



ECOLOGICALLY SUSTAINABLE DESIGN (ESD) REPORT

128 Bunnerong Road and 120 Banks Avenue, Eastgardens NSW 2036

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1 Introduction – BATA 2 Master Plan

The Stage 2 Concept is the vision of SJB Architects and will be constructed by Karimbla Construction Services (NSW) Pty Ltd, also referred to as Meriton. The masterplan seeks to re-purpose an industrial site into a future proofed and sustainable community.

The concept design will; support a diverse and growing population, group together recreational, employment, retail, and leisure, focus on walkability to neighbouring amenities including Westfield Eastgardens, the golf club and the bus interchange.

This master plan addresses the National Strategy for Ecologically Sustainable Development by:

- Being a design concept that allows for large open parklands throughout the site. Green roof tops, an extensive Water Sensitive Urban Design (WSUD) strategy and a landscape plan that promotes local flora and fauna.
- Promoting active and public transport modes, extensive bike paths and bike parking provisions, space for share cars and a significant commitment to Electric Vehicle charging stations.
- Energy efficiency optimised, with real time energy consumption monitors installed to all units and managing the residential base building energy demands.
- Generation of solar power onsite
- Extensive community facilities for use by the residents and wider community.

This development will be an asset that will be enjoyed by the wider community well into the future



2 Aim of the Report

Efficient Living have prepared this revised Ecologically Sustainable Design (ESD) report to accompany a submission for BATA 2 - Integrated and Staged Concept Development at 128 Bunnerong Road and 120 Banks Avenue, Eastgardens in response to:

- Sydney Eastern City Planning Panel Report. Panel reference: PPSSEC-21 - Bayside Council Project & DA No: DA-2019/386 - BATA 2 - Integrated and Staged Concept Development and;
- Atlas Urban, BATA 2 Concept plan review

The following table outlines the **ESD controls** applicable to the site.

Botany Bay Local Environmental Plan 2013
Design excellence 6.16/1. The objective of this clause is to deliver the highest standard of sustainable architectural and urban design. 6.16/4. In considering whether the development exhibits design excellence, the consent authority must consider the following matters; 6.16/4/d. The achievement of the principles of ecologically sustainable development.
6.18 The development control plan must provide for all of the following – The application of the principles of ecologically sustainable development,
Regulatory Requirements
NatHERS and BASIX controls All residential dwellings and class 2 common areas with-in the proposed complex will comply with NatHERS whole of house and or BASIX regulations.
Section J and/or NABERS All commercial floor area including; Retail, Office, Pools, Gyms, Day cares, Co-working space, Public use community rooms and serviced apartments will comply with Section J, Energy Efficiency of the National Construction code, or an alternative pathway deemed acceptable, ie. NABERS energy.

As detailed in the Atlas Urban review, the DA for each stage is anticipated to pass through a rigorous assessment including the Bayside Design Review Panel, this means that the individual buildings will be required to meet the standards of excellence.

The purpose of this ESD report is to highlight the sustainability initiatives targeted in the Concept Design and list precinct-wide Sustainability Strategies.

The National Strategy for Ecologically Sustainable Development is referenced in the Atlas Urban report. This strategy defines ecologically sustainable development as:

'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.

3 A Landscaped Setting

As Australia's need for Urban Density increases, dwelling's become smaller, facilities are shared, public and active transport trends shift and this ultimately drives down the ecological footprint per capita; a big win for the environment.

Our cities of the future need to allow humans to still feel attached to natural environments. Increased building heights need to be balanced with large open spaces where community can come together and recharge in nature.

6.2 URBAN HEART & COMMUNITY PARK



6.3 RECREATIONAL PARK



3.1 Master Plan Concept

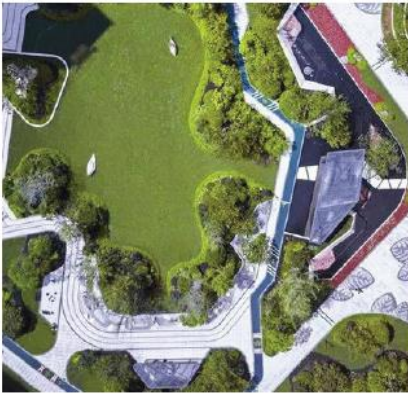
The master plan for the BATA 2 site was designed around the principals of a landscaped setting. Key features include:

- Retention of existing established trees to the perimeter of the site.
- Public Domain area of 30,000m² with 30% tree canopy cover.
- In excess of 20,000m² of soft scape area.
- Landscaped settings to selected roof tops.

3.2 Green roofs

In addition to all on grade landscaping; all podiums and most of the lower level roof tops will have grassed areas, garden beds and allocated areas for deep soil planting to support larger trees. These areas will be for the exclusive use of the residents within the associated buildings.

HIGH BUILDING COMMUNAL PODIUM



MEDIUM BUILDING COMMUNAL PODIUM



3.3 Tree Canopy Cover

Basement car parks have been exchanged for above ground facilities allowing a large portion of this site to have direct contact with the earth for deep soil planting of significant trees. Trees and plants will be selected that are native to the area and will support the return of local fauna. The natural setting will provide opportunities for structured and wild play, and many private and open spaces for people to relax and reconnect. Landscape settings improve air-quality, stabilise air temperatures, provide shade, increase mental health, encourage physical activity, improve storm water quality and reduce runoff.

3.4 Community vegetable gardens

Each building will have elevated garden beds dedicated for the exclusive use of the residents within the associated building to participate in community run edible garden programs.



3.5 Urban Heat Island Effect

The extensive amount of on grade, podium and roof top gardens significantly reduce the impacts of Urban Heat Island Effect. The roof tops with-out green roofs will be covered with Nepean gravel which has a neutral tan colour.

Sydney's construction trend has included urban sprawl with a lot of hard surfaces and dark external colours. This new era of development will start to reverse these impacts by absorbing the heat energy back into the natural environment.

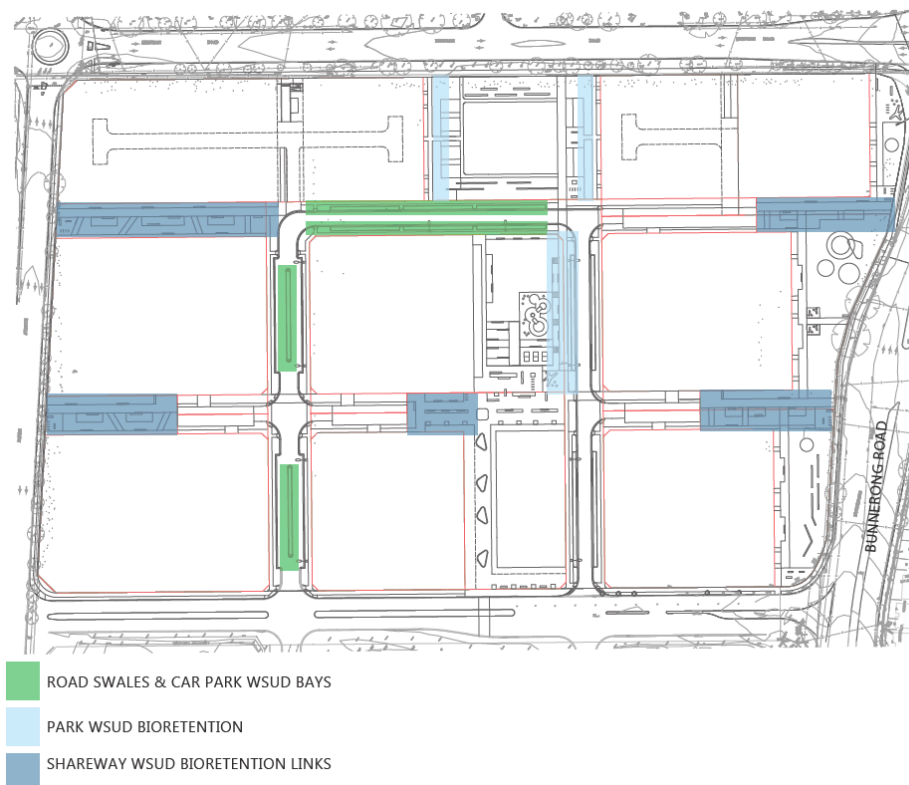
4 Water

The National Strategy for Ecologically Sustainable Development requires new development to not only conserve but enhance the community's resources now and into the future.

Urban sprawl has placed excessive stress on Sydney's storm water systems. Increased populations require a smarter approach to the use of mains water and discharge of water into sewer systems.

4.1 Water Sensitive Urban Design

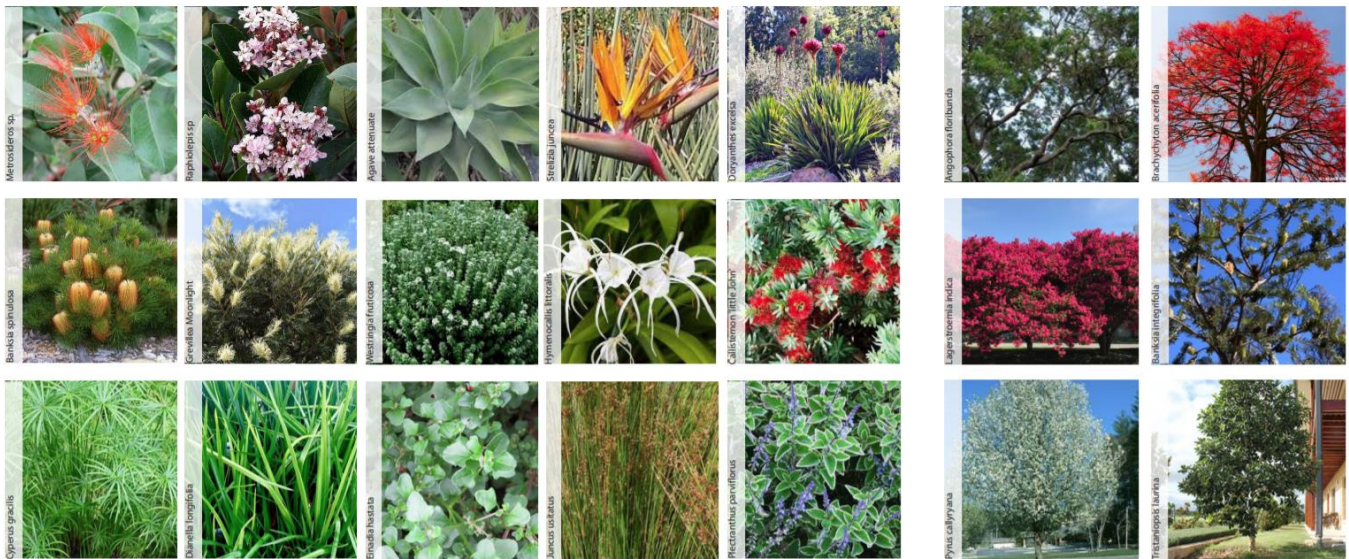
The replacement of basement carparks for above grade parking solutions maximises the amount of deep soil landscaped area allowing rain to absorb into the water table. The grass, plants and trees absorb the rain and improve soil quality, allowing the soil to hold more water. The landscape plan has surfaces finishes and levels designed direct stormwater overflow into bio-filtration gardens, swales and basins. This will improve stormwater quality and mimic natural systems.



4.2 Landscape & Irrigation

The landscape design focuses on low water native plant species. These plants require significantly less water to thrive. Irrigation systems will comprise of subsurface drip systems and automatic timers with rainwater/soil moisture sensor controls.

The proposed landscape design will include 70% native and endemic tree species and 50% native and endemic shrub and groundcover understorey plant species in the public domain areas.



4.3 Rain Water Tanks

The roof tops and landscape podiums area ideal for the capture and reuse of rainwater. These areas will feed into rainwater tanks and be used to water the common area gardens.

4.4 Fixtures and Fittings

Water efficiency with-in the complex not only reduces the need for mains water but also reduces the load on the sewer systems. The development will reduce mains water consumption by installing the following fixtures and fittings:

Fixture Type	WELS Rating
Taps	5 Star
Urinals	4 Star
Toilet	4 Star
Shower	6L to 7.5L per min
Dishwashers	4 Star

5 Carparks

As the needs of our communities evolve our buildings and ideas need to be adaptable to facilitate the housing needs of the future.

A traditional approach to large scale multi-residential living includes significant excavation of a basement carpark covering the vast majority of the site with a series of towers creating a single united building. There is a significant environmental implication to this.

Environmental Impact

On grade construction is faster and has less impact on the local community, flora and fauna during construction.

Embodied Energy

Basement carparks require more concrete and steel than providing the same amount of parking above ground.

Energy Efficiency

Basement carparks require more energy for mechanical supply and exhaust fans and lighting

Landscaping

Basement carparks reduce the ability to plant trees of significant size across the site.

Stormwater management

Basements carparks do not allow natural absorption of rainwater back onto the water table.

71	<i>Encourage the preparation of low-carbon, high efficiency strategies to reduce emissions, optimise the use of water, reduce waste and optimise car parking provision where an increase in total floor area greater than 100,000 square metres is proposed in any contiguous area of 10 or more hectares.</i>
72	<i>Investigate potential regulatory mechanisms such as a Protection of the Environment Policy (PEP) that sets low-carbon, high-efficiency targets to be met through increased energy efficiency, water recycling and waste avoidance, reduction or reuse. This could include a framework for the monitoring and verification of performance for Priority Growth Areas, Priority Precincts, Collaboration Areas, urban renewal precincts and housing growth areas that are planned to have an increase in total floor area greater than 100,000 square metres.</i>

Meriton carried out a preliminary analysis on the carbon footprint of the excavation phase, and the environmental savings for the trucks alone is equal to removing 513 cars off the road for a year.

Scenario - BATA STAGE 2 , Pagewood	
1,422	Total No. of Car Spots
189,195.55	m3 of excavate spoil material
13,048	truck movements (say 14.5T of spoil per truck)
120	km per movement (avg 60km each direction to Spring Farm waste/tip)
1,565,756	truck km travelled for excavation works
850	g/km (carbon truck emission)*
1,330,892,856	total g (carbon)
1,330,893	total kg (carbon)
1,331	total T (carbon)
2.59	T/km p.a. (Cars 184g/km NSW average 14,100km/yr)
513.0	cars on the road p.a. (NSW average)
7,233,113	car km travelled p.a.
5,489	daily car trips (avg 10.7 day/dwelling RMS Guide Traffic Generation)
1,954,069	yearly car trips

1 Carspot = 133m3 soil. (Refer to Tab)

	Area (m2)	Basement Lvl	Slab-to-Slab Height	Volume (m3)	
Phase 1	N/A	N/A	N/A	N/A	
Phase 2	6,226	2	2.7	33,620	
Phase 3	6,746	2	2.7	36,428	
Phase 4	4,959	2	2.7	26,779	
Phase 5	277	1	2.7	N/A	
Phase 6	6,096	2	2.7	32,918	
Phase 7	5,280	2	2.7	28,512	
Town Houses A+B	11,415	1	2.7	30,821	
total	40,999			189,078	m3
			Approx	1,421.64	Car spots

* [Average 700-1000g/km] DR DAVID HOWEY, DR ROBIN NORTH and DR RICARDO MARTINEZ-BOTAS (October 2010). Road transport technology and climate change mitigation: Grantham Institute for Climate Change, Briefing paper No 2, p. 4.

** Ausgrid 2016-17 Local Council Community Electricity Report

*** NSW emission factor 0.87 carbon (kg) per kwh (<https://coolaustralia.org/wp-content/uploads/2013/12/Calculating-GHG-emissions.pdf>)

5.1 Future proofing

This proposal already has less car parking allocation per unit than BATA 1 because society's trend is very quickly moving away from privately owned vehicles, and additional bike parking allocation has been given to support active forms of transport. Share cars, UBERS, public transport, etc. are on the rise and we will soon move more towards a driverless society where On Demand transport is favoured over private car ownership. As this evolution happens carparks across the world need to be repurposed, for this reason continuing to build significant underground structures does not make sense. BATA 2 will be ready and able to easily convert unused carpark into future land uses as the need arises.

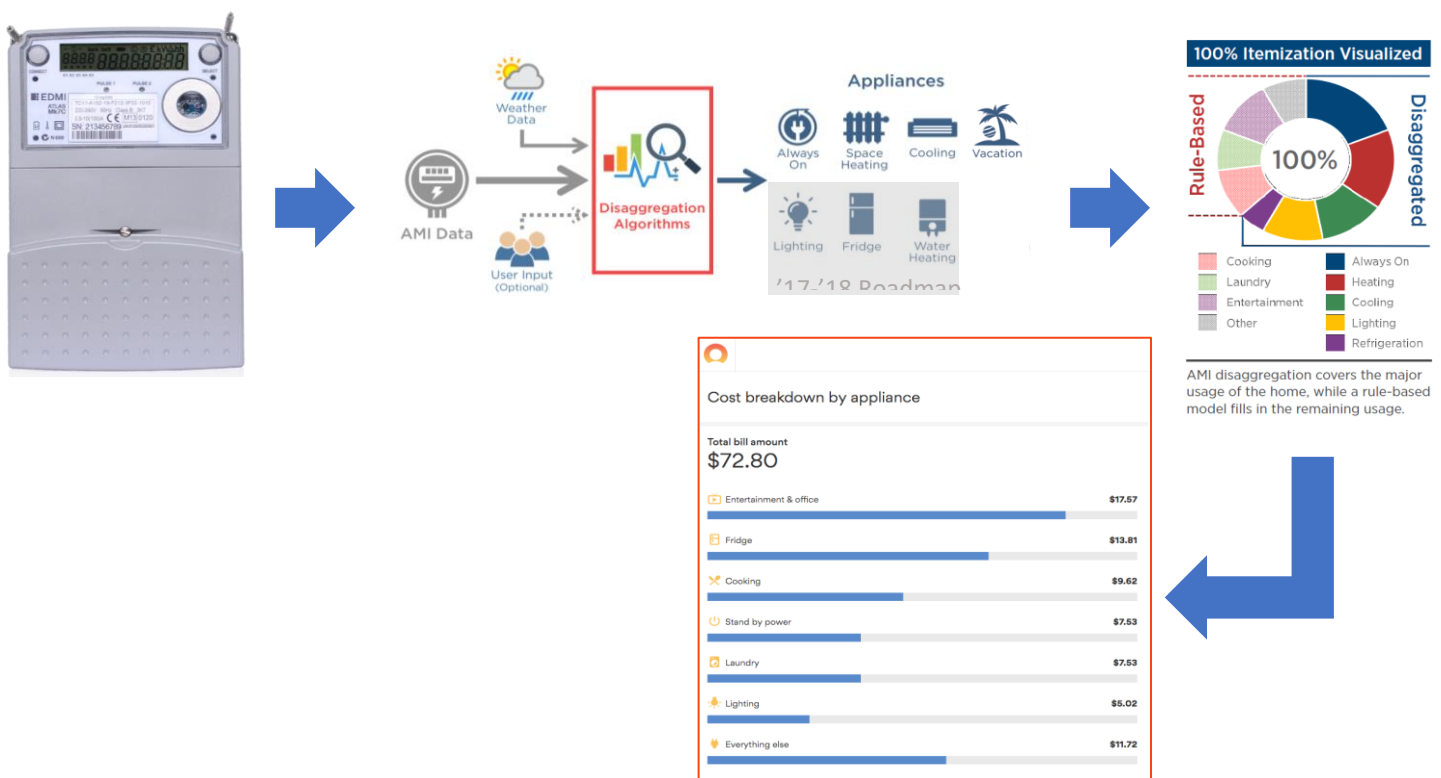
6 Energy

6.1 Embedded Energy Network

Meriton will be partnering with a leading energy provider to deliver an embedded energy network. Embedded electrical networks are privately owned and operated metering networks that allow high-rise residential buildings to pool their electricity purchasing power and share in discounted electricity prices. Embedded networks deliver benefits for the builder, the Owners Corporation and the end customer. They are also recognised by the Green Building Council as a favourable solution for multi-residential developments.

6.2 Knowledge is power

Consumer education is a very powerful tool in curving occupant behaviour and delivering energy savings. As a commitment to energy efficiency all occupants in this development will be provided with an app that gives them real-time energy usage data. Occupants will see the dollars and cents impact of running the air-conditioning compared to opening the doors or leaving the lights on when the leave the unit, this over time equates to changes in lifestyle habits and big wins for the environment.



6.3 Common area energy reduction and optimisation

Each of the residential buildings will have a Building Management System (BMS) connected to all major energy consuming systems with-in the common areas. Most of the strata's energy is consumed in the lifts, lighting and ventilations systems. This BMS will feed real-time data to building managers and allow them to optimise and control energy efficiencies on a daily basis.

6.4 Lighting

Meriton will use LED lighting solutions throughout common areas with zoned switching and motion sensors.

6.5 Ventilation

The carparks ventilation systems will have fans with carbon monoxide monitors and variable speed drives. Where practical energy savings can be made in the above ground carpark via a supply air with natural exhaust system.

6.6 Lifts

Meriton partner with KONE as a preferred lift supplier, to provide lifts across most of their projects. KONE offer superior energy efficiency than most other suppliers. The KONE EcoDisc motor acts as a generator, and the car, counterweight and braking system generate energy that is converted into electrical current that can be used elsewhere in the building or to drive other elevators. Up to 30% energy savings with regeneration and permanent magnet motor. In addition to this the higher buildings will have destination control programed lifts to further reduce energy consumption.



6.7 Solar Energy and Lighting

Solar Energy

The podiums and low roof areas will be utilised for communal open space and roof top gardens while the high roof areas will have space dedicated to the installation of Photovoltaic panels where practical. The energy generated from these solar systems will be used to power the common areas.



Solar Lighting

The community open space will feature solar power lighting.

The solar lighting will be used in selected areas with good solar access.

Not only will this reduce energy consumption but it is also a good education and awareness feature for the wider community.

7 Waste and Recycling:

7.1 Demolition and Construction waste

Meriton will partner with an ecologically aware waste contractor such as, Bingo Industries for the building demolition and waste resource recovery solutions on this site.

Bingo Industries have a 'Waste Free Australia' objective and they support a circular economy by turning waste into recycled products.

Meriton can commit to a 90% target recycling all construction waste for Stage 2 BATA. Meriton and Bingo Industries are currently achieving in excess of 94% for a current construction site at 180 George Street, Parramatta.



7.2 Durability and Longevity

The average life span of a strata building far exceeds that of a single residential home. Meriton always build with the same tried and tested construction methods and building inclusions because they are high quality, durable and low maintenance.

7.3 Reduced Consumerism

The environmental footprint of people living in a unit over a suburban home is significantly reduced, due to; lower heating and cooling energy loads, greater reliance on public transport, smaller spaces to furnish and less room to store clothes and goods. This often leads to the occupant buying less and investing in better quality.

7.4 Waste sorting and storage facilities

The waste sorting rooms on each level will contain a general waste garbage shoot and recycling bins. The building manager will organise daily collection of recycling bins. Waste storage rooms for commercial and residential areas of the building will be kept separate.

7.5 Composting facilities

BATA 2 plans to take waste recovery 1 step further. All common area podiums will be fitted with community vegetable gardens and to compliment this composting facilities will be provided for the use off all residence.

Food waste disposed of in landfill rots and becomes a significant source of methane – a potent greenhouse gas with 21 times the global warming potential of carbon dioxide. Using worm farms to process food waste stops the carbon emissions and allows the waste to naturally return to the feed cycle.



Compost & Community

It's a garden, its a bench seat and it will compost tonnes of food waste per year with no smells or mess. Subpod makes community composting simple and beautiful. Good compost grows food and friendships.

8 Transport

8.1 Private Vehicles

A key feature of this master plan is the reduction of private car parking spaces and a greater emphasis on active and public transport solutions. The Concept plan incorporates car parking at the following rates;

- 0.6 spaces per 1 bedroom unit
- 0.9 spaces per 2 bedroom unit
- 1.4 spaces per 3 bedroom unit
- 1 space per 20 dwellings for visitors
- 1 space per 80m² of retail and
- 1 space per 30m² of supermarket.

This represents a significant reduction compared to BATA 1.

8.2 Car share facilities

Parking allocation for dedicated car share services will be provided throughout the site.

8.3 Public Transport

The site is located on a key transport link hub, close to the bus interchange at the Westfield Eastgardens with several routes providing short trips to the CBD via Southern Cross Drive (M1) and Anzac Drive, eastern suburbs beaches and many other areas in Sydney. The routes include Route 392, 400, 420 and 144. Mascot train station is around 6km drive or short bus ride away from the site and connects users with key employment areas.

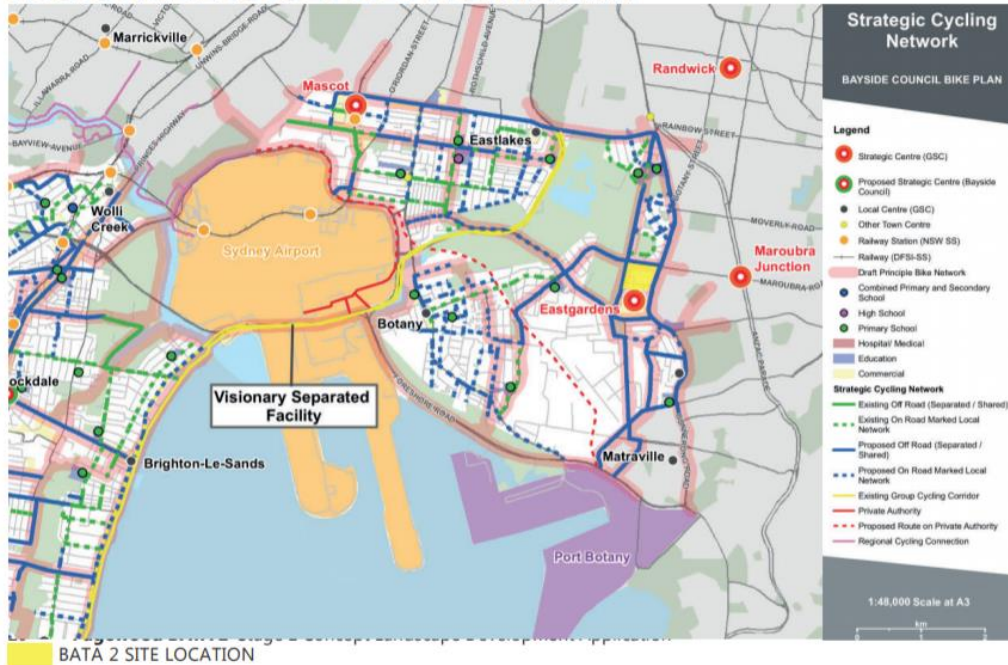
8.4 Push Bikes

There is significant investment going into the creation of walking and bike paths throughout the site and into the wider community. With such a great focus on active transport into the future and drawing the wider community into this site the path infrastructure is a major feature of this Master Plan.

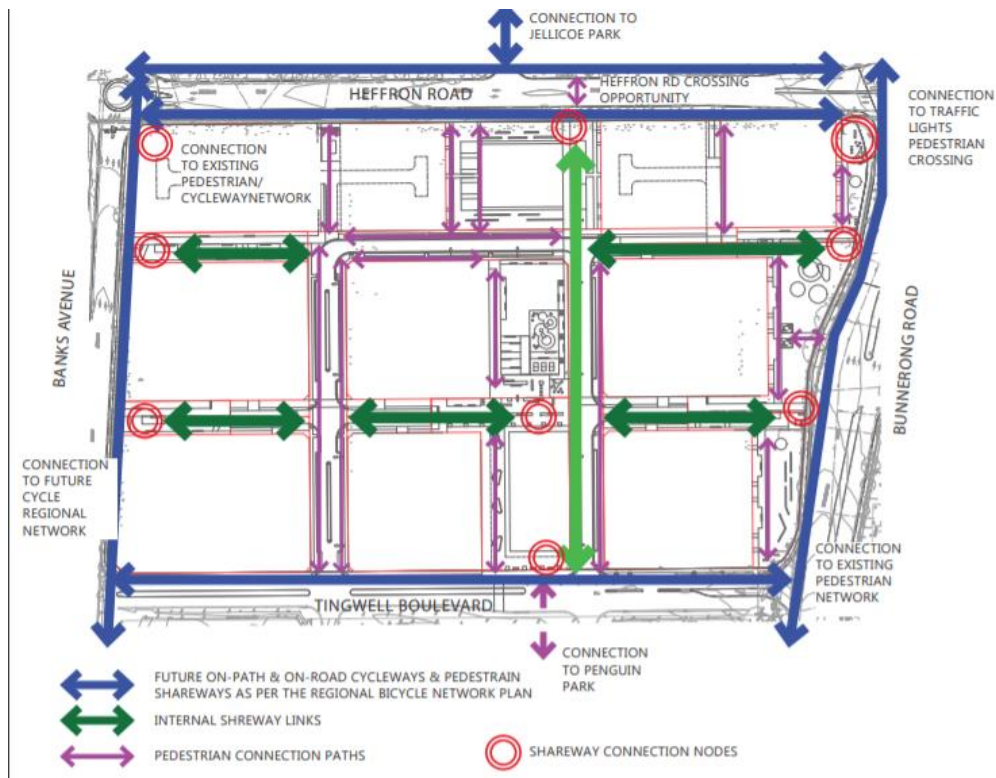
SHAREWAY LINKS



REGIONAL BICYCLE NETWORK PLAN



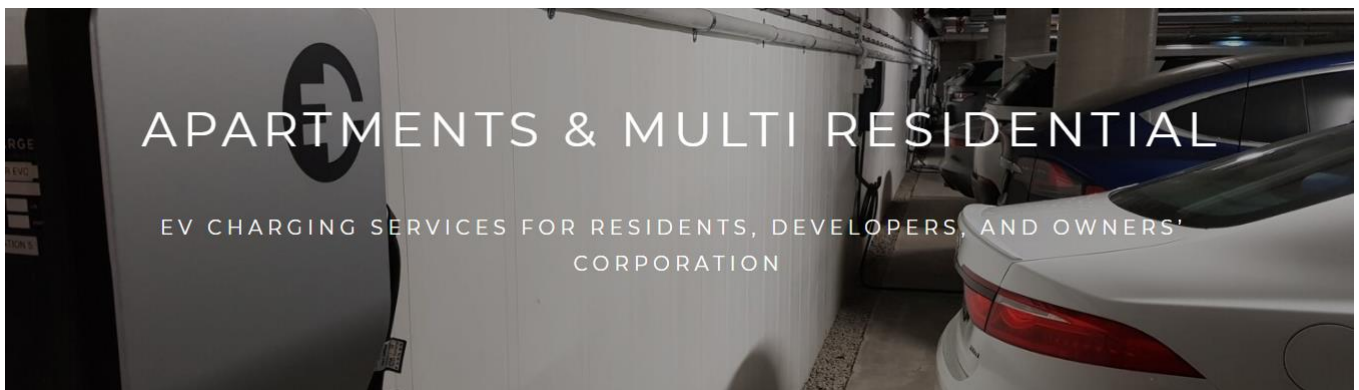
5.3 SHAREWAY / CYCLE WAY NETWORK & ENTRY NODES



Connecting pathways are provided throughout the site and into the greater community to encourage active transport modes including: walking, bicycles, skateboards, etc.

8.5 Electric Vehicles

Meriton are committed to supporting Electric Vehicles (EV) trajectory targets and will be partnering with an experienced third party EV infrastructure expert to provide integrated custom EV charging networks within the sites electrical system. Meriton have committed to 20% of the car parking spaces as being EV capable during construction by implementing a smart energy load management system. This is well in excess of the 5% target set by the Green Building Councils recommendation under the Green Star tool and over time home owners can sign up to the EV infrastructure provider's service agreement for EV charging.



8.6 The future of Electric power transport

Electrical cars are just the beginning, with an increased focus on health and social distancing our countries bike paths have never been busier. Service agreements with, a EV charging specialist can also cater for charging electric bikes, scooters and electric Penny Farthings.



9 CO² Emission Reduction

Many of the above initiatives will significantly reduce the CO² emission throughout the construction process and life of the development including;

- A significant carbon savings from reduce truck movements by avoiding excess excavation.
- Less private cars and greater reliance on public and active transport.
- Ability for future residence to access electric car charging stations reducing our reliance on petrol.
- Energy savings from smarter lift technology.
- Worm Farms reducing the food waste going to landfill and releasing greenhouse gases.
- Solar Energy used to power common areas and public area lighting.
- Energy savings from occupant education and access to time of use energy monitors.

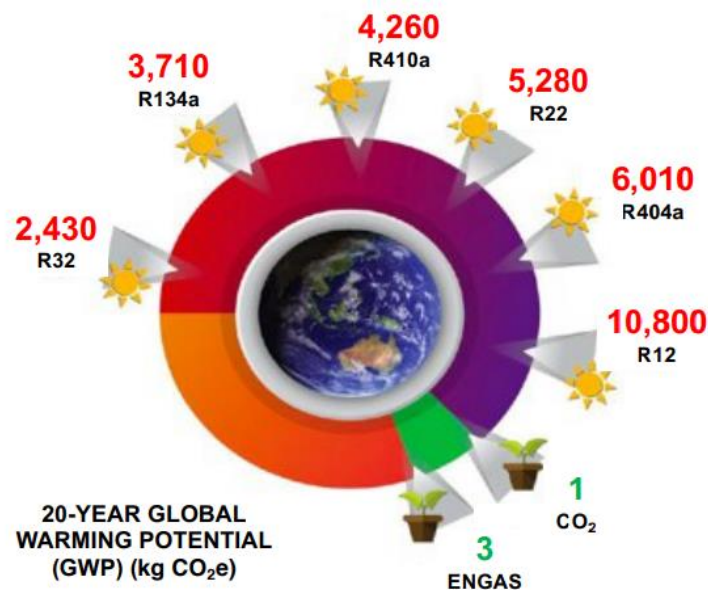
There is another less talked about but major contributor to our countries Co2 emissions and that is the leakage of refrigerant from our ever growing number of air-conditioning units.

9.1 The Impact of Air-conditioning units

- Refrigerant leakage from air conditioning is estimated at 9% of the refrigerant volume, each year, on average. Direct greenhouse emissions from AC refrigerant leakage is significant.
- Local Governments, such as City of Sydney, are beginning to encourage air conditioners in new developments have a GWP of 3 or less. Most chemical refrigerant air conditioners have a GWP of more than 200 times this.
- Air Conditioners with hydrocarbon natural refrigerant are also more energy efficient. The improved energy efficiency reduces the indirect greenhouse emissions from the electricity used. For instance, 1 x 9kW Pioneer AC in an apartment can save 1,298 kg CO² p.a., compared to a new chemical refrigerant air conditioner of the same product class, from the reduced electricity consumption.

Refrigerant	20-yr kg CO ₂ e	100-yr kg CO ₂ e	Life time (yrs)
R22	5,280	1,760	11.9
R410a	4,260	1,924	28.2
R32	2,430	677	5.2
Hydrocarbon	< 3	< 3	< 1

This table shows the kg of CO² equivalent for every 1 kg of refrigerant and its atmospheric lifetime.



Meriton is committed to low Global Warming Potential (GWP) air-conditioning. Meriton can install Pioneer Air-Conditioning systems with a GWP of 3. Retrofits are also taking place in their existing building stock.

The majority of main stream air-conditioning suppliers do not currently have a LowGWP option on the Australian market. Major brands like Meriton throwing their support behind this technology encourages other brands to follow suit. Deakin have recently announced they are developing a Low GWP solution known as R32 - Next Generation Refrigerant that they planning to release to the Australian market in 2023.

AIRAH, Australia's peak Air Conditioning industry body has published strong directives such as the following:

"The biggest threat is to do nothing. The phase-down is a reality, the transition to low Global Warming Potential (GWP) technology must happen, the industry must rise to the challenge...the first best thing anyone in the industry can do is to learn about the low GWP refrigerant-based solutions...Stop designing and installing with high GWP refrigerants, now!"

10 Conclusion

The proposed Concept embraces many ideals targeted by cities of the future. Incorporating dwelling types ranging from two storey, 3 bedroom town houses to 1 bedroom high rise apartments and affordable housing to support diverse communities. The site is ideal for the active transport objectives, the inclusion of day cares, supermarkets, retail and alfresco dining; creating jobs and increased self-sufficiency. The latest technologies will be embraced to reduce carbon footprints. The roof top and terrace community gardens turn otherwise unusable spaces into intimate community hubs, while the 20,000m² of community open space with-in the complex create a connection with nature for the wider community.