 'energy services company' (ESCO) instead of a 'traditional' electricity retailer
  - Consider the design to either enable, or not preclude, future energy technologies and initiatives
  - Recognise technology is going to change, so through procurement, specify intended outcomes rather than specified technologies

- Permit residents to air dry laundry on balcony. Design measures such as screened outdoor areas on balconies should be considered to facilitate reduced energy use in clothes drying.

- Design Considerations
  - Design building systems to enable future retrofitting of new technologies such as building integrated PV
  - Consider designing the precinct to be 100 percent electric for the buildings (i.e. no gas)
  - Identify potential future sites for solar installations as the price reduces and the need increases
  - Design the risers with capacity and accessibility to enable future additions of thermal or water networks
  - Consider heat pumps to achieve the required hot water demand
  - For thermal comfort within the development:
    - Design residential units to achieve optimal thermal comfort conditions in such a way that minimises the need for active systems
    - Prioritise passive design measures in the buildings such as optimised orientation, western shading devices, minimised glazing and using high thermal performance glazing to reduce overall energy consumption.
  - Provide mixed mode HVAC for commercial and retail with maximised COP ratios to drive energy efficiency
  - For residential units, do not permit installation of split system fan coil units on balconies to avoid formation of heat drafts and undesirable outdoor balcony conditions. The following solutions are not mandated, but noted as potential technical solutions available:
    - Designing residential units for potential retrofitting of mechanical cooling systems comprising of indoor direct expansion fan coil unit with pipe reticulation to an outdoor air cooled condenser unit located in a designated plant room, as opposed to on the unit balcony. Consider locating a plant room every 10 floors to house the condenser unit
    - Centralised chilled and heating water systems with fan coil units servicing residential units. The thermal energy (chilled and hot water) is metered to allow central energy plant energy and operating cost to be appropriately allocated. The heating would be provided by electrically driven heat pumps to negate the need for gas

Water

- Planning Controls:
  - Commitment to 6-star Green Star Communities for the precinct and 5-star Green Star Design & As-Built for buildings (based on 2018 submission guidelines)
  - Commitment to beyond compliance target for BASIX Water
  - Detail water sensitive urban design considerations into the DCP

- Management Alternatives/Initiatives:
  - Consider servicing options that may allow for a public or private water utility to be considered for the precinct
  - Discuss with the City of Sydney interest in the option of Council providing storm water storage and recycling facilities to irrigate the public domain
- Design Considerations:
  - Consider potential for connection to the recycled water infrastructure at Green Square Town Centre and the Australian Technology Park
  - Consider design for potential retrofit of third pipe systems to plumb toilets and laundries with recycled water, if connected
  - Selection of drought-tolerant, low water use vegetation in gardens, green roofs and green walls to reduce irrigation needs
  - Provision of high efficiency water fixtures (4, 5, 6 star WELS), inclusion of high water efficiency appliances as part of apartment package, or offering financial incentives for residents to purchase high efficiency appliances
  - Consider spatial provision for rainwater/stormwater harvesting tanks and pumps

Waste

- Planning Controls:
  - Commitment to 6-star Green Star Communities for the precinct and 5-star Green Star Design & As-Built for buildings (based on 2018 submission guidelines)
- Management Alternatives/Initiatives:
  - Planning and design of precinct to facilitate and prioritise waste management practices in line with the waste hierarchy
  - Consider incentives to encourage reduction of waste generation rates, potentially through reduced waste levies and fees
  - Consider seeking a NABERS Waste rating for the commercial and waste rates
  - Consider creating a 'Return and Earn' container collection point to allow the community to access a new income stream and promote recycling rates
- Design Considerations:
  - Consideration of the NSW EPA Better Practice Guide for Waste Management in Multi-unit Dwellings in the preparation of the DCP
  - Consider the potential provision of in-sink food waste disposers to reduce organic waste and encourage use of waste as a fertiliser. Would need to be discussed with Sydney Water
  - Provision of waste and recycling bins in the public domain to reduce littering and promote recycling
  - Design in smaller residential waste bins into the residential apartment fitout to disincentivise waste generation

- Residential and commercial/retail waste disposal rooms separate to avoid overloading issues
- Provision of space for residents to temporarily store unwanted bulky items to be disposed of
- Future consideration of a vacuum waste solution should be considered for its merits within the Metro Quarter. Due to the ground level space constraints there may be potential for a vacuum waste system that would separate and centrally transfer and store waste, ready for collection either on site or off site. This will reduce the need for multiple waste collections and reduce storage / separation facilities within buildings and reduce loading docks size. It may also have amenity improvements within the streets with reduced loading docks and waste vehicle movements. It may also allow for a change in street geometry

6.0 Conclusion

Integration of sustainability into the Metro Quarter design is a complex process that involves the consideration of many levels of policy, regulation, and market and industry drivers. It requires the setting of a long-term vision for the development in cooperation with the various design disciplines.

A significant part of the challenge is understanding the appropriate level of design intervention to push the development away from business as usual practice towards a market-leading sustainable development and provide a preferable ultimate outcome.

In this report, the SEARs issued for the Metro Quarter SSD Application pertaining to ESD have been demonstrated through the development of an ESD Framework that incorporates the ESD principles as defined in the EP&A Regulation. The recommended initiatives that have been developed for implementation or further investigation as a product of the framework demonstrate compliance with BASIX SEPP (2004).

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