

An aerial photograph of the Broadmeadow area in Newcastle, Australia. The image shows a dense residential neighborhood with a grid-like street pattern. A large, light-colored oval track, likely a horse racing track, is visible in the upper right. A railway line runs diagonally through the center of the image. The title 'Sustainability Analysis Report' is overlaid in large, bold, black text on a semi-transparent grey background in the upper left corner.

Sustainability Analysis Report

Housing the Hunter: a plan for renewal at Broadmeadow

Revision 03, March 2024

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00 Executive summary

This Sustainability Framework sets out the key sustainability ambitions for Broadmeadow, and an approach to embed environmental, social, and economic sustainability into the Broadmeadow Structure Plan and Place Strategy

This report is structured into four key sections which develop the narrative and provide the evidence base for its application.

Section 01

Describes the purpose of this framework as providing guidance to all future infrastructure investment and property development in the area across all stages of the project lifecycle from planning and design, to construction and operation. The methodology for establishing the evidence-base for future decision making and synthesising it into a Broadmeadow-specific Sustainability Vision and Framework for delivery.

Provides a background summary of sustainability in Broadmeadow at diminishing scales from the Six Cities Region to the Hunter Region, City of Newcastle and finally Broadmeadow.

Section 02

Establishes the sustainability context in which Broadmeadow Structure Plan and Place Strategy operates, and includes an exploration of:

- physical, environmental and social aspects of the region
- the public policy framework at local, state, Commonwealth, and global levels
- sustainability ambitions of stakeholders
- the property and real estate development environment
- emerging sustainability research on the urgency and scale of change required to address pressing socio-environmental challenges
- benchmark projects with aspects relevant to Broadmeadow
- megatrends shaping the macroenvironment

Section 03

Introduces Broadmeadow Structure Plan and Place Strategy overarching Sustainability Vision and builds on the Design Principles proposed in the Urban Design Report that reflect organisational ambitions, statutory requirements, industry and public expectations, and sustainability challenges in the built environment. The nine themes outlined are:

- Vibrant and Healthy
- Circular Economy
- Resilient and Adaptable
- Climate Positive
- Equitable and Inclusive
- Biodiverse and Regenerative
- Integrated Mobility
- Integrated Water Cycle
- Smart and Connected

To structure a delivery approach, this Sustainability Framework builds

on the Design Principles proposed in the Urban Design Report and for each describes:

- Ambition | what will Broadmeadow do for sustainability
- Rationale | why this is critical to delivering a successful and sustainable place
- Principles | fundamental outcomes which represent positive achievement
- Benchmarks | quantifiable indicators which align with existing policies or frameworks
- Opportunities | potential actions to deliver sustainability across the development lifecycle
- Supports | specific frameworks or policies that it contributes to or facilitates

Section 03

Provides the circular economy strategy including information about the strategic planning context, and specific strategic initiatives. Opportunities and challenges are summarised for each initiative.

Initiatives include:

1. Preservation
2. Design for Circularity
3. Modern Methods of Construction
4. Operational Waste Reduction
5. Sharing Economy
6. District Utilities
7. Products as services
8. Green Infrastructure
9. Responsible Procurement

Section 04

Resource Use modelling analyses the existing business as usual demands for electricity, water and waste as well as the three stages and whole of life carbon emissions.

Section 05

The Net Zero Carbon Strategy takes analysis from resource use modelling and applies Best Practice strategies for the site to achieve net zero carbon emissions.

Strategies Include:

- Building Re-use
- Consumption Reduction
- On site renewables
- Green Power
- Water Reduction
- Embodied Reduction
- Circular Economy
- Offsets

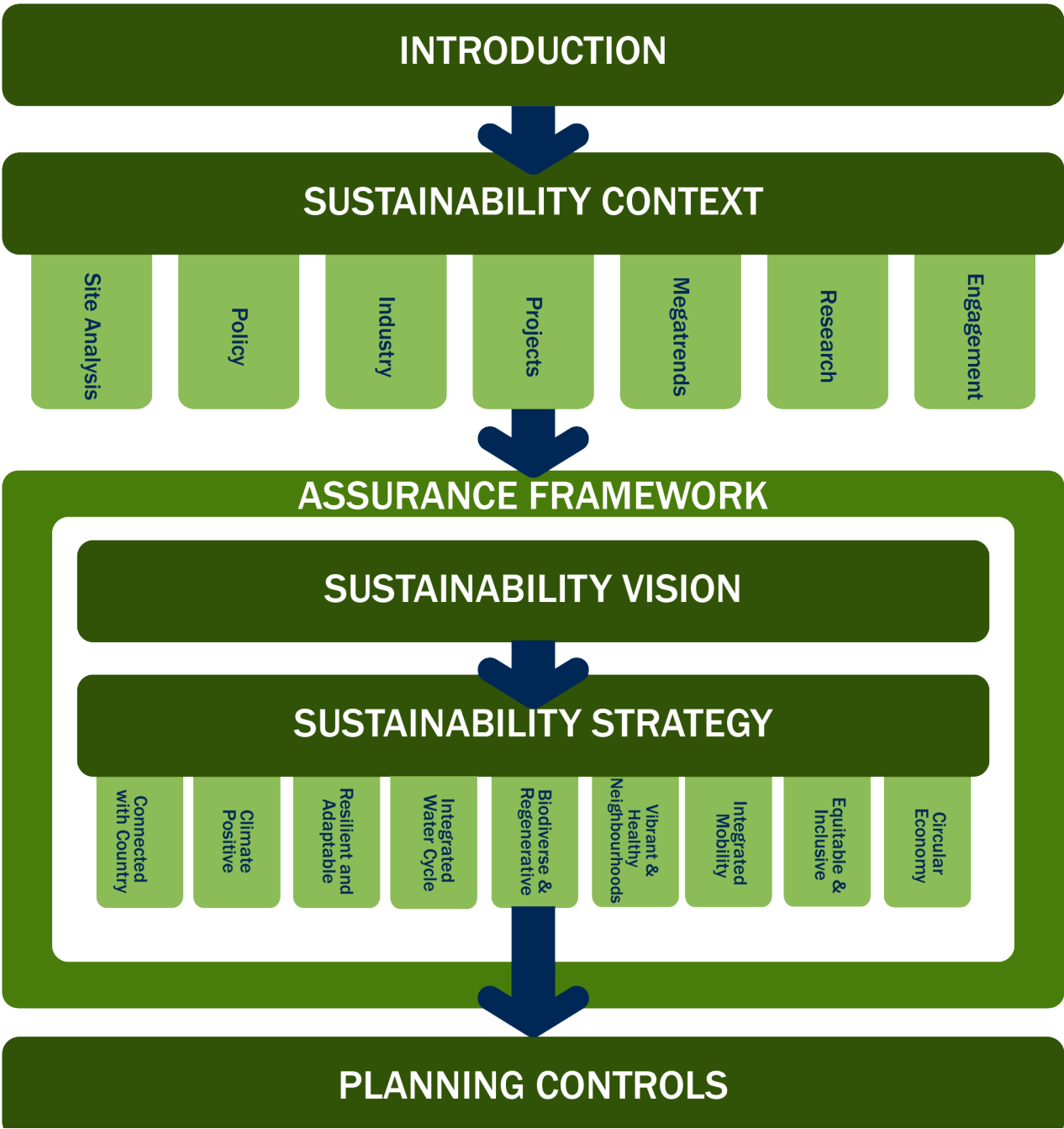


Figure 1.1 Broadmeadow Structure Plan and Place Strategy Sustainability Framework document structure (Source: Atelier Ten)

01 CONTEXT

1.1 Purpose and Approach

1.1.1 Purpose

This Sustainability Framework marks the beginning of a considered and coordinated approach to the implementation of sustainability in the Broadmeadow Precinct. It is designed to guide all future infrastructure investment and property development in the area across all stages of the project lifecycle from planning and design, to construction and operation.

This document represents the outcome of a research and engagement process designed to direct its efforts to areas most meaningful to the overarching goal to become “an international-quality destination for sporting events and entertainment” that is “diverse, vibrant and commercially viable”

1.1.2 Project introduction

As and outcome of the NSW Government Planning led NPP program Atelier Ten has been commissioned to deliver a vision for sustainable development of the Broadmeadow Precinct for Newcastle LGA.

Broadmeadow sits within the Rezone and Build initiative area for NSW Planning. It can deliver community benefit through the delivery of up to 17,000 new homes, 14,000 new jobs and reimagining a diverse sport and event precinct.

Broadmeadow has a role to play in making Newcastle a significant residential, sport and entertainment precinct. Broadmeadow’s central location and good integration into the district can deliver exceptional place outcomes for Greater Newcastle. Broadmeadow can support a mix of uses, including diverse and affordable housing options, and continue to service the growth of Newcastle and the Hunter.

Delivery of the Housing the Hunter: a plan for renewal at Broadmeadow Integrated Structure Plan and Place Strategy is led by Cox Architecture.

This Sustainability Strategy supports the outcomes of the master planning development through the enquiry by design process.

The vision and ambition of this sustainability report is to align with the objectives of the City of Newcastle Council (NCC) Place Strategy. The Place Strategy will:

- identify precinct attributes which have strategic economic, social, and environmental significance and the way these may be protected and enhanced.
- establish economic, environmental, public domain and urban design aspirations and strategies for the Broadmeadow Precinct in the one Strategy
- examine potential opportunities for: housing, jobs, entertainment facilities, open space including the necessary supporting infrastructure that will be required for each.
- identify how land use conflicts between existing and potential land uses may be managed.
- provide an integrated environmental strategy to deal with contamination, waste, and water cycle management (including

- flood management), which has the support of state agencies.
- continue to promote the precinct a world class sport and entertainment precinct for Greater Newcastle
- identify 15-minute walkable neighbourhoods, that can offer multi-modal transport options.
- consider synergies and relationships with adjoining areas and land uses.
- establish an integrated open space strategy addressing urban greening and improvements to existing and potential open space networks, integrated with active transport opportunities.
- establish a platform for multiple stakeholders to collaborate to deliver on the shared future vision and structure plan for the Precinct.
- provide recommendations on the potential growth capability of the Precinct and infrastructure required to support this growth including identifying sub-precincts that, based on their character, are more suitable for growth and change and long-term opportunities for land use change.
- provide a high-level cost estimate for infrastructure required to support growth, the staging of such infrastructure linked to development growth and outline the potential funding mechanisms for delivery of this infrastructure.

1.1.3 First Moves State-led Rezoning

The Structure Plan identifies the Newcastle Showground site, Basketball Stadium and PCYC and the Locomotive Depot as First Move rezoning sites. Government ownership and large lot sizes render these sites more feasible for development.

The Basketball Stadium and PCYC and Newcastle Showground sites will catalyse development in the centre of the Broadmeadow Precinct, and establish a local vernacular for future development. New and rejuvenated open spaces are accompanied by active streetscapes that respond to the pedestrian scale, defining new 15-minute neighbourhoods with easy access to daily needs and strong active transport connections.

1.1.4 Proposed Methodology

The method to deliver the report follows:

Stage One –Analysis

Initial desk top review phase tasks:

1. The critical review of existing studies relevant to sustainability, their methodology and assessment outcomes including:
 - a) physical, environmental, and social aspects of the region
 - b) the public policy framework at local, state, Commonwealth, and global levels
 - c) sustainability ambitions of other relevant stakeholders
 - d) the property and real estate development environment
 - e) emerging sustainability research on the urgency and scale of change required to address pressing socio-environmental challenges.

- f) benchmark projects with sustainability aspects relevant to Broadmeadow
 - g) megatrends shaping the macro-environment.
2. Identification of any gaps in the analysis, and preparation of recommendations for resolution.
 3. Preparation of detailed project methodology to resolve any identified knowledge gaps, in consultation with key stakeholders.
 4. Ground truth the investigation area, including relevant meeting stakeholders, reviewing consultants’ preliminary data and defining limitations or exclusions.

Draft Analysis Report Preparation

1. Preparation of analysis in a *Preliminary Analysis Report*:
 - a) Maps/figures identifying the constraints or opportunities relating to the discipline.
 - b) Strengthening innovation

Stage Two – Sustainability Framework Delivery

This workshop and scenario testing phase will build and refine the preliminary draft. It will:

1. Refine the vision and ambition for the precinct.
2. Deliver supporting strategies and frameworks for:
 - a) Net Zero Strategy
 - b) Circular Economy Strategy
 - c) Climate Adaptation and Community Resilience Planning
 - d) Carbon, Water and Energy calculations for scenarios
3. Define recommendations for future staging and delivery of the Broadmeadow Precinct.

Stage Three – Final Report

Collaboration with the project team will result in *summary analysis*, observations, recommendations, and targets to support the Place Strategy and Structure Plan preferred scenario.

A final technical report will be delivered reflecting outcomes of the integrated masterplan.

1.2 Purpose and Approach

1.2.1 Framework visioning method

This framework documents an approach to sustainability that incorporates two discrete exercises conducted in succession.

The first exercise is designed to explore the current context of sustainability relevant to this particular organisation in this place. It puts Broadmeadow into context, and provides an includes:

- **Site** | contextual analysis of physical and environmental conditions in the Broadmeadow region
- **Policy** | statutory and regulatory planning framework in which the organisation operates
- **Stakeholders** | organisations with a physical presence in the area with ambition and agency to deliver sustainable outcomes
- **Projects** | benchmark projects with aspects relevant to Broadmeadow
- **Megatrends** | major long-term global movements and patterns that have a major impact in the macroenvironment
- **Research** | emerging research on how society and the natural environment impact each other
- **Engagement** | meetings and workshops with relevant Government organisations and stakeholders

The second exercise synthesises this research into a Broadmeadow-specific Sustainability Vision and Framework for delivery. This Sustainability Framework builds on the Design Principles proposed in the Urban Design Report and for each describes:

- **Ambition** | what will Broadmeadow do for sustainability
- **Rationale** | why this is critical to delivering a successful and sustainable place
- **Principles** | fundamental outcomes which represent positive achievement
- **Benchmarks** | quantifiable indicators which align with existing policies or frameworks
- **Opportunities** | potential actions to deliver sustainability across the development lifecycle
- **Supports** | specific frameworks or policies that it contributes to or facilitates



Figure 1.1 Evidence base supporting sustainability ambition and vision (Source: Atelier Ten)

1.3 Background

1.3.1 Broadmeadow Precinct

The 313 Ha Broadmeadow Precinct site is located only 3kms from Newcastle CBD and currently contains underutilised government lands and ageing sporting and event infrastructure, industrial warehouses, train stations and low density residential areas.

The Hunter Sports and Entertainment Precinct at Broadmeadow is state-owned land and is effectively two sites- a smaller entertainment centre and showground site as well as the larger McDonald Jones Stadium and racing track. The precinct contains a variety of sporting facilities such as hockey fields, touch football fields, tennis courts and indoor basketball courts; and is a popular destination for international events, hosting the Grand Masters Hockey World Cup in 2016, that brought 800 players and thousands of supporters from over 16 countries.

The precinct has great potential to become “a first choice sporting, leisure and entertainment destination” that is “diverse, vibrant, sustainable and commercially viable”.

1.3.2 City of Newcastle

Newcastle is Australia’s seventh largest city and is an internationally recognised major port hub. The city is the largest regional centre in NSW and is the economic hub of the Hunter Region. Newcastle City is the Country of the Awabakal and the Worimi peoples and the “care and stewardship they have performed in this place since time immemorial”.

Newcastle is home to the University of Newcastle (UoN); the John Hunter Hospital- a tertiary referral hospital for Northern NSW; and a number of world-class research organisations. The city is also the cultural hotspot of the Hunter Region containing the Newcastle Art Gallery, Newcastle Museum, Civic Theatre and Playhouse, and hosts cultural events throughout the year.

1.3.3 Hunter Region

Newcastle is located within the Hunter Region, which is only a two hour drive from Sydney. The region offers a unique and high quality of lifestyle with an exceptional natural environment including beautiful beaches and bushland. The region also holds Australia’s oldest vineyards, oyster production, agriculture exports and leading education and research institutions. The Hunter is rich in resources such as coal, natural water, electricity generation, innovative manufacturing and business.

The 2041 vision for the Hunter Region places Greater Newcastle as the capital and creative hub of the Hunter that offers globally connecting infrastructure, education, innovation and research. Newcastle will maintain its strong communities with affordable living creating vibrant and resilient neighbourhoods. Communities are close to jobs and services, supported by public transport and efficient walking and cycling options. The natural environment enriches the lifestyle of the region, sustaining the water supply, supporting clean air

and protecting biodiversity.

1.3.4 Six Cities Region

The Hunter is apart of the Six Cities Region- a network of connected cities that support each other whilst leveraging each others unique character and strengths. The cities comprise of the future Metropolis of Three Cities, Lower Hunter and Greater Newcastle City, Central Coast City and Illawarra-Shoalhaven City.

The region will have digital connectivity in nanoseconds and ensure that people and goods can move across the region in 90 minutes. In each city jobs will be 30 minutes from people’s homes, with vibrant local centres and neighbourhoods that can meet daily needs in a 15 minute walk. The aspirations and knowledge from First Nations people are recognised and embedded in planning for the region’s future.

Social sustainability is intrinsic to the development of the region, with the vision including more sustainable and affordable housing that can adapt to “changing needs over time.” Communities and cities will drive Broadmeadow towards net zero emissions and mitigate climate related risks. Social infrastructure will be accessible and attractive with town centres embracing more experience based mix uses. Housing is located near public transport hubs, such as the Metro, and in locations that provide a high quality of life.

The NSW Government’s Net Zero Plan Stage 1: 2020-2030 creates a pathway to a low-carbon state by 2050. Low and zero emission vehicles are key to the transition to clean and quiet mobility. Renewable energy will ensure transport, homes and businesses are sustainable and climate-proofed cities. A circular economy in these cities will transform urban systems and create efficiency of resources. Emissions will have more than halved by 2050, and NSW will play a leadership role in the global region for the transition to a net zero economy. Establishing partnerships with representatives of First Nations communities, Aboriginal Community Controlled Organisations, traditional custodians, and Local Aboriginal Land Councils, the Commission will ensure First Nations perspectives inform and influence all its planning and decision-making processes. The commission will also create a

First Nations Advisory Panel “to advise on regional strategic planning.”



Figure 1.2 Six Cities Region (Source: GSC)

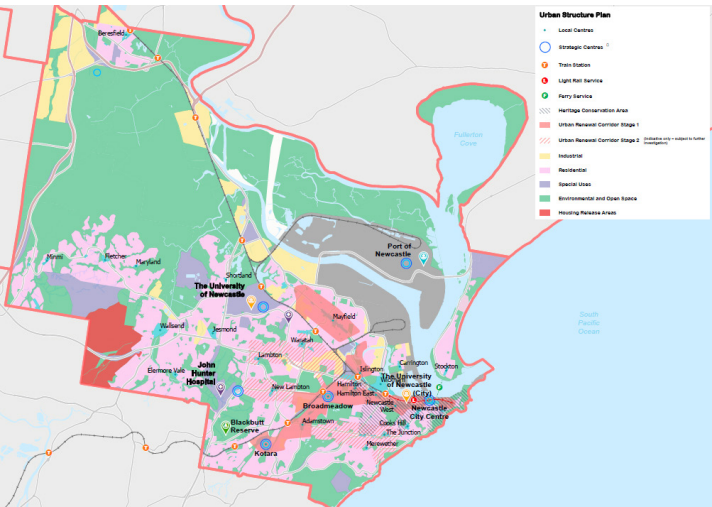


Figure 1.5 Broadmeadow Structure Plan and Place Strategy primary investigation area (Source: MP Precinct Innovation Place Strategy)

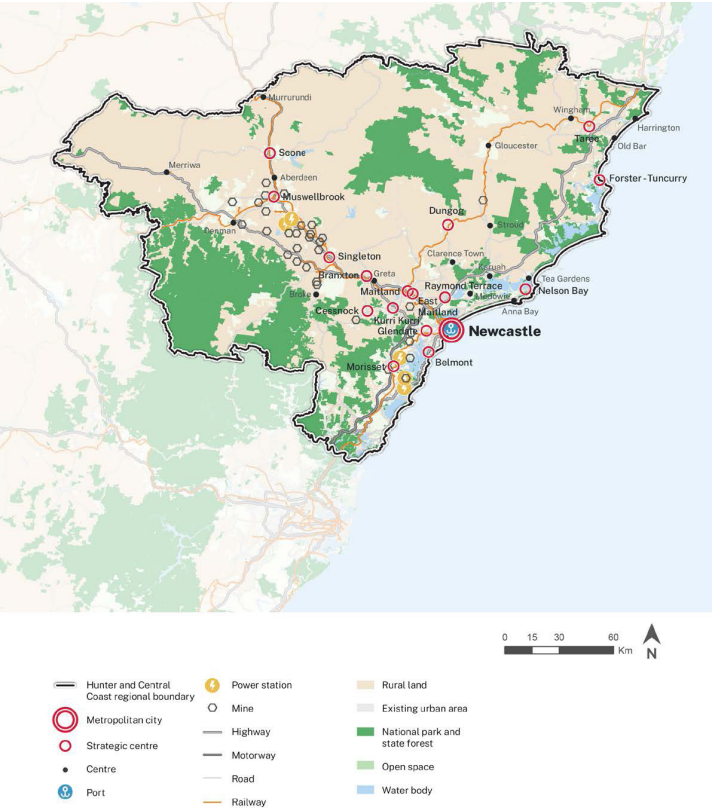


Figure 1.3 Greater Sydney Innovation Districts (Source: GCS)

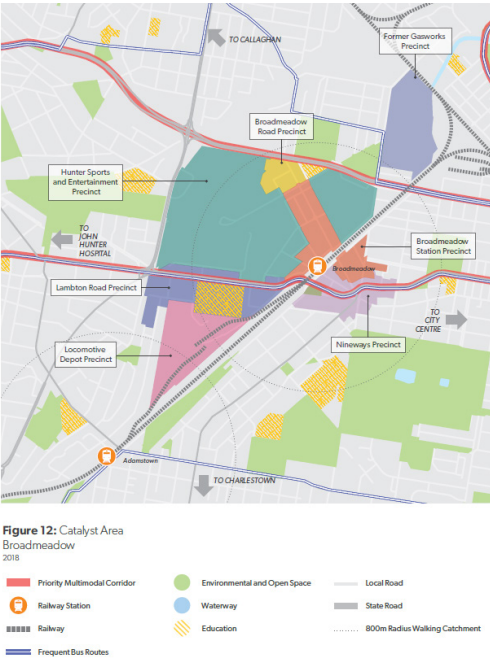


Figure 1.4 A Metropolis of Three Cities (Source: GCC)

1.4 Site context

This Sustainability Vision aims to represent and provide direction to all stakeholders in the Broadmeadow site, while also taking into consideration the wider vision for Broadmeadow. Informed by this vision a series of precinct planning opportunities and development controls will be proposed within the Primary Investigation Area.

1.4.1 Strengths

- Emerging arts and culture reputation
- *Local artists and organisations like the Creative Incubator and the Hunter School of Performing Arts
- Open space and sports facilities
- Entertainment facilities e.g. Newcastle Entertainment Centre and McDonald Jones Stadium
- Existing public transport connections including Broadmeadow Train Station

1.4.2 Weaknesses

- Car-oriented mobility, and lack of active transport infrastructure
- Ground contamination
- Need for continued protection of sensitive ecosystems in the face of massive population and visitation growth.
- Aging infrastructure may require substantial updates and renovations.
- Balancing the needs of various stakeholders, including local residents, businesses, and environmental advocates.
- Balancing the needs of various stakeholders, including local residents, businesses, and environmental advocates.
- Possible disruption to ongoing events and activities during the redevelopment process.
- Need for careful planning to ensure inclusivity and accessibility for all community members.
- Need for restoration of the natural environment on the land surrounding Styx Creek and the former Gasworks site.

1.4.3 Opportunities

- Leading sustainable precinct of the Hunter Region through climate resilience and net zero carbon
- Styx Creek renewal that runs through the Broadmeadow site, connecting to the larger Throsby Creek (that leads to Hunter River and eventually out to sea)
- Unused/empty land that can be restored and remediated for public open space
- Extension of the light rail to connect the outer suburbs and CBD to Broadmeadow
- Connection to Country through Aboriginal consultation and continuing engagement
- Create a vibrant place with increased amenities including eateries and entertainment, that is activated not just when events are occurring but as a place to go
- Implement innovative sustainable technologies and practices

- and smart city trialing
- Develop existing medical and health organisations that are connected to core facilities such as sports science, health services, education/training facilities to support Broadmeadow as a sports precinct and provide local employment opportunities
- Link the existing 15 km Fernleigh Track to the Broadmeadow Precinct, continuing the existing cycling nature track
- Transform the industrial precinct catering for the arts whilst retaining existing businesses
- Promotion of active transportation options, such as pedestrian pathways and cycling lanes.
- Development of mixed-income housing to encourage a diverse and inclusive community.
- *Higher density residential and hotel accommodation around transport hub

1.4.4 Constraints

- High density housing may cause increased traffic congestion and parking issues
- Economic uncertainties that could impact funding and investment for the redevelopment.
- Potential for conflicts between different land uses and interests within the park.
- Competition for resources and attention with other urban development projects in Sydney.
- Adverse weather events and climate change impacts that could disrupt construction and future operations.

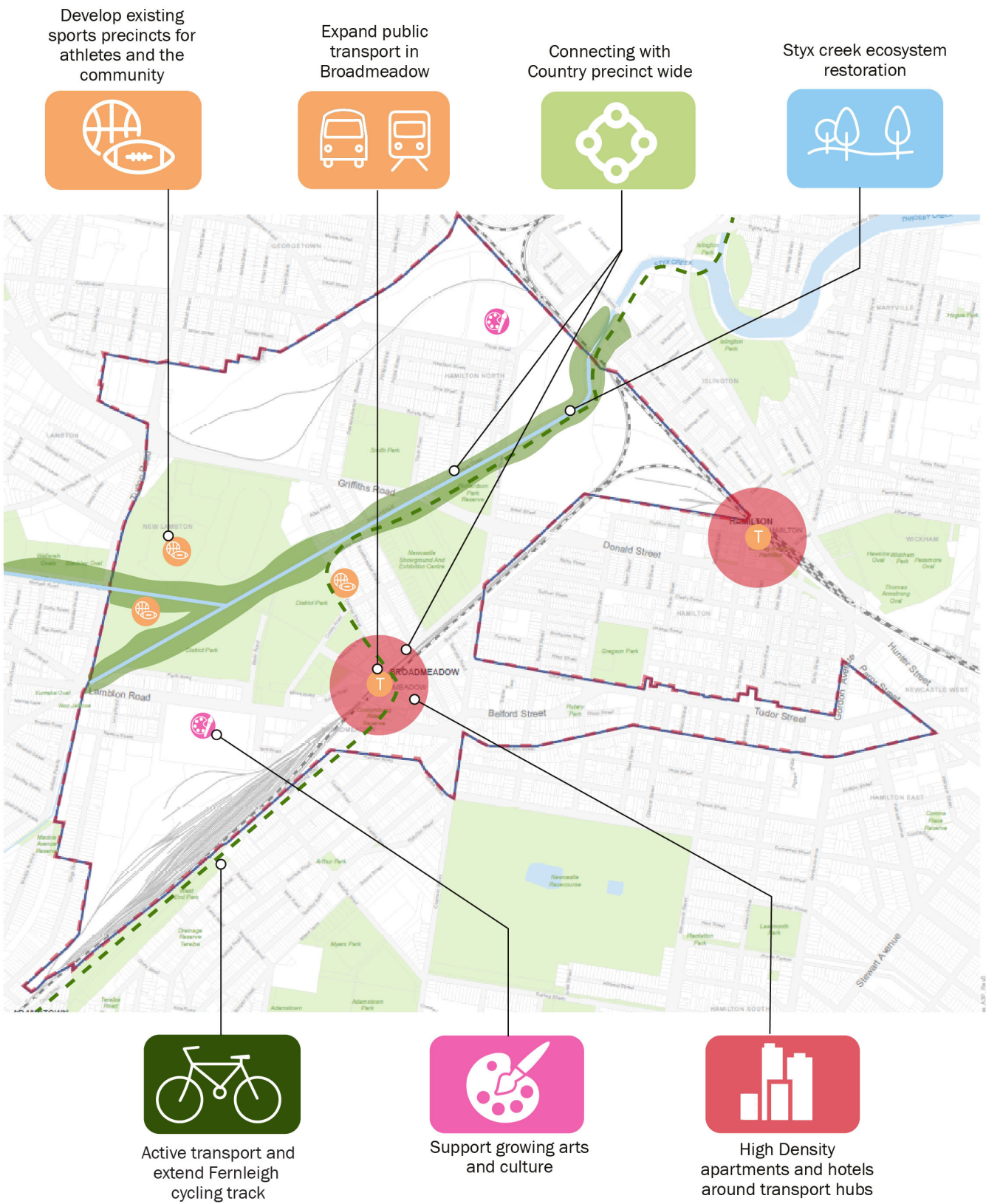


Figure 1.6 Broadmeadow spatial site context diagram (Source: Atelier Ten)

1.5 Policy and planning framework

These documents layout policy ambitions and priorities for master planning globally, in the commonwealth, in NSW and Broadmeadow.

These documents have been organised in a hierarchy based on their relevance to the Broadmeadow Structure Plan and Place Strategy:

- Ambition | What do we want?**
Provide the global and national goals and aspirations for sustainability, sustainable development, and climate resilience.
- Direction | How do we get there?**
Provide state and region specific objectives and pathways for achieving ambitions.
- Guidance | What does it look like?**
Provide design specific approaches and support for the implementation of objectives in Broadmeadow's built environment.
- Place | What do we do in Broadmeadow?**
Provide Broadmeadow specific strategies and actions for delivering an Innovation District

A detailed review of the **Place** documents follows on the next pages. For each a short summary is provided, as well as potential implications or actions for realising them in the Broadmeadow Structure Plan and Place Strategy.

A review of these documents shows key and consistent themes across this policy context include:

- Inclusivity - a place for everyone
- Activated sports and entertainment precinct
- Expand sport and active recreation opportunities
- Healthy and active communities
- Nationally significant arts, culture, festivals
- Innovation hub - business and encourage entrepreneurship
- Net carbon zero by 2050
- Zero Emissions Transport
- Work with Awabakal, Worimi and Mindaribba Local Aboriginal Land Councils
- Social and affordable housing
- Smart city infrastructure
- 15 minute neighbourhoods
- Care and promote Newcastle's Aboriginal heritage places
- Conserve and regenerate existing landscapes, heritage, waterways
- Circular economy
- Sustainable Supply Chain

Place



Guidance



Direction



Ambition



1.6 Development environment

Equally important to policy and planning is the industry context in which the project will be delivered.

1.6.1 Industry

Beyond statutory requirements the property and real estate industries, along with NGOs have begun to set their own (often more ambitious) objectives for future investment.

It is important to understand these because they help drive innovation and progress towards sustainable development. Industry groups often represent a broad range of stakeholders, including businesses, communities, and environmental organizations, and their insights and recommendations can help stakeholders identify new opportunities to reduce their environmental impact and improve their social and economic outcomes.

Aligning with sustainability ambitions and concerns from industry groups can help meet increasing market demands for environmentally responsible buildings and developments. Consumers and investors are increasingly aware of the importance of sustainability, and many are actively seeking out properties and investments that align with their values.

1.6.2 Rating tools

Additionally, a valuable sustainability assurance mechanism used by industry are third-party rating tools. Many local and international tools have recently been updated or are currently in the process of doing so. These updates are designed to better incorporate changes in industry preferences, clearer climate goals, and post-COVID responses.

Even if a project is not seeking certification through sustainability tools it is still important to understand the criteria they use, why they use them, and their future plans for the tools.

These tools are developed through a rigorous and evidence-based process and have been widely adopted as industry standards for measuring and achieving sustainability outcomes. Understanding their criteria can help a project identify areas of improvement and optimize its sustainability performance.

A review of these documents shows key and consistent themes across this policy context include:

- Hub for advanced manufacturing, particularly in the defence and aerospace sectors at Broadmeadow
- Health and education precinct to be established
- Gateway to the region's tourism, with improved transport links and the development of visitor infrastructure and experiences.
- Hub for renewable energy generation and storage
- Investment in public transport infrastructure for access to education, employment, and recreational opportunities.
- Greater support for mental health and wellbeing services
- Reduced investor appeal if resilience against unexpected events is not improved.
- Community engagement, investment, and partnership is key to generating buy in, shared value, and long-term success.
- Liveability encompasses the built and natural environments; economic prosperity and affordability; social diversity, stability and equity; educational opportunity; cultural, entertainment and recreation
- Placemaking reveals and responds to the location, culture and people that gives each place its unique value and authentic qualities.
- Align with sustainability rating tools such as Green Star, Nabers and WELL

Industry

Property Council of Australia



Committee for Sydney



Committee for the Hunter



The Australian Sustainable Built Environment Council



GRESB



Rating tools

Green Star



NABERS



Climate Active



WELL



LHA



1.7 Megatrends

Megatrends are major global, long-term movements or patterns that are slow to form but have a major impact in the macroenvironment.

They are the great forces that are evident in world leading development, and will affect the future in all areas throughout the world over the coming decades.

- Identified megatrends that will directly affect planning for Broadmeadow and beyond come from:
- United Nations
 - CSIRO
 - World Economic Forum
 - Organisation for Economic Co-operation and Development (OECD)



1.7.1 Climate change

Anthropogenic (human-induced) climate change resulting in increase frequency and intensity of severe weather events and the global imperative for mitigation, adaption, and disaster preparedness.

Broadmeadow will need to be robust enough to deal with increasingly intense and unpredictable weather including warming air and water temperatures, severe storms, and bushfires, critical infrastructure failure, civil disturbance, shifts in business models, social stresses, at nested scales from park, to building, to equipment.



1.7.2 Biodiversity collapse

Climate change coupled with global urbanisation leading to declines in species, habitats and ecosystems from physical, chemical, and biological pressures.

Support remediation at Broadmeadow, expand existing biodiversity and environmental conservation and management. The community will receive regional-scale benefits from the associated ecosystem services.



1.7.3 Geopolitical Shift

Uncertain futures characterised by geopolitical tensions and wars are disrupting global trade patterns with growing investment in defence.

Newcastle is a city with a global gateway to the rest of the world, with Newcastle Airport and the largest port on the East Coast, Newcastle Port. Geopolitical shifts and wars affect the availability and costs of valuable resources like electricity and petrol, Broadmeadow precinct will need to be resilient to these changes.



1.7.4 Ageing populations

Growth in the proportion of older people caused by improvements in public health, social and economic developments, and medical advancements, coupled with declining fertility rates.

Broadmeadow will need to ensure a diversity of residential models and typologies suitable for older Australians, and incorporation of allied services and infrastructure such as pathology, therapy, and fitness.



1.7.5 Health and wellness

Acceleration in preventative health and holistic wellness with a broader focus on nutrition, exercise, mental well-being and lifestyle.

Broadmeadow residents and community will expect the built environment to support their physical, mental, emotional, and cognitive wellbeing, and its role as a space fo respite in the region will become more important in the future. Especially as Broadmeadow will be an inclusive sports precinct and will build on existing health amenities.



1.7.6 Rising inequality

Income disparities and lack of opportunities create vicious cycles of inequality, exacerbating the risks of divisions and hampering economic and social development.

Broadmeadow will need to ensure it supports an inclusive community by delivering social infrastructure, implementing sustainable procurement models, and exploring options for culturally appropriate and safe spaces.



1.7.7 Urbanisation

The rapid rise in the number of people living in urban areas is leading to increased pressure on infrastructure, competition for resources, and social isolation.

Broadmeadow will need to foster community cohesion and resilience, ensure urban design throughout the precinct is people- focused, and empower workers, residents, and visitors to have a say on the future of the precinct, and identify opportunities to co-design elements of the place.



1.7.8 Digital technology

Technical progress, constant further development of the internet, and increasing globalisation emerging as a result of digitalisation have a considerable impact on society.

Broadmeadow will need to enhance social and environmental performance and disclosure through emerging digital technology and the internet of things by developing a data platform and sensor strategy, providing a way-finding platform, and supporting the development of a Living Lab.

Our canvas extends beyond the realm of conventional construction, encompassing the interplay of property and real estate investment, government funding, and the overarching pursuit of sustainable advancement. To guide this transformative process, we turn our attention to a constellation of emerging trends in sustainable development – informed by climate science, ecological insights, and social dynamics – to sculpt a blueprint that transcends the mundane and resonates with visionary pragmatism.

Key Lessons and Actions

- ### 1.8.1 Doughnut Economics

The framework regards the performance of an economy by the extent to which the needs of people are met without overshooting Earth's ecological ceiling. In this model, an economy is considered prosperous when all twelve social foundations are met without overshooting any of the nine ecological ceilings. This situation is represented by the area between the two rings, considered by its creator as the safe and just space for humanity.

1.8.2 Regenerative Development and Design

Within a regenerative economy, the focus moves up from the purely mechanical activities of production and consumption to the developmental activity of wise management. This wise management seeks to grow not only wealth but the wealth-generating capacity of all participants, as well as growing the natural capital that underpins societal wealth.

1.8.3 Transformative Placemaking

Transformative Placemaking expands the scope of development to include efforts aimed not only at improving our social, emotional, and physical wellbeing, but at remaking the relationship of place and economy in ways that generate widespread, and locally-led, prosperity. The key aim is to nurture an economic ecosystem that is regionally connected, innovative, and rooted in the assets of its local residents and businesses.

The diagram illustrates the Doughnut Economics model, showing the relationship between the ecological ceiling, the social foundation, and the regenerative and distributive economy. The outer ring represents the **ECOLOGICAL CEILING**, and the inner ring represents the **SOCIAL FOUNDATION**. The space between them is **the safe and just space for humanity**. The center is labeled **REGENERATIVE AND DISTRIBUTIVE ECONOMY**. A **SHORTFALL** arrow points from the center towards the **SOCIAL FOUNDATION**, and an **OVERSHOOT** arrow points from the **SOCIAL FOUNDATION** towards the **ECOLOGICAL CEILING**. Various environmental and social indicators are placed around the circle, including climate change, ocean acidification, chemical pollution, nitrogen & phosphorus loading, freshwater withdrawals, land conversion, biodiversity loss, air pollution, and ozone layer depletion. The center contains ten sectors: water, food, health, education, income & work, peace & justice, political voice, social equity, gender equality, and housing.

Living System Design
Living & Whole systems
Pattern thinking

Less Energy required

Regenerating

Technical System Design
Technologies & techniques
Fragmented thinking

More Energy required

Conventional Green Sustainable Restorative Regenerative

Degenerating

[illegible]

atelier ten

1.9 Case Studies

A new complementary urban model is now emerging, giving rise to what we and others are calling “innovation districts.”

These districts are geographic areas where leading-edge anchor institutions and companies cluster and connect with start-ups, business incubators and accelerators.

Australian case studies

We explore several local case studies of sports and entertainment precincts to uncover what, if any, are the defining characteristics from a sustainability perspective.

These projects represent the competitive market in which Broadmeadow will be operating and it is critical to understand what publicised sustainability ambitions and objectives are, as well as how they are proposed to be delivered.

International case studies

We then explore a broad collection of international precedents which have elements relevant to Broadmeadow, and demonstrate best practice approaches to delivering holistic sustainability including: social sustainability, nature and biodiversity, transport, circularity and assurance.

Key outcomes and implications

- Mixed-income communities to promote social equity
- Implementation of renewable energy systems, such as solar panels and wind turbines, to reduce reliance on fossil fuels
- Target to achieve net-zero carbon emissions for the development
- Creation of pedestrian and cycle paths to promote walking and cycling
- Achieving sustainability assurance such as Green Star Communities rating and WELL communities rating
- Community engagement programs include public art, cultural events, and community initiatives such as a community garden.
- Resilient urban places e.g. green roofs and permeable pavements to reduce the urban heat island effect.
- Inclusive community hub for everyone
- Free and accessible activities and musical experiences involving local community



1.9.1 Cockburn Coast - Perth, Australia

The Cockburn Coast development is a sustainable coastal community project located in Perth, Australia.

It aims to integrate urban living with natural coastal landscapes and promote sustainability through innovative design and construction methods. The project covers an area of approximately 120 hectares and includes more than 2,000 residential apartments and townhouses, 90,000 square meters of commercial space, and a 6-hectare public park. The development is expected to cost \$2.5 billion and is being developed by LandCorp, the Western Australian Government's land development agency.

Energy, carbon, and net zero:

- Implementation of renewable energy systems, such as solar panels and wind turbines, to reduce reliance on fossil fuels
- Target to achieve net-zero carbon emissions for the development

Affordability:

- Provision of affordable housing units for low-income households
- Implementation of mixed-income communities to promote social equity

Transport and mobility:

- Provision of public transport infrastructure, such as a new train station and bus interchange, to encourage sustainable mobility
- Creation of pedestrian and cycle paths to promote walking and cycling

Community and people:

- Creation of community gardens, green spaces, and public art installations to promote social interaction and community engagement
- Incorporation of community facilities, such as a community center and public park

Nature, ecology, and biodiversity:

- Incorporation of green infrastructure, such as rain gardens and wetlands, to improve habitat for wildlife and promote biodiversity
- Creation of green spaces, such as the public park, to provide opportunities for outdoor recreation and connection to nature

Assurance:

- Designed to achieve a 5 Star Green Star Communities rating
- Pursuing a WELL Community certification.
- Committed to achieving a minimum of 25% carbon emissions reduction compared to business as usual for the project.



Figure 1.10 Cockburn Coast (Source: City of Cockburn)



Figure 1.11 Community open space (Source: Urbis)

1.9.2 Victoria Harbour - Melbourne, Australia

The Victoria Harbour development is a mixed-use waterfront community project located in Melbourne, Australia.

The project covers an area of approximately 20 hectares and includes more than 2,000 residential apartments, 200,000 square meters of commercial space, and a 3-hectare public park. The development is a joint venture between Lendlease and the City of Melbourne and is expected to cost \$2.5 billion.

Energy, carbon, and net zero:

- Implementation of renewable energy systems, such as solar panels and geothermal heating, to reduce reliance on fossil fuels
- Target to achieve net-zero carbon emissions for the development by 2025

Affordability:

- Provision of affordable housing units for low-income households
- Implementation of mixed-income communities to promote social equity

Transport and mobility:

- Provision of public transport infrastructure, such as a tram line and bike lanes, to encourage sustainable mobility
- Creation of pedestrian-friendly streets and spaces to promote walking and cycling

Community and people:

- Creation of community gardens, green spaces, and public art installations to promote social interaction and community engagement
- Provision of affordable housing units for low-income households
- Incorporation of community facilities, such as a community center and public park

Nature, ecology, and biodiversity:

- Incorporation of green infrastructure, such as rain gardens and green roofs, to improve habitat for wildlife and promote biodiversity
- Creation of green spaces, such as the public park, to provide opportunities for outdoor recreation and connection to nature

Assurance:

- Designed to achieve a 6 Star Green Star Communities rating
- Pursuing a WELL Community certification, which assesses the project's impact on human health and wellbeing.
- Recognized with numerous sustainability awards, including the 2017 Banksia Sustainability Award for Large Business Sustainability Leadership.



Figure 1.12 Victoria Harbour (Source: Lendlease)



Figure 1.13 Victoria Harbour open green space (Source: Development Victoria)

1.9.3 Ginninderry - Canberra, Australia

Ginninderry is a large-scale sustainable development project located in Canberra, Australia.

It is a joint venture between the government of the Australian Capital Territory (ACT) and the Riverview Group. The project aims to create a sustainable community that is socially, economically, and environmentally viable for current and future generations. The Ginninderry development is spread across 1,500 hectares of land, with a total of 11,500 homes planned for construction over the next 30 years. The development includes a mix of housing types, including apartments, townhouses, and detached houses. The total cost of the project is estimated to be AUD 5 billion.

Energy:

- The homes have a minimum of 6-star energy rating and are equipped with energy-efficient appliances and fixtures.
- Ginninderry offers free energy audits and provides education and information on ways to reduce energy consumption and costs.
- Offers financial incentives and support for low-income households to install solar panels, upgrade insulation, and switch to energy-efficient appliances.

Climate adaptation and resilience:

- Fire-resistant landscaping, buffer zones, and water-sensitive urban design features to mitigate the impact of floods.

Transport and mobility:

- Network of shared paths and cycleways, and is serviced by a public bus network.
- Electric vehicle charging infrastructure in public spaces and in some homes.

Community and people:

- Range of shared spaces and facilities, such as parks, playgrounds, community gardens, and a community center.
- Partnerships with local training and employment organizations.

Assurance:

- 6 Star Green Star Communities rating.
- Community buildings certified under the WELL Building Standard.



Figure 1.14 Ginninderry Aerial Image (Source: Riverview Group)



Figure 1.15 Shared paths and cycleways (Source: Riverview Group)

1.9.4 YarraBend - Melbourne, Australia

YarraBend is a sustainable housing development located in Melbourne, Australia situated on a 16-hectare former industrial site and is a joint venture between international property developer Glenvill and property investment company VicSuper.

The development will feature over 2,500 homes, a town centre with retail and commercial spaces, community facilities, and extensive parklands. The development has been designed to encourage a sustainable and active lifestyle, with walking and cycling paths, green spaces, and access to public transportation.

Energy, Carbon, and Net Zero:

- Solar panels installed on rooftops and in communal areas to generate renewable energy
- Smart home technology implemented to monitor and control energy usage
- All homes built to achieve a minimum 7-star energy rating

Affordability:

- A range of housing types and sizes to cater to different budgets
- Shared ownership schemes and rent-to-buy options to make housing more accessible

Climate Adaptation and Resilience:

- Water-sensitive urban design to manage stormwater runoff and reduce the risk of flooding

Transport and Mobility:

- Electric vehicle charging stations installed throughout the development
- Walking and cycling paths and access to public transportation to encourage active and sustainable transport modes

Community and People:

- Community facilities including a library, pool, and community centre to foster a sense of community and social connection
- Programs and events to promote sustainable living practices and social inclusion

Waste, Materials, and Circularity:

- A materials recovery facility to sort and recycle construction and demolition waste
- A composting facility to divert food waste from landfill

Nature, Ecology, and Biodiversity:

- Over 7 hectares of parklands and green spaces, including a community garden and orchard
- Habitat corridors and wildlife crossings to promote biodiversity

Assurance:

- Targeting a 6 Star Green Star Communities rating
- Registered with the Climate Bonds Initiative, which promotes investment in projects that address climate change.



Figure 1.17 Yarrabend Aerial Image (Source: Yarrabend)



Figure 1.16 Fostering a sustainable community (Source: Yarrabend)

1.9.5 Fishermans Bend - Melbourne, Australia

Fishermans Bend is a new urban renewal development located in the heart of Melbourne, Australia. It is one of Australia's largest urban renewal projects and is set to become a vibrant, sustainable, and innovative mixed-use community.

The development is spread across an area of 480 hectares and will comprise of around 80,000 residents and 80,000 jobs upon completion. It aims to create a vibrant, sustainable and resilient community that is well-connected and provides easy access to transport, shops, schools, and parks.

The development will feature a mix of residential, commercial, and industrial buildings that will be designed to meet the highest sustainability standards. There will be a focus on creating buildings that are energy-efficient, affordable, and adaptable to changing climate conditions.

Energy, carbon, and net-zero:

- Buildings designed to achieve a minimum 5-star energy rating
- All buildings will have access to renewable energy sources
- Smart meters will be installed to monitor energy usage
- District energy system that utilizes centralized heating and cooling systems to provide more efficient energy use across multiple buildings and reduce overall energy costs.

Affordability:

- At least 5% of the housing will be designated as affordable, with a range of housing options and tenancy arrangements.
- Initiatives will be implemented to reduce ongoing living costs for residents

Transport and mobility:

- Public transport infrastructure will be improved, and new connections will be established
- Car sharing and electric vehicle charging infrastructure will be provided

Community and people:

- range of community engagement initiatives, such as community gardens and spaces for community events.
- Social infrastructure, including schools and health facilities.

Waste, materials, and circularity:

- A central waste management facility will be provided for the disposal and processing of bulky and hazardous waste, as well as for the recycling and repurposing of construction waste.
- A composting facility will be available for residents to dispose of organic waste, which can be used as fertilizer for community gardens and urban agriculture projects.

Assurance:

- Targetting 6 Star Green Star Communities rating and LEED Neighborhood Development

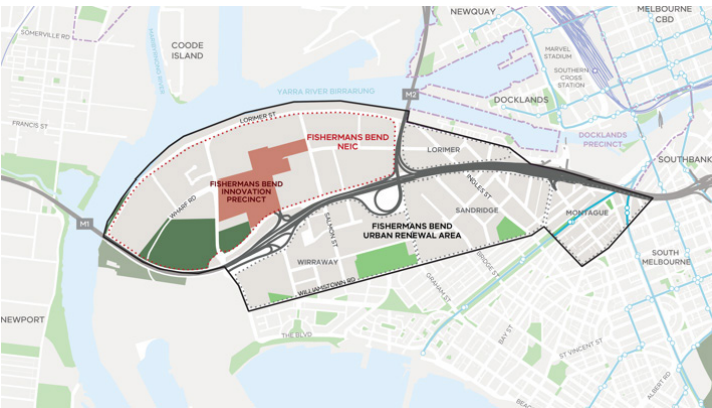


Figure 1.18 Fisherman's Bend Precinct Map (Source: CM))



Figure 1.19 Fisherman's Bend Green Spine Interpretation (Source: Aurecon))

1.9.6 King's Cross - London, UK

King's Cross is a mixed-use development located in the heart of London, UK, on a 67-acre site that was previously used for industrial purposes.

The development aims to transform the area into a vibrant and sustainable neighborhood, with a combination of residential, commercial, retail, and public spaces.

The King's Cross development consists of approximately 50 new buildings, including 2,000 new homes, 20 new streets, and 10 public squares. The project cost approximately £2 billion (\$2.7 billion) and is being developed in phases, with completion expected in 2028. The development includes a variety of building types, including offices, apartments, and retail spaces. The development also features numerous community programs, such as an art program, events, and community engagement initiatives.

Energy, Carbon, and Net Zero:

- On-site renewable energy generation from solar pv and biomass boilers.
- Aims to achieve carbon neutrality by 2030.

Affordability:

- 50% of the housing units are affordable homes.

Climate Adaptation and Resilience:

- Building design features green roofs, solar shading, and other measures to minimize overheating during heatwaves.

Transport and Mobility:

- Network of cycle paths and pedestrian routes.
- Electric vehicle charging infrastructure is provided throughout the development.

Community and People:

- Community engagement programs include public art, cultural events, and community initiatives such as a community garden.
- The development includes a range of public spaces and amenities that encourage social interaction and community building.

Waste, Materials, and Circularity:

- Waste reduction strategies such as recycling facilities, composting, and efficient design and material use are implemented.

Nature, Ecology, and Biodiversity:

- A range of green spaces, parks, and public gardens.
- Biodiversity-friendly features such as bird boxes and insect habitats.

Assurance:

- Awarded a BREEAM Communities "Excellent" certification
- The individual buildings within the development have achieved a range of sustainability ratings, including BREEAM Excellent, LEED Gold, and WELL Gold.



Figure 1.20 Kings Cross Heritage Area (Source: Kings Cross)))



Figure 1.21 Kings Cross Vision (Source: Argent)

1.9.7 The Yards - Washington DC, USA

The Yards is a mixed-use development located in the southeast waterfront of Washington DC, USA. The development spans 48 acres and includes a combination of residential, office, retail, and entertainment spaces.

The Yards is situated on the site of a former Navy yard and is being developed by Forest City Washington. The development includes over 3,500 residential units, with a mix of apartment buildings and townhouses, as well as over 1.8 million square feet of office space, and over 400,000 square feet of retail and entertainment space. The Yards is designed to be a vibrant and sustainable community that promotes healthy living and environmental sustainability.

Energy, Carbon, and Net Zero:

- Buildings exceed DC Energy Code requirements by 30%
- on-site renewable energy generation, including solar panels on several buildings.

Affordability:

- Over 900 affordable housing units, representing over 25% of the residential units.
- Mix of affordable housing options, including rental apartments and for-sale townhouses.

Climate Adaptation and Resilience:

- The development incorporates green roofs and permeable pavements to reduce the urban heat island effect.

Transport and Mobility:

- Bike lanes and bike parking facilities.
- Located near public transportation options, including a metro station and several bus lines.
- Car-sharing and carpooling programs.

Community and People:

- Several community spaces, including a public park and community center.
- Public art installations to enhance the cultural vibrancy of the community.
- Job training and employment opportunities for residents of the surrounding neighborhood.

Waste, Materials, and Circularity:

- Wood from the site's former industrial buildings has been repurposed for use in the development.
- Prioritizes the use of locally sourced materials, reducing transportation emissions and supporting the local economy.

Assurance:

- Buildings designed to achieve LEED Gold certification.
- Targeting WELL Community certification.
- Registered for Envision infrastructure rating system certification.



Figure 1.22 Aerial Rendering of The Yards (Source: The Yards))



Figure 1.23 The Yards public park (Source: The Yards))

1.9.8 Wembley Park, London

Located at Brent and North West London, Wembley Park is a vibrant urban heart developed on 34.4 hectares of what used to be car parking used on events days only. Since 2004, £2bn have been invested to transform it into a place with retail, residential, commerce, and recreational areas.

Known most widely as an events space, the public realm, housing and retail spaces have been developed to create a globally renowned entertainment district.

Energy, Carbon, and Net Zero:

- ENVAC automated vacuum waste management system, first of its kind in the UK
- Highly energy efficient site-wide district energy system
- The single energy centre feeds approximately 20 separate buildings linked to a district heating network approximately 3.5 km in length
- Piled raft solution under each of the towers for foundations which reduced the number of piles needed by over 30%

Nature, Ecology, and Biodiversity:

- By 2050, Wembley Park will be more than 50% blue (ponds, puddles, canals, rivers and lakes) or green space (parks, gardens and woodlands)

Community and People:

- Wembley Park has evolved to create a brand new neighbourhood that brings business, people, experiences, education and employment together
- 8,500 homes expected to be built by 2027
- Implementation of The Yellow, Wembley Park's community hub
- Space for the Brent Foodbank, one of the largest foodbanks operating in the London Borough of Brent
- The Royal Philharmonic Orchestra at Wembley Park provides visitors and the local community with free and accessible musical experiences across Wembley Park

Assurance

- BREEAM Excellent on student accommodation development



1.9.10 Queen Elizabeth Olympic Park,
London

Originally built for the 2012 Summer Olympic and Paralympic Games, the park is a re-purposed complex of residential and commercial buildings as well as sporting venues located in London’s East End. It spans 560 acres (225 hectares), with about 26 acres (10 hectares) of woods.

This is the project with which we can draw the most parallels with Broadmeadow. Both Olympic Parks have transitioned from events venues into multi-use precincts with residential and community spaces as well as large blue and green areas.

Energy, carbon, and net zero:

- Low energy, low water housing, built from low-embodied carbon, non-toxic materials
- Energy Centre on site that provides low-carbon heat and cooling to venues, commercial spaces, and neighbourhoods in and beyond the Park
- Use of green roofs to keep things cool, build resilience against flooding and create more open space. PVs provide electricity
- Homes are connected to the low carbon distribution heating system
- Electric charging points for cars are provided
- All homes meet Zero Carbon criteria

Community and people:

- Residents can grow food in community gardens
- 100% are lifetime homes and 10% are wheelchair accessible

Affordability:

- 35% of the housing across the park is affordable

Transport and mobility:

- Streets and public realm are designed to favour pedestrians and cyclists
- Every home is within 350m of a bus stop

Assurance:

- BREEAM Excellent standard on all venues



1.9.9 East Village - Calgary, Canada

The East Village development is a mixed-use urban community located in downtown Calgary, Canada.

The project aims to transform a formerly neglected area into a vibrant and sustainable community with residential, commercial, and recreational spaces. The development covers an area of approximately 49 acres and includes over 11 residential buildings, with over 2,000 residential units, as well as office, retail, and community spaces.

Energy, carbon, and net zero:

- Geothermal heating and cooling systems in buildings
- Solar panels on some buildings
- Building automation systems to optimize energy use
- Energy-efficient building designs that exceed Canadian energy codes by 30%

Affordability:

- 20% of residential units are reserved for affordable housing
- Mixed-income housing throughout the development
- Rental and ownership options to accommodate a range of budgets

Transport and mobility:

- Priority given to pedestrian and bike-friendly designs
- Access to public transit and the city's bike path network
- Car sharing and bike sharing programs available to residents

Community and people:

- Public art installations throughout the development
- Community gardens and green spaces for residents
- Health and wellness programs offered to residents
- Social programs to support community building

Waste, materials, and circularity:

- Recycling and composting programs available to residents

Nature, ecology, and biodiversity:

- Use of native plant species in landscaping to support biodiversity
- Green roofs and living walls on buildings to support local ecosystems
- Design of buildings to minimize light pollution and protect local wildlife

Assurance:

- LEED ND (Neighborhood Development) Gold certification
- Green Building Council of Canada's Zero Carbon Building Standard for some buildings
- BOMA Best Platinum certification for energy and environmental performance in some buildings



1.10 Summary of key findings

Climate action

- Responsible and efficient consumption and production of materials and resources, prioritising renewable energy, and offsetting unavoidable impacts.
- Broadmeadow has a 2050 net zero emissions target as well as zero emissions transport for the precinct.
- The Hunter Region is becoming a fast growing hub for renewable energy generation and storage.

Climate adaptation

- Maximising efficiency, increasing autonomy, sharing resources, and reducing dependency are all initiatives explored that contribute to resilience.

Biodiversity and ecology

- Governments and organisations now take more nuanced and integrated view of nature than purely canopy or green coverage and consider habitat, nature-based solutions, and ecosystem services, as well as the complementary benefits these bring to our cities and communities.
- Broadmeadow will remEDIATE contaminated landscapes to create healthy places for people and wildlife alike
- Conserve and regenerate existing landscapes and waterways

Health and wellness

- Benefits come from intentionally seeking to create places that enhance liveability.
- Actively co-creating communities leads to improved resilience, higher commercial value and faster sales, greater talent attraction and retention, and encourages further good design in an area.
- 15 minute neighbourhoods
- Expanding sport and active recreation opportunities for all at Broadmeadow
- Active transport to support healthy people

Social sustainability

- Equity, inclusion, diversity, accessibility, and stewardship
- Empowering communities and maximising shared value capitalises on the existing resources in a location rather than relying entirely on the import of external capital and people.
- Retaining communities with social and affordable housing, mitigating gentrification
- Expanding sports programs and the arts, culture and festivals at Newcastle

Value chains

- Holistic sustainability across the entire project lifecycle considers the source of all products and materials, their manufacture and end of life, the people that have contributed to their creation and whether they have benefited.
- Create a cascade of sustainable practices that flows smoothly throughout the supply chain.
- Enabling circular economy practices at Broadmeadow

Data and technology

- CN Smart City Strategy.

- Data - collection, use, sharing and security - and leveraging them in real time for dynamic smart city outcomes.
- Data utilised correctly can have huge sustainability benefits. Collection, storage and accessibility is of the utmost importance and care must be taken to ensure ethical use of people's data.
- Smart cities infrastructure can create safer and more innovative cities by utilising the latest technology to solve city problems.
- Facilitating Broadmeadow to be Newcastle's innovation hub

Governance

- Consider the governance and institutional framework to enable the partnerships required for coordination and management, planning, land assembly finance and risk sharing mechanisms as well as any special incentives which may be available to catalyse development.
- An effective governance framework assures sustainability outcomes are tracked and delivered (standards, compliance, management).



Figure 1.24 Recurring attributes that define sustainable development.

02 SUSTAINABILITY STRATEGY

2.1 Sustainability Strategy

2.1.1 Sustainability Vision

Broadmeadow will catalyse the existing innovation community and expand natural ecosystems to foster a place which champions connection with Country and represents an exemplar of healthy sustainable placemaking.

It will enrich the quality of life of residents, workers, and visitors, enhance the wellbeing of the local community, and work to protect broader environmental and climate health.

2.1.2 Sustainability Principles

In support of this Sustainability Vision an overarching commitment to connecting to Country is proposed, along with 9 Sustainability Themes which provide direction to specific targets and design initiatives.

Connected with Country

The recognition and responsibility that this place was, is, and will continue to be a place of cultural significance for Aboriginal Peoples

Climate Positive

Fosters climate positive outcomes in construction and operation, and industry leading in resource efficiency

Resilient and Adaptable

Broadmeadow and its residents thrive despite short term shocks from weather and acute events and can adapt to longer term stresses like climate change

Biodiverse and Regenerative

Net positive impact on biodiversity, prioritises natural systems, and fosters local ecology to create a biophilic environment

Vibrant and Healthy Neighbourhoods

Enriches the quality of life of visitors and the community through passive and active public spaces and an emphasis on green places to support the mental and physical wellbeing of everybody.

Smart City

Leverage existing stakeholders and research partnerships to implement the latest smart technology to improve efficiency, safety and sustainability at Broadmeadow.

Circular Economy

Broadmeadow will become world leading for sustainable and efficient resource use during construction, operations and end of life.

Integrated Mobility

Broadmeadow will have diverse and flexible mobility options that connect people within the precinct and to greater regions, championing active and public transport for everyone.

Integrated Water Cycle

Cherish and managing water resources, Broadmeadow holistically integrates water systems, promoting stewardship, conservation, and resilience.

Equitable and Inclusive

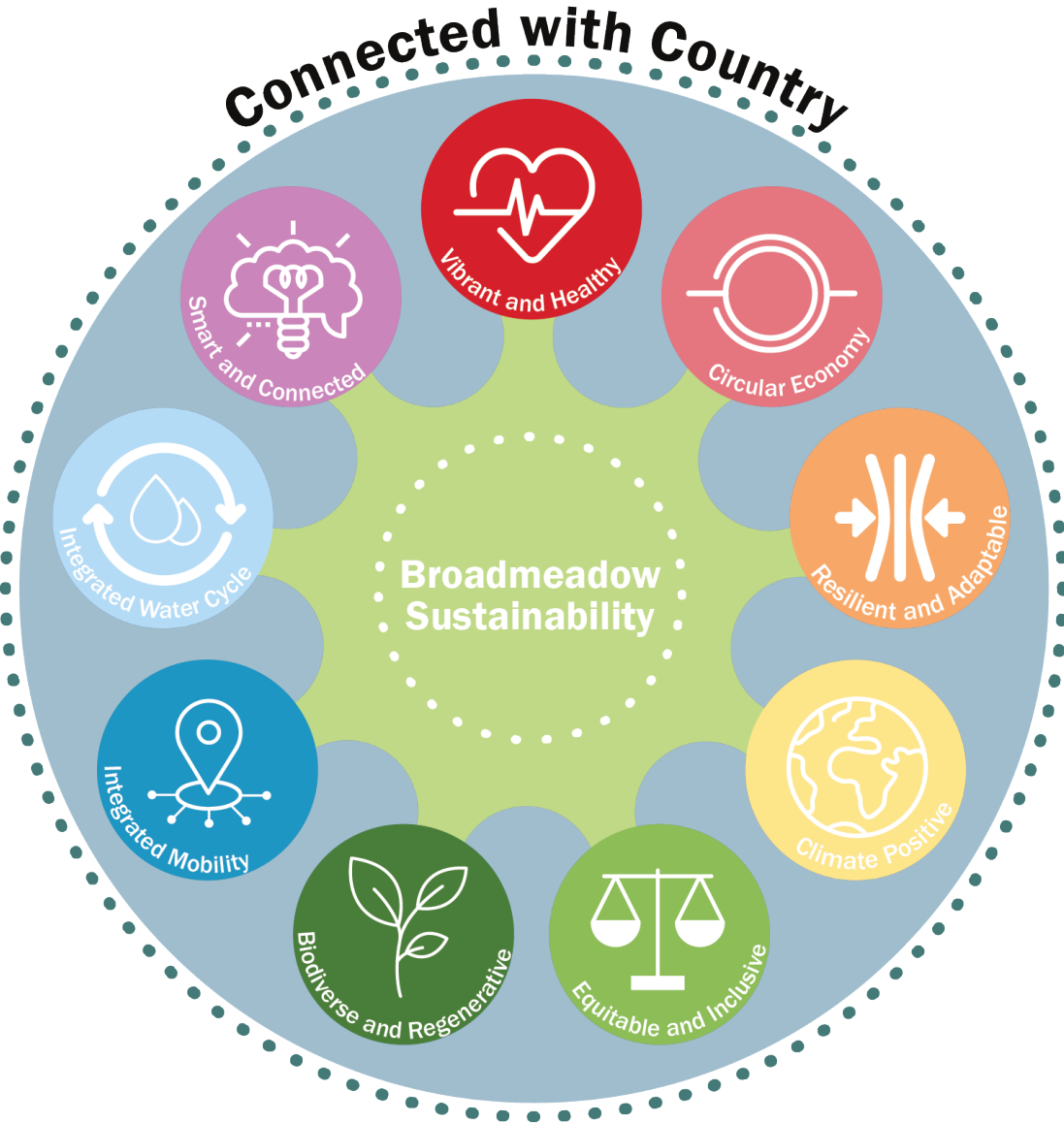
Crafts an environment that embraces diversity, ensures inclusivity, where every individual is celebrated regardless of their age, size, gender, cultural background, disability or ability and feels an integral part of the community.

2.1.3 Structure of Sustainability Themes

Each Sustainability Theme unfolds with a comprehensive approach, comprising:

- **Vision Statement** – Articulating the overarching aspiration that defines the Theme’s essence and significance.
- **Description** – Delving into the thematic context and the transformative potential it holds.
- **Principles** – Enunciating the guiding principles that underscore our commitment to the Theme.
- **Benchmarks** – Outlining ambitious yet attainable performance targets, encompassing both minimum and stretch objectives.
- **Planning Opportunities** – Showcasing tangible strategies, each opportunity demonstrates how Broadmeadow actively delivers or enables the Theme.
- **Design Opportunities** – Illuminating architectural and design possibilities, these directives guide future detailed design of areas outlined in the precinct and private developments.
- **Operational Opportunities** – Unveiling pathways for operational excellence, both for City of Newcastle and private developers, these opportunities actively drive the realisation of the sustainability mission and overarching Vision.

As we navigate the pages ahead, these elements collectively compose a roadmap toward a vibrant, sustainable, and thriving Broadmeadow—a testament to our unwavering commitment to a better future.



2.2 Connected with Country



Respecting and celebrating the area’s history, and particularly Connecting with Country underpins all of the sustainability ambitions for Broadmeadow Structure Plan and Place Strategy and its ongoing operations.

Rationale

A strong understanding of, and connection to Country will produce a place that has a distinct identity, shaping a unique sense of place that is necessary to attract investment and ensure longevity, social justice and inclusion. A place that actively engages in connecting with Country will continually be contributing to sustainability and resilience.

Objectives

- Incorporate shared histories of cultural landscapes into project design principles.
- Acknowledge Traditional Owners and other Aboriginal peoples in the local and regional communities.
- Develop mutually beneficial relationships with Country.
- Cultural heritage sites are protected and accessible to local Aboriginal communities for ongoing cultural practices.
- Indigenous ecosystems endemic to the local area have been regenerated.
- Indigenous culture, heritage, and knowledge of local country is embedded and evident in the built and cultivated environments of the development.
- Opportunities for Indigenous communities are regularly created through ongoing development.
- Create meaningful, ongoing engagement between Aboriginal communities and precinct authorities.

Benchmarks

- Indigenous culture, heritage, and knowledge of local country is embedded and evident in the built and cultivated environments (International Indigenous Design Charter)
- 1 per cent of total addressable spend is directed to Aboriginal businesses (NSW Aboriginal Procurement Policy).
- 3 per cent of total goods and services contracts are awarded to Aboriginal businesses (NSW Aboriginal Procurement Policy).

Planning opportunities

- Consult with the Aboriginal community and relevant advisors for planning decisions and input
- Consult Guraki Aboriginal Advisory Committee for local decision making

- Engage with local Aboriginal and Torres Strait Islander entrepreneurs, artists, business, inventors and community for innovation initiatives in the Broadmeadow precinct
- Identify any Aboriginal places of heritage or significance on the site through Aboriginal consultation. Protect and enhance these sites and identify opportunities to educate the public of these sites/artefacts where appropriate
- Work with Awabakal, Worimi and Mindaribba Local Aboriginal Land Councils to enrich and inform our community and environment
- Regenerate and increase access to Styx Creek, encouraging biodiversity to flourish
- Provide green pathway links that flow through the area, following desire lines and natural paths which link to the precinct’s green open spaces
- Avoid damaging intact or remnant Country
- Protect and make accessible cultural heritage sites for local Aboriginal communities to continue cultural practices
- Reinstate Aboriginal names for places, and help stakeholders understand, pronounce and value these names.
- Replace offensive place names with culturally inclusive and appropriate ones.
- Placemaking opportunity at Styx Creek

Design opportunities

- Include Indigenous designers in the design teams for public realm, buildings and infrastructure.
- Explore innovation opportunities for Broadmeadow such as the VR pre-contact initiative to connect visitors, workers and the community to Aboriginal heritage and culture
- Protect and restore local Indigenous historical and cultural sites.
- Support and nurture publicly accessible traditional food production endemic to the area.

Operational opportunities

- Ensure Aboriginal and Torres Strait Islander representation for a range of opportunities e.g. precinct installations, employment
- Develop a Reconciliation Action Plan (RAP) for the precinct.
- Include Indigenous designers and decision makers, especially ones with Ancestral connections to these lands, throughout projects.
- Set up an Aboriginal Advisory Panel that includes local on-Country living and working in the community.
- Create opportunities for Indigenous communities through the program development.
- Support employment opportunities for Aboriginal people within Aboriginal and non-Aboriginal owned businesses.
- Support sustainable growth of Aboriginal owned businesses by driving demand via government procurement of goods and services.

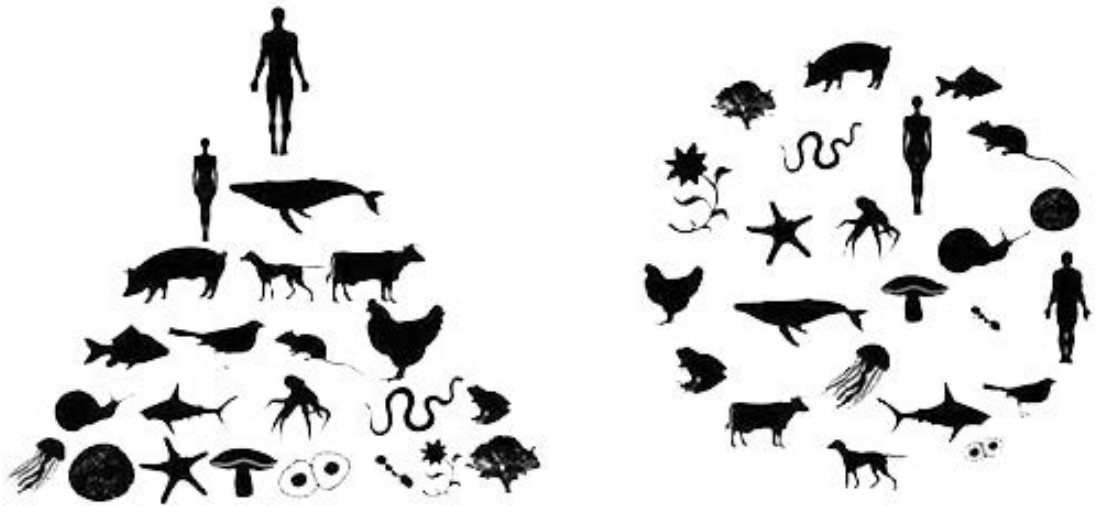


Figure 2.1 Ego-centric v Eco-centric diagram adapted from Art Tawanghar, Designer, San Diego (2016) (Source: GANSW)

Reciprocal relationships with Country and community form cultural practices, which in turn shape individual identities. All are also influenced by external factors including environment, politics, and wider society.

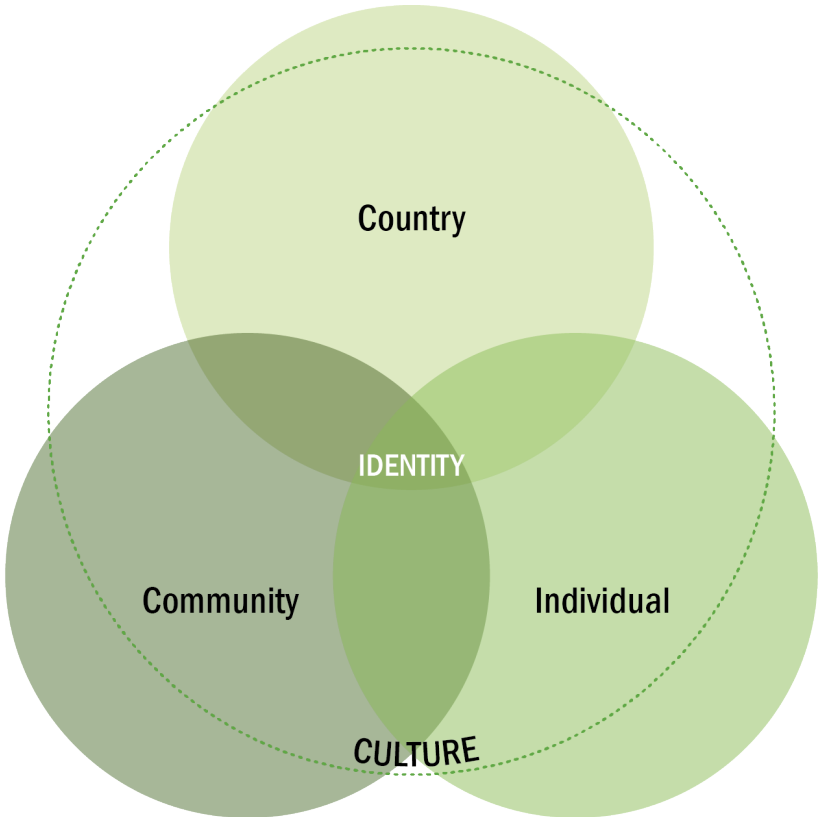


Figure 2.2 Interrelationships between Country, community and individuals, adapted rom Draft Connecting with Country Framework, GANSW (2020) (Source: Atelier Ten)

2.3 Smart City



Transparent sustainability performance, and precinct data generates value, while privacy and security are maintained for all stakeholders.

Rationale

Digital infrastructure can improve quality of life, facilitate tracking and tracing of resource flows, monitor materials, building elements, landscapes and ecosystems, and is a prerequisite for realising other parts of the vision, especially, connected mobility, circular economy and zero carbon.

Objectives

- User, worker, client and visitor experience enhanced through digitally enabled places and spaces.
- High Quality ICT Infrastructure.
- Affordable, zero emissions utilities are supported by smart city digital technology.
- Built environment resource flows are tracked digitally.
- Natural resource flows are tracked digitally.
- Food production resource flows are tracked digitally.

Benchmarks

- 100% 5G coverage.
- 100% fibre network.
- 100% WiFi coverage.

Planning opportunities

- Incorporate sensor-based triggering technologies into cycleways such as LED lighting for key commuter routes
- Use the Broadmeadow as a test-bed facility for new mobilities technology including MaaS networks and autonomous vehicles
- Develop a smart parking network including sensors, wayfinding and payments apps, dynamic signage and digital permit systems
- Utilise beacon network and sensor technologies to create interactive sites and deliver city information including creative placemaking content, environmental education, wayfinding
- Pilot and deploy smart bin infrastructure
- 4G and 5G (or other future technology) radio cells integrated into buildings, public transport, smart poles and other infrastructure
- Fibre optic network to buildings and homes and data transfer from gateway devices
- Highspeed Wi-Fi nodes and mesh networks for public access and sensor connection
- Smart road marking for connected and autonomous vehicles to facilitate traffic management
- Implement electric vehicle charging stations precinct-wide

- Install smart lighting in public spaces that is remote controllable and event configurable and is sensitive to light pollution
- Install digital signage and interactive smart screens in public spaces and on transport
- Install smart poles that combine lighting, sensors, connectivity and signage in public spaces
- Implement smart benches with many functions such as cooling or heating, device charging, lighting, sensors, connectivity and smart screens in public spaces
- IoT Sensing, monitoring and control of:
 - Traffic (sensors in busy road surfaces, buildings integrated with parking and traffic management infrastructure)
 - Mobility (bicycle parking, MaaS availability, curb space, deliveries)
 - Utilities (energy, ICT, water, lighting)
 - Public realm (occupancy detection, cleanliness, security)
 - Environment (air quality, temperature, humidity, soil, energy, water, stormwater, ventilation, native animals)
 - Waste (quantity, quality, location)
- Vehicle to Infrastructure (V2I) to communicate between road signs, traffic lights and connected autonomous vehicles (CAVs)
- Pilot and deploy smart bin infrastructure
- Dynamic digital displays situated throughout building and public domain to communicate building, precinct, and contextual information (e.g. events, amenities, accessibility options, transit timetables, directions, weather and environmental conditions).
- Dynamic digital displays within public spaces to communicate cultural and educational information to the public
- Implement smart grid technologies, with onsite battery storage
- Ability to add sensors throughout spaces targeted for investigation by potential Living Lab opportunities.

Design opportunities

- Support mobile working with frequent interior and exterior GPOs, charge stations, and a variety of spaces for individual and collaborative working - “I” and “we” spaces.
- Encourage technology-based arts within the creative space of Broadmeadow, involving the community and visitors
- Provision in building designs for future integration of an in-building mobile signal solution.
- Installing solar rooftops and solar gardens models for new residences
- Provide spaces for future building innovation provisions e.g. onsite battery storage, rooftop solar

Operational opportunities

- Incorporate standards enhancing disability inclusion principles into all smart city technology installations
- Develop a single digital platform for data management, monitoring and disclosure of environmental performance.
- Build a digital engineering framework for consideration of sustainability improvements over design and tracking of operational data.
- Data collected is accessible to the public for educational and innovation purposes through free access and promotions



Figure 2.3 Enehub smart street pole with EV charging (Source: ENE.HUB)



Figure 2.5 Smart bench with phone charging station (Source: MMCITÉ)



Figure 2.7 Smart solar bench with digital wayfinding and precinct educational information (Source: Hola Systems)



Figure 2.4 Smart road marking for pedestrian crossing (Source: STEPVIAL)

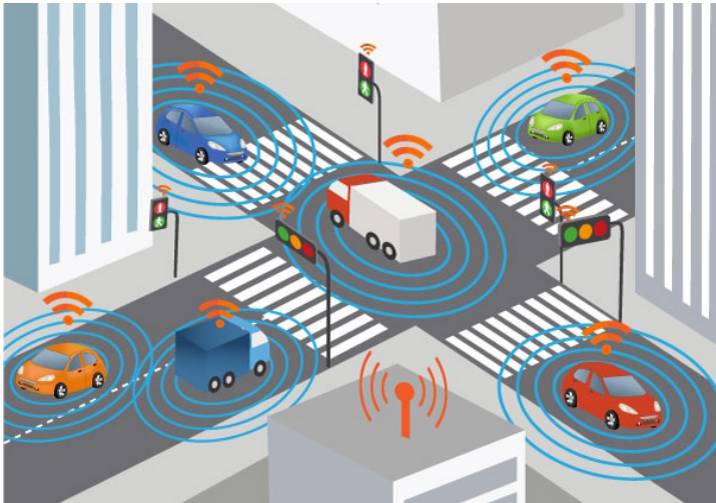


Figure 2.6 Mobility sensing for traffic management and Vehicle to Infrastructure (V2I) (Source: Mouser Electronics)



Figure 2.8 Interactive light art installation at Vivid, Sydney (Source: Nine)

2.4 Climate Positive



Net zero emissions in construction and operation by 2030.

Rationale

A zero carbon future is central to all sustainability strategies and policy documents at all tiers of government. A zero carbon present is rapidly becoming the basic expectation for innovative and thought leading industries like those targeted for investment in this precinct.

Objectives

- Minimise upfront greenhouse gas emissions.
- Eliminate on-site fossil fuel combustion.
- Prioritise passive design to minimise operational energy use
- Decrease of workers travelling to Broadmeadow via car
- Increase and prioritisation of public and active transport
- Minimise demolishing existing buildings especially concrete structure/foundational structure
- Implement circular economy principles for waste reduction

Benchmarks

- Net zero emissions by 2050 (Net Zero Plan Stage 1: 2020-2030).
- 70% reduction below 2005 level of emissions by 2035 (Net Zero Plan Stage 1: 2020-2030).
- Net zero emissions from organic waste by 2030 (Net Zero Plan Stage 1: 2020-2030).
- 40% reduction in embodied carbon by 2030 (World Green Building Council)
- By 2025 (City of Newcastle):
 - 30% reduction in city-wide emissions
 - 30% reduction in average daily electricity consumption
 - 10,000 registered electric vehicles
 - 100MW of new renewable generation capacity
 - 1 MW of new community renewable energy projects

Planning opportunities

- Maximise onsite renewable energy generation and storage.
- Regenerated landscapes sequester carbon.
- All-electric built environment.
- Prioritise timber and other plant-based building materials that sequester carbon in their growth.
- Prioritise low embodied carbon materials.

- Invest in shared infrastructure to support waste stream diversion to recycling.
- Creation of end-markets for recycled products.
- Build distribution networks for water supply and discharge streams.
- Facilitate on site electric vehicle (EV) charging.
- Create extensive and efficient active transport paths and facilities to discourage private car use, decreasing emissions
- Provide more public transport routes that provide an efficient and easy way for workers to travel to/from home
- Potential for microgrid, especially for any new buildings to be built, link energy to shared generator/storage
- Install megawatt scale battery storage options
- Hydrogen station
- Source 100% renewable electricity precinct wide
- Trial and demonstrate vehicle-to-grid (V2G) and other emerging technologies.

Design opportunities

- Implement net zero buildings, infrastructure and operations
- Utilise opportunities for low emissions materials such as green concrete in design and construction of buildings
- Recover and use recycled glass and other recovered materials as building materials
- Implement passive design features
- Prioritise timber and other plant-based building materials that sequester carbon in their growth.
- Choose low embodied carbon materials and products for major building systems (structure, cladding, foundations, etc.).
- Minimise operational energy through climate responsive design.
- Construct buildings to exploit use of thermal mass to regulate internal temperature.
- Optimise all façades to shade glazing to reduce cooling energy use yet provide high quality daylighting.
- Maximise the free cooling provided by outdoor air through design for cross ventilation, and night purging.

Operational opportunities

- Support residents and businesses to transition to low emissions technologies, including solar gardens, virtual microgrids, community renewable energy and battery storage initiatives.
- Encourage Newcastle residents and businesses to buy and sell local/regional renewable energy and carbon offsets.
- Mandatory minimum green building and infrastructure ratings for all built environment.
- Guarantee and verify operational energy efficiency through building performance tuning (e.g. NABERS ratings)
- Mandatory use of recycled materials and products with recycled content through built environment construction.
- Purchase 100% renewable energy for all operations.
- Offset all residual emissions from construction and operation with nature based solutions.
- Implement circular waste solutions for organic waste e.g. compost, biofuel



Figure 2.9 Biosolar roof combining solar panels with green roof (Source: Living Roofs)



Figure 2.11 High-speed public electric vehicle chargers (Source: NRMA)

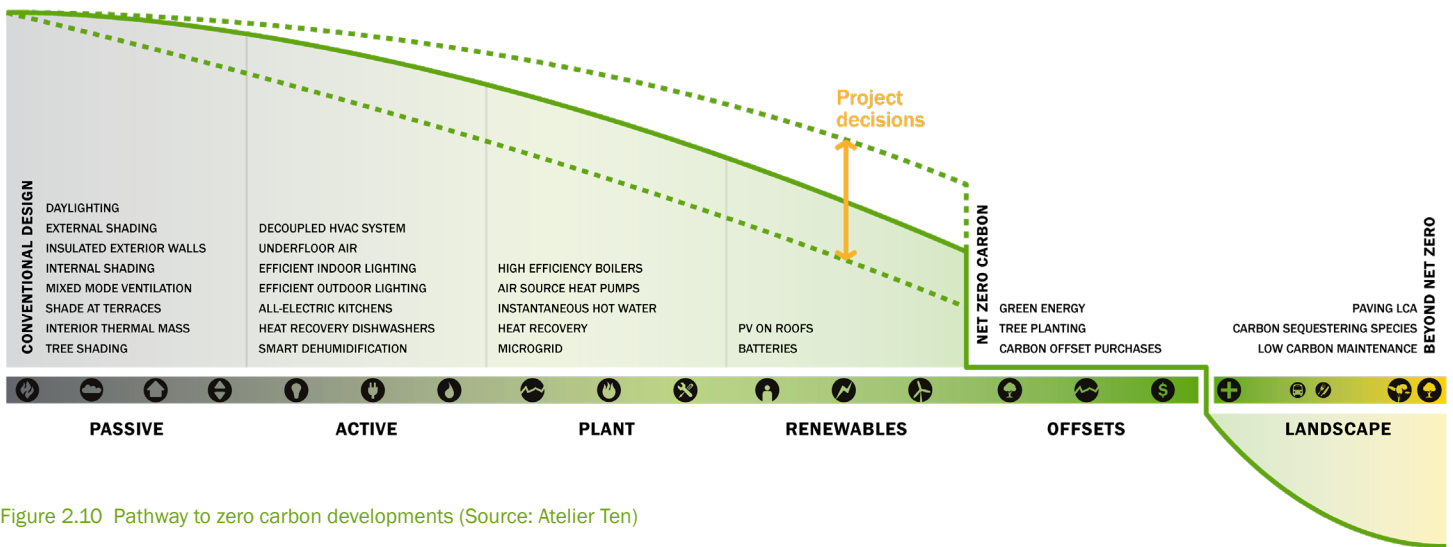


Figure 2.10 Pathway to zero carbon developments (Source: Atelier Ten)

2.5 Resilient and Adaptable



Broadmeadow will exemplify forward looking development by mitigating exposure to foreseen risks, being resilient to disruption, recovering rapidly, and being adaptable to societal advancement.

Rationale

Adapting to the direct effects of climate change on the environment and our settlements, as well as the indirect effects on society and the economy is critical to creating communities that will thrive long into the future, and will have greater capacity to support neighbouring communities and contribute to the resilience of the region as a whole.

Objectives

- Resilient to short term shocks (extreme weather, utility failures).
- Adaptable to long term stresses (climate change, increasing energy costs).
- Flexible to changing market conditions and environmental performance expectations.

Benchmarks

- Complete climate change risk and opportunity assessments (NSW Climate Change Adaptation Strategy).
- Develop and deliver adaptation action plans (NSW Climate Change Adaptation Strategy).
- Reduce climate change impacts on health and wellbeing (NSW Climate Change Policy Framework).
- Manage impacts on natural resources, ecosystems and communities (NSW Climate Change Policy Framework).
- Support a more flexible and resilient water cycle (Resilient Sydney).
- Design to RCP8.5 climate scenarios (Green Building Council of Australia).

Planning opportunities

- Floodplains manage floods naturally- regenerating Styx Creek to act as natural floodplain
- 100% of surface runoff from roads, roofs and other hardscapes filtered through landscape treatment before discharging to waterways.
- On-site stormwater detention for heavy rainfall events that delay discharge.
- Building systems and infrastructure continue operating during utility failure.
- Green roofs, extensive tree canopies and vegetated public realm to mitigate urban heat island effects and protect against increasing peak temperatures.
- Extensive urban street canopies to be resilient to heat and encourage active transport even on hot days

- Locate above probable maximum flood (PMF) levels all critical equipment and services (electrical equipment and switch gear, emergency power equipment, major HVAC plant).
- Design all structure below PMF to survive flooding.
- Include space for future energy storage (electrical or thermal batteries).
- Precinct places foster interaction and stewardship, community identity, sense of connectedness and community resilience capacity.
- Integrate community facilities that can serve as gathering places during emergencies and interruptions in services.
- Prioritise materials with low thermal mass or high solar reflectance index (SRI) to reduce urban heat island (UHI) effects.
- Landscapes balance drought tolerant low evapo-transpirative species, and high evapo-transpirative species that provide local cooling.
- Plant local vegetation and trees that can withstand forecasted extremes of environmental conditions such as resisting bushfires
- Provide shade and sufficient drainage for flooding in public open spaces including green spaces
- Provide cool and healthy public spaces
- Provide resilient ecosystems and green space for endemic flora and fauna
- Ensure access to fresh and affordable food
- Create a community garden to provide local and affordable healthy food

Design opportunities

- Buildings all perform 20% better than national construction code for thermal envelope performance.
- All buildings exceed NCC requirements
- Utilise a climate responsive design approach, optimise building envelope for passive climate control.
- Provide areas of operable facade to allow fresh air during power outages
- Allow islanding of any on-site generation and standby power circuit to enable limited building operations without utility power.
- Green roofs designed to reduce peak rainwater runoff.
- Buildings collect rooftop rainwater for onsite reserve water source during emergencies.

Operational opportunities

- Develop Climate Adaptation and Community Resilience plans.
- Facilitate and enable ongoing community programming (e.g. markets, events, etc.) to foster community cohesion and robustness.

Supports

- UN SDGs
 - SDG 9 Industry, Innovation and Infrastructure
 - SDG 11 Sustainable Cities and Communities
 - SDG 12 Responsible Consumption and Production
 - SDG 13 Climate Action



Figure 2.12 Smoke blankets Sydney during the 2020 bushfires (Source: ABC News)

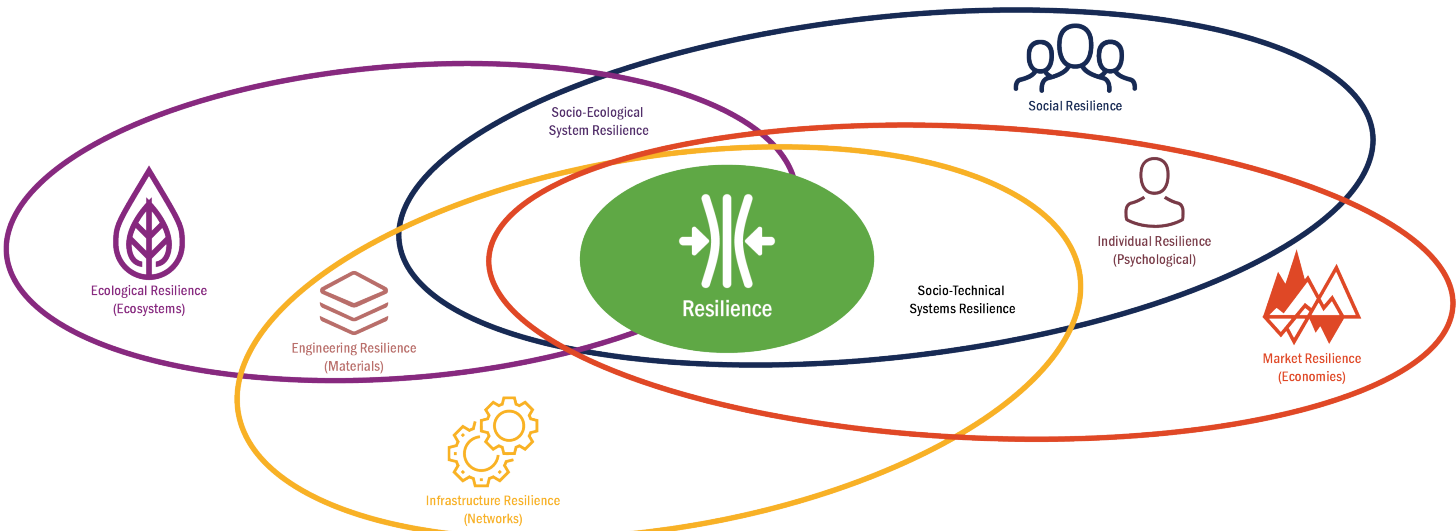


Figure 2.13 Multidisciplinary view of resilience (Source: Atelier Ten)

2.6 Circular Economy



Broadmeadow will incorporate circular economy principles in all aspects of construction, operations and end of life, to become world leading for sustainability and efficient material use.

Rationale

Reducing consumption and waste is essential for reducing greenhouse gas emissions and ensuring a sustainable future. Implementing systems and infrastructure that facilitate waste reduction, reusing, sharing and repairing for resources will be crucial for Broadmeadow to achieve net zero emissions and reducing waste to landfill.

Objectives

- Maximise resource efficiency.
- Minimise upfront greenhouse gas emissions.
- Eliminate on-site fossil fuel combustion.
- Establish an environment that promotes and adheres to circular economy principles
 - Sustainable design
 - energy and material input
 - production
 - distribution
 - consumption, reuse, repair
 - sharing economy
 - end of life
 - collection
 - recycling

Benchmarks

- Net zero emissions by 2050 (Net Zero Plan Stage 1: 2020-2030).
- 40% reduction in embodied carbon by 2030 (World Green Building Council)
- 80% municipal waste diversion (CN)
- NSW Waste and Sustainable Materials Strategy 2041:
 - Reduce total waste generated by 10% per person by 2030
 - Achieve an 80% average recovery rate from all waste streams by 2030
 - Significantly increase the use of recycled content by governments and industry
 - Phase out problematic and unnecessary plastics by 2025
 - Halve the amount of organic waste sent to landfill by 2030.

Planning Initiatives

- Specific site opportunities to implement Circular Economy:
 1. Schools
 2. Events - reducing waste at events
 3. Industrial/Arts - providing reverse garbage practices to conserve

and reuse valuable materials for the arts community

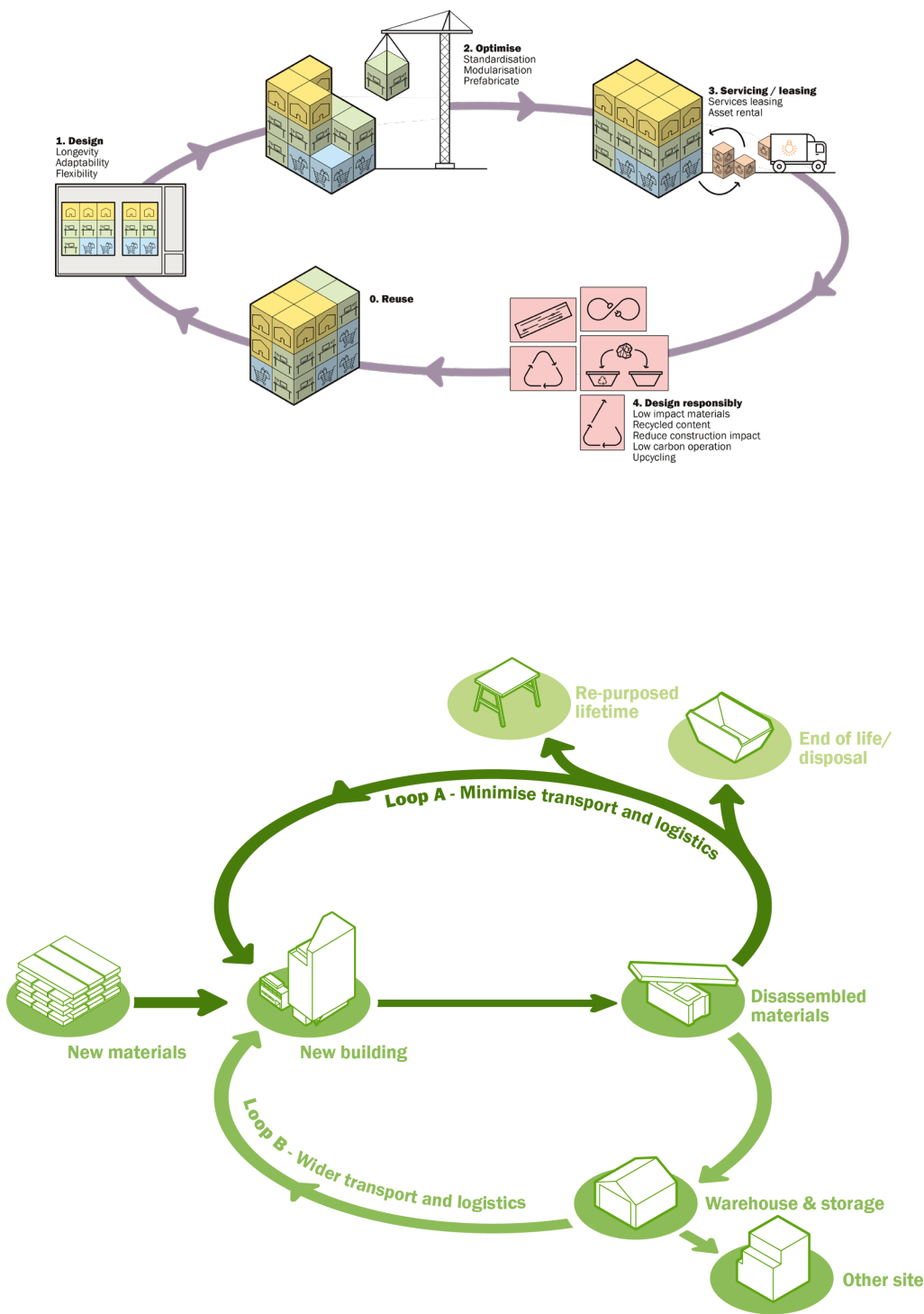
- Conserving government-owned land for a consolidated waste system to be implemented at Broadmeadow
- Establish resource recovery industries and circular economy precincts. Increase recycling and productive reuse of organics
- Provide infrastructure and planning for a circular economy at the Broadmeadow precinct
- Collection of organic waste for compost and energy generation
- Provide clear signage to educate people and visitors on what bin to put their rubbish in
- Provide opportunities for people to recycle and repair textiles or other objects, through creation of a repair shop or diversion to an external recycle/repair organisation
- Support, grow and fund existing organisations at Broadmeadow such as Upcycle Newcastle- a creative textiles upcycling organisation that holds community tutorials and events
- Support and fund the many existing organisations and businesses at Broadmeadow that contribute to the circular economy, including Oz Harvest, Second Hand City, Used Cars, Lifeline - through consultation to support their needs
- Invest in shared infrastructure to support waste stream diversion to recycling.
- Develop a facility/program that enables people to swap and donate used sport and art equipment that could be in demand for the community of Broadmeadow
- Collect more separated waste streams from precinct residents and commercial office (i.e. paper and cardboard, metal, glass, hard plastic, soft plastic, organics).
- Develop an incubator where organisations and entrepreneurs have access to waste resources and facilities for experimentation.

Design Initiatives

- Promote and normalise circular economy through encouraging the design of buildings, public space and art to adhere to sustainable design and circular economy principles e.g. collaborating with local artists to use disregarded car parts to create an interesting public art display,
- Buildings designed for disassembly.
- Buildings designed for alternative second- and third-life uses.

Operational Initiatives

- Localise supply chain and sustainable procurement
- Support waste avoidance opportunities, promotion and education for Newcastle residents
- Use renewable energy within all waste operations
- Consider and avoid environmental impacts from waste recovery and collection
- Encourage the use of innovative products and systems that reduce waste going to landfill e.g. biodegradable takeaway cutlery and packaging for all restaurants within Broadmeadow
- Form partnerships with all businesses and organisations within Broadmeadow to educate and promote the circular economy and put systems and products in place that support circular economy principles



2.7 Biodiverse and Regenerative



Broadmeadow will be built and operated so that it is a globally significant test bed for sustainable outcomes.

Rationale

A net zero future is central to all sustainability strategies and policy documents at all tiers of government. Actively protecting existing biodiversity and regenerating environmental and ecological damage across the value chain is rapidly becoming the baseline expectation for innovative and thought leading industries like those targeted for investment in this precinct.

Objectives

- Maximise resource efficiency.
- Minimise upfront greenhouse gas emissions.
- Eliminate on-site fossil fuel combustion.
- Prioritise passive design to minimise operational energy use.
- Preserve and protect existing natural ecosystems
- Establish a biophilic environment that provides regular immersion in and contact with nature and natural systems.
- Maximise future mature tree canopy and vegetation coverage in public domain.
- Prioritise nature-based solutions wherever possible.
- Protect and enhance local habitat including both native flora and fauna.
- Establish a biophilic environment that provides regular immersion in and contact with nature and natural systems.

Benchmarks

- Net zero emissions by 2050 (Net Zero Plan Stage 1: 2020-2030).
- 40% reduction in embodied carbon by 2030 (World Green Building Council)
- 40% Tree Canopy Cover across Greater Sydney (North District Plan).
- Achieve site vegetation coverage of at least 40% (Greater Sydney Commission).
- Maintain and introduce habitat (Biodiversity Sensitive Urban Design, RMIT).
- Improve potential for positive human-nature interactions (Biodiversity Sensitive Urban Design, RMIT).
- Mitigate light and noise pollution impacts on nature (Biodiversity Sensitive Urban Design, RMIT).

Planning Initiatives

- Maximise and increase urban greening
- Create green, high canopied biodiversity corridors that link

- together, and enable accessibility for the public
- Prioritise low embodied carbon materials.
- Create interconnected network of open space
- Design pathways (in consultation with Traditional Custodians) through open space that adheres to the natural creeklines and contours leading to open spaces
- Increase unstructured open space in Broadmeadow to allow for native flora, fauna and ecosystems to thrive, whilst workers and the community can enjoy these places
- Reconnect Broadmeadow to the natural environment through increasing access to natural assets such as creeks and green walks
- Balance between plant species:
 - Native to the Plant Community Type (PCT) attracts local birds and insects to help with the local ecosystem.
 - Locally-sensitive drought tolerant plant species which require little irrigation and maintenance.
 - High evapo-transpirative planting for localise passive cooling
- Carefully restrict site and precinct lighting through use of a light allowance to substantially reduce light pollution and preserve dark skies at night.
- Restore the degraded creek systems such as Styx Creek and any surrounding riparian zones
 - Layered riparian corridor to create foraging habitat for flying foxes and microbats and improve water quality
 - Choose vegetation that support foraging habits of Flying Foxes and other endemic species at Broadmeadow
- Protect priority habitat corridors and refuge areas to protect mobile species, and migratory birds and fish.
- Create safe, regularly located wildlife crossings along major roads.

Design Opportunities

- Create habitats where detention ponds are required
- Instream reconstruction, creating fish habitats
- Connect proposed residential building to vegetation and biophilia whilst ensuring good connections and networks within the Broadmeadow community and to surrounding communities
- Prioritise timber and other plant-based building materials that sequester carbon in their growth.
- Maximise the free cooling provided by outdoor air through design for cross ventilation, and night purging.
- Building roofs actively contribute to sustainability ambitions: solar PV, green roofs, inhabitable terraces.
- Sensitive lighting for habitats

Operational Opportunities

- Guarantee and verify operational energy efficiency through building performance tuning (e.g. NABERS ratings)
- Mandatory use of recycled materials and products with recycled content through built environment construction.
- Purchase 100% renewable energy for all operations.
- Offset all residual emissions from construction and operation with nature based solutions.

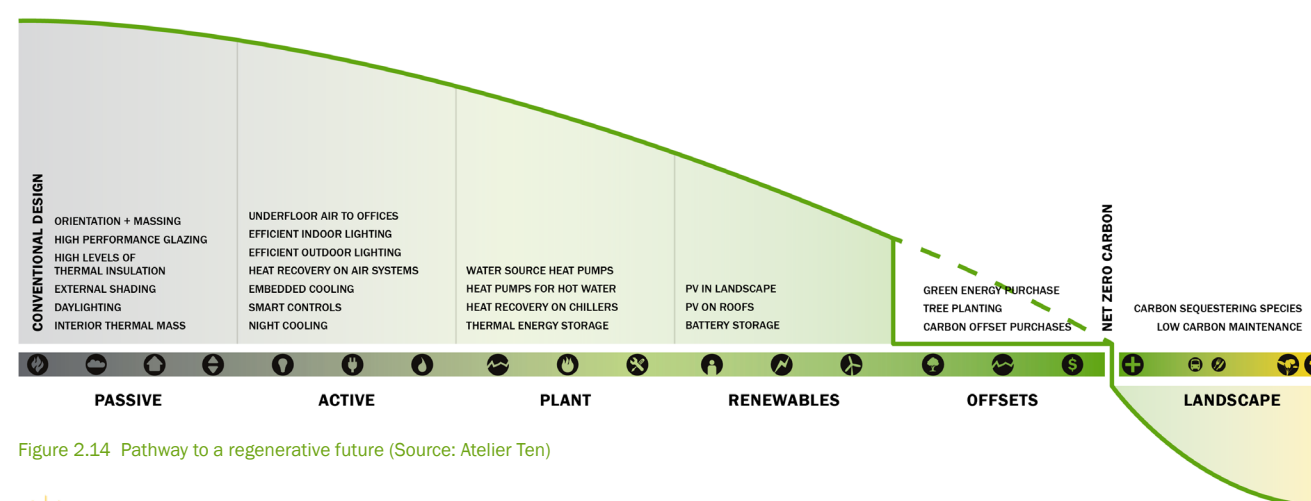


Figure 2.14 Pathway to a regenerative future (Source: Atelier Ten)

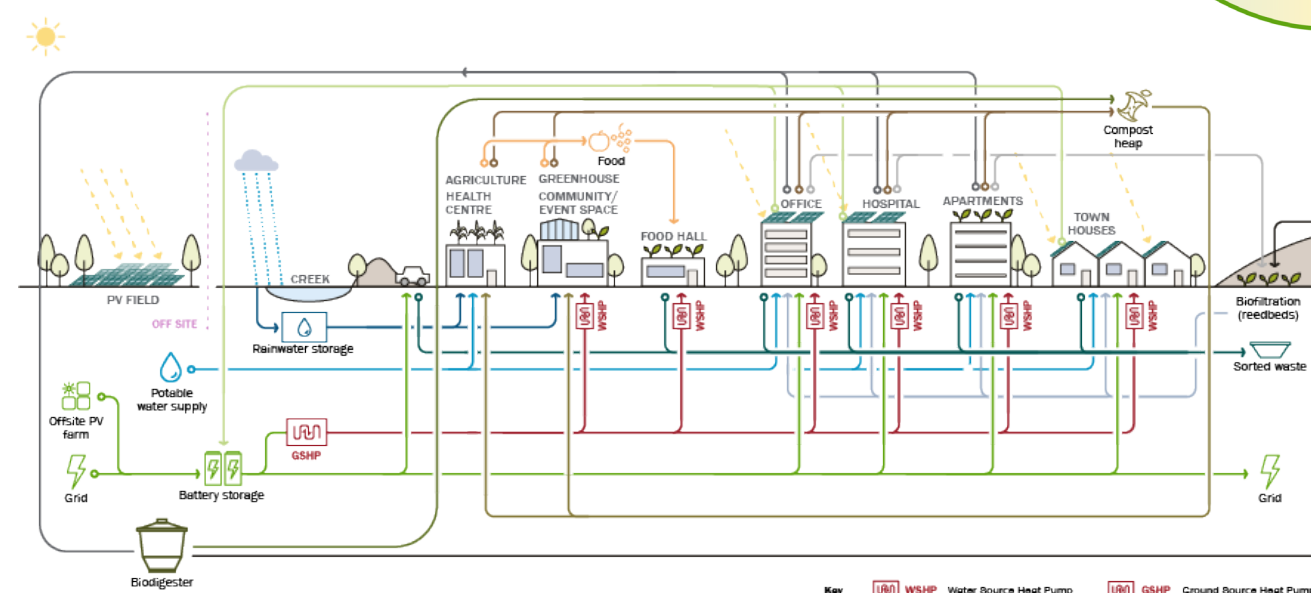


Figure 2.15 Opportunities for circular economy at Broadmeadow (Source: Atelier Ten)

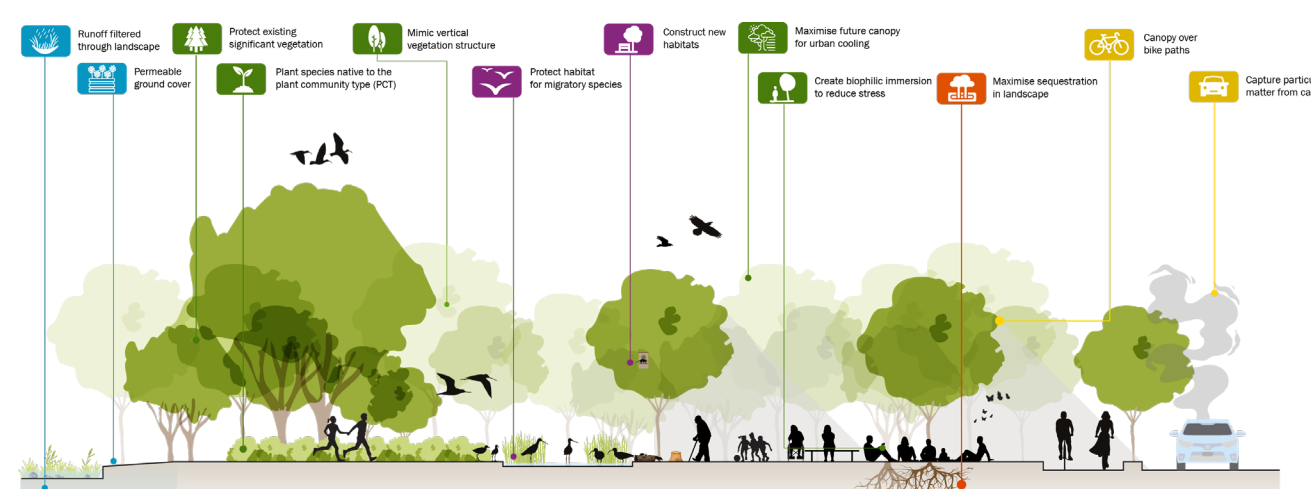


Figure 2.16 Opportunities to incorporate biodiversity in the built environment (Source: Atelier Ten)

2.8 Integrated Mobility



Broadmeadow will operate as an exemplar of sustainable, people-oriented, place-based mobility, supporting and encouraging personal active transportation, while integrating multiple nodes and seamless transitioning between them.

Rationale

The success of the precinct will depend on diverse, flexible, and connected mobility options for goods and people. These systems must be adaptable to future transport systems both within the Precinct and out to the surrounding regions. Corridors and station and terminal areas will be protected for future transportation systems.

Objectives

- Walking or cycling is the most convenient option for short trips within the precinct or to nearby destinations.
- Efficient, reliable and easy-to-understand public transportation serves most regular workers trips, and a substantial share of visitor trips, to and from the precinct.
- Seamless connectivity between precinct and airport.
- Minimal landscape given over to vehicular transportation corridors.
- Future rail and autonomous logistics vehicle corridors protected.
- Universally accessible and inclusive public transport.
- Diverse micro-mobility options.
- Walk Score, Bike Score and Transit Score are 70 or higher.
- All transportation systems are resilient to RCP8.5 climate challenges.

Benchmarks

- 30 minute access for customers to their nearest metropolitan centre and strategic centre by public transport seven days a week (Future Transport 2056).
- Fast and convenient interchanging, with walking times of no longer than five minutes between services (Future Transport 2056).
- A resilient transport system that contributes to the NSW Government’s objective of net-zero emissions by 2050 (Future Transport 2056).

Planning opportunities

- Provide accessible and open pathways/plazas with open lines of sight throughout the precinct that connect the different sports and entertainment places within Broadmeadow, creating a unified precinct
- Opportunity for public pedestrian boulevard from the Station to McDonald Jones Stadium

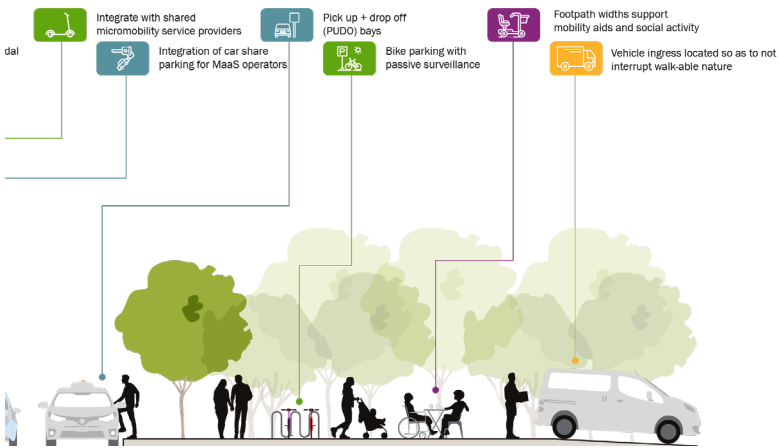
- Plan for concentrated growth around transport and activity nodes and easy transport from these nodes to the precinct e.g. free shuttle service, clear walkways and wayfinding
- Support use of EVs, shared transport, and more efficient car parking management
- Provide amenities that can cater for growing residential and visitor population, enabling 15 minute neighbourhoods
- Connect the precinct through fully seperated direct roads and pathways that prioritise pedestrians and cyclists
- Link the existing 15 km Fernleigh Track to the Broadmeadow Precinct, continuing the existing cycling nature track
- Link the Broadmeadow cycling network to the Greater Newcastle cycling network.
- Pedestrian and cycling routes are visually pleasant and cool, with consistent tree canopies and vegetation
- Micro-mobility station areas located regularly throughout public realm.
- 100% of parking to have charging capacity
- Clear wayfinding for pedestrians and cyclists and wayfinding messaging throughout precinct that encourages physical activity (e.g. x mins to walk to x landmark)
- Autonomous EV Shuttles within precinct
- Install bicycle fixing facilities across the precinct, along cycle routes
- Bicycle parking located in areas with passive surveillance
- Pedestrian pathways are accessible for different people including the disabled and children
- Pedestrian and cycling paths located near activated amenities e.g. cafes, gyms, grocers.
- Working with Traditional Custodians, design pathways (woven ways) that weave through open space and between buildings that adhere to natural creeklines and contours
- Integration of multimodal mobility hubs (bus stop, bike/scooter share, car share) and allied services (water filling station, charging, weather protection, public toilets, live weather and network status).
- Pick up and drop off (PUDO) bays for ride-hailing (e.g taxis, Uber, etc.) and future autonomous vehicles.

Design opportunities

- Biophilic and visually interesting/pleasing pathways and cycleways
- Attractive high quality end of trip (EOT) facilities to facilitate and encourage active mobility e.g. showers
- Loading dock entries that do not interrupt valuable pedestrianised public domain.

Operational opportunities

- Partnerships with MaaS operators which provide free or discounted rates for building tenants, residents and/or hotel guests (GoGet, Lime, Uber).
- Precinct governance supports trialling and rapid deployment of new mobility systems.



2.9 Vibrant and Healthy Community



Broadmeadow will create a place that is welcoming to all people, regardless of their age, size, gender, culture, disability or ability, and enrich the health and wellness of workers, visitors and the community.

Rationale

Broadmeadow will prioritise human health and wellbeing, inclusion, mobility options, access to resources, affordability, and participation in leadership. These factors enable successful and vibrant places that improve liveability and resilience, achieve higher commercial value and faster sales, encourage further good design in an area, and demonstrate a commitment to corporate social sustainability.

Objectives

- Foster a vibrant, cohesive social environment that is reflective of community history and identity.
- Encourage active mobility and recreational exercise.
- Nature, biophilia, immersion and contact with natural systems
- Safety, and enhancing social engagement.
- Built environment is welcoming to diverse users communities.
- All built environment is fully physically accessible and inclusive.
- Public and amenity space support socialising and collaboration.
- Promote responsible labour practices and support human rights

Benchmarks

- Promote access to fresh, nutritious and affordable food and drink (Healthy Built Environment Checklist).
- Promote access to quality open spaces, including green space and recreational facilities (Healthy Built Environment Checklist).

Planning opportunities

- Strengthen Newcastle's reputation as an arts and cultural destination by creating a nationally significant platform for arts and culture by collaborating with local artists and organisations like the Creative Incubator and the Hunter School of Performing Arts to improve facilities and programs
- Provide quality open space, sports facilities and programs that enable everyone to participate on a competitive and non-competitive basis, establishing Broadmeadow as a sports destination for everybody
- Serve all areas with fully accessible pedestrian pathways and separated bicycle paths that create better connections and encourage physical activity
- Link the existing 15 km Fernleigh Track to the Broadmeadow Precinct, continuing the existing cycling nature track

- Integrate diverse physical social infrastructure and exercise facilities e.g. playground, benches, that encourage people to stay
- Accessible drinking water fountains, with water bottle filling in 800 m radius throughout the precinct
- Protect existing neighbourhoods character and amenities by engaging with existing communities about what they like already in their community and what they need
- Affordable and fresh food available within the precinct
- Unobstructed lines of sight and visual connection to create a sense of openness and safety
- Develop guidelines for an innovative public art program representing Broadmeadow to showcase local artists' art throughout the Broadmeadow precinct.
- Activated ground plane- retail and community spaces e.g. community garden, communal public hall, courtyards, cultural places that supports 18 hour economy
- Creative public lighting to enforce safety, orientation, creativity, and accessibility
- Enabling a vibrant nightlife, activating the precinct after dark with art, businesses and sports and entertainment
- Develop Hub support facilities that are connected to core facilities such as sports science, health services, education/ training facilities to provide local employment opportunities
- Prioritise multi-purpose flexible spaces that also support other industries such as the arts

Design opportunities

- Maintain the existing industrial, arty, hipster character of Broadmeadow within the design of buildings and places
- Minimise pedestrian exposure to surface parking lots e.g. placing parking behind/below buildings and providing direct footpath access to building entrances and lobbies.
- Celebrate natural materials through biophilic design.
- Design facilities and open spaces to be accessible for range of abilities

Operational opportunities

- Curated and cohesive visual narrative recognising local history.
- Encourage individual volunteerism and community development.
- Private and public precinct organisations maintain transparent equitable and inclusive social and business practices
- All eligible built environment (including private buildings) achieves basic healthy building certification.
- Eliminate pesticide use from landscape maintenance.



Figure 2.17 Creating cycleways and pedestrian paths through nature for physical activity (Source: Unsplash)



Figure 2.19 Warehouse conversion to youth centre and skate park (Source: EFFEKT)



Figure 2.18 Safe and inclusive outdoor sports facilities with unobstructed lines of view (Source: Prince Alfred Park)



Figure 2.21 Accessible drinking fountains (Source: Civiq)



Figure 2.20 Adaptive Reuse of warehouses to affordable art studios (Source: Mark Mahaney)

2.10 Integrated Water Cycle



Empowering a harmonious coexistence between water, nature, and community, Broadmeadow envisions a sustainable future where water is a unifying force, nurturing ecosystems, enhancing well-being, and fortifying resilience for generations to come.

Objectives

- Embrace integrated approach respecting water system interconnectedness, including surface water, groundwater, and stormwater.
- Prioritise aquatic habitat preservation, harmonising human activities with the natural environment.
- Champion water efficiency to minimise waste, safeguard resources for present and future generations.
- Empower community through education, involvement, fostering shared water stewardship.
- Strategically plan for challenges like flooding and climate change, enhancing adaptability.
- Utilise cutting-edge tech and practices for optimal water management.
- Design water-centric spaces for culture, recreation, and aesthetics, enhancing precinct quality of life.

Benchmarks

- (Get any stats/info on Broadmeadow water)

Master Plan Initiatives

- Naturalise Styx Creek and any other natural waterways at Broadmeadow, and provide direct access to creek; spaces along the edge for people to gather
- Establish areas for cultural practice and other events adjacent to creek edges.
- Integration of biofiltration ponds and water sensitive urban design initiatives to treat water before it reaches the river system.
- Endemic vegetation restoration.
- Ensure all built environment has recycled water infrastructure suitable for future Newcastle City mains connection.
- Optimise local collection, storage and use of stormwater in

catchments that are not part of a centralised stormwater harvesting system.

- Reduce the volume and manage the quality of stormwater discharged to creeks and wetlands from buildings, roads, carparks and paving to protect the habitats of receiving waters, and with consideration of environmental flow requirements.
- Embed water-sensitive urban (WSUD) design principles into the master plan, ensuring that water flows seamlessly through urban spaces, enhancing aesthetics and functionality.

Design opportunities

- Integrate green roofs and rain gardens into building design to capture rainwater, reduce runoff, and enhance urban greenery.
- Incorporate water-efficient landscaping with native plants to conserve water and support local biodiversity.
- Develop façades that channel rainwater for cooling, irrigation, or other beneficial purposes, optimising water use.
- Use permeable pavements and surfaces to allow rainwater infiltration, reducing runoff and enhancing groundwater recharge.
- Incorporate water features like ponds or waterfalls into building design for aesthetic appeal and improved microclimates.
- Design versatile spaces that double as temporary water storage during heavy rainfall while serving community needs.
- Apply SuDS principles, such as swales and permeable paving, to manage rainwater close to its source and enhance water quality.

Operational opportunities

- Implement robust water monitoring systems to track water quality, usage patterns, and resource availability, facilitating informed decision-making.
- Conduct water-focused educational programs and initiatives to raise awareness and promote responsible water usage among residents, visitors, and workers.
- Enhance public access to water bodies, encouraging recreational activities and fostering a deeper connection to nature and the environment.



Figure 2.22 WSUD, Rain Garden (Source: Yerrabingin)



Figure 2.24 WSUD, permeable paving (Source: New Dawn)



Figure 2.23 Water play feature (Source: Yerrabingin)



Figure 2.25 Creek Naturalisation (Source: Sydney Water Talk)

2.11 Equitable and Inclusive



Broadmeadow will create an environment that is welcoming to all people, regardless of their age, size, gender, culture, disability or ability, so they become part of the community.

Principles

- Encourage the community to play a hands-on role in shaping its future.
- Built environment is welcoming to diverse users communities.
- All built environment is fully physically accessible and inclusive.
- Public spaces and amenities support gathering, socialising and collaboration.
- Provide spaces that can be used for community activities and services.
- Precinct development and operations promote responsible labour practices and support human rights throughout Broadmeadow's many supply chains.
- Foster a vibrant, cohesive social environment that is reflective of community history and identity.

Benchmarks

- 3% of the total number of goods and services contracts to Aboriginal businesses, in line with NSW Government Aboriginal Procurement Policy.

Master Plan Initiatives

- Support all of the existing strong community organisations, and businesses by community consultation to meet their growing needs and provide improved facilities and links to strengthen these existing communities such as the existing Sunday Farmer's Markets
- Ensure new housing developments have provisions for social and affordable housing to meet the specific needs of the area
- Embed public art of varying forms and scales into the fabric of the development.
- Consult with local Aboriginal community, designers and place-makers to define distinctive sub-places/open spaces within SOP to connect and educate the public to Aboriginal culture. E.g. through design such as distinctive signage, ground paving, art, plant types, seating and other urban features.
- Consult with the disabled community and organisations to cater for this community in the built and urban environment, such as having an adequate amount of sensory rooms available in all entertainment spaces
- Activate the precinct after-hours to cater for all people and ensure safety and good design
- Generous footpath widths to support mobility aids, and commercial and social activity.

- Diverse public space types to ensure equity of access regardless of socioeconomic background.
- Extensive accessible street furniture and physical artefacts (e.g. ledges, planters) to allow visitors to stop and rest.
- Legible wayfinding system suitable for all abilities.
- Unobstructed lines of sight and visual connection to create a sense of openness.
- Areas of refuge from environmental conditions or the main flow of activity.
- Exterior power points to support informal community gathering.
- Substantial and creative public lighting to enforce safety, orientation, drama, and accessibility.
- Public restrooms located in public spaces
- Sporting equipment, gyms and outdoor gyms cater for all people including disabled, elderly and women

Design opportunities

- Design public restrooms with features such as accessible stalls, changing stations, and sensory-friendly amenities to accommodate diverse user needs.
- Integrate designated quiet spaces and retreat areas within building interiors, offering serene environments for relaxation and sensory relief.
- Incorporate multi-sensory elements, such as textured surfaces, visual art installations, and auditory cues, to create enriching experiences for individuals with varying sensory sensitivities.
- Design outdoor spaces with inclusive playground equipment and play structures that cater to children of all abilities, encouraging social interaction and play.
- Integrate cultural elements and artistic expressions from diverse communities within building architecture, interiors, and public spaces to celebrate inclusivity and heritage.

Operational opportunities

- Free programs that encourage community and learning such as school holiday programs e.g. bush tucker, walk on Country, art programs
- Provide community sporting programs that cater for under-represented communities and the diverse sports and activities that they preference, through consultation with these communities and relevant organisations
- Dedicated community programs and spaces for promoting and collaborating with the public, where the public have a say on initiatives
- Encourage women and girls sports by creating sports programs and facilities that cater for all women and girls e.g. free girls basketball
- Implement sustainable procurement models focused on social justice, equity and access to opportunity.
- Opening hours of public spaces and businesses.
- Ensure retail services offer fresh and healthy food options.
- Initiate and implement programs to communicate, educate and engage the public.
- Facilitate and enable free community programming and events (e.g. markets, concerts, street fairs).

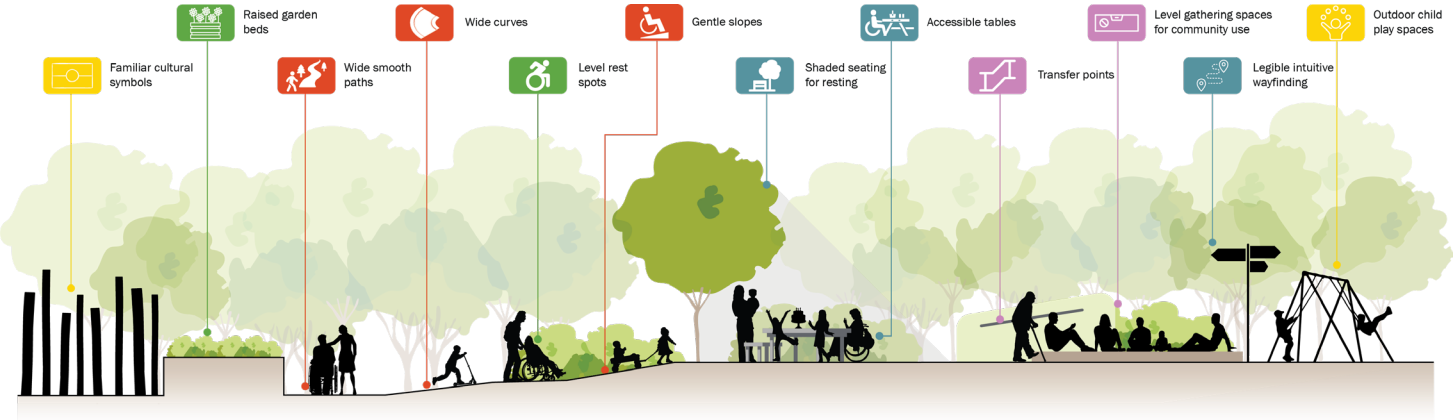


Figure 2.27 Opportunities to accessible and inclusive nature (Source: Atelier Ten)



Figure 2.28 Affordable and free sports programs for girls (Source: Nature Play, WA)



Figure 2.26 Supporting Broadmeadow Sunday Farmers markets



Figure 2.30 Outdoor workstations and powerpoints for informal community gatherings (Source: COMPLETE)



Figure 2.29 Vibrant, green and accessible streets and street furniture (Source: COMPLETE)

03 CIRCULAR ECONOMY STRATEGY

3.1 Circular Economy Summary

The circular economy is a new economic model for addressing human needs and fairly distributing resources, without undermining the functioning of the biosphere or crossing any planetary boundaries.

The Circular Economy Strategy has been structured into 3 core parts.

- 10. Strategic Planning Context - what is circular economy, why is it important, existing policy/support?
- 11. Circular Economy Strategic Initiatives - what can I do?
- 12. Implementation at Broadmeadow - how can I do it?

Circular Economy Overview & Strategic Planning Context

Key documents were taken into consideration for creating the circular economy strategy. These include place strategies of City of Newcastle and the surrounding Hunter Region. Other documents provide the strategies and targets for the direction and ambition for a circular economy.

Circular Economy Strategic Initiatives

This report identifies nine potential circular economy strategies than can be embedded into the Broadmeadow Master Plan:

- 1. Preservation: Preserve existing infrastructure and resources, extending their lifespan and reducing the need for new materials.
- 2. Design for Circularity: Incorporate circular design principles, ensuring products and infrastructure are easily disassembled, repaired, and recycled.
- 3. Modern Methods of Construction: Embrace innovative construction techniques to minimize waste and energy consumption.
- 4. Waste Reduction: Implement strategies to reduce waste generation and improve waste management practices.
- 5. The Sharing Economy: Promote sharing and collaborative consumption to maximize resource utilisation.
- 6. District Utilities:
- 7. Products as a Service: Shift to a service-based model, encouraging product durability, repairability, and sharing.
- 8. Responsible Procurement:
- 9. Green Infrastructure:

By integrating these circular economy strategies into the Broadmeadow Masterplan, the aim is to create a more sustainable and resource-efficient precinct, minimising waste generation, optimising material use, and promoting a circular and regenerative economic model that is aligned with the Sustainability Strategy for the precinct.

Implementation at Broadmeadow

The implementation of circular economy initiatives at Broadmeadow can be categorised into three groups: enablers, facilitators, and actuators (shown to the right). These categories represent different levels of complexity and impact on achieving circularity.

The following key actions are recommended for Broadmeadow:

Key Step 1: Building Re-use Strategy

- Engage structural advice to confirm buildings for reuse.
- Develop architectural design for the reused buildings.
- Engage a demolition specialist to visit the site and prepare a bill of quantities for potential materials that can be reused on-site.
- Prior to commencing demolition, develop a building-specific disassembly plan that identifies materials for salvage.
- Allocate sufficient space and time for the storage of salvaged materials.

Key Step 2: Circular Economy Hubs

- Identify circular economy hubs opportunities.
- Plan space for circular economy hubs and consider where they could be located o best serve the community.
- Consider waste collection and sorting facilities and collaboration with Summerhill Waste Management Centre.

Key Step 3: Sharing economy strategy

- Discuss potential opportunities for delivering the sharing economy.
- Identify and reserve suitable space for a tool, equipment, and material library.
- Identify local entrepreneurs to operate sharing groups or staff Maker Spaces.
- Set up suitable company structures to engage with building occupiers for leasing and repair within the precinct.

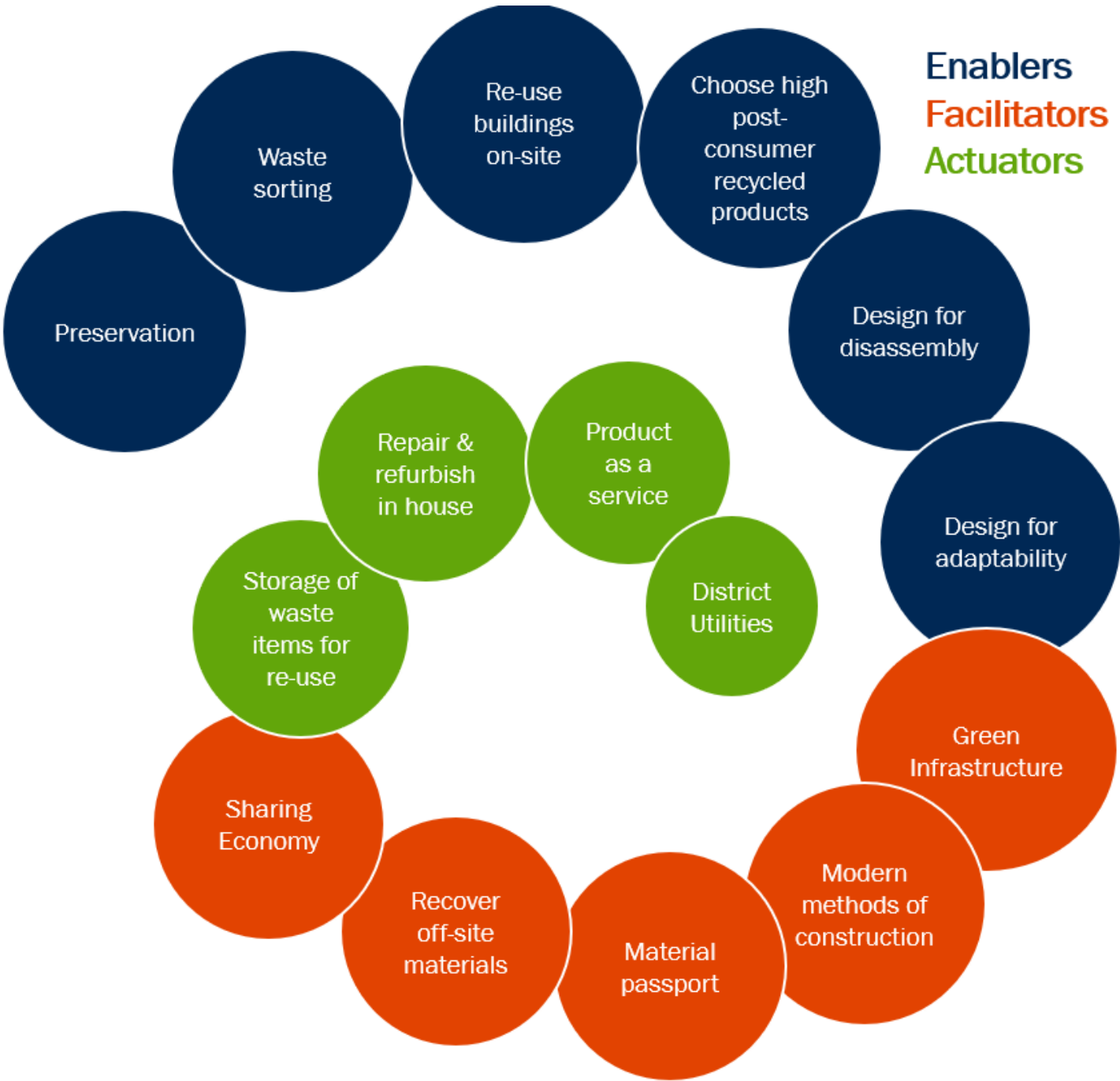
Key Step 4: Circular Design Guide

- Set up circular design guide during the masterplanning stage and handover during later stages to ensure circular economy principles are followed from design through to project end of life.
- The principles should be centred around design for disassembly and adaptability.

The actions mentioned above should be implemented during the master planning phase. It is important to engage with experts, such as structural advisors, architects to confirm the reuse potential of existing buildings and develop suitable designs.

Considering space and requirements for circular economy hubs and sharing economy services early allows for the establishment of necessary structures and partnerships. Additionally, the provision of library and workshop space offers opportunities to build a vibrant community hub where various activities can take place.

These circular economy strategies and principles should be integrated in a circular design guide that addresses circularity throughout the entire life of the precinct, from planning to end-of-life,



3.2 Introduction

What is circular economy?

The **circular economy** is an **economic model** for addressing human needs and fairly distributing resources, without undermining the functioning of the biosphere or crossing any planetary boundaries.

A circular economy is built to be restorative and regenerative by design:

- **materials are cycled** at continuous high value
- all energy is based on **renewable sources**
- water resources are extracted and cycled sustainably
- biodiversity is supported and enhanced through economic activities.

Ultimately a circular economy is balancing sustainable and regenerative resource use with economic activities aimed at the health and wellbeing of humans (and other species), the maximisation of societal value (looking beyond economic value alone).

Circular economy for urban development:

- **Smart spatial planning** that works with the existing landscape and climate rather than against it and reinforces green and blue networks
- A design of the built environment that **minimises resources use** throughout the buildings' lifecycle (from construction to operations to end of life)

- Infrastructure and facilities (for example waste management) that support the **preservation and cycling of resources**, and applying the principles of industrial symbiosis wherever possible.

Achieving the ideal of a circular city or neighbourhood therefore means applying circular design principles to all layers of the urban environment.

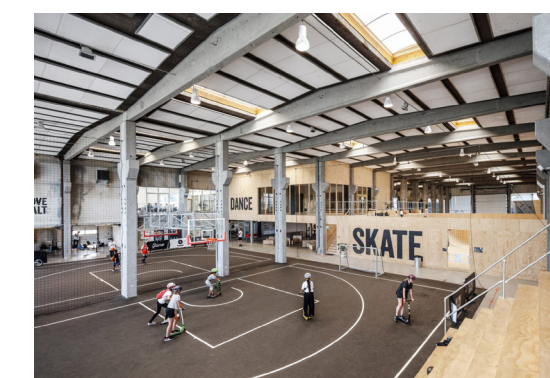
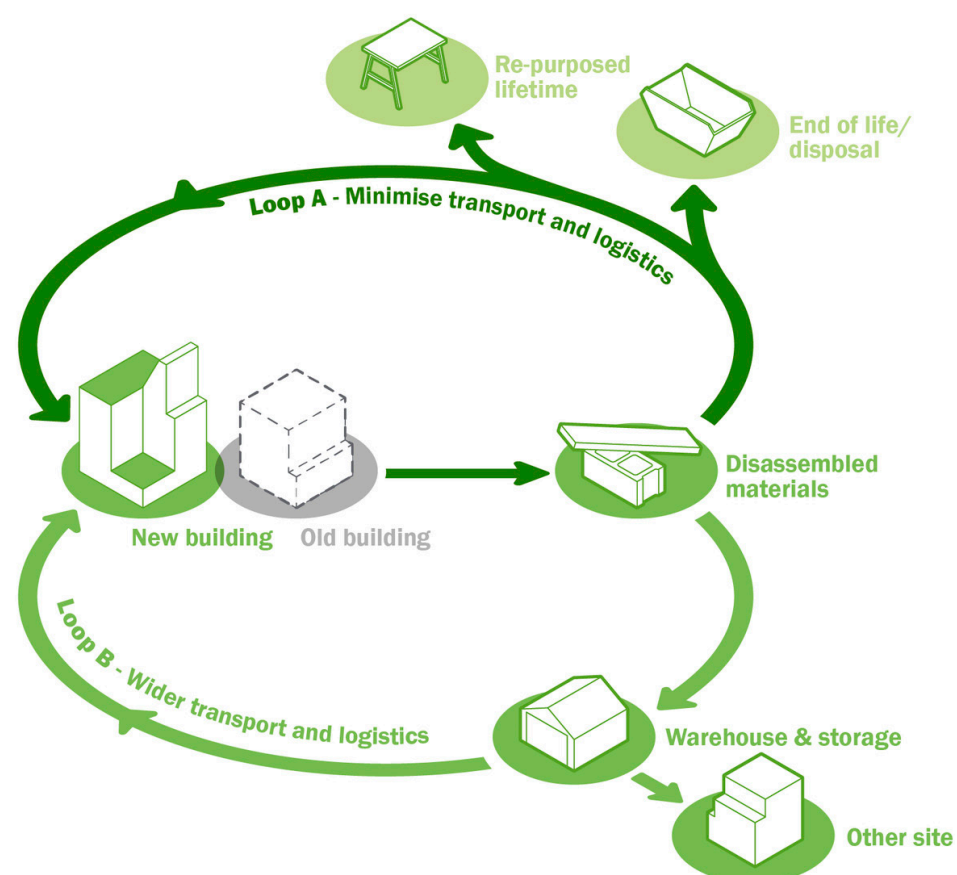
Circular economy takes a **holistic view of whole of life material flows** in the built environment and its supply chain. Beyond materials and waste, it also considers:

- Heritage conservation
- Resource efficiency and avoidance
- Design, construction, and operational circularity
- Sharing economy
- Sustainability as a service
- End of life

Why is it important?

The importance of waste reduction, resource efficiency and recovery, and circular economy is enshrined at all levels of Australian government and is becoming increasingly critical to contemporary urban development of all scales.

Circularity is a path to a sustainable and fair world.



3.3 Strategic Planning Context

Australian National Waste Policy

The National Waste Policy provides a national framework for waste and resource recovery in Australia. It also highlights the importance of working together and outlines the roles and responsibilities for everyone - businesses, governments, communities, and individuals.

Five key principles for waste management, transitioning Australia to a circular economy are:

- 1. Avoid waste
- 2. Improve resource recovery
- 3. Increase use of recycled material and build demand and markets for recycled products
- 4. Better manage material flows to benefit human health, the environment, and the economy
- 5. Improve information to support innovation, guide investment and enable informed consumer decisions

An updated National Waste Policy was published in 2018.

The 2019 National Waste Action Plan drives implementation of seven ambitious targets, including:

- 1. Regulate waste exports
- 2. Reduce total waste generated by 10% per person by 2030
- 3. Recover 80% of all waste by 2030
- 4. Significantly increase the use of recycled content by governments and industry
- 5. Phase out problematic and unnecessary plastics by 2025
- 6. Halve the amount of organic waste sent to landfill by 2030
- 7. Provide data to support better decisions

Infrastructure Australia

The Australian Government's 2021 Australian Infrastructure Plan proposes two key Reforms and a series of supporting recommendations related to waste:

Reform 9.1 Valuing resources to enable a circular economy:

Integrate the circular economy into national waste policy and infrastructure projects.

- 9.1.1. Increase understanding of the role of consumers in the circular economy through community education on responsible waste behaviour.
- 9.1.2. Reduce the impact of plastic on the environment by implementing the National Plastics Plan.
- 9.1.3 Build support for the circular economy and embed circular practices by developing a circular economy roadmap for the infrastructure sector, including annual progress reports.
- 9.1.4 Support co-location of circular economy facilities by undertaking collaborative land-use planning.
- 9.1.5. Reduce organic waste to landfill by mandating local council food organics and garden organics (FOGO) collection services.

Reform 9.2 Waste data to drive innovation:

Encourage market development through government and industry partnerships to accelerate and extend the implementation of the National Waste Policy's data actions and bring national consistency to the household waste collection and landfill levy system.

- 9.2.1 Support coordinated policy through an integrated whole-of-life waste data strategy for priority resources.

- 9.2.2 Create a high-quality recycling system with lower processing costs by developing common benchmarks for each material stream, consolidating services and targeting infrastructure investment.
- 9.2.3. Increase landfill diversion by developing a waste levy pricing strategy and national levy protocols.

NSW Waste and Sustainable Materials Strategy 2041

The National Waste Policy provides a national framework for waste and resource recovery in Australia. It also highlights the importance of working together and outlines the roles and responsibilities for everyone - businesses, governments, communities, and individuals.

The policy outlines the five key principles for waste management that will enable Australia to transition to a circular economy. These include:

- 1. Avoid waste
- 1. Improve resource recovery
- 1. Increase use of recycled material and build demand and markets for recycled products
- 1. Better manage material flows to benefit human health, the environment, and the economy
- 1. Improve information to support innovation, guide investment and enable informed consumer decisions

NSW Circular Economy Policy Statement

The State of NSW and NSW Environment Protection Authority (EPA) through the NSW Circular Economy Policy Statement: Too Good to Waste advises the NSW Government will adopt the following circular economy principles:

- Minimise consumption of finite resources;
- Decouple economic growth from resource consumption;
- Design out waste and pollution;
- Keep products and materials in use;
- Innovate in resource efficiency, give preference to higher-order re-use and repair opportunities;
- Create new circular economy jobs.

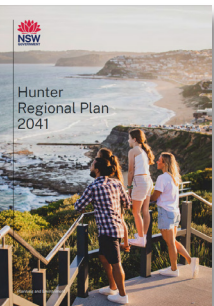
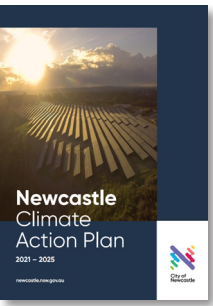
Circular Design Guidelines for the Built Environment

Present a whole-of-system approach for implementing circular design strategies throughout all phases of built environment projects.

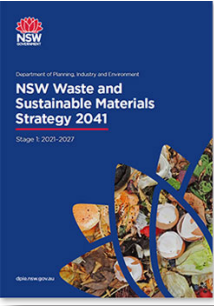
Circular design strategies include:

- Design for longevity, flexibility and adaptability, to maximise materials and circularity and enable dissassembly, material efficiency, best practice operational waste management
- Re-use existing assets or materials
- Select products with recycled content, designed for disassembly, have an identified end-of-life use, and low impact materials
- Incorporate green infrastructure
- Maintain a materials database

Place



Direction



Ambition



Stakeholders

- NSW Government
- Hunter Region
- City of Newcastle
- Private owners
- Developers
- Nearby Residents
- Public/visitors
- Businesses & Organisations
- Educational Institutions



- Procure products as a service

Green Star, Infrastructure Sustainability Council and NABERS Waste Rating tools are relevant to Circular Design Strategies.

Our Sustainable Waste Strategy, City of Newcastle

The Strategy sets a vision for reducing waste, increasing recycling rates, strengthening the economy and creating new jobs within Newcastle over the next 20 years.

- The strategy proposes a mix of:
- Infrastructure and service provision supported by educational campaigns.
 - Construction of the planned material recovery facility and organics processing facility at Summerhill. The vision is for Summerhill Waste Management Centre to become an innovative resource recovery hub that creates enduring value for customers, community, and the environment.

Summerhill’s Waste Management centre’s close proximity to Broadmeadow (less than 10km) makes it suitable for processing all operational waste (red, yellow and green bins) produced within the precinct, reducing the need for onsite waste storage and processing

This strategy is aligned with State and Federal targets of diverting 80% of recycling and 50% of food waste from landfill. It also adopts the NSW Government’s principles of a circular economy as the City of Newcastle begins its transition from a linear economy to a circular economy.

Newcastle 2040 Community Strategic Plan, City of Newcastle

Newcastle will be a “liveable, sustainable, inclusive global city”.

- The Strategic Plan contains 5 themes, one of which is Sustainability. The priorities and objectives of sustainability in relation to Circular Economy are:
- 2.3 Circular Economy
- 2.3.1 Design out waste
 - Create sustainable material cycles through the city’s economy. Establish resource recovery industries and circular economy precincts. Increase recycling and

- productive reuse of organics.
 - 2.3.2 Localised supply chain and sustainable procurement
 - Foster resilience and sustainability through procurement, resource-sharing and construction activities that preference local suppliers and supply chains.
- “Through our transition to a circular economy, we design out waste, creating new opportunities and technologies in our local economy, promoting renewable products and sustainable infrastructure, and rethinking our use of resources as a circular flow.”
- Actions:
- Community Indicators - Municipal waste diversion from landfill
 - 80% diversion by 2030
 - 40% in 2020-21 (Domestic recycling rate)
 - Service Indicators - Use of local suppliers

Newcastle Climate Action Plan 2021-2025, City of Newcastle

The report provides actions to enable the City of Newcastle to be sustainable and climate positive.

“By supporting residents, business and industry to act more sustainably, encourage local resilience and build a circular economy based on local sourcing, production, manufacturing and consumption of materials, the City can continue to build a prosperous, healthy, equitable and sustainable community and propel Newcastle towards a net zero emissions future.”

- Towards a net zero emissions city:
- 5.7 Promote and encourage local resilience and a circular economy through sustainable procurement practices, and the local sourcing, production and consumption of materials.
- 5.8 Identify options to encourage and support waste avoidance opportunities for Newcastle residents, business and industry, including a phased-in ban on single use plastics.
- 5.9 Identify and measure the carbon sequestration potential from street and park trees, bushland, wetland and other natural assets and promote the opportunities and multiple climate and resilience benefits of urban blue-green grids.
- Sustainable Supply Chain
- Utilise opportunities for low emissions materials such as green concrete in design and construction of CN assets
 - Recover and use recycled glass and other recovered materials in CN operations
 - Continue to source 100% renewable electricity for CN operations
 - Install megawatt scale battery storage options

Hunter Regional Plan 2041, NSW

The 20 year land use plan developed by NSW government supports a circular economy for the Hunter.

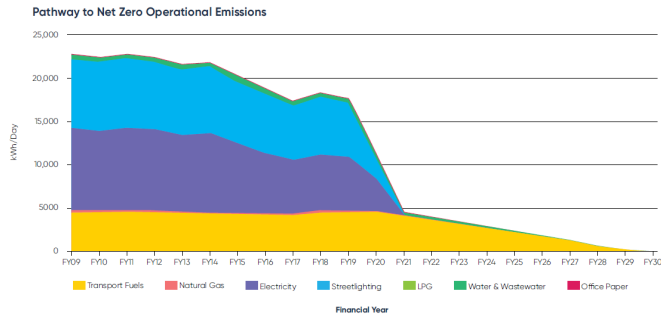
- Circular economy principles
- The Hunter will transition towards a circular economy by focusing on seven key principles:
- 1. Sustainable management of all resources
 - 2. Valuing resource productivity
 - 3. Design out waste and pollution
 - 4. Maintain the value of products and materials
 - 5. Innovate new solutions for resource efficiency
 - 6. Create new circular economy jobs
 - 7. Foster behaviour change through education and engagement

- Strategy 1.5 - Local strategic planning should consider:
- Alignment with the NSW Waste and Sustainable Materials Strategy 2041 and the seven circular economy principles identified in this plan
 - Opportunities to support the circular flow of materials by enabling new remanufacturing, resource recovery, re-use and recycling facilities and the expansion of existing circular economy facilities
 - The location of circular economy facilities and existing waste management centres, and ensure sensitive land uses do not encroach on these areas or limit their future expansion
 - Opportunities to promote circular economy outcomes through local policy guidance and development controls relating to building design, materials, construction, and waste management.

Hunter and Central Coast Circular Economy Roadmap

Sets out a 12 month roadmap aimed at accelerating the transition to a circular economy in the Hunter and Central Coast Region.

- It sets out 3 focus areas with objectives under each:
- Regional circular economy knowledge hub
 - Physical spaces enabling innovation and collaboration
 - Active business ecosystem creating circular products
 - Skill development for circular jobs
 - Pivoting and advancing industry
 - Build local industries contributing to a circular economy
 - Local cycling of key materials
 - Prioritising sectors , including renewable energy, manufacturing and agriculture
 - Driving circular markets
 - Local circular communities
 - Stimulate markets for circular products and services



3.4 Strategic Initiatives

This circular economy strategy for Broadmeadow centres around levels of responsibility and agency. That is, who can do something to facilitate a circular economy, and what resources do they have to do so. As the name suggests a circular economy follows a cyclical process aligned with the development process. Eight specific initiatives are explored which facilitate, enable, or actively contribute to a circular economy.

- 1. Preservation
- 2. Design for Circularity
- 3. Modern Methods of Construction
- 4. Operational Waste Reduction
- 5. Sharing Economy
- 6. District Utilities
- 7. Products as services
- 8. Green Infrastructure
- 9. Responsible Procurement

For each we explore:

Rationale
How it contributes to, and why it is important for circular economy

Lifecycle stage
Which stages of the development cycle it can be implemented in

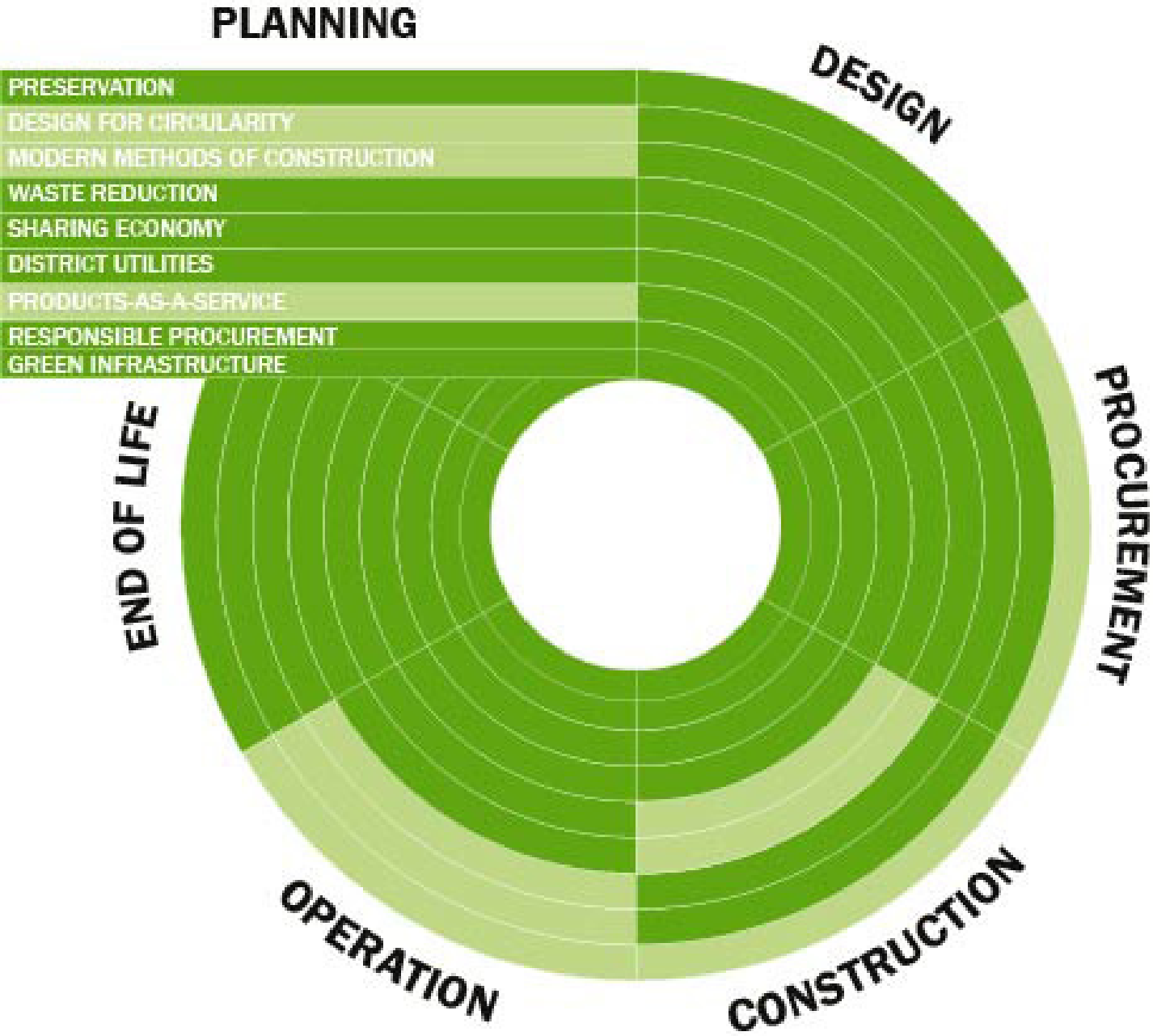
Stakeholders
People and organisations that will be impacted by the circular economy initiatives. For Broadmeadow these include:

- NSW Department of Planning, Homes and Infrastructure (DPHI)
- NSW Government Landowners, including Venues for NSW, School Infrastructure NSW, Transport for New South Wales, Transport Asset Holding Entity, Hunter Water, etc
- City of Newcastle
- Private Landowners and Developers
- Crown Land
- COX as Master Planners
- Community, including local residents adjoining the precinct, wider Newcastle regional community, future knowledge workers based on site

Delivers & Alignment
Direct and indirect benefits for stakeholders and society and how initiatives align with circularity key outcomes (shown to the right) and the Broadmeadow Sustainability Strategy.

Opportunities & Challenges
Discrete actions for delivering the initiative and potential challenges

Innovations
Examples of the initiative being implemented on real world projects.



Circularity Outcomes

- Longevity**
Building forms promote longevity by allowing easy adaptive reuse to accommodate alternative occupancies.
- Building Disassembly**
Embedding end of life considerations for building disassembly or long-term re-use;
- Materials**
Maximise re-used, recycled, or renewably sourced materials in construction;
- Shared Economies**
Provide spaces that facilitate sharing economy programs like GoGet cars, bicycle share services, and community tool libraries.
- Construction Waste Diversion**
Divert the majority of construction waste from landfill to beneficial re-use (provisionally 95%, in line with Green Star benchmarks);
- Eliminate Plastic**
To eliminate single use plastics from the upstream supply chain by 2025 in line with the National Waste Policy Action Plan;
- Operational Waste Diversion**
Divert operational waste from landfill;
- Supply Chain Recycling**
To establish high levels of recyclability in the upstream supply chain;
- Recycling**
To separate and recycle recoverable waste by types;
- Stewardship**
Supporting stewardship in procurement; procuring services rather than products;

Preservation

Rationale

Preservation promotes sustainable development by conserving resources, reducing carbon emissions associated with new construction, and preserving the unique cultural and historical identity of the precinct.

Life Cycle Stage

Planning
Design
Procurement
Construction
Operation
End of Life

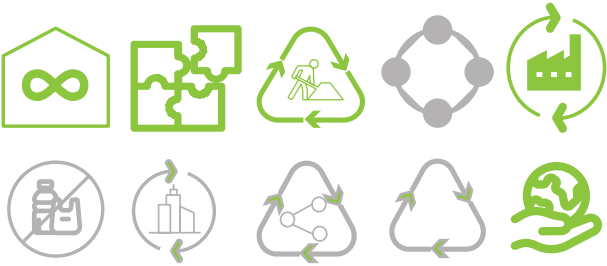
Stakeholders

NSW DPHI
NSW Government
City of Newcastle
Private Landowners and Developers
COX
Community

Delivers

- Community cohesion and resilience
- Placemaking
- Reduced embodied carbon
- Preserve the value of materials

Alignment



Opportunities

- Preservation of culturally significant buildings such as the heritage industrial warehouses and buildings for future generations.
- Retain existing materials and structural components of buildings and warehouses for other purposes e.g. shading structures, concert spaces
- Education to visitors and the public of existing heritage buildings, places and cultural places
- Preservation in accordance with Connecting with Country - preserving the environment, songlines, views
- Adaptive reuse of culturally significant buildings for new uses in line with future development scenarios e.g. using industrial warehouses as studios and exhibition centres for the artist community
- Reuse and retain existing assets, materials and structures such as building additional floors on existing structures to limit new structural elements required and building footprint
- Conservation of any significant terrestrial or aquatic ecologies and integration into the new urban fabric such as Styx Creek
- 'Delicate demolition' that removes as little as possible, preserves it for reuse onsite, and as a last resort diverts it from landfill for use as recycled content in other construction materials such as retaining existing warehouses and structures at Broadmeadow, and reusing materials for other construction and projects as a last resort
- Designing new structures with longevity in mind, with buildings being adaptable to different uses and use of durable materials and easy repairs/maintenance

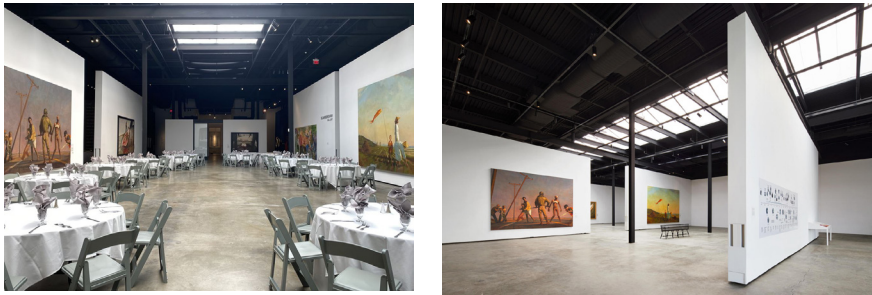
Challenges

- Maintenance and upgrading older heritage buildings
- Heritage constraints and limitations regarding adaptive reuses

Innovations

Bo Bartlett Center

- Former cotton warehouse
- Converted to a multidisciplinary gallery, archive and educational space
- Opportunity of high ceilings to match the large artworks
- A space for artist collaboration, hosting exhibitions and programs
- Kinetic walls enable flexible floor plans for different programs like musical events, art exhibitions, lectures, galas
- Central skylight over main gallery space allows light and airy feel



MALHA

- An innovative platform for the fashion world where creators, entrepreneurs, suppliers and consumers can establish connections
- Collaborative, focused on sustainability
- Warehouse with translucent tiles and open plan floor space
- Small offices for residents, photography studio, sewing studio, showroom, restaurant, co-working space, auditorium
- Used shipping containers for sustainability allowing for quick and clean construction
- Empty space between containers allows for parades, markets, film screenings, debates



Design for Circularity

Rationale

Designing for circularity minimises resource waste, reduces environmental impact, promotes economic viability through extended building lifespans, and creates a resilient built environment that can adapt to changing needs and contribute to long-term sustainability.

Life Cycle Stage

Planning
Design
Procurement
Construction
Operation
End of Life

Stakeholders

NSW DPHI
NSW Government
City of Newcastle
Private Landowners and Developers
COX
Community

Delivers

- Resource efficiency
- Reduced embodied carbon
- Prolonged building lifespan
- Waste disposal costs are reduced
- Increased construction speed
- Reduced construction demolition waste to landfill
- Avoid harmful/composite materials

Alignment



Opportunities

- Designing built forms that enable alternative long-term uses (second and third lives)
 - Flexible design elements e.g. flexible walls and reconfigurable floor plan layouts for event spaces
 - Consider alternative uses for office spaces due to people working from home e.g. shared office spaces, sharing economy of offices and meeting rooms
- Designing for deconstruction and disassembly
 - Any new buildings and furniture can be easily dismantled at end of life with materials that can be repurposed (e.g. using material passport)
 - Using materials and finishes that can be easily recycled and repurposed e.g. avoiding glued furniture, harmful chemicals
 - Modular building components that can be reused easily at end of life
- Resource reduction by increased material use efficiency
- Modular and prefabrication processes with standardised elements that reduce waste
- Flexible fitouts that address modular components which enable dismantling and relocation to allow different configurations or repurposing of buildings
 - Apartments, offices and event spaces can be reconfigured to allow for additional space or rooms
- Locally sourced materials that can be recycled or reused easily at end of life
- Use connection systems that support easy disassembly

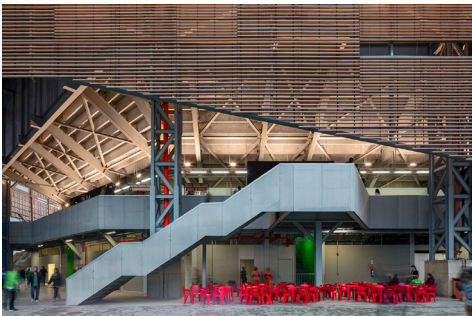
Challenges

- May be limited variety with modular construction options
- Increased front-loaded design and decisions

Innovations

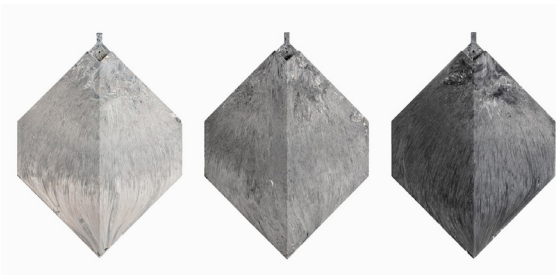
Rio Olympics Handball Stadium

- Stadium designed for after the Olympics
- The structure to be dismantled and used in construction of 4 state schools
- The main elements that will be reused are the roof, rainscreen cladding, main structural steel elements and disabled ramps, which will form the shells of the four schools.
- The schools were designed simultaneously with the arena



Sint Oelbert School

- 100% recyclable cladding made from plastic shingles using recycled PVC windows and gutters
- The shingles are made from shedding PVC building window frames, downspouts and rain gutters
- The shingles are fire approved
- Each tile has a unique texture due to plastic composition
- Raw material wastes were collected from neighbourhoods in the Netherlands to upcycle plastic waste



Modern Methods of Construction

Rationale

Modern means of construction enables faster, more efficient, and cost-effective building processes, leading to reduced construction waste, improved resource utilisation, and accelerated progress towards sustainable development goals.

Life Cycle Stage

Planning
Design
Procurement
Construction
Operation
End of Life

Stakeholders

NSW DPHI
NSW Government
City of Newcastle
Private Landowners and Developers
COX
Community

Delivers

- Resource efficiency
- Reduced embodied carbon
- Reduced materials costs
- Modular construction reduces disruptions to surrounding areas
- Increased construction speed
- Reduced construction demolition waste to landfill

Alignment



Opportunities

- Creating panelled units in factories, which can be quickly assembled onsite to create 3D structures.
 - Pre-fab units can be used to create different types of buildings from large event spaces and apartments to smaller scale galleries
 - Fast track the construction of precinct due to increased construction speed
 - A good option for temporary buildings that can be easily constructed and dismantled such as temporary pavillions for events or arts
- Volumetric construction, which sees 3D, or pre-fabricated units created under factory conditions.
- Pre-cast concrete foundations and pre-formed wiring looms.
- Pre-fabricated floor and roof cassettes (panels).
- Minimise material offcuts

Challenges

- Sourcing pre-fabricated and modular construction individuals and businesses e.g. builders
- Transportation may increase carbon emissions if prefab and modular materials are located far from site. Also costs may be higher and risk of delays if modular pieces go missing

Innovations

Katerra

- Combines technology and modular construction to create large scale prefab buildings
- Streamline the design and construction process whilst still providing world class design
- It handles all parts of the building process including site development, schematic design, fabrication of parts and onsite construction
- Fully coordinated design
- Generally uses wood frame construction and CLT
- No pre-existing models, rather a standard kit of parts – including floor systems and exterior and interior wall panels – that can be deployed in different ways for each project



Bradfield 'first building'

- The building will be used as an advanced manufacturing share hub for research institutions and partners to collaborate
- Integrated landscape and architecture that connects with Country
- Building is based on modular design, constructed from sustainable materials like laminated timber
- Minimises construction and demolition waste
- Highly energy efficient, is able to be off the grid using renewable energy
- Uses passive design



Waste Reduction

Rationale

Waste reduction is crucial for achieving sustainability goals, as it encourages best practices in materials filtering, waste contracting, continuous monitoring, and collaboration with the waste management industry.

Life Cycle Stage

Planning
Design
Procurement
Construction
Operation
End of Life

Stakeholders

NSW DPHI
NSW Government
City of Newcastle
Private Landowners and Developers
COX
Community

Delivers

- Resource efficiency
- Waste to landfill is reduced
- Reduced embodied carbon
- Reduced greenhouse gas emissions

Alignment



Opportunities

- Precinct-wide recyclable stream separation in private developments and the public domain that considers future increases in the number of separate waste streams collected (i.e. hard plastic, soft plastic, cardboard and paper, glass, metal, etc.)
 - Waste stations throughout Broadmeadow precinct that are clearly legible with images that allows people to separate their own waste
- On site collection of difficult waste streams (i.e. e-waste, chemicals, oils, etc.)
- Organic waste composting on site
 - Create circular waste streams at Broadmeadow, from collection of organic waste from private and public domain to creating compost on site and using for community gardens/precinct gardens
 - Zero organic waste target, compost all organic waste similar to Barangaroo Precinct, use maggot farms
- Single-use plastic free environments
- Ban single use plastic precinct-wide
- Procurement practices to eliminate waste streams and mandate recycled content
- Implement a Green Lease clause that requires tenants to design fit-outs to separate a minimum of 5 waste streams, use compostable packaging, and not use plastic bags.
- Important to consider the extreme amount of waste created from large events
 - All packaging and cutlery must be biodegradable, can trial innovative biodegradable packaging
 - Incentives for people to bring their own coffee cups
- Reuse “waste” materials on site as furniture or repurposing them for new building materials e.g. old pallets as furniture, creating a parkour space from old materials

Challenges

- Council and Summer Hill Waste Management Centre cooperation for circular economy waste reduction
- Provide enough space and equipment for separating and storing waste
- Visitors may lack awareness and education of waste reduction, it's important to educate people who visit Broadmeadow through clear signs and easy waste separation bins

Innovations

Barangaroo South

- A small levy on leases contribute to a fund to ensure all tenants contribute to waste reduction and net zero emissions
- Targets 80% operational waste diversion from landfill for the precinct
- Sorts all waste generated across all buildings into 19 categories in the centralised waste storage centre
- Obliges all tenants and building owners to use waste management contractors that responsibly handle and dispose of waste and offset emissions
- Biodegradable packaging by all retail tenants
- Maggot farm for organic waste



Unilever

- Recycling machines that use AI to automatically identify and sort plastics for recycling
- Product refill stations at various supermarkets that also enable people to gain discounts on Unilever product
- Recycle or reuse almost all non-hazardous waste from their operations
- 58% of 2022 global plastic packaging footprint was collected and processed in 2022
- By 2025 Unilever ensure that 100% of plastic packaging is designed to be fully reusable, recyclable or compostable
- Recycling plastic type bins have been implemented
- Contributes to the Ocean Fund to invest in waste collection, management and recycling in India and Indonesia
- Develop innovative waste solutions through partnerships such as: paper-based laundry detergent bottle; transformed tea waste into textile dyes; and reused sludge to feed earthworms



Sharing Economy

Rationale

Integrating the sharing economy maximises asset utilisation, reduces transport emissions, and promotes sustainable practices, fostering a sense of community and resource efficiency.

Life Cycle Stage

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Operation
End of Life

Stakeholders

NSW DPHI
NSW Government
City of Newcastle
Private Landowners and Developers
COX
Community

Delivers

- Health and wellness
- Community cohesion and resilience
- Reduced car-dependence
- Product and asset maximisation
- Resource efficiency
- Diversion from landfill

Alignment



Opportunities

- Facilitate active mobility-as-a-service providers (i.e. bike and scooter sharing) in the public domain by integrating expansive separated and shared cycleways, parking stations with charging capability, and allied infrastructure like end-of-trip facilities
- Facilitate mobility-as-a-service providers (i.e. car-share – GoGet, rideshare - Uber) in the community by integrating dedicated parking, infrastructure for future charging capability, and dedicated pick-up drop-off bays
- Implement EV shuttle services and trial autonomous shuttle services to and from major public transport hubs such as from Hamilton, Broadmeadow and Adamstown train stations
- Facilitate sharing of consumer appliances, tools, and sports equipment by incorporating space for sharing practices in community facilities, and encouraging incorporation in private developments e.g. tool and children’s toy libraries within community spaces
- Community gardens incorporating food growing, small-scale livestock (i.e. chickens), composting, and education for adults and children. Use the fresh produce to provide affordable/free food to the community and incorporate within local cafes.
- Shared spaces for use by community, commercial tenants, and external stakeholders e.g. gallery multipurpose space for artists to hold temporary shows and events. Warehouses can be converted for community uses and informal sport centres similar to EFFEKT innovation case study
- Support product reuse, repair, and remanufacturing by incorporating maker spaces, dry labs, fab labs for youth and public use in community facilities
- Support and expand existing shared economy organisations and businesses at Broadmeadow like Upcycle Newcastle, OzHarvest, Second Hand World

Challenges

- Delivery and logistics of goods and services may result in high traffic congestion and carbon emissions e.g. ride-sharing instead of public transport, transporting products.
- When shared items reach the end of their useful life proper waste management is crucial
- The sharing economy is still emerging with a regulatory gray area, it’s important to go with reputable businesses that ensure trust, safety and worker’s rights

Innovations

EFFEKT

- A former windmill factory has transformed into a community youth cultural hub featuring street sports zones like a huge skating bowl, maker workshop spaces, DJ facilities and organised spaces
- The building is wrapped in a translucent polycarbonate skin to appear light and welcoming, and will also serve as a canvas for local artists to display and project their art
- Repurposing a former factory
- Shared spaces, collaboration and fitness for youth
- Cost-effective - a third of the price compared to building a traditional sports hall
- Building’s original components repurposed as furniture, parkour activities, hang out spaces



Citibike

- In NYC America’s largest bicycle sharing scheme began, with a partnership between Citibank and the city that invited tourists and commuters to use New York’s bike lanes
- People could sign up as Citi Bike members, paying an annual fee of \$95 for unlimited rides of 45 minutes
- Other memberships enable flexibility such as the 24 hour pass for \$10 or a seven day pass for \$25
- Encourages people who don’t own a bike to get around by active transport
- This is a more cost-effective way for people to get around compared to private companies such as Lime which can be more expensive



District Utilities

Rationale

District Utilities can provide a centralised system to the buildings and facilities within the designated district which can provide greater efficiency and flexibly support future improvement.

Life Cycle Stage

Planning
Design
Procurement
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Operation
End of Life

Stakeholders

NSW DPHI
NSW Government
City of Newcastle
Private Landowners and Developers
COX
Community

Delivers

- Health and wellness
- Community cohesion and resilience
- Reduced car-dependence
- Reduces reliance on single utilities system
- Product and asset maximisation
- Resource efficiency
- Diversion from landfill
- Reduce greenhouse gas emissions

Alignment



Opportunities

- Link infrastructure systems to get the required demand for economics of scale for district utilities
- Water recycling at all buildings and integrating the greywater treatment or treated water into the landscape
- Implementing smart city infrastructure including smart networks, smart buildings, and smart public infrastructure optimising services and enhancing user experience
 - In accordance with Newcastle Smart City Strategy
 - Implement smart infrastructure e.g. smart waste systems, traffic sensing systems.
 - Pilot new smart city innovations at Broadmeadow
- Onsite treatment of organic waste (enclosed worm farm, dehydrator etc) and support for community gardens to create a circular organic waste system at Broadmeadow precinct
- Generate energy independently as a precinct for future-proofing resilience, using renewable energy sourced from solar panels
- Consider integrating a district cooling plant similar to Barangaroo
- Energy storage facility similar to Marina Bay can retain cool energy for use when there is a high demand for air-conditioning
- Potential for microgrid, especially for any new buildings to be built, link energy to shared generator/storage
- Shared utility infrastructure such as a megawatt scale battery, vehicle 2 grid

Challenges

- Difficult to connect existing buildings to shared generators and microgrid
- Convincing developers to invest in community district system and cooperate with other developers and building owners
- Upfront costs of shared utility and renewable systems, however lower costs long-term

Innovations

Barangaroo

- Energy generated by solar panels on site powers public areas and the recycled wastewater plant
- District Cooling Plant avoids using drinking water to reject heat from the buildings and provide efficient airconditioning, instead uses filtered water from Sydney Harbour
- Embedded electricity network
- Recycled water treatment plant treats wastewater and supplies non-drinking water for uses like irrigation
- Extensive water storage tanks to capture rainwater
- Ability to mine the adjacent public sewer for additional recycled water
- On-site renewable energy generation
- Low voltage co-generation plant



Marina Bay

- Energy storage facility retains cool energy for use when there is a high demand for air-conditioning
- Cool energy storage systems work by using electricity - usually when demand is at its lowest - to freeze a tank of water. Melting the stored ice can then provide cooling to buildings when demand for air-conditioning is high.
- This reduces the amount of energy that is consumed from the grid for cooling purposes
- Ice thermal energy storage system (ESS) will add up to 1,500 refrigeration ton-hour (RTH) of energy to the Marina Bay district cooling network operated by SP, saving up to 2 megawatts (MW) of electricity a day



Product as a service

Rationale

Emerging global best practice is to replace asset ownership with product service systems deep into tenant business operations. The product service model facilitates easy refurbishment and reuse of products that otherwise typically go to landfill after a short service life. Note that many of these are require tenant partnerships to be put into action.

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Stakeholders

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COX
Community

Delivers

- Resource efficiency
- Product and asset maximisation
- Increased recycling
- Reduced waste to landfill
- Lower costs due to reduced waste and new materials

Alignment



Opportunities

- Encourage the leasing of interior fitout items (e.g. carpeting) which can be incrementally replaced as need arises (i.e. tiles replaced as they wear in high traffic areas)
- Incentivise leasing of electrical equipment (e.g. lighting, ICT equipment) which can be relocated with churn and updated with advancing technology
- Encourage leasing of furniture and consumer goods (e.g. desking, workstations, dishwashers, washing machines) which can be relocated or replaced with churn
- Support leasing of modular building systems (e.g. facades) which can be upgraded at the end of design life, and easily disassembled for recycling and reuse
- Ensure that all new materials for buildings or additions have material passports, as well as any applicable existing buildings (e.g. steel from existing warehouses)
- Ensure sustainable procurement of materials and products through assurance with reputable certification e.g. Cradle to Cradle
- Implement 'buy and buy-back' arrangement for furniture

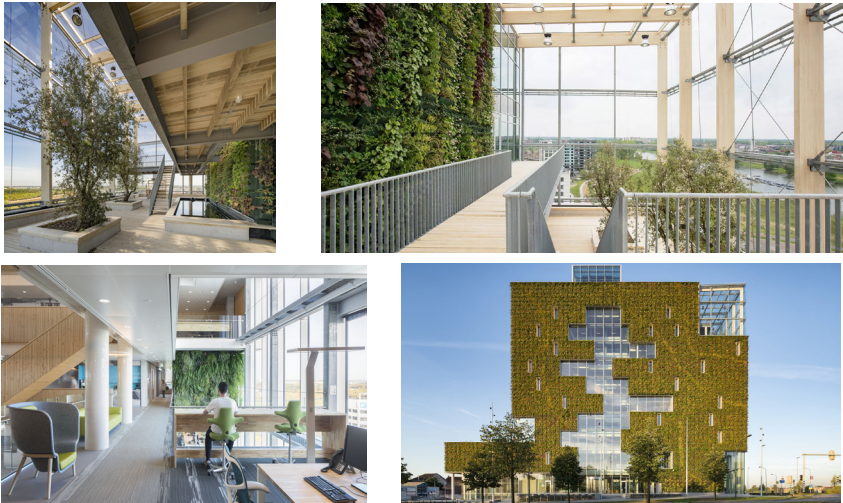
Challenges

- Ensure sustainable procurement and recycling of all assets leased, when assets want or need replacing that they are recycled or reused sustainably without causing extra waste

Innovations

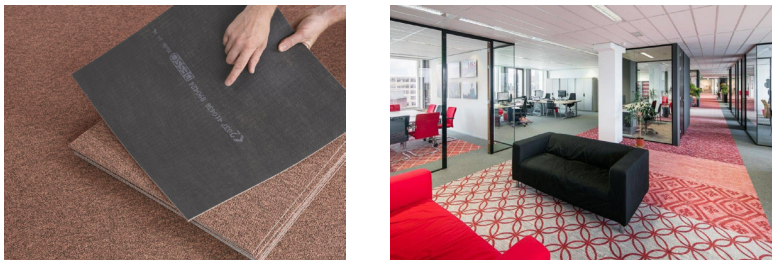
Venlo City Hall

- Cradle to Cradle certified building
- Close detail of procurement of products even soap
- Building componenets are documented in a digital 'material passport' that discloses: material constituents, how to disassemble, recycle or return them to the manufacturer
- A proportion of the original investment can then be recouped.
- Creating a log of the residual material value within the building enables quantification of buildings as material banks.
- Furniture is provided under a 'buy and buy-back' arrangement and is easy to disassemble, ensuring workable components can be reused.
- Healthy material choices for furniture to facilitate recyclability, with certain materials avoided such as paint and glue, due to the lack of ingredient transparency, to ensure material health and aid future recovery of materials.



Desso Carpets

- Carpet tiles for offices and industry that are leased with take-back programmes
- Products with recyclable yarn can be separated from the backing and used over and over again.
- Woollen carpets made from bio-degradable base made out of corn by-product
- DESSO uses 100% renewable electricity (hydropower) in production locationsfor all stages
- DESSO EcoBase® backing achieved Cradle to Cradle Gold level certification and Platinum level for material health
- ReStart is the take back programme to collect post-consumer carpet tiles. Upon return, carpets are processed using our recycling facility which separates the yarn and other fibers from the backing
- The PA 6 yarn can be returned to our yarn manufacturer for the production of new yarn. Carpet tiles with bitumen backing is reused in the cement industry.



Responsible Procurement

Rationale

Sourcing services, supplies and works taking into account economic, social, labour and environmental factors sets the basis of a morally right and fair precinct.

Life Cycle Stage

Planning
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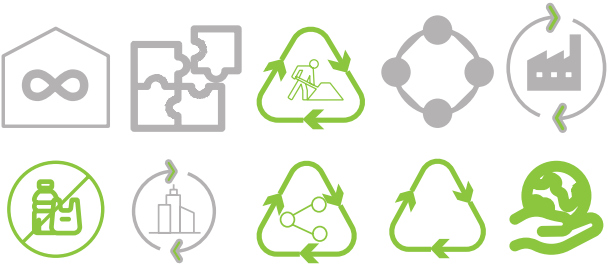
Stakeholders

NSW DPHI
NSW Government
City of Newcastle
Private Landowners and Developers
COX
Community

Delivers

- Fair and just procurement
- Ethical practice

Alignment



Opportunities

- Responsible sourcing of materials, considering their recycled content and low impact materials
- Engagement with suppliers that apply models for delivery and return logistics or incentivise end-of-life return options
- Implement a responsible procurement strategy for the entire precinct but especially for events, that aligns with circular economy outcomes. Encourage people to bring their own cups, use glass bottles instead of plastic or use reusable plastic cups, cutlery and other items like bowls and plates, compostable takeaway items like cutlery, paper/pasta straws.
- Ban single use plastics for the whole Broadmeadow Precinct this includes food items and also temporary signage. Use sustainable option like digital signage that can change every event or one that creates signage from recycled plastic like Ecoboath
- Incentive for people to bring their own coffee cups such as a discount on coffee
- Types of food served at events, ensure this food is responsibly procured, have lower food miles and carbon emissions, ensure no food waste for entire precinct especially at events through composting.
- Eliminate paper at events to ensure no paper waste and make events fully digital
- Offer sustainable travel options as big events can create large travel/carbon miles. This could include offering alternatives to driving such as public transport, offering free electric powered shuttles throughout the entire Broadmeadow Precinct
- Use products and materials with high recycled content for operations and construction e.g. glass crushed concrete, reusing existing materials on site

Challenges

- Balancing long term sustainability with costs
- Managing supply chain transparency, ensuring that there is no greenwashing
- Engaging with willing and sustainable suppliers
- Ensuring supply chains are compliant with sustainable procurement standards

Innovations



Cradle to Cradle

- Leading multi-attribute standard used globally across industries by designers, brands and manufacturers for designing and making products that enable a healthy, equitable and sustainable future.
- Assessment based on 5 categories: material health, product circularity, social fairness, water and soil stewardship and clean air and climate protection



Good Environmental Choice Australia

- GECA certification cuts through the greenwash to make it easy for architects, specifiers, procurement professionals and consumers to decide if a product really is as environmentally responsible as it claims to be
- GECA ecolabel is an independent 'tick' that shows your product is better for the environment, has a lower impact on human health and has been ethically made.
- The four categories are: environment, health, social and ethical, and fit for purpose



Forest Stewardship Council

- Developed to be relevant to different kinds of forest ecosystems and in diverse cultural, political, and legal settings
- Forest-based materials you use come from FSC-certified sources.
- This certification lets builders, architects, artists, and others use FSC trademarks to showcase their commitment to sustainable forestry.
- LEED Platinum and Green Star recognise FSC



RED List

- The IUCN Red List is a critical indicator of the health of the world's biodiversity.
- Powerful tool to inform and catalyse action for biodiversity conservation and policy change, critical to protecting the natural resources we need to survive



Just

- Transparency platform for organisers to disclose their operations, including how they treat their employees and where they make financial and community investments
- Firms are rated from zero to three stars in the categories of: diversity, equity, safety, worker benefit and stewardship

Green Infrastructure

Rationale

Circular economy architecture must be integrated into the surrounding environment to give and take in conjunction with nature. Designers must study the context, ecologies and existing cycles of a building site to ascertain what is required of the site’s bioregion and how the new construction can contribute to existing ecology.

Life Cycle Stage

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Design
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End of Life

Stakeholders

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COX
Community

Delivers

- Fair and just procurement
- Ethical practice
- Reduce impact of built assets on natural ecosystems
- Improved management of stormwater and flood safety
- Sequesters carbon

Alignment



Opportunities

- People occupying the space will ensure that it is clean if they enjoy the space, which will also influence improved safety through passive surveillance
- Understand what is required of the Broadmeadow and Newcastle bioregion so architecture and places can positively contribute to ecology and biodiversity e.g. use materials that are beneficial to the natural environment
- Retain and enhance existing green spaces and vegetation
- Provide increased green surfaces such as green roofs and facades
- Grow food produce in green spaces or green roofs so people can access fresh and affordable food, and feed organic waste into circular system e.g. compost
- Lower energy use through evapotranspirative cooling and insulation benefits
- Contribute to increasing a places ecological value by providing healthy and ecologically diverse habitats and attracting and retaining biodiversity such as birds, bees, native plants
- The Grey Headed Flying Fox (utilises foraging resources e.g. flowering trees) and the White-bellied Sea Eagle are frequently reported species, which the new Broadmeadow precinct should accomodate for these habitats
- Architecture of buildings are shaped by sustainability and biophillia such as the undulating roof form of Nottingham University’s Chemistry Lab
- Implement phytoremediation where needed to future proof a healthy natural environment for people and nature
- Ensure that landscaping can contribute to a circular system at Broadmeadow e.g. using natural and non-harmful pesticides, filtering and treating stormwater before re-use in waterways/ponds similar to the Sydney Park Water Reuse Project

Challenges

- Ensure good management of green spaces to keep places clean and attractive for people to visit
- Maintain habitats to retain native flora and fauna

Innovations

Sydney Park Water Reuse Project

- Creating a significant piece of green infrastructure on one of Sydney’s oldest post-industrial wastelands
- Transformation into 44 hectares of parkland
- An integral component of Sustainable Sydney 2030; targeting 10% of water demand to be met through local water capture and re-use in the park
- Multi-disciplinary collaboration that inter-weaves design, art, science and ecology
- The ponds once suffered from outbreaks of blue-green algae and stagnation of water, now there is an enhanced circulation of water
- The water scheme diverts an average of 840 mega litres per annum of stormwater for treatment and re-use



Chemistry Laboratory, University of Nottignham

- The first carbon-neutral lab in the UK made of natural materials, and operational energy is provided by renewable sources
- The undulating roof form is a direct representation of sustainable design drivers
- The roof embraces biodiversity by including a natural environment and aiding in rainwater attenuation
- Remediation strategy of contaminated land that included a clean capping layer for asbestos contamination, restriction of penetration through contaminated source regions, and ground gas protection measures.
- The project’s bird boxes and ecologically diversified green roof provide a hospitable environment for local species, resulting in a +3.83 change in ecological value.
- The greenery and biodiveristy of the roof provides a continous connection to the landscape
- Achieved BREEM and LEED Platnium certifications



Implementation at Broadmeadow

Circular economy initiatives broadly fit into 3 categories:

- Enablers
- These initiatives are critical to unblock future implementation of the circular economy. They tend to be the ‘low hanging fruit’ that will underpin the long-term circular economy strategy.
- Facilitators
- These initiatives are slightly more complex but act to facilitate more meaningful and significant future circularity for the precinct. Investment in these initiatives is likely to more significant, with more meaningful impact on future circularity opportunities.
- Actuators
- These initiatives convert circularity potential into measurable achievement. They go well beyond business as usual, requiring a rethink of the role of NSW DPHI, City of Newcastle and Private Landowners & Developers in the precinct, going beyond the traditional role of a landowner or developer. Although challenging, realising these actions will show a measurable delivery of circularity for the precinct.

Actions that are key at each project stage are detailed below:

Land Use Planning Stage

At current, land use planning, stage, the focus is on identifying suitable adaptive reuse opportunities for existing buildings
Key actions are:

	Embed the reuse of existing buildings within the masterplan
	Ensure sufficient space for storage of products and materials, repair workshops, car sharing pods.

Planning Stage

Actions at planning stage need to be focused on preserving the existing buildings on site, allowing suitable space for resource recovery facilities, and determining the overarching strategies particularly products and a service.
Key actions are:

	Undertake surveys (structural and architectural) of existing buildings to confirm their potential for reuse
	Pre-demolition audit of salvageable materials
	Agree the product-as-a service and sharing economy strategy for the project.
	Ensure building form is suitably adaptable, with floor-floor heights maximised for each building form, choose flexible building forms.
	Design each building form for a minimum of 2 building end uses.
	Consider a kit-of-parts design for the precinct across multiple building types and forms

Building design stages

At later building design and specification stages, materials outcomes can be specified in greater detail. Design of individual buildings is the opportunity to embed:

	Materials with high post consumer recycled content
	Materials recovered from other projects and off site uses
	Design of buildings and elements for disassembly
	Design of buildings and elements for adaptability
	Specification for modern methods of construction
	Implementation of material passports

The design of individual buildings will follow at later stages, so no additional detail on the above is included within this report. Strategies for individual buildings will need to respond specifically to:

- The type of building.
- The financial model for development.
- The relevant stakeholders’ requirements.
- Technical opportunities and limitations identified as the individual building design develops.

Operation

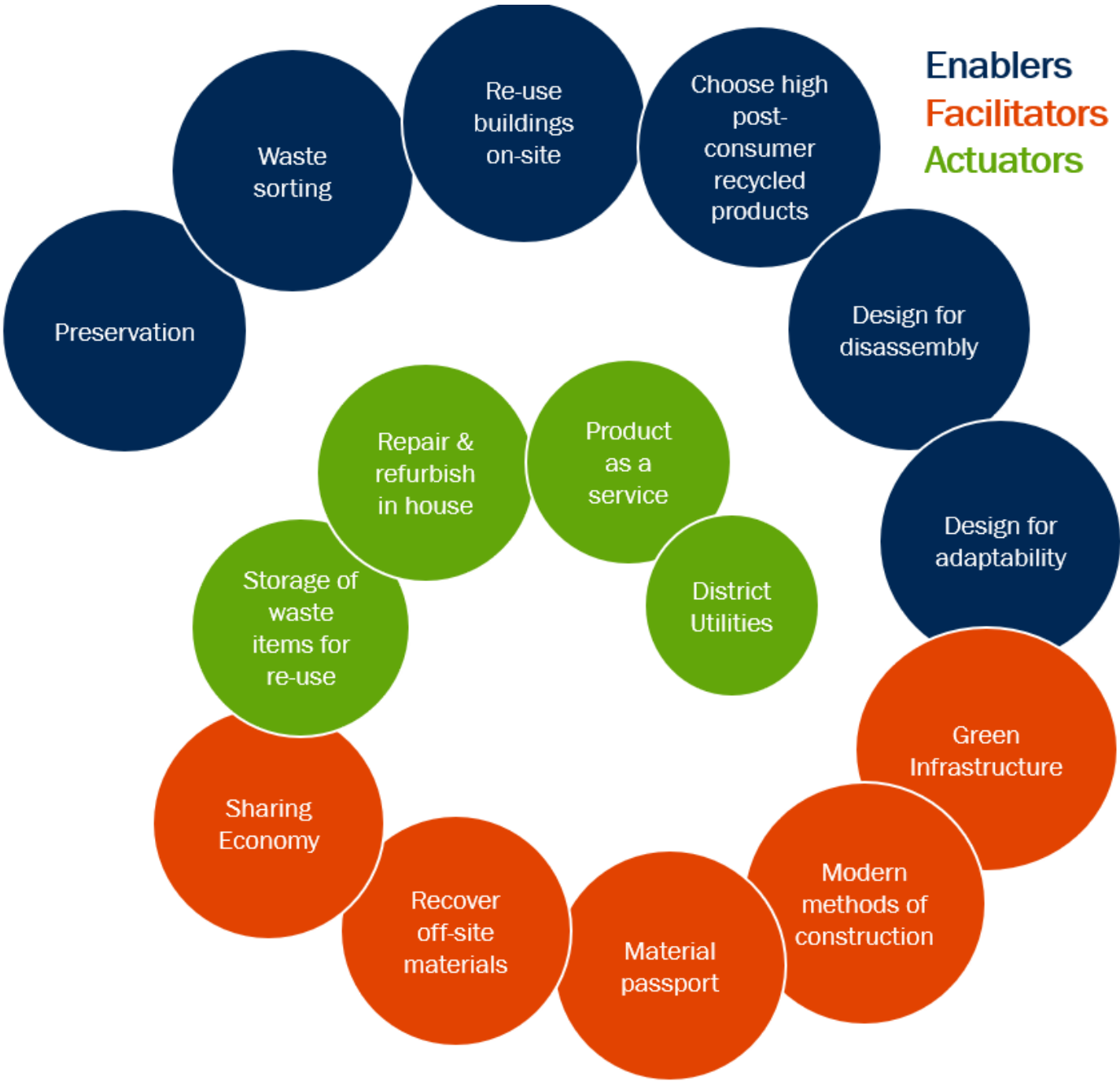
In operation, the precinct will need to manifest the commitment to the circular economy through:

	Implementing new models of procurement and operation which prioritise circularity
	Leasing products such as office furniture, lighting, finishes etc to occupiers, rather than occupiers purchasing new items themselves.
	Operating and managing the facilities for repair and refurbishment of leased items
	On site waste sorting
	Recovery and re-sale of waste materials for re-use elsewhere

The circular economy requires a significant change to current financial models, which makes it crucial that at master planning stage strategies are developed in consideration of what is feasible and manageable for the precinct. This may include development of new financial vehicles which would oversee this operation and day to day management of aspects of the sharing economy, or partnership models with emerging operators and community entrepreneurs in this space. Engagement at master planning stage gives BlueScope and Colony Six the time to develop the models and partnerships that will deliver the circular economy.

End of Life

At end of life for the precinct, reference to the material passports can identify materials for reuse and resale; materials can be stored on site while waiting for their reuse destination to be identified and transport arranged.
End of life of buildings at the precinct represents the first step in the materials’ journey to the start of their next life elsewhere.



Broadmeadow Circular Economy Strategy Key Actions

Key Step 1: Building Re-use Strategy

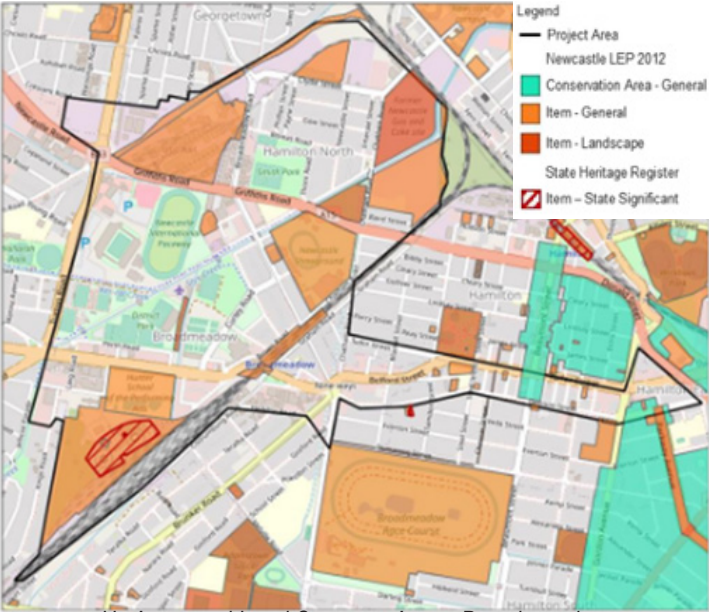
The largest way to reduce a buildings embodied carbon and waste is not to build at all. Therefore, building re-use should be maximised where possible. Even those buildings which are not suitable for re-use structurally may be able to be adapted or their materials can be salvaged during demolition.

When & Who

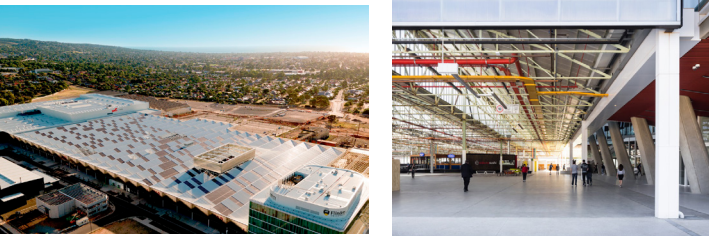
During the masterplan a Building Re-use Strategy should be developed by COX in collaboration with relevant stakeholders (i.e. NSW DPPI, City of Newcastle, Landowners and Developers). The strategy should consider the following:

Next Steps

- Identify heritage and significant buildings which should be maintained and consider whether there's any other buildings that could be adaptively reused
 - Although initial scoping of heritage buildings has already been performed (shown in the figure to the right), further consideration is recommended in identifying existing buildings which can be adapted or re-used
- Develop architectural design for the reused buildings
- Conduct a pre-demolition audit to identify the potential materials that can be salvaged, and the best opportunities for preservation and reuse (this may occur later during the construction stage)
 - Engage a demolition specialist to undertake a site visit and prepare a bill of quantities of potential materials for reuse on site
 - Prior to demolition works ensure a building specific disassembly plan is prepared, identifying materials for salvage
- Allow space and time for storage of salvaged materials



Heritage and Land Conservation at Broadmeadow



Adaptive re-use of Tonsley Park Main Assembly Building

Key Step 2: Circular Economy Hubs

Although Summerhill Waste Management Centre (located approximately 20 minutes from Broadmeadow town centre) provides collaboration opportunities there are advantages in developing more local circular economy hubs within the precinct, including:

- Reduced transportation and logistics
- Reduced embodied carbon
- Better service and engage with community

When & Who

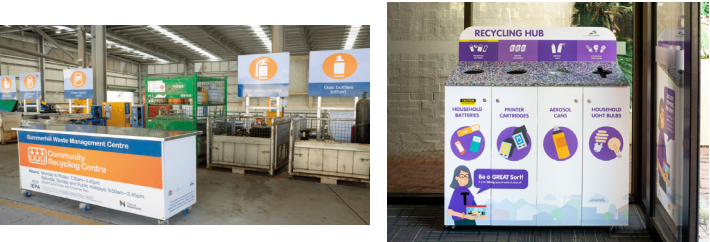
Planning space for circular economy hubs should be considered in the masterplanning stage. This should be considered by COX in collaboration with City of Newcastle. The community and commercial sector should also be engaged to identify the circular economy opportunities that can be offered to them.

Next Steps

- Consider collaboration opportunities with the Summerhill Waste Management Centre:
 - Collection and processing of precinct operational waste
 - Collecting compost to be used for landscaping in agriculture and site rehabilitation from the organics processing facility once developed (onsite organics facility at Summerhill is pending approval)
 - Sourcing recycled (good condition) materials suitable for re-use
 - Consider waste collection routes and road access to the Summerhill Waste Management Centre
- We propose an additional 3 community hubs within the precinct that serve the Broadmeadow community.
 - Community sharing and recycling hub – this should be located within residential and community hubs for servicing that community.
 - Commercial scale hub – this should be located away from the community and in close proximity to industrial and commercial buildings
 - Building material re-use hub - these should be located near buildings and site's which offer material re-use opportunities



Summerhill Waste Management Centre proximity to Broadmeadow



Large scale community recycling centre at Summerhill Waste Management Centre (left) and small scale recycling hubs (right)



Springvale community sharing hub



Building material re-use hub

Broadmeadow Circular Economy Strategy Key Actions

Key Step 3: Sharing Economy Strategy

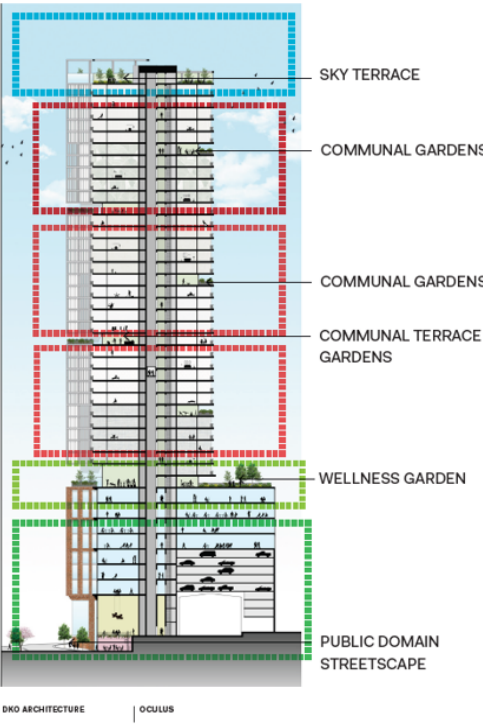
By enabling people to share resources and services, a sharing economy hub can reduce waste, promote sustainable transportation and support local business. This can contribute to Broadmeadow and City of Newcastle's overall sustainability objectives and help to create a more resilient and sustainable community. Providing a space for people to come together and share ideas can also foster social connections and community engagement.

When & Who

If the sharing economy & product as a service strategy is considered as part of the precinct masterplan, it will be crucial to develop the strategy early to provide time to set up the necessary structures and find suitable partners to engage with to implement the strategy. This should be developed by COX in collaboration with Atelier Ten.

Next Steps

- Discuss the potential opportunities for delivering Sharing Economy
 - Members of the community come to attend repair lessons on repairing household items
 - Precinct repair staff engage with occupiers to repair items on loan
 - Members of the community come to borrow or return tools and equipment
 - Space is available for community charities such as 'Men's Shed'
- Where a tool, equipment, material library is proposed, identify and reserve suitable space by the community heart
 - The library & workshop space could then be co-located with other key community and retail areas.
- Identify local entrepreneurs who may be able to operate sharing groups or staff Maker Spaces
- Set up suitable company structures that will permit COX to engage with building occupiers to lease and repair items within the precinct



St Leonards Home BTR allocation of space for sharing economy



New City of Merri-Bek community hub with community sharing facilities including tool library



Integration of car share parking and shared micromobility service providers

Key Step 4: Circular Design Guide

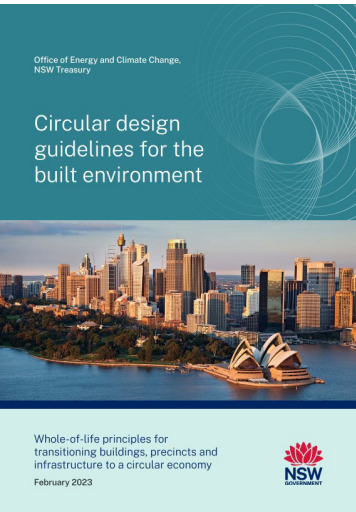
Developing a circular design guide that identifies both design for disassembly and adaptability principles will ensure new buildings constructed within Broadmeadow are adaptable to changing needs and their end-of-life emissions are mitigated.

When & Who

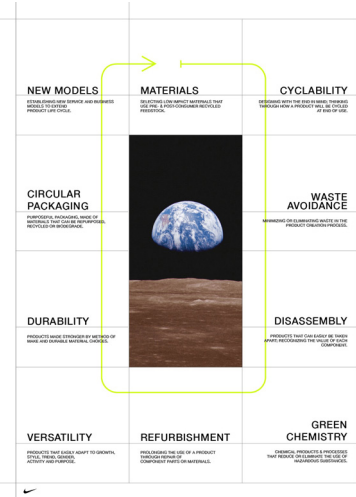
During the masterplan stage a circular design guide should be developed by COX in collaboration with City of Newcastle and Atelier Ten and consider existing guides developed by NSW Government. This guide can then be handed over to future stages ensuring circular design principles are followed throughout the entire project from design through to end of life.

Next Steps

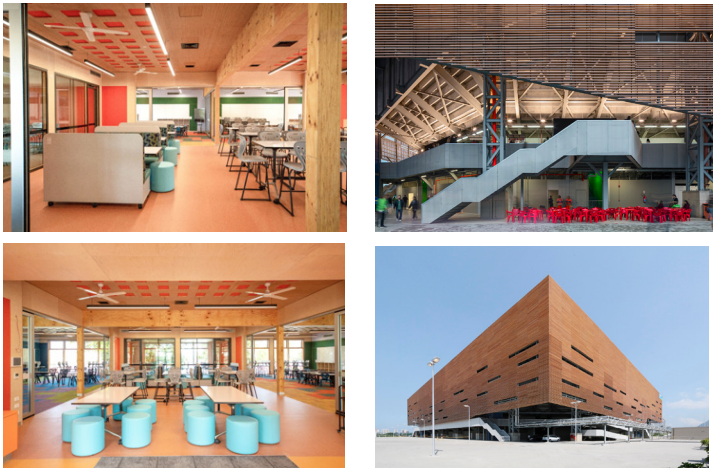
- Design for disassembly principles to consider:
 - Document materials and methods for deconstruction
 - Select materials with consideration for future impacts
 - Design connections which are visible and accessible
 - Minimise chemical connections
 - Use bolted, screwed and nailed connections
 - Separate MEP systems
 - Design for the worker and labour of separation
 - Simplicity of structure and form
 - Interchangeability
 - Safe deconstructions
- Design for adaptability principles to consider:
 - Clear spans
 - Generous floor-to-floor heights
 - Flat floors
 - Interior non-load bearing partitions
 - Regularly spaced structural elements
 - Stronger structural systems
 - Durable materials
 - Modular design and construction
- Early engagement with a structural engineer during the design process will facilitate the implementation of these principles



NSW Government Circular Design Guide



Nike Circular Design Guide



Design for disassembly at Fern Bay School (left) and design for adaptability at Rio Olympic Stadium (right)

Appendices

Appendix A Policy and Planning Framework

3.4.1 Newcastle 2040 Community Strategic Plan, City of Newcastle

Newcastle will be a “liveable, sustainable, inclusive global city”.

The Community Strategic Plan focuses on four themes to deliver the vision: Liveable, Sustainable, Creative and Achieving Together. With the overarching theme being Inclusive.

Key Moves and Actions for Sustainability are:

- 1. Liveable
 - Enriched neighbourhoods and places
 - Connected and fair communities
 - Safe, active and linked movement across the city
 - Innovative and connected city
- 2. Sustainable
 - Action on climate change
 - Nature-based solutions
 - Circular economy
- 3. Creative
 - Vibrant and creative city
 - Opportunities in jobs, learning and innovation
 - Celebrating culture
 - City-shaping partnerships
- 4. Achieving Together
 - Inclusive and integrated planning
 - Trust and transparency
 - Collaborative and innovative approach

- Implications for Broadmeadow Structure Plan and Place Strategy**
- Provide quality spaces that enable all people to participate
 - Create and maintain sustainable, healthy and inclusive streets
 - Enable cultural heritage to inform local character and identity
 - Promote and support healthy and active communities
 - Provide safe and connected cycleways and pedestrian networks
 - Establish resource recovery industries and circular economy precincts. Increase recycling and productive reuse of organics
 - Localise supply chain and sustainable procurement
 - Capture water at the source, mitigate flood impacts through design, and create public spaces that collect, clean and recycle water
 - Maximise urban greening
 - Cultivate innovation with business and encourage entrepreneurship
 - Support a creative, vibrant and safe nightlife
 - Attract visitors and strengthen Newcastle’s reputation as an arts and cultural destination by creating a nationally significant platform for arts, culture, festivals and expression
 - Undertake a holistic approach to planning that is reflective of community needs and aspirations



Figure 3.1 Newcastle 2040 Community Strategic Plan (Source: CN)



Figure 3.2 Four themes to deliver vision for Newcastle (Source: CN)

3.4.2 Newcastle Local Strategic Planning Statement, City of Newcastle

“In 2040 Newcastle will be a smart, liveable and sustainable global city.”

The vision for Newcastle LSPS includes: an integrated and accessible transport network, a green city, a liveable city and a smart and innovative economy.

Areas of Change: Broadmeadow

- 1,500 dwellings for 2036
- 550 jobs for 2036
- Development of world class sport and entertainment precinct, including former industrial land

Key Priorities for sustainability include:

- 1- Prioritise active transport in our City
 - Encourage uptake of active transport by planning for short trips (distance of 400m to 4km).
- 2- Support emerging transport opportunities and public transport improvements with continued integration of land use and transport planning.
- 4- Green our neighbourhoods
 - Improves environmental, social and psychological outcomes
 - Enhance and expand urban green spaces, network and blue/green grids
- 5- Protect and enhance our bushland, waterways and wetlands.
- 6- Reduce carbon emissions and resource consumption
 - Achieve excellence in sustainable and urban building design
- 7- Plan for climate change and build resilience
- 9- Sustainable, healthy and inclusive streets, neighbourhoods and local centres
- 12- Sustainable, affordable and inclusive housing
- 16- Grow our tourism, entertainment, and night-time economies

Implications for Broadmeadow Structure Plan and Place Strategy

- Plan for concentrated growth around transport and activity nodes
- Support use of EVs, shared transport, and more efficient car parking management
- Riparian zone surrounds creeks such as the Styx Creek that runs through the site, should be protected and enhanced
- Protect local biodiversity
- Net carbon zero by 2050
- Climate Action Plan provides framework for reducing carbon emissions and resource consumption
- Support Broadmeadow community to respond and recover from climate emergency events
- Provision of quality shade for resilience of long and extreme heat events
- Work with Awabakal, Worimi and Mindaribba Local Aboriginal Land Councils to enrich and inform our community and environment
- More social and affordable housing especially for specific needs including students, elderly and disabled.



Figure 3.3 Newcastle LSPS (Source: CN)



Figure 12: Catalyst Area Broadmeadow 2018

Legend:

- Priority Multimodal Corridor
- Environmental and Open Space
- Local Road
- Railway Station
- Waterway
- State Road
- Railway
- Education
- 800m Radius Walking Catchment
- Frequent Bus Routes

Figure 3.4 Broadmeadow Catalyst Area (Source Newcastle LSPS)

3.4.3 Newcastle Climate Action Plan 2021-2025, City of Newcastle

The report provides actions to enable the City of Newcastle to be sustainable and climate positive.

- Sustainable Supply Chain
- Utilise opportunities for low emissions materials such as green concrete in design and construction of CN assets
 - Recover and use recycled glass and other recovered materials in CN operations
 - Continue to source 100% renewable electricity for CN operations
 - Install megawatt scale battery storage options
- Zero Emissions Transport
- Support cycling through adequate cycle lanes, bike parking and end-of-ride facilities
 - Publicly accessible electric vehicle charging infrastructure at key locations
 - Procure electric vehicles for all passenger fleet replacements
- Net Zero emissions city
- Goals for 2025:
 - 30% reduction in city-wide emissions
 - 30% reduction in average daily electricity consumption
 - 10,000 registered electric vehicles
 - 100MW of new renewable generation capacity
 - 1 MW of new community renewable energy projects
 - Investigate low carbon and water building performance enhancements for inclusion in CN DCP for all new buildings and major renovations, encouraging passive design features, green roofs, solar panels, storage and EV charging.
 - Support residents and businesses to transition to low emissions technologies, including solar gardens, virtual microgrids, community renewable energy and battery storage initiatives.
 - Encourage Newcastle residents and businesses to buy and sell local/regional renewable energy and carbon offsets.
 - Trial and demonstrate vehicle-to-grid (V2G) and other emerging technologies.
 - Support waste avoidance opportunities for Newcastle residents
 - Measure carbon sequestration potential from street and park trees, bushland, wetland and other natural assets
 - Promote Newcastle as a clean tech innovation hub and an international test laboratory for best practice carbon and water reduction technologies

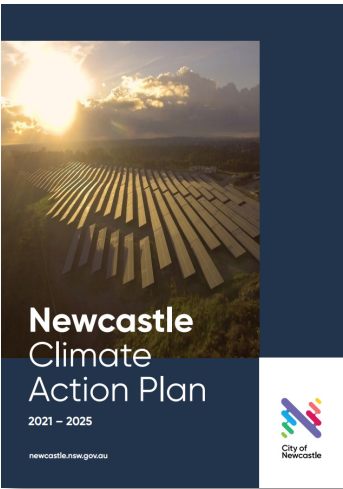


Figure 3.5 Newcastle Climate Action Plan (Source: CN)

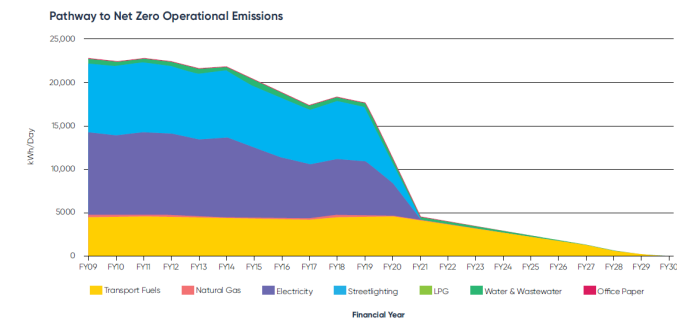


Figure 3.8 CN pathway to net zero operational emissions (Source: CN CAP)



Figure 3.6 4 Key Themes to reduce CN emissions (Source: CN CAP)

3.4.4 Smart City Strategy, City of Newcastle

The strategy “leverages the smart city movement to improve our liveability, sustainability and economic diversity, develop local innovation, build international profile and attract talent and inward investment to our city.”

- Approach:
- Collaborative, with the Council and University contributing \$8 million
 - Smart City Infrastructure - WiFi and LPWAN (low power wide area networks) will link sensors and integrated technology to provide detailed real time city data
 - Innovation Hub - built at the intersection of UoN campus and CN cultural spine. The hub will launch spinoffs, start-ups and mature companies; and attract investment and businesses
 - Digital Precinct
 - Living Lab
 - Hunter Regional Incubator

- Smart City Principles:
- Collaboration - organisations working together
 - Connectivity - Interconnection of people and systems
 - Efficiency - valuable outcomes
 - Openness - transparent access to data
 - People - engage community, humanity and citizens
- Key Strategies relevant to sustainability:
- Smart Mobility
 - 1.3 Deploy IoT-based smart traffic monitoring systems and collect real time data
 - 2.1 Use crowdsourcing technology to collect data on informal city cycle routes and incorporate into cycleways planning
 - 2.2 Incorporate sensor-based triggering technologies into cycleways such as LED lighting for key commuter routes
 - 2.4 Deploy night-time wayfinding systems utilising digital components (apps, projections) to increase safety
 - 3.1 Use the city as a test-bed facility for new mobilities technology including MaaS networks and autonomous vehicles

- Smart Living
 - 1.3 Develop a smart parking network including sensors, wayfinding and payments apps, dynamic signage and digital permit systems
 - 1.4 Deploy an electric vehicle (EV) charge point network
 - Utilise beacon network and sensor technologies to create interactive sites and deliver city information including creative placemaking content, environmental education, wayfinding
- Smart Environment
 - 1.2 Install Internet of Things (IoT) sensor clusters across the LGA to monitor environmental conditions in urban, natural and aquatic environments
 - 1.5 Pilot with CSIRO and other research institutes intelligent building controls in key Council facilities to create smarter, more energy efficient buildings
 - 2.1 Pilot and deploy smart bin infrastructure
 - 3.3 Trial and deploy smart lighting across the city via integrated smart pole technology

- 3.5 Expand solar battery storage capacity and create scalable, storage networks
- Smart People
 - 1.4 Encourage community use of city data through free access and promotional programs
 - 2.1 Incorporate standards enhancing disability inclusion principles into all smart city technology installations
 - 2.5 Pilot, deploy and promote inclusive smart assistive technology in the public domain
 - 3.1 Increase the regular presentation of technology-based arts and science creative content across Council’s cultural facilities

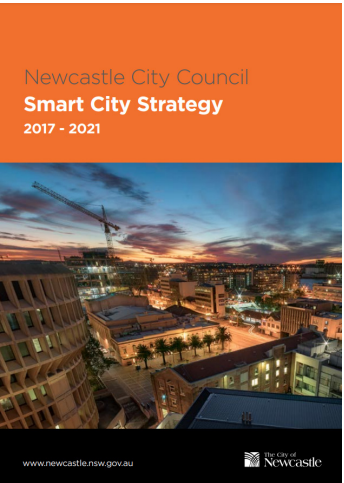


Figure 3.7 Broadmeadow Innovation District Study (Source: GSC)

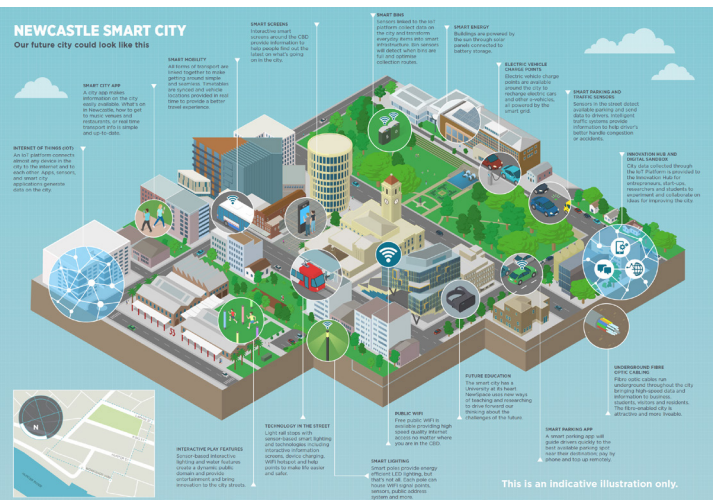


Figure 3.9 Vision for Newcastle Smart City (Source: Smart City Strategy (Source: CN))

3.4.5 Aboriginal Heritage Management Strategy, City of Newcastle

The Strategy aims to protect Aboriginal heritage places and items whilst enhancing education and regard from the Newcastle and visiting communities.

Key aims and objective of the strategy:

- 10. To enhance our community’s knowledge of and regard for Aboriginal cultural heritage items and places
- 11. To protect the City’s Aboriginal heritage places for the benefit of everyone
- 12. To protect the integrity of heritage places by ensuring consistent and sympathetic treatments of cultural heritage artefacts and places
- 13. To invest in the care and promotion Newcastle’s Aboriginal heritage places

Environmental Resources and Characteristics:

- Research demonstrated that resources influencing Aboriginal occupation of the region including water, stone, flora and fauna, were found throughout all areas of the LGA.
- Areas where a wide range of available subsistence resources or stone materials occurred, such as the Hunter estuary delta, the Hexham Swamp, the Stockton Bight, and the Black Hill Spur were found to be key locations in Aboriginal occupation of the region.

Current Initiatives:

- Commitment (1998) to Aboriginal and Torres Strait Islander peoples of Newcastle to live according to their own values and cultures.
- Guraki Aboriginal Advisory Committee seeks to engage indigenous people in local government decision making.
- Guidelines for Acknowledgement of Country - CN RAP (2013).
- Aboriginal Dual Naming of Landforms
 - Interpretative signage
 - Launched virtual reality package at 8 locations immersing viewer with a pre-contact landscape of these locations
- Aboriginal Employment Strategy 2018-2021
- Newcastle Museum, ensures Aboriginal representation
- Art Gallery, continuously growing Aboriginal art collection

Implications for Broadmeadow Structure Plan and Place Strategy

- Ensure Aboriginal and Torres Strait Islander representation for a range of opportunities e.g. precinct installations, employment
- Consult with the Aboriginal community and relevant advisors for planning decisions and input
- Consult Guraki Aboriginal Advisory Committee for local decision making
- Explore innovation opportunities for Broadmeadow such as the VR pre-contact initiative to connect visitors, workers and the community to Aboriginal heritage and culture
- Engage with local Aboriginal and Torres Strait Islander entrepreneurs, artists, business, inventors and community for innovation initiatives in the Broadmeadow precinct
- Identify any Aboriginal places of heritage or significance on the site through Aboriginal consultation. Protect and enhance these

- sites and identify opportunities to educate the public of these sites/artefacts where appropriate
- Identify and develop locations on site for Aboriginal people to practice their culture, through consultations of relevant Aboriginal local organisations and the Aboriginal community

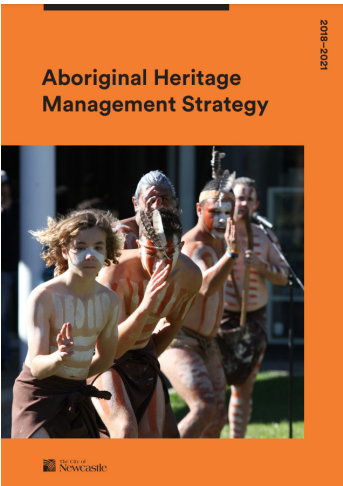


Figure 3.10 Broadmeadow What We Heard (Source: Dep. of Planning)

3.4.6 Hunter Regional Plan 2041, NSW

The 20 year land use plan developed by NSW government proposes 9 objectives for a connected and vibrant metropolis.

Relevant objectives and strategies for sustainability include:

- O1 Diversify the Hunter’s mining, energy and industrial capacity
- S 1.1 support the growth of adjoining industrial areas or settlement areas
 - S1.1 enhance corridors within the landscape such as biodiversity corridors or disused infrastructure corridor
 - S 1.5 opportunities to support the circular flow of materials by enabling new remanufacturing, resource recovery, re-use and recycling facilities and the expansion of existing circular economy facilities
- O2 Support the right of Aboriginal residents to economic self-determination
- O3 Create 15-minute neighbourhoods to support mixed, multi-modal, inclusive and vibrant communities
- O4 An inter-connected and globally-focused Hunter without car dependent communities
- O6 Conserve heritage, landscapes, environmentally sensitive areas, waterways and drinking water catchments
- O7 Reach net zero and increase resilience and sustainable infrastructure
- O8 Plan for businesses and services at the heart of healthy, prosperous and innovative communities
- P6. Tourism activities support domestic and international visitors, providing diverse and sophisticated tourism experiences

Implications for Broadmeadow Structure Plan and Place Strategy

- Support the growth of nearby industrial areas for existing and growing employment, such as the nearby art warehouses, engage in community consultation of these areas
- Provide biodiversity corridors that link together and enable people to use them
- Provide infrastructure and planning for a circular economy at the Broadmeadow precinct
- Protect existing neighbourhoods character and amenities by engaging with existing communities about what they like already in their community and what they need
- Provide amenities that can cater for growing residential and visitor population, enabling 15 minute neighbourhoods
- Connect the precinct through direct roads and pathways that prioritise pedestrians and cyclists
- Conserve and regenerate existing landscapes, heritage, waterways and drinking water catchments of Broadmeadow
- Implement net zero buildings, infrastructure and operations

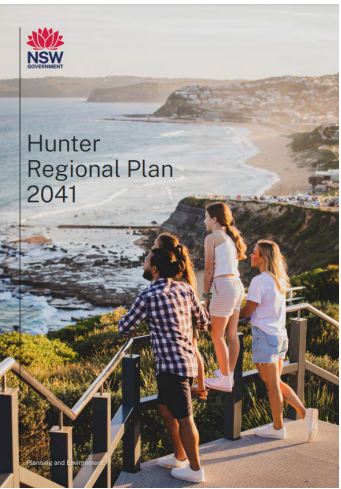


Figure 3.11 Hunder Regional Plan 2041 (Source: New South Wales Government)

3.4.7 Our Sustainable Waste Strategy, City of Newcastle

The sustainable waste strategy aims for “zero harm to the environment by reducing pollution, taking a regenerative approach, and treating materials as resources.”

Objectives:

1. Mitigate environmental impacts from managing all material streams received
2. Create and develop long-term local resource recovery options
3. Power future SWMC infrastructure and operations through renewable energy
4. Collaborate with other Hunter Councils, State and Federal Governments, industry experts, and universities to explore and promote circular innovation

Opportunities:

- Security around processing recyclable (yellow-lid) and organic (green-lid) materials locally (Challenge 1)
- Meeting ambitious waste and recycling targets (Challenge 4)
- Managing our high-risk operation proactively, rather than reactively (Challenge 8)
- Realising the potential of renewable energy generation and usage (Challenge 10)
- Generate green energy from organics
- Recover textiles through yellow bins
- Implement a food organics recovery facility at SWMC
- Compositional waste audits conducted by the NSW EPA revealed:
 - Over two-thirds of the material in our red bins could be diverted from landfill with 45% comprised of food and organics and 22% of dry recyclables.
 - Over two-thirds of material arriving at a landfill from commercial and industrial waste was a mixed waste load and 51% of this material was considered degradable organic.

Implications for Broadmeadow Structure Plan and Place Strategy

- Implement a circular economy for the Broadmeadow Precinct, including the collection of organic waste for compost and energy generation
- Provide clear signage to educate people and visitors on what bin to put their rubbish in
- Provide opportunities for people to recycle and repair textiles or other objects, through creation of a repair shop or diversion to an external recycle/repair organisation
- Use renewable energy within all waste operations
- Consider and avoid environmental impacts from waste recovery and collection



Figure 3.12 Our Sustainable Waste Strategy (Source: CN)

3.4.8 Hunter Sports and Active Recreation Plan, NSW

The Plan works alongside the community to provide outcomes and strategies to improve sports and recreation in the Hunter Region.

Outcomes of consultation sessions:

- increased participation
- improved access
- integrated performance pathways
- fit for purpose facilities
- valued regional sporting events
- improved collaboration

Strategies to consider for sustainability:

- Promote Active Kids Voucher program
- Provide support to under-represented groups to access sport and active recreation opportunities
 - Facilities and programs to provide access to people with disabilities, seniors an and other under-represented groups
 - Consider Women in Sport Strategy
- 2.3 Facilitate more recreational walking and cycling paths.
 - Maintain and link Fernleigh Track
- 2.4 Explore options for shared transport to sport and active recreation activities
- 2.7 Focus on people not currently participating in any form of sport and active recreation.
- 4.1 Establish a Regional Sporting Hub at the Hunter Sports and Entertainment Precinct at Broadmeadow and explore locations for sub -hubs
- 4.8 Plan for female friendly sporting facilities

Implications for Broadmeadow Structure Plan and Place Strategy

- Link the existing 15 km Fernleigh Track to the Broadmeadow Precinct, continuing the existing cycling nature track
- The majority of Greater Newcastle is flat so provides a great opportunity to upgrade cycling networks. Link the Broadmeadow cycling network to the Greater Newcastle cycling network.
- Provide cycling links to public transport stops and stations; and EOT facilities
- Establish sports sub-hubs within growth corridors that are multi-purpose facilities for sport and community purposes to bring the local community together
- Consult with the female community to provide inclusive sports facilities, programs and sporting types to increase female sports participation
- Develop Hub support facilities that are connected to core facilities such as health and fitness, sports science, health services, education/training facilities. This will provide local employment opportunities
- Establish inclusive sports facilities/programs to under-represented groups, people with disabilities and seniors

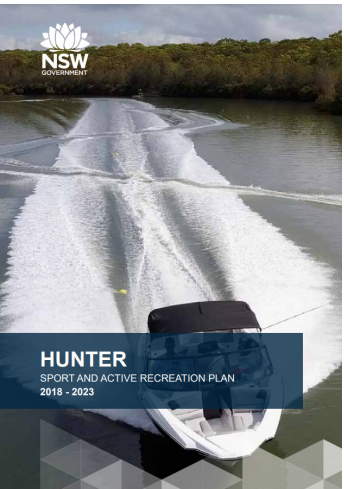


Figure 3.13 Hunter Sports and Active Recreation Plan

3.4.9 Hunter Sports and Entertainment Precinct Vision, Venues NSW

The Vision for Hunter Sports and Entertainment Precinct prioritises the community, sustainability and flexibility of spaces.

Concept plan principles:

1. Develop an elite sports and entertainment precinct.
2. Consolidate sports and entertainment uses to improve operations and create a stronger relationship between different uses.
3. Provide a variety of places for organised and casual sports and activity within the open space network.
4. Improve access and connections both within and to the Precinct.
5. Develop higher density residential and a mix of retail, commercial and residential uses on surplus land around the train station.
6. Provide adaptable and flexible spaces that can host and support major events when required

Potential Future Options - For community events such as the Newcastle Show:

- using the ground floor of a new multideck car park to accommodate animal pavilions
- ceasing operations of an indoor sports hall for one week to display indoor exhibits or hosting these in a new multipurpose arena
- locating the show ring on newly created training fields
- creating a side show alley in the open plaza area north of McDonald Jones Stadium

Implications for Broadmeadow Structure Plan and Place Strategy

- Prioritise walking and cycling and good connections from Broadmeadow Train Station
- Strong connections within and without the site
- Opportunity for public pedestrian boulevard from the Station to McDonald Jones Stadium
- Create destinations such as cafés and green space for people to stop and relax
- Event plaza connecting all venues that provides sustainable amenity such as shading, permeable paving, smart street furniture, vegetation and biophillicia
- Prioritise multi-purpose flexible spaces that also support other industries such as the arts
- Create an activated precinct even when there are no sports events being held through enabling a 18 hour or 24/7 economy and supporting local businesses within the precinct such as supporting sport hubs, retail
- Connect proposed residential building to vegetation and biophillicia whilst ensuring good connections and networks within the Broadmeadow community and to surrounding communities



Figure 3.14 Our Sustainable Waste Strategy (Source: CN)

Appendix B Development Environment

3.4.10 Creating Great Australian Cities, Property Council of Australia

The Property Council has commissioned this project to stimulate debate about the future of our cities, to improve public understanding of the issues at stake, and to help governments make good decisions for the future.

This report examines what is required to create great Australian cities. It provides an ‘outside in’ perspective based on our analysis of city megatrends, new research into global benchmarks, international case studies and the distinctive underlying issues present in Australian cities.

This research identified ten megatrends that will shape Australia’s cities for decades to come:

- Urbanisation and metropolitan growth
- Aging population
- Exponential technology change
- Globalisation of trade, supply and value chains
- Intensifying climate change
- Re-urbanisation of jobs and capital
- Economic transition and the rise of the innovation economy
- The rise of Asia
- Resource scarcity and energy convergence
- Rising infrastructure and governance gaps

Implications for Housing the Hunter: a plan for renewal at Broadmeadow

- A consistent high rate of infrastructure investment and infrastructure finance innovation
- Use of public land, anchors and assets to strategic goals allows cities to unlock new areas of opportunity, catalyse new development processes, and adjust to new economic and social trends.
- A high quality of placemaking, place management and tactical urbanism
- Master-planning and pooled public budgets for neighbourhoods and areas
- Growing political divides between educated ‘anywheres’ and rooted ‘somewheres’.
- Spiralling climate, pollution and health threats result in much more frequent extreme weather.
- Governments, companies and societies will be forced to create more capacity to combat challenges, but stronger planetary pushback may exacerbate existing concerns and create new ones.
- More cities become exposed by failures to integrate climate change with public health, co-ordinate among local governments, and support the most vulnerable groups.
- New weather patterns and extreme events incur immediate costs and long-term effects on productivity, tourism and reputation associated with damaged natural assets.
- Reduced investor appeal if resilience against unexpected events is not improved.
- Spikes of migration from other climate-affected regions.



Figure 3.15 Creating Great Australian Cities (Source: Property Council of Australia)

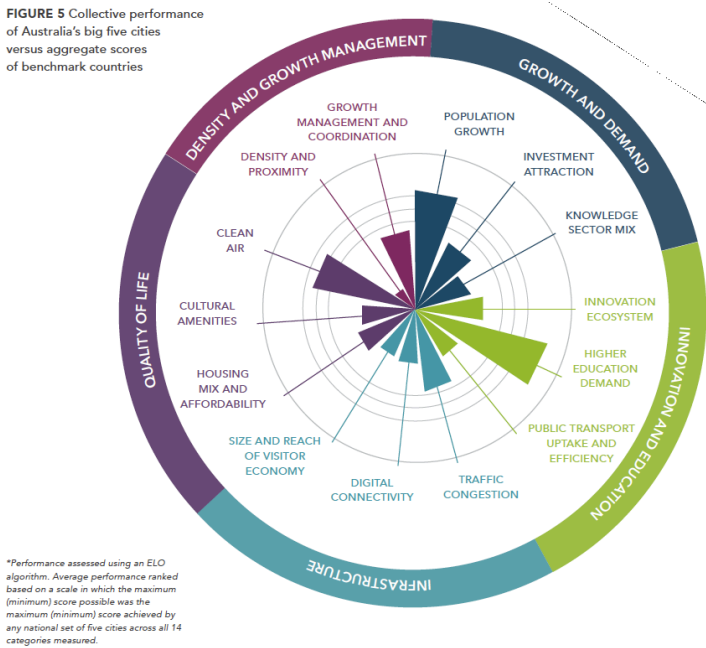


Figure 3.16 t

3.4.11 A Common Language for Social Sustainability, Property Council of Australia

A common language for social sustainability, launched by the Property Council in 2018, sparked a new industry conversation about the S in environmental, social and governance.

The handbook, A common language for social sustainability, provides definitions and context of social sustainability and the 17 Sustainable Development Goals.

The handbook covers five key areas and uses examples to explain how social sustainability applies to:

- Culture and community
- Health and wellbeing
- Mobility and access
- Equity and fair trade
- Economic outcomes

Implications for Broadmeadow Structure Plan and Place Strategy

- Contributing to ‘closing the gap,’ reconciliation, and Indigenous inclusion are critical success factors.
- Community engagement, investment, and partnership is key to generating buy in, shared value, and long-term success.
- Diversity of of race, ethnicity, gender, sexual orientation, socio-economic status, work experience, educational background, marital or parental status, income, age, physical abilities, geographical location, religious beliefs, political beliefs or other ideologies throughout operations is necessary.
- Placemaking reveals and responds to the location, culture and people that gives each place its unique value and authentic qualities.
- The capacity of communities and their members to survive, adapt and grow, regardless of the chronic stresses and acute shocks imposed by the economy or natural environment needs more focus.
- Health and wellbeing needs to be viewed as a state of “complete physical, mental and social wellbeing and not merely the absence of disease of infirmity”, as defined by the World Health Organisation.
- The key components that influence the health, comfort and wellbeing of building occupants. IEQ is determined by many factors, including air quality, lighting and views, acoustic and thermal comfort, radiation, décor, amenity, layout and ergonomics.
- Liveability is important and broad, encompassing: the built and natural environments; economic prosperity and affordability; social diversity, stability and equity; educational opportunity; cultural, entertainment and recreation. Other factors influencing community liveability include: amenities; connection or sense of belonging; sense of safety; education provision; support for personal health; resilience and citizenship.
- The goal of accessibility is to create an inclusive society for all people, regardless of their physical, mobility, visual, auditory or cognitive abilities.
- Equal access to community resources and opportunities. No individuals or groups of people should be asked to carry a



Figure 3.17 A Common Language for Social Sustainability (Source: Property Council of Australia)

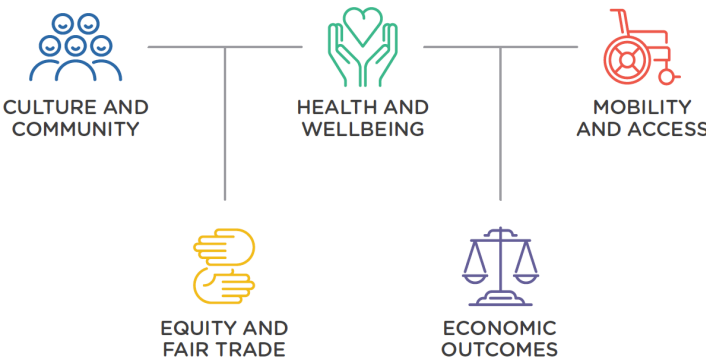


Figure 3.18 Social sustainability themes (Source: Property Council of Australia)

greater social or environmental burden than the rest of the community.

3.4.12 A Plan for the Hunter, Committee for the Hunter

"A Plan for the Hunter - Frontier of the New Economy" report is a proposal developed by the Committee for the Hunter (C4H), an independent organisation of business and community leaders in the Hunter region of New South Wales, Australia.

The report aims to provide a roadmap for the economic future of the Hunter region, focusing on six key sectors:

- advanced manufacturing
- agribusiness
- defence
- energy
- health and education
- tourism

Implications for Housing the Hunter: a plan for renewal at Broadmeadow

- A comprehensive, integrated Structure Plan that aligns with the region's economic development strategy and supports the growth of key sectors.
- Prioritising sustainable and resilient development, including the use of renewable energy, green infrastructure, and sustainable transport options.
- Broadmeadow to become a hub for advanced manufacturing, particularly in the defence and aerospace sectors, leveraging the region's existing strengths in these areas.
- Establish a health and education precinct at Broadmeadow, building on the nearby John Hunter Hospital and the University of Newcastle's presence in the region.
- Broadmeadow to serve as a gateway to the region's tourism offerings, with improved transport links and the development of visitor infrastructure and experiences.
- Engaging with local communities and stakeholders to ensure that development at Broadmeadow is socially inclusive and benefits the wider region.



3.4.13 Youth Voice Hunter, Committee for the Hunter

"Youth Voice Hunter" report is a publication by the Committee for the Hunter, which aims to amplify the voices of young people in the region and provide insights into their perspectives on issues that affect them.

The report includes data collected through surveys and focus groups, as well as recommendations for how to better engage with and support young people in the Hunter region.

Implications for Housing the Hunter: a plan for renewal at Broadmeadow

- Increased investment in public transport infrastructure to make it easier for young people to access education, employment, and recreational opportunities.
- Creating safe and welcoming public spaces that are accessible to all, particularly for young people who may feel excluded or marginalised in other areas.
- Broadmeadow to become a hub for creative industries, such as music and arts, that are popular among young people and can contribute to the local economy.
- Affordable housing options, particularly for young people who may be struggling to find suitable accommodation in the region.
- Engaging with young people as active stakeholders in the development of Broadmeadow and the wider region, including through youth-led consultations and decision-making processes.
- Greater support for mental health and wellbeing services, particularly in light of the impacts of the COVID-19 pandemic on young people's mental health.
- Broadmeadow to become a leader in sustainable development, with a focus on reducing carbon emissions and promoting sustainable lifestyles among young people.

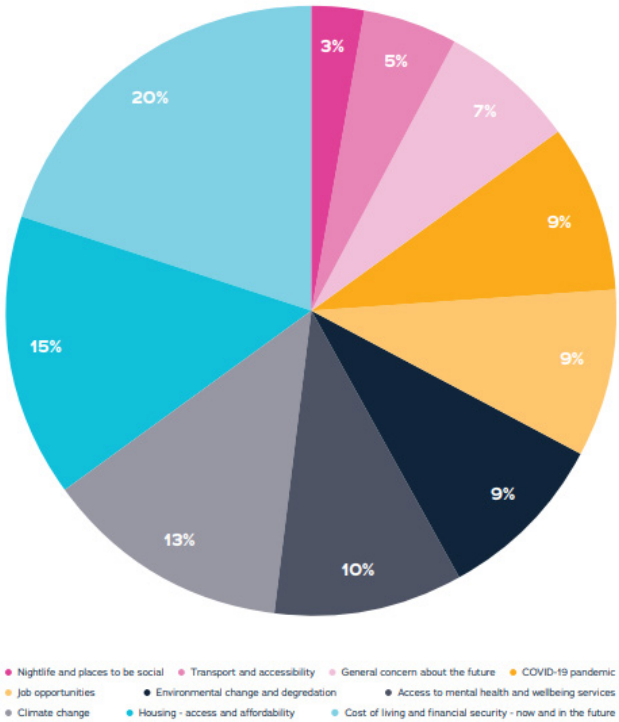
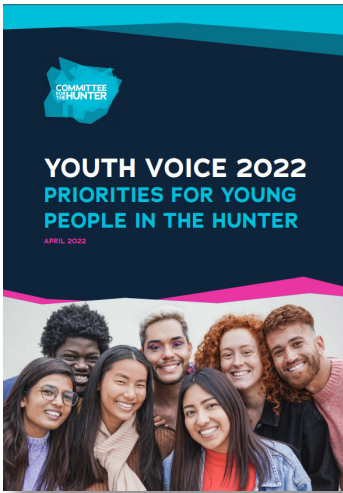


Figure 3.19 Issues that concern Youth of Hunter the most (Source: Youth Voice Hunter)

3.4.14 Hunter 2023 - A New Energy, Committee for the Hunter

"Hunter 2023 - A New Energy" report is a publication by the Committee for the Hunter, which provides a roadmap for transitioning the Hunter region of New South Wales, Australia to a low-carbon, sustainable energy future.

The report identifies the potential of the region to become a leader in renewable energy generation and storage, as well as opportunities for job creation and economic growth in the energy sector.

Implications for Housing the Hunter: a plan for renewal at Broadmeadow

- Broadmeadow to become a hub for renewable energy generation and storage, leveraging the region's existing strengths in these areas and providing opportunities for job creation and economic growth.
- Developing integrated, smart energy systems that can maximise the use of renewable energy and reduce reliance on fossil fuels.
- Broadmeadow to become a model for sustainable urban development, incorporating features such as green infrastructure, sustainable transport options, and energy-efficient buildings.
- Partnerships between government, industry, and communities to drive the transition to a low-carbon, sustainable energy future in the region.
- Engaging with local communities and stakeholders to ensure that the benefits of renewable energy development are shared equitably and that the transition does not have negative social or environmental impacts.
- Broadmeadow to become a leader in energy innovation and research, building on the region's existing strengths in the fields of science, technology, engineering, and mathematics (STEM).
- Investment in skills development and training to ensure that the region's workforce is equipped to participate in the emerging renewable energy industry.

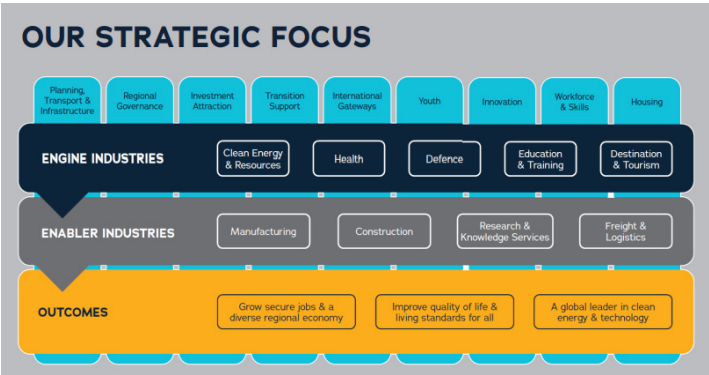
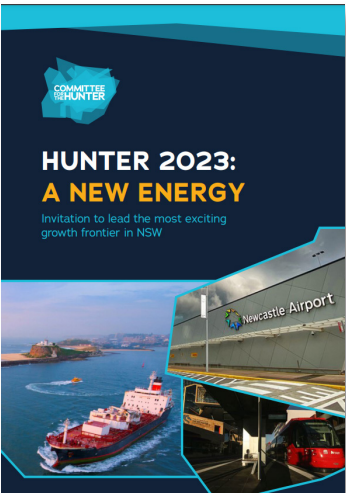


Figure 3.20 Hunter New Energy Strategic Focus (Source: Hunter 2023: A New Energy))

3.4.15 Hunter 2023 - Priorities for the NSW Government, Committee for the Hunter

The "Hunter 2023 - Priorities for the NSW Government" report is a publication by the Committee for the Hunter, which sets out a series of recommendations for the NSW Government to support the development of the Hunter region of New South Wales, Australia.

The report covers a range of issues, including infrastructure, industry, education, and health.

Implications for Housing the Hunter: a plan for renewal at Broadmeadow

- Investing in public transport infrastructure, particularly to improve connectivity between different parts of the region and reduce dependence on private cars.
- Broadmeadow to become a hub for innovation and entrepreneurship, particularly in the fields of renewable energy, smart cities, and advanced manufacturing.
- Investment in education and skills development, particularly in STEM fields, to ensure that the region's workforce is equipped to participate in emerging industries and technologies.
- Supporting the development of sustainable urban environments, incorporating features such as green infrastructure, energy-efficient buildings, and active transport options.
- Investment in health infrastructure and services to ensure that the region's growing population has access to quality healthcare.
- Broadmeadow to become a model for integrated land use planning, incorporating features such as mixed-use developments, public green spaces, and community facilities.
- Engaging with local communities and stakeholders in the development of the region, particularly to ensure that the benefits of growth are shared equitably and that the region's unique cultural and environmental assets are protected.

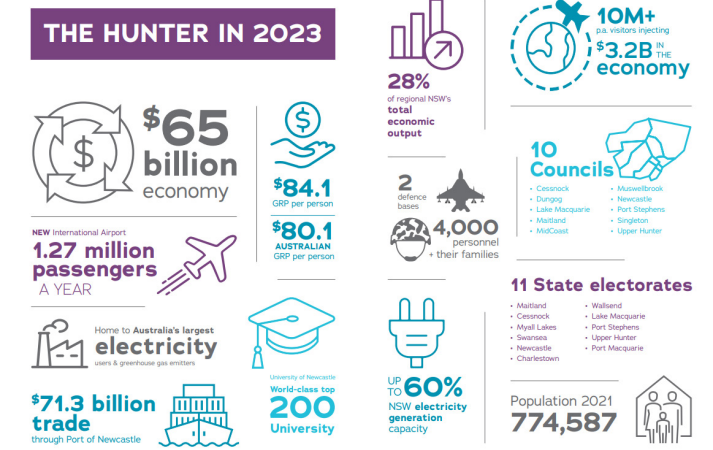


Figure 3.21 NSW Gov Vision for Hunter (Source: Hunter 2023: Priorities for the NSW Government)

3.4.17 The Sandstone Mega-Region, uniting Newcastle – the Central Coast – Sydney – Wollongong, Committee for Sydney

"The Sandstone Mega-Region, uniting Newcastle – the Central Coast – Sydney – Wollongong" report is a publication by the Committee for Sydney, which proposes the creation of a mega-region in New South Wales, Australia that encompasses Newcastle, the Central Coast, Sydney, and Wollongong. The report argues that by leveraging the strengths of each of these cities, the mega-region can become a global economic powerhouse and improve the quality of life for residents. Sustainability is an important focus of the report, with the authors arguing that the mega-region can only succeed in the long-term if it is developed in a sustainable and resilient manner. The report highlights the importance of reducing carbon emissions and improving the energy efficiency of buildings and transport systems, as well as the need to protect and enhance the natural environment of the region.

Implications for Housing the Hunter: a plan for renewal at Broadmeadow

- Develop sustainable and resilient infrastructure, including public transport, roads, and energy systems, to support economic growth in a low-carbon manner.
- Broadmeadow to become a hub for renewable energy and clean technology innovation, building on the region's existing strengths in these areas.
- Incorporating green infrastructure and public open space into new developments, to provide opportunities for recreation and improve the liveability of the region.
- Protect and enhance the natural environment of the region, including its beaches, wetlands, and forests, which are important for tourism and recreation.
- Engaging with local communities and stakeholders in the development of the mega-region, particularly to ensure that the benefits of growth are shared equitably and that the region's unique cultural and environmental assets are protected.
- Potential for the mega-region to become a leader in sustainable development and climate action, setting an example for other regions around the world.

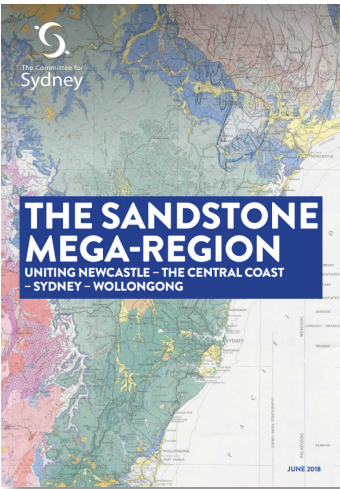


Figure 3.24 The Sandstone Mega-Region, uniting Newcastle – the Central Coast – Sydney – Wollongong, (Source: Committee for Sydney)

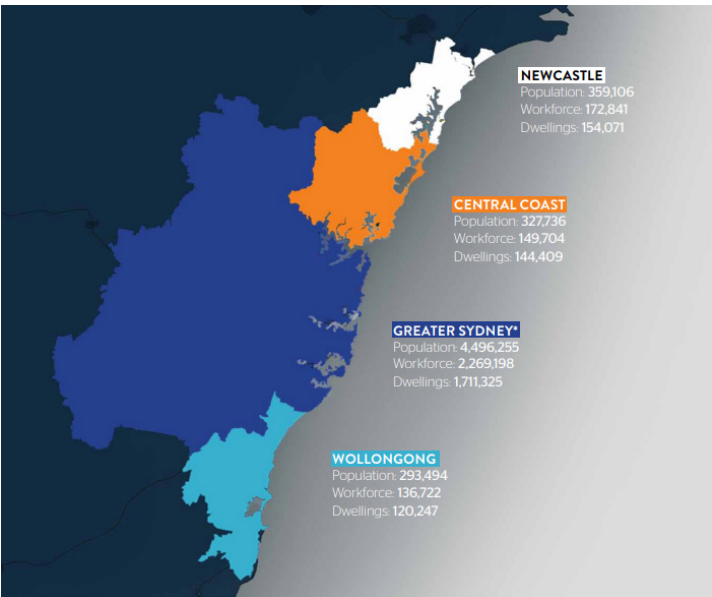


Figure 3.25 The Sandstone Mega-Region Map of Regions (Source: Committee for Sydney)

3.4.16 Health & Well-being in Real Estate, Green Health Partnership and GRESB

This report summarises outcomes from a multi-year collaboration between the Green Health Partnership and GRESB to provide real estate companies and investors with actionable information on health and well-being within ESG (environment, social, governance) reporting.

Health and well-being are emerging as a global leadership and market differentiation opportunity for property companies and funds around the world. Forward-looking real estate companies and investors incorporate environmental, social and governance (ESG) considerations into business operations. While human health and wellbeing is an implicit component of ESG, it is now becoming an intentional and increasingly institutionalised focus across the entire real estate industry.

Implications for Broadmeadow Structure Plan and Place Strategy

- High performing employees – present, healthy, engaged – are prepared to support high performing companies.
- An explicit focus on health and well-being helps fund managers maximise the potential value of real estate assets and services and mitigate associated risks.
- Engaged investors ask about efforts to promote health through real estate fund management and development.
- Top performing companies implement holistic processes that influence asset design, construction and operation to promote health and well-being among employees, tenants and communities. Engaged investors ask about the purpose and scope of an organization's health efforts.
- Engaged investors ask organisations about the quality of health strategies management and request information about results.
- Engaged investors ask organisations about the presence or state of development of fundamental health promotion processes, including leadership, policy, needs assessment, business strategy and performance measurement.
- Companies should ensure that health and well-being are explicit components of business strategies.
- Increase utilisation of secondary data while working to increase the availability of primary data.
- Leading companies are implementing a variety of actions, simultaneously including those related to asset design, operation and programming as well as actions to benefit the communities surrounding assets.
- Many GRESB participants use third party building certifications to take action to promote health and well-being for tenants and customers (WELL or Fitwel).

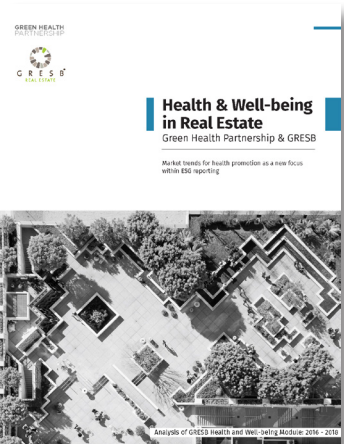


Figure 3.22 Health & Well-being in Real Estate (Source: Green Health Partnership and GRESB)



Figure 3.23 Average GRESB Health & Well-being score (Source: Green Health Partnership; and GRESB)

3.4.18 Unlocking the pathway: Why electrification is the key to net zero building, Australian Sustainable Built Environment Council (ASBEC)

A report from the Australian Sustainable Built Environment Council (ASBEC) confirms 100% electrification is the lowest cost, fastest emissions reduction pathway for Australia’s built environment.

SPR modelled three ‘plausible but divergent’ decarbonisation scenarios: 100% electrification; a combination of electrification and green hydrogen; and a ‘base case’, representing ‘business as usual’ of electrification, fossil gas, green hydrogen and carbon offsets.

This report finds 100% electrification is the lowest cost option to decarbonise our built environment – but lowest cost does not mean no cost. Our detailed analysis by building type, geography and lifecycle reveals that electrification, while necessary, is not always cost-beneficial. Failing to acknowledge and address these costs will significantly impede the transition to net zero building operations.

Implications for Broadmeadow Structure Plan and Place Strategy

- Energy efficiency matters to the electrification agenda. A wealth of literature supports a “fabric first” approach to energy efficiency, in which the building does the hard work rather than bolt on energy devices.
- Improvements to energy efficiency can decrease the space requirements and size of equipment, minimise the need for purchased energy, and enable a higher share of operational costs to be covered by rooftop photovoltaics.
- The building sector cannot rely on offsets in the future, as these will need to be allocated to sectors that are harder to abate in other words, those industries that don’t have the decarbonisation solutions readily available.



Figure 3.26 Unlocking the pathway: Why electrification is the key to net zero building (Source: ASBEC)

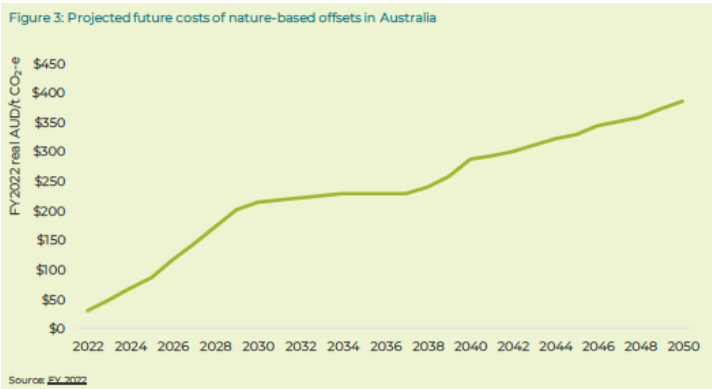


Figure 3.27 Projected future costs of naturebased offsets in Australia (Source: ASBEC)

3.4.19 Rapid and Least Cost Decarbonisation of Building Operations, Australian Sustainable Built Environment Council (ASBEC)

The “Rapid and Least Cost Decarbonisation of Building Operations” project which encompasses new and existing, commercial and residential buildings examines the lowest cost pathways to decarbonise building operations aligned with a net zero by 2050 target.

Specifically, the final report is intended to provide:

- A detailed inventory of operational emissions (scope 1 and scope 2) in residential and commercial buildings
- A detailed characterisation of decarbonisation options available to building owners, and the internal costs, benefits and barriers associated with each option
- Modelling which considers the likely take up of decarbonisation options in at least three divergent scenarios for decarbonisation of fuel sources (including electricity, gas, biofuels and hydrogen)
- Analysis of implications for industry and government.

Implications for Broadmeadow Structure Plan and Place Strategy

- Solar and battery storage technologies, and the new business models that they enable, are disrupting traditional energy supply models but also creating significant value for consumers.
- Power Purchase Agreements (PPAs) allow customers to hedge electricity price risks at the same time as ensuring their consumption is fully supplied by renewable energy sources. They also enable building owners to choose a fully electric solution while achieving zero operational emissions immediately, ahead of full grid decarbonisation.
- Solar energy systems, batteries, and demand management require long term investments, but returns are highly susceptible to short term changes in tariffs and regulatory settings.
- The electrification of the transport sector, now underway around the world albeit more slowly in Australia will shift much of the transport energy demand to the built environment, with many electric vehicle (EV) drivers and fleets recharging their vehicles at home or at work, adding to building loads.
- EVs offer the facility of being ‘batteries on wheels’, with vehicle to load (VTL) possibilities, along with smart chargers, enhancing grid stability.



Figure 3.28 Rapid and Least Cost Decarbonisation of Building Operations (Source: ASBEC)

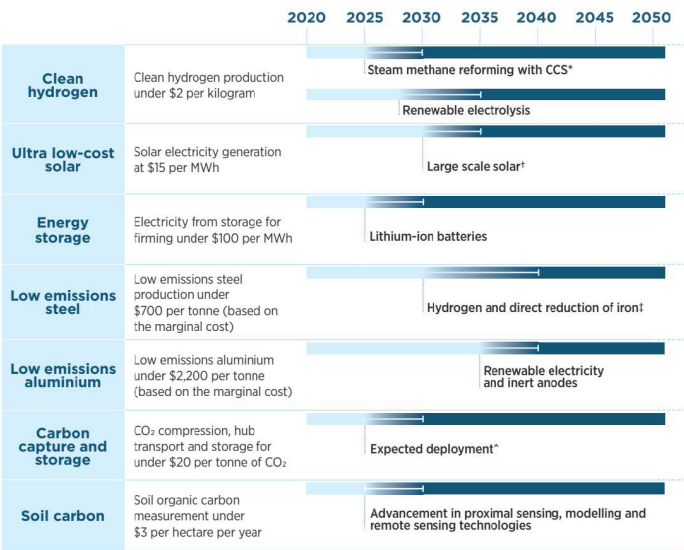


Figure 3.29 The Australian Government’s Long Term Emissions Reductions Plan (Source: ASBEC)

3.4.20 Five ways the built environment can help Australia transition to a net zero future, Australian Sustainable Built Environment Council (ASBEC)

The Australian Sustainable Built Environment Council (ASBEC), as the peak body of key organisations committed to a sustainable, productive, resilient built environment in Australia, urges the federal government to seize the unique opportunity the built environment offers to dramatically reduce carbon emissions in highly cost-effective ways that will also stimulate the economy. In this policy platform for COP26, ASBEC recommends five practical policies across residential, commercial and public buildings that should be implemented by federal government to drive emissions reduction:

1. Give households the energy performance information they need to achieve healthy, affordable, comfortable homes
2. Demonstrate government leadership through high performing government buildings
3. Position Australia as a global leader in high performance building products and technologies
4. Provide economic stimulus by incentivising building upgrades
5. Deliver a Net Zero Carbon Ready building code and pathways to decarbonise building operations

Implications for Broadmeadow Structure Plan and Place Strategy

- Support beyond code energy efficiency standards.
- Publicise consistent, easily-understood information about home energy performance.
- Prioritise passive design strategies to maximise energy efficiency.
- Implement a best practice governance model based on NABERS that brings governments together with industry to collectively manage energy performance benchmarks for homes.
- Assertive action is needed to raise the energy performance of new buildings and incentivise investment in existing building upgrades.
- Measures could include strong minimum standards for new buildings and fitouts, targets for onsite energy efficiency and requirements around renewable energy, offsite renewable energy and offsets.
- Promote the adoption of building sustainability rating systems such as Green Star and NABERS to drive sustainable outcomes.
- Review of existing accommodation and leasing policy presents an opportunity for leadership in the transition towards net zero buildings.
- High performance glazing and heat recovery ventilation systems.
- Building and precinct level batteries.
- Thermal or battery energy storage at the building level to support local energy generation.
- Using electric vehicles and building and precinct level batteries to provide distributed energy storage, flatten energy demand and reduce the impact of peak events.
- 10% reduction in embodied emissions in new commercial and



- residential buildings.
- Incentivise deep retrofits to improve performance.

3.4.21 Issues Paper: Reshaping Infrastructure for a net zero emissions future, Infrastructure Sustainability Council of Australia (ISCA), ClimateWorks Australia, and the Australian Sustainable Built Environment Council (ASBEC)

The *Issues Paper: Reshaping Infrastructure for a net zero emissions future* is designed to progress a new conversation to better understand the challenges and opportunities in reshaping transport, energy, water, communications and waste infrastructure for a net zero emissions world.

It is the first step in a broader effort to reshape Australia's infrastructure agenda and makes the case for why emissions reductions should be prioritised in infrastructure advice and decisions today.

Implications for Broadmeadow Structure Plan and Place Strategy

- Planning for sector transitions to net zero emissions (e.g. in electricity and transport), and identifying strategic infrastructure needs and priorities to enable these transitions.
- Examining proposed needs, issues and opportunities for compatibility with a broad set of scenarios achieving net zero emissions by 2050.
- Designing adaptive strategies, where required, to ensure solutions are resilient to future changes.
- Drawing on existing standards to guide design and lifecycle decisions, such as Green Building Council of Australia's Green Star tool, and ISCA's Infrastructure Sustainability Planning Rating Tool. Upgrading or developing new tools where relevant.
- Prioritising and investing in infrastructure projects critical to enabling a net zero emissions future.
- Testing the performance of project options against a broad set of scenarios achieving net zero emissions by 2050, with only those that perform well in such scenarios progressing to business case development.
- Drawing on existing standards to guide investment decisions at the portfolio and asset level, such as GRESB's Infrastructure Assessment tool. Upgrading or developing new tools where relevant.
- Undertaking detailed cost-benefit analysis (and sensitivity tests of demand and cost modelling) of chosen project design, testing for robustness across a variety of future climate change scenarios, including multiple net zero emissions by 2050 scenarios.
- Setting emissions performance standards for infrastructure, including caps for emissions embodied in construction materials, produced during construction and operation.
- Seeking opportunities to reduce operating emissions (e.g. through retrofitting infrastructure, or through renewable power, energy efficiency, electrification, and offsets)
- Reviewing projects post-completion to evaluate whether a project achieved its emissions performance objectives, along with its strategic objectives and economic performance.



Figure 3.30 Issues Paper: Reshaping Infrastructure for a net zero emissions future (Source: ISCA, ClimateWorks Australia, and ASBEC)

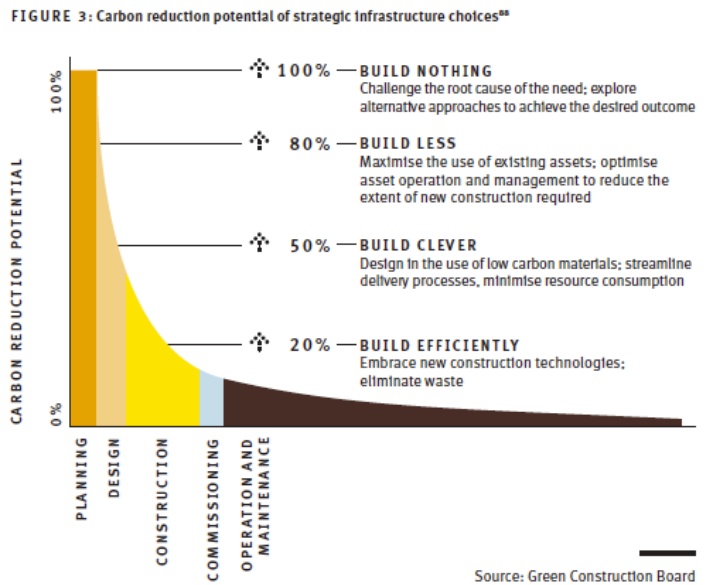


Figure 3.31 Carbon reduction potential of strategic infrastructure choices (Source: ISCA, ClimateWorks Australia, and ASBEC)

3.4.22 Green Star Future Focus, Green Building Council of Australia (GBCA)

In March 2018, Green Building Council of Australia (GBCA) embarked on an ambitious journey to reshape the Green Star rating system and create the next evolution of the tools.

Green Star Future Focus will see the rating system evolve and adapt to ensure the sustainable built environment delivers what it needs to, whilst also responding to global megatrends and emerging challenges.

Implications for Broadmeadow Structure Plan and Place Strategy

- Amenities that enhance a person’s well-being, encourage healthy and active transport and lifestyle decisions.
- Mimic or connect with nature and provide a comfortable environment.
- Conceived, built and operated to reduce or eliminate toxic materials, are well ventilated and lit.
- Ready to address the future impacts of climate change and to respond positively to other changes and shocks.
- Resilient to natural disasters and man-made impacts including changing technology and demographics.
- Resilient to long-term risks to its value.
- Minimise exposure to risks negatively impacting people’s health and human rights.
- Continue working in the face of adversity.
- Make the community and surroundings more resilient too.
- Highly efficient with the use of our limited natural resources.
- Lower energy consumption thanks to smarter design.
- Renewable energy powers the buildings and infrastructure (on-site or off-site).
- Mostly fossil-fuel free and is carbon neutral by offsetting all its emissions.
- Reducing and offsetting its embodied carbon.
- Smart, well-designed, managed and governed.
- Safe, comfortable, inclusive and of high amenity.
- Improve the urban fabric, enhance the local infrastructure, and provide value to the community.
- Designed for everyone, beyond accessibility compliance laws.
- Designed to respect and celebrate our culture and our history.
- Built with consideration of the rights of future occupants, the workers involved, those involved in the supply chain, and those in the surrounding community.
- considerate of the current and historic impacts to our natural environment.
- Reduce any impact on the site and enhance it as much as possible.
- Contribute to increasing the ecological value and biodiversity of the site and beyond.
- Connect green corridors in the city and work to enhance a city’s biodiversity.



Figure 3.32 Green Star Future Focus (Source: GBCA)

3.4.23 Green Star for Communities: A Future Focus Discussion Paper, Green Building Council of Australia (GBCA)

Green Star Communities aims to continue the success of Green Star on a precinct scale. It aims to provide a clearer definition of a sustainable precinct, as well as set a pathway for net zero precincts to be delivered over the next decade. Green Star Communities:

- Introduces a new set of categories and credits reflecting issues relevant to the market now and in the future
- Prioritises the elimination of carbon emissions from the built environment
- Considers impacts at a precinct and building level
- Establishes a clear, well-defined entry point for best practice precincts
- Caters to distinct sectors through the introduction of sector specific credit

Implications for Broadmeadow Structure Plan and Place Strategy

- A new definition of a community
- A broader scope of issues with a clearer and more accessible language.
- All projects to deliver carbon reductions.
- Exploring the goal of net zero emissions precincts by 2030.
- Including a focus on buildings.
- The rating tool will place greater weight on the sustainability of built form, whilst acknowledging diverse levels of control across precinct types.
- Ensuring that all projects deliver a minimum set of clearly defined outcomes that align with what stakeholders are wanting in a sustainable precinct, in the short and long term.
- Higher levels of sustainability leadership, with the recalibration of requirements for 4,5 and 6 star.
- More consistent categories and language across all rating tools -to maximise how tools may work together, reduce documentation, and increase understanding of the benefits.



Figure 3.33 Green Star for Communities: A Future Focus Discussion Paper (Source: GBCA)

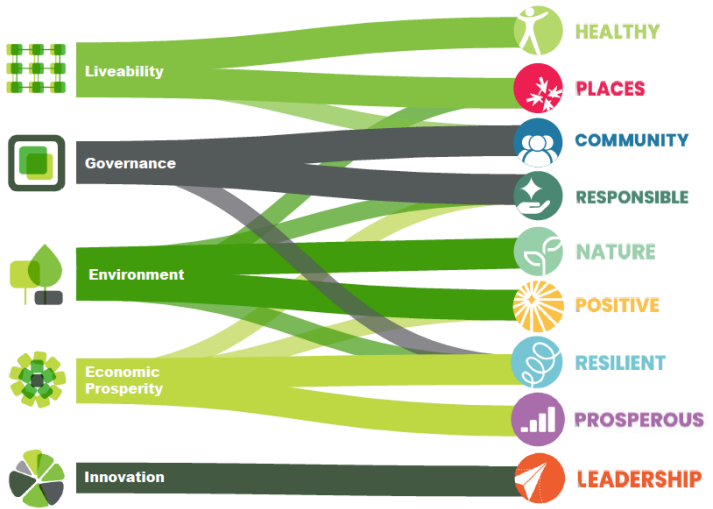


Figure 3.34 Alignment of old to new categories (Source: GBCA)

3.4.24 Climate Positive Roadmap for Precincts, Green Building Council of Australia (GBCA) 3.4.25 Green Star Buildings v1, Green Building Council of Australia (GBCA)

The Climate Positive Roadmap for Precincts contains a set of principles to guide precinct carbon reductions and ambitious targets for all new precincts to be climate positive by 2030 and existing precincts by 2050.

- It spells out the five key actions to achieve climate positive precincts:
- 1. Embed climate positive pathways into all stages of planning.
 - 2. Commit to fossil fuel-free precincts, and ensure policy and planning processes support this ambition.
 - 3. Remove the barriers to low carbon precinct energy solutions.
 - 4. Drive lower upfront carbon in materials and construction activity.
 - 5. Commit to delivering low carbon buildings in all precincts.

- Implications for Broadmeadow Structure Plan and Place Strategy
- Building & precinct scale energy generation and storage.
 - Electric vehicle optimisation for transport, solar energy capture and building consumption.
 - Intelligent microgrids and virtual power plants balancing energy supply and demand.
 - Precinct scale energy trading supported by networked metering and retail platforms.
 - Offsite power purchase agreements for renewable energy.
 - Capture of waste heat and coolth for re-use.

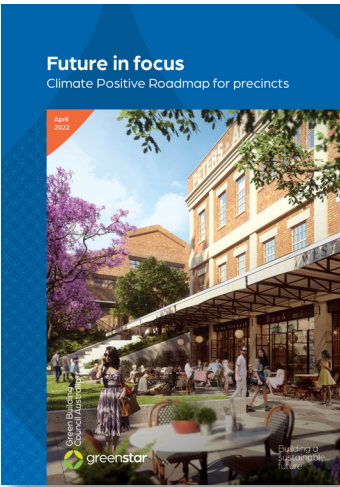


Figure 3.35 Climate Positive Roadmap for Precincts (Source: GBCA)

- Actions for government
1. Understand the cumulative carbon impacts of sustainable precinct development and develop frameworks for tracking their contribution to city and state carbon reduction targets
 2. On high priority precincts, provide the vision, clear governance frameworks for the design, approvals, and curation of the development following climate positive principles.
 3. Position government land organisations (GLOs) as leaders on climate positive precincts; trialling new innovations and partnerships
 4. Ensure all lessons are captured from government projects, and shared with industry stakeholders.
 5. Set zero carbon targets for all government delivered/operated social and transport infrastructure
 6. Ensure conversations with utility network planners addresses the need to support for innovative precinct energy solutions
 7. Plan and deliver sustainable forms of transport earlier in development areas, and prioritise the adoption of electric vehicles and supporting charging infrastructure
 8. Develop residential and business grant schemes to support the transition to all electric existing buildings.
 9. Develop plans to transition all infrastructure in the public domain to efficient, all electric and powered by renewables (e.g., street and open space lighting, maintenance facilities).
 10. Integrate climate positive principles into priority neighbourhood renewal strategies and explore how this can be delivered through statutory planning, education and behaviour change, and the upgrade of public spaces.

Figure 3.36 Actions for government to deliver climate positive precincts (Source: GBCA)

The latest version of the Green Star Buildings rating tool is the first to be aligned with the new focus areas aligned with megatrends. Some key insights we think will translate over to the newest version of the Green Star Communities tool:

- Implications for Broadmeadow Structure Plan and Place Strategy
- 10 Minimum Expectations that must be achieved by all projects
 - 6 Star rated projects must be designed to be fossil fuel free, powered by renewables, and built with low carbon materials
 - Rewards products that have lower environmental impact, are transparent, respect human rights, and are lower in carbon content
 - Creating a driver for low carbon products by introducing a requirement that must be met by all buildings to reduce their embodied carbon to achieve a rating
 - Climate Positive Pathway will increase in stringency over time.



Figure 3.37 Green Star Buildings v1 (Source: GBCA)

- Green Star Buildings v1 categories
- Responsible**: Recognises activities that ensure the building is designed, procured, built, and handed over in a responsible manner.
 - Places**: Supports the creation of safe, enjoyable, integrated, and comfortable places.
 - Healthy**: Promotes actions and solutions that improve the physical and mental health of occupants.
 - People**: Encourages solutions that address the social health of the community.
 - Resilient**: Encourages solutions that address the capacity of the building to bounce back from short-term shocks and long-term stresses
 - Nature**: Encourages active connections between people and nature and rewards creating biodiverse green spaces in cities.
 - Positive**: Encourages a positive contribution to key environmental issues of carbon, water, and the impact of materials.
 - Leadership**: Recognises projects that set a strategic direction, build a vision for industry, or enhance the industry's capacity to innovate.

Figure 3.38 Green Star Buildings v1 categories (Source: GBCA)

Credits	Criteria	2020*	2023*	2026*	2030**
Energy source	Renewable electricity	6 star	5 star	All registrations	All certifications
	Renewable energy	6 star	5 star	All registrations	All certifications
Energy use	10% reduction	All registrations			All certifications
	20% reduction	6 star	5 star	All registrations	All certifications
	30% reduction				
Upfront carbon emissions	10% reduction	All registrations			All certifications
	20% reduction	6 star	5 star	All registrations	All certifications
	40% reduction			6 star	All certifications
Other carbon emissions	Scope 1 eliminated or offset (refrigerants and fossil fuels)	6 star	5 star	All registrations	All certifications
	All remaining emissions offset (embodied carbon and other under control)		6 star	5 star	All certifications***

* Denotes year of registration
** Denotes year of completion
*** under consideration

Figure 3.39 Increasing stringency of Climate Positive Pathway over time (Source: GBCA)

3.4.26 Future of NABERS Energy (FoNE) Consultation Paper, NSW Government

Over the past decade, the property and energy markets have gone through several transformations, such as the decarbonisation of the grid and the rise in net zero emissions targets.

The Future of NABERS Energy project seeks to adapt NABERS Energy to these trends. NABERS has developed proposals in consultation with a Technical Working Group and the NABERS National Steering Committee, and is now inviting stakeholders to provide feedback. Key topics in this consultation paper include:

- Update to the emissions factors used in NABERS
- Recognition for net zero emissions
- Enhanced recognition for renewable energy purchases
- Aligning to the Greenhouse Gas Protocol's market-based carbon accounting method
- Renewable energy purchasing

Implications for Broadmeadow Structure Plan and Place Strategy

- Current average NABERS Energy ratings for 100% electric buildings in NSW is ~4 Star.
- Average NABERS Energy rating for 100% electric building in NSW based on predicted future National Greenhouse Accounts (NGA) emissions factors will be ~4 Star.
- Lower emissions fuel choices will continue to be rewarded in ratings.
- Over the past year, various Property Council Australia (PCA) members and Technical Working Group (TWG) members have requested that NABERS consider introducing a net zero emissions recognition for existing buildings, that could be conducted alongside a NABERS Energy rating.
- NABERS proposes to recognise buildings that are energy efficient and run on 100 % renewable energy with a NABERS Net Zero Emissions certification.
- The proposed NABERS Net Zero Emissions certification would be equivalent to the 7th star of NABERS Energy with GreenPower.
- The NABERS Net Zero Emissions certification would be different to Carbon Neutral in two ways:
 - The scope of NABERS Energy rating tools only includes energy consumed for the operation of the buildings: electricity and onsite fuels (typically gas and diesel). Therefore, the NABERS Net Zero Emissions certification would only include stationary energy.
 - Renewable energy would be the only method to achieve the NABERS Net Zero Emissions certification (as NABERS does not allow the use of carbon offsets).
- NABERS proposes to update the NABERS Energy with GreenPower tool to align with the market-based carbon accounting method.

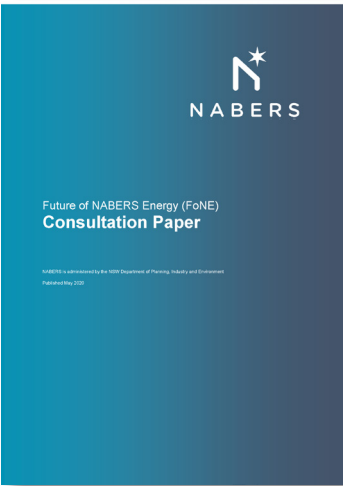


Figure 3.40 Future of NABERS Energy (FoNE) Consultation Paper (Source: NSW Government)

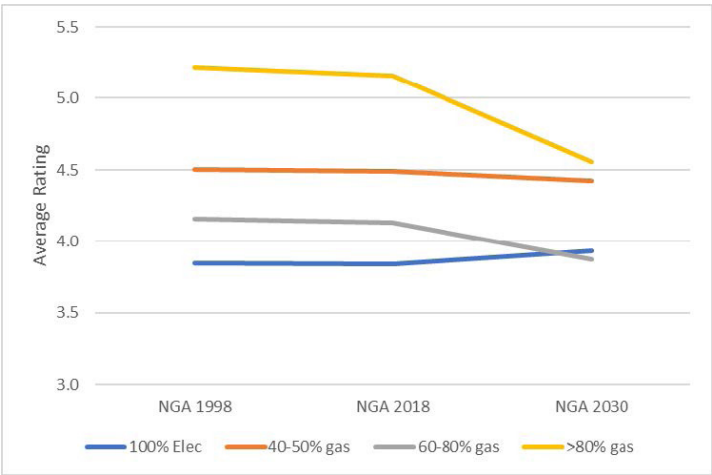


Figure 3.41 Average NABERS Energy for office base building ratings with updated NGA factor NSW/ACT (Source: NSW Government)

3.4.27 Embodied Emissions Consultation Paper, NSW Government

Australia currently has no consistent method of measurement for embodied emissions. Over 12 months, NABERS has worked in partnership with the GBCA and collaborated with industry and governments across Australia to understand the appetite for a standard for embodied emissions and the role of NABERS in administering that standard.

In developing this consultation paper NABERS has engaged with 207 individuals from 139 organisations across 38 workshops. The feedback from industry told us that NABERS has a clear role to play in accelerating efforts to reduce embodied emissions in Australia's commercial building stock.

NABERS has published a consultation paper containing 10 proposals for feedback covering five topic areas:

- Scope of the tool
- Calculation method
- Benchmarking
- Certification Process
- Future Development

The 10 proposals outline how a rating tool, which we are tentatively calling the NABERS Embodied Emissions tool, would measure, verify and compare embodied emissions in new buildings and major refurbishments.

Implications for Broadmeadow Structure Plan and Place Strategy

- Embodied emissions are an emerging focus for the property sector.
- There is no single accepted approach to calculating embodied emissions from buildings in Australia or globally.
- NABERS will provide an industry standard method for measuring embodied carbon.
- This will be tied to existing NABERS tools which are well understood by industry, and used by Government.
- It will provide consent authorities and developers a method for assuring and certifying true whole of life net zero.
- GBCA will recognise the NABERS Embodied Emissions tool as a verification pathway in the current 'Upfront carbon emissions' credit of future versions of the Green Star Buildings rating tool.
- Stakeholders recognised that, as the grid becomes less reliant on fossil fuels, operational emissions will fall and this will elevate the issue of embodied emissions.
- Stakeholders acknowledged that interest in measuring and reducing embodied emissions is increasing across all segments of the property sector, driven by influencers such as investors, developers, builders, suppliers and policy makers.

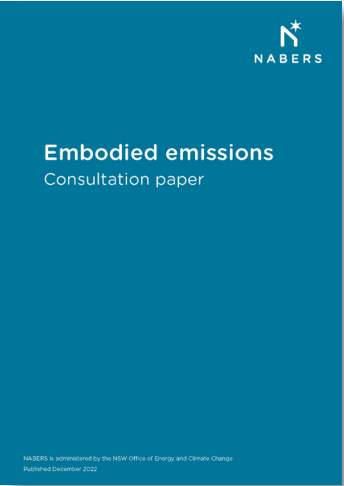


Figure 3.42 Embodied Emissions Consultation Paper (Source: NSW Government)

3.4.28 Climate Active, Australian Government

The Climate Active Carbon Neutral Standard is a voluntary standard to manage greenhouse gas emissions and to achieve carbon neutrality, and is the only government accredited carbon neutral certification scheme in Australia.

Climate Active is a world-leading, government-backed certification that is aligned to national and international greenhouse gas accounting protocols. focused on operational carbon emissions at present, with a probable future focus on upfront carbon as well. It provides best-practice guidance on how to measure, reduce, offset, validate and report emissions that occur as a result of the operations of a precinct.

Climate Active certification is available for :

- **Organisations** (Certification that the business operations of an organisation have resulted in a state of carbon neutrality)
- **Products** (Certification that a product being created, used and disposed has resulted in a state of carbon neutrality)
- **Services** (Certification that the provision of a service has resulted in a state of carbon neutrality)
- **Events** (Certification that the activities associated with running an event have resulted in a state of carbon neutrality)
- **Buildings** (Certification that the operations of a building have resulted in a state of carbon neutrality)
- **Precincts** (Certification that the operations of a precinct have resulted in a state of carbon neutrality)

Implications for Broadmeadow Structure Plan and Place Strategy

- Climate Active certification represents the Gold Standard for carbon neutral certification in Australia.
- Building certification is available through the National Australian Built Environment Rating System (NABERS) or the Green Building Council of Australia (GBCA).
- Climate Active certification sends a clear signal that organisations are serious about addressing climate change and committed to sustainability, innovation, and industry leadership.
- It provides an edge over competitors and taps into an increasing number of consumers driving the market for sustainable and ethical products and services.



Figure 3.43 Climate Active Carbon Neutral Standards for Precincts and Buildings (Source: Australia Government)

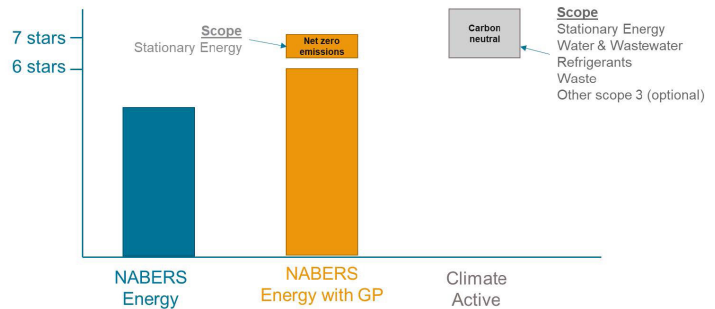


Figure 3.44 Difference between the NABERS Energy ratings tools and Climate Active Carbon Neutral certification for buildings (Source: NSW Government)

3.4.29 WELL Standard, International WELL Building Institute (IWBI)

The WELL rating system follows performance-based criteria that measure, monitor and certify parts of the built environment that have an innate impact on wellbeing and health of humans.

Its aim is to help prevent chronic diseases by using the built environment through the improvement of nutrition, mood, fitness, sleep patterns and performance of its occupants. It assesses how “healthy” a building is across 10 categories: air, water, nourishment, light, movement, thermal comfort, sound, materials, mind and community.

Implications for Broadmeadow Structure Plan and Place Strategy

- The COVID-19 pandemic had led to a rapid uptake of health, safety and well-being considerations in buildings, communities and organisations.
- Australia leads the market with about 25 per cent of commercial office space now WELL-enrolled, largely spurred by workplaces wanting to support a return to the workplace.
- The biggest momentum has come from the large real estate owners, which then influences the rest of the market.
- There is growing global awareness that by creating healthier buildings and a culture that prioritises human well-being, employers will benefit from a healthier, more productive workforce and building owners and property investors gain a higher-valued asset.
- There is growing demand from tenants for health-focused buildings.
- The existence and popularity of a health and wellbeing focused third party rating system in the marketplace demonstrates the enthusiasm from investors, tenants, and the public for places that contribute positive health outcomes.
- The rate of adoption both locally and globally demonstrates recognition that the Standard, its evidence-base, and its future pathway represents an authoritative exemplar of healthy places.



Figure 3.45 WELL Building Standard (Source: IWBI)



Figure 3.46 WELL Community Standard (Source: IWBI)



Figure 3.47 10 WELL concepts (Source: IWBI)

1.B.1 State Environmental Planning Policy (Sustainable Buildings) 2022 & Local Environmental Policy 2012, Amendment (Blackwattle Bay Precinct)

The SEPP and LEP are planning policies that have to be implemented at Bank Street Park.

Sustainability standards for non-residential development come into effect from 1 October 2023.

SEPP implications for Bank Street Park:

- This SEPP affects all new non-residential development with a capital investment value of \$5 million. The new buildings at Bank Street Park will be impacted by this.
- The development should be designed to enable:
 - the minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials,
 - reduction in peak demand for electricity, including through the use of energy efficient technology,
 - reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design,
 - the generation and storage of renewable energy,
 - the metering and monitoring of energy consumption,
 - the minimisation of the consumption of potable water.

SEPP Amendment (Blackwattle Bay Precinct) 2022 & Local Environmental Policy 2012, Amendment (Blackwattle Bay Precinct)

The SEPP and LEP both contain the following implications for Bank Street Park:

- Deliver a world class foreshore walk that is in the public domain
- Public site links from Bank Street through to the foreshore
- Public foreshore promenade should have a minimum width of 10m that is clear of buildings and other permanent structures
- For erection of buildings:
 - development is consistent with the Blackwattle Bay Design Guidelines
 - building is capable of achieving a Green Star building rating with a “credit achievement” in Credit 22: Energy Use, or a standard the consent authority is satisfied with
 - public utility infrastructure i.e. water, electricity supply, sewage disposal/management, essential for the development is available, or adequate arrangements have been made to make the infrastructure available when it is required
 - the development will not result in the number of car parking spaces exceeding 1 space for every 1,100m² of gross floor area used for business premises and office premises in the Blackwattle Bay Precinct.
 - New buildings must not exceed GFA stated in 6.68 (2) of the LEP