



Full Circle
Design Services

March 2026

Main Street Ellenbrook

Sustainability Strategy

Graham Agar

FULL CIRCLE DESIGN SERVICES



Full Circle Design Services

Telephone: 0412 475 819	Report N°: 2025_101_ESD_REP_01
Email: graham.agar@fcds.com.au	Original Date of Issue: 7 th January 2026
ACN: 163 742 890	
ABN: 84 163 742 890	

Title:	Main Street Ellenbrook - Sustainability Strategy
Author:	Graham Agar
Client:	Space Collective Architects
Contact:	Felipe Soto
Description:	This report provides the ESD strategy for the proposed multi-residential development on Main Street in Ellenbrook. The project includes around 40 apartments, over four levels across two 'blocks'. The design also includes two commercial tenancies fronting Oval Vista. The design is targeting best practice sustainable design features across a range of assessment categories including low carbon operations, renewable generation, thermal performance, health and wellbeing and sustainable transport.

Revision	Date	Checked by		Transmitted by	
A	7 th January 2026		CR		GEA
B	2 nd February 2026				GEA
C	25 th February 2026				GEA
D	1 st March 2026				GEA

Distribution	Revision								
Receiver	A	B	C	D					
SCA	X	X	X	X					

Executive Summary

The multi-residential development on Main Street in Ellenbrook is seeking to provide around 40 new dwellings, with a range of 1 bed, 2 bed or 3 bed apartments available.

The design includes car parking for residents, the two commercial tenancies and visitors with entry at ground level off Fruin Loop.

Apartments have thermally efficient envelopes with sensible glazed areas well protected by balconies or vertical reveals.

Considering the nature of the project and its location, the project team have developed four key sustainable design themes which support the project's value proposition and add to the experience for owners and occupiers:

- Healthy living
- Minimised footprint and operational costs
- Community Benefits
- Sustainable transport

Supporting these themes are a range of sustainable design features and inclusions which will provide verifiable performance improvement over current business as usual design and construction practices. These features include:

- Photovoltaic array on site
- Highly walkable location
- Low embodied energy
- Electric vehicle infrastructure
- Envelope performance improvement and passive design
- Outdoor communal amenity areas
- Biodiversity improvement and native planting
- Fossil fuel free site
- Low GWP refrigerant

This report provides additional information on the proposed themes and the verification pathway for the project.

Contents

Executive Summary.....	1
1. Introduction.....	1
1.1 Project Description.....	1
1.2 Existing Site.....	1
1.3 Strategic Project Aims	2
1.4 Initial Review Response.....	3
2. Healthy Living.....	4
2.1 Low Toxicity Materials.....	4
2.2 High Performance Envelope.....	5
2.3 Natural Ventilation.....	5
2.4 Acoustic Performance.....	5
3. Minimised Footprint and Operational Costs.....	6
3.1 Considered Development.....	6
3.2 Fossil Fuel Free Site.....	7
3.3 Waste Management.....	7
3.4 Embodied Energy.....	7
3.5 Renewable Energy.....	8
3.6 Overall Performance.....	8
4. Community Benefits.....	9
4.1 External Amenities.....	9
4.2 Additional Street Activation	9
5. Climate Resilience	10
5.1 Risk Review.....	10
5.1.1 Flood Risk – Very High Inundation Scenario.....	11
5.1.2 Bushfire Prone Areas.....	11
5.2 Design Response.....	12
5.2.1 Water Efficient Fittings.....	12
5.2.2 Native or Drought Tolerant Planting.....	13
5.2.3 Urban Heat Island Mitigation	13
6. Sustainable Transport.....	14
6.1 Electric Vehicle Facilitation.....	14
6.2 Alternative Transport.....	15
7. Feature Summary.....	16

1. Introduction

FCDS have been commissioned to assist the Main Street Ellenbrook design team in developing and implementing a holistic sustainable design strategy which meets best practice design outcomes and provides verifiable performance metrics for external review and comment.

This report presents the proposed ESD themes the project has elected to pursue and outlines key design features to deliver measurable performance against these themes.

1.1 Project Description

The development includes 40 dwellings – including a range of 1 bed, 2 bed and three bed typologies.

Apartment layouts are consistent between levels, minimising conditioned envelope and providing a thermally efficient form. The building also includes undercover parking, with communal green space and outdoor communal amenity areas for both blocks.

1.2 Existing Site

The existing site is vacant and within a developed residential town area. The new development can improve biodiversity outcomes for the area with additional native planting whilst increasing local population density and addition of amenity.



Above: Lot Location (Google Maps)

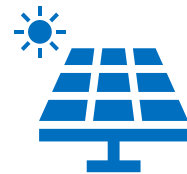
1.3 Strategic Project Aims

In progressing this development, the project team are keen to deliver best practice sustainable design outcomes for occupiers, owners and the surrounding community and, therefore, have selected the following key sustainable design themes for the project. Design features, aligning with national best practice, have also been proposed as a means to demonstrate the project has met its intended outcomes:

- Healthy living
 - The design should promote occupant health and wellbeing, both through internal design decisions and access to external spaces.



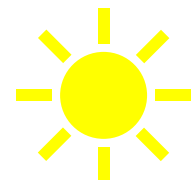
- Minimised footprint and operational costs
 - The design must ensure that operational utility use – such as energy and water – are minimised, with long life cycle products and low carbon technology where possible.
 - The development should minimise impacts to nature and local ecology.



- Community Benefits
 - The development is intended to provide an excellent outcome for the local community, with additional residences supporting a range of sizes from 1 bed to three bed – with a focus on two bedroom apartments.



- Climate resilience and future focus
 - The development has a design life of in excess of 50 years. The final product must provide high performance in current climatic conditions, with flexibility and resilience to suit weather patterns in 2080 and beyond.



- Sustainable transport
 - The location of the project can assist occupants in reducing their dependence on cars. Integration and facilitation of sustainable transport options is key for project success.



1.4 Initial Review Response

FCDS note the following comments from the original DRP:

- ***Technically this is not a brownfield site***
 - Comment is noted. There was only one reference to 'Brownfield' which has now been changed to previously cleared. The intent of the point was to reflect that the site was not being cleared to support this development.
- ***PV Goals appear to be overly conservative given the roof area available. 1.5kW per apartment should be a minimum and consider battery back-up.***
 - As the review panel will be aware, any array over 30kWp triggers a more complex and costly Western Power approval process. Further, considering the relatively limited base load expected for the development (limited conditioned common area or day time demand) anything over 1kW per apartment will generally be shut down by Western Power.
 - Whilst provision of batteries do offer potential to retain some energy on site they are generally economical infeasible for apartment developments of this size.
 - FCDS expect that the optimal array for this site will be around 30kW, with any larger array incurring significantly greater costs and delays with Western Power and delivering limited additional generation due to restrictions on grid export.
- ***Develop the sustainability benefits and initiatives into a sustainability strategy with clear commitments and targets***
 - It is not clear what was lacking in the original sustainability strategy presented to the panel. However, we note the following summary:
- ***Vision and Commitment***
 - The project is intended to deliver a sustainable development through embracing five key sustainability themes including:
 - Healthy Living
 - Minimised Carbon Footprint and Operational Costs
 - Community Benefits
 - Climate Resilient Design
 - Sustainable Transport
- ***Performance Benchmarking***
 - The project has used nationally accepted benchmarks from the BCA (Building Code of Australia) and GBCA (Green Building Council of Australia) to identify minimum performance and stretch / best practice performance respectively.
- ***Design Features***
 - The report provides a summary of design features included against each theme, including either a design commitment or evidence from existing documentation that the design will deliver.
- ***Summary, Commitments and Verification***
 - The last page of the report provides a consolidated list of proposed design features and benchmarks, with a clear commitment for where and how they will be implemented and demonstrated.

The report is written in a manner to facilitate review and ongoing management by future strata corporations or owners.

2. Healthy Living

The project is ideally located for walkability with other residences, shopping facilities, education and community spaces are all within easy walk or public transport of the proposed site.



Above: Current aerial view (Google Maps)

The design also seeks to improve occupant health outcomes through the design features detailed in the following sections.

2.1 Low Toxicity Materials

Internal finishes and joinery will prioritize low toxicity through minimisation of VOCs and formaldehyde:

- Walls and ceiling paints will target Ultra Low VOC compliance (<5g/l)
- Adhesives, sealants, trim paints, primers and sealers will comply with Green Star best practice benchmarks.
- All internal joinery will be certified as low (E0 or E1) formaldehyde

At building license stage the design team will provide a performance specification for all relevant products and, where selected, will ensure materials meet the performance requirements above.

2.2 High Performance Envelope

The building design will prioritize the protection of glazing through the use of deep balconies to protect from low angle summer afternoon sun.

Initial modelling of a typical 2 bed apartment indicates a 7.5 Star potential based on:

Construction Element	Insulation / Performance
External Walls	R2.2 Insulation 75mm
Floors	R1.9 Insulation – 40mm Board + Reflective Layer to car park
Concrete Roof	Light tiles, 100mm R4.5 board below
Metal Roof	R1.5, Reflective insulation under roof sheets
Ceiling	R3.0 Bulk, where exposed above
Fans	Fans in living and dining areas and bedrooms
Sliding Doors	Clear Double Glazing
Awning Windows	U <3.2 – SHGC = 0.52 / 0.47

Overall, the project intends to target a 7.5 Star NatHERS average rating for the apartments. This is in keeping with R-Code requirements and improves thermal comfort and energy efficiency. At building license, the Section J compliance report will demonstrate the performance improvement.

2.3 Natural Ventilation

The design will ensure that all apartments meet or exceed the ventilation requirements of AS 1668.4 for natural ventilation.

The building orientation will assist with access to prevailing breezes, with most units having access to dual aspect natural ventilation.

At building license stage the mechanical designer will certify appropriate ventilation provisions for all habitable spaces.

In addition to the above, the project also intends to facilitate active transport through the integration with local footpaths and pedestrian infrastructure.

2.4 Acoustic Performance

The design is targeting best practice sustainability outcomes for the site through management of noise levels and exceeding BCA requirements for noise separation in walls and floors.

Compliance will be demonstrated through acoustic reporting at Building License, with verification of some performance elements on site at practical completion.

3. Minimised Footprint and Operational Costs

The Greenhouse Effect and global warming has been identified as the most significant environmental challenge of our times. Increasingly corporations and governments are embracing the need to act through setting performance goals and penalising carbon inefficiency with increasing utility costs.

The project team are aware of the need for projects to act responsibly with their ecological footprint both initially and in operation through life cycle assessment and building design. Best practise design can successfully reduce energy and water consumption, divert waste from landfill and minimise refrigerant carbon footprint. Site selection can minimise impact on existing fauna and offer the potential for developments to act as a restorative force.

Many of the features in other categories contribute to improved building carbon efficiency, including natural ventilation, an efficient envelope and water efficiency measures. Sustainable transport options also reduce the carbon footprint of building occupants and visitors.

The following additional design features are intended to delivery embodied and operational carbon footprint improvements:

3.1 Considered Development

The building will have god access to existing community pedestrian and road infrastructure. The ground plane will provide native planting connections / activation of existing pathways, improving the current biodiversity outcomes of the bare site:



3.2 Fossil Fuel Free Site

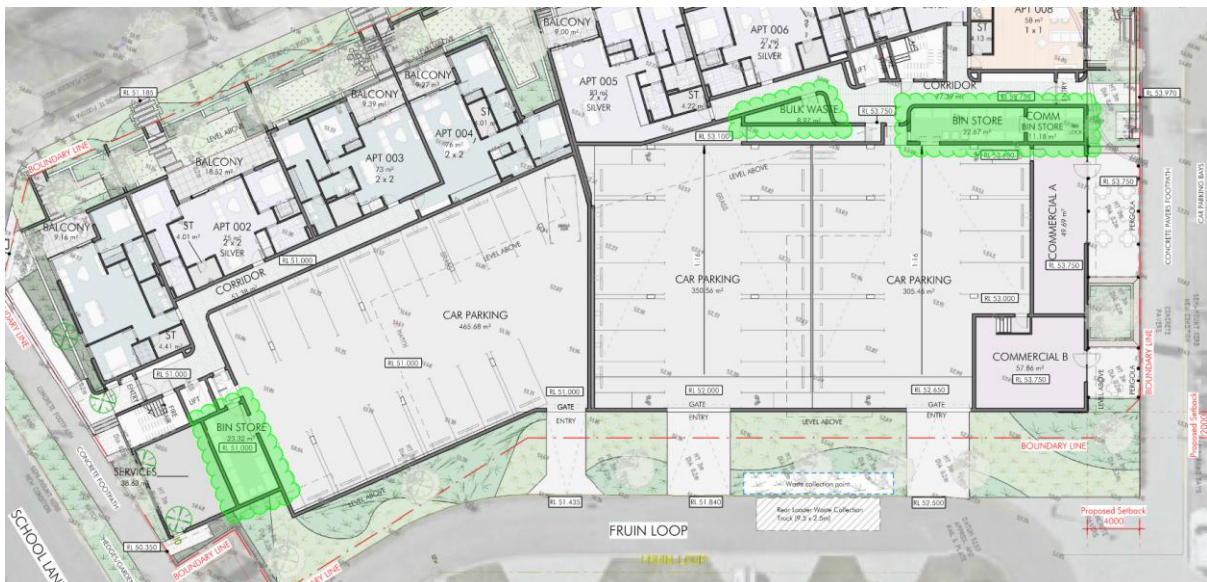
The design will eliminate fossil fuel use on site as far as practical. Whilst emergency systems – such as pumps – may require diesel back up, all apartment cooking, domestic hot water and heating will be delivered by electrical systems.

The transition away from fossil fuels reduces the carbon footprint for buildings, an effect which will increase as Perth electrical network continues to transition to renewable energy. The use of gas fired equipment in any new project locks in the requirement for direct greenhouse gas emissions for the duration of the plant life time – potentially up to 30 years for large boiler systems.

At building license stage the design documentation will show electrical infrastructure for all residences to operate fossil fuel free.

3.3 Waste Management

The design includes well sized and located waste stores at ground level. The spaces will meet best practice requirements for safe access for both occupants and waste contractors and will be sized sufficiently to cater for at least three waste streams; food and organic waste (FOGO), general waste and mixed recyclables.



3.4 Embodied Energy

The proposed design will be targeting a reduction in upfront carbon through material selections, and design rationalisation. The image below shows the typical breakdown and embodied of different construction materials for apartment buildings over a project lifetime.

Assessment of similar style developments shows that concrete and steel make up the majority of the building's upfront carbon emissions. The design team will be reviewing the potential for the use of a post-tensioned slab, replacement of Portland cement and selection of sustainably sourced steel to assist in minimising this footprint. In addition, window frames will consider the use of Local Capral frames – achieving a reduction of around 50% in embodied carbon emissions.

In addition to aluminium, concrete and steel, refrigerants can also play a major role in building embodied and upfront carbon. The mechanical design will seek to utilise R32 refrigerant in lieu of the more common blends, with systems aiming to be kept small and local to limit capacity and refrigerant in pipework – a reduction of around 60% in refrigerant carbon footprint.

3.5 Renewable Energy

The design intent is to include potential for roof mounted solar panels for each building, targeting around 30kWp generation. Exact sizing and generation profile is to be confirmed as building form and number of apartments are confirmed. The systems are expected to produce more than 50MWh of electricity annually and should offset more than 40% of the annual electrical demand of each building.



3.6 Overall Performance

Overall, the project team are seeking to demonstrate at least a 30% performance improvement in operational energy and 10% water reduction against typical performance. Design features above will contribute to this target:

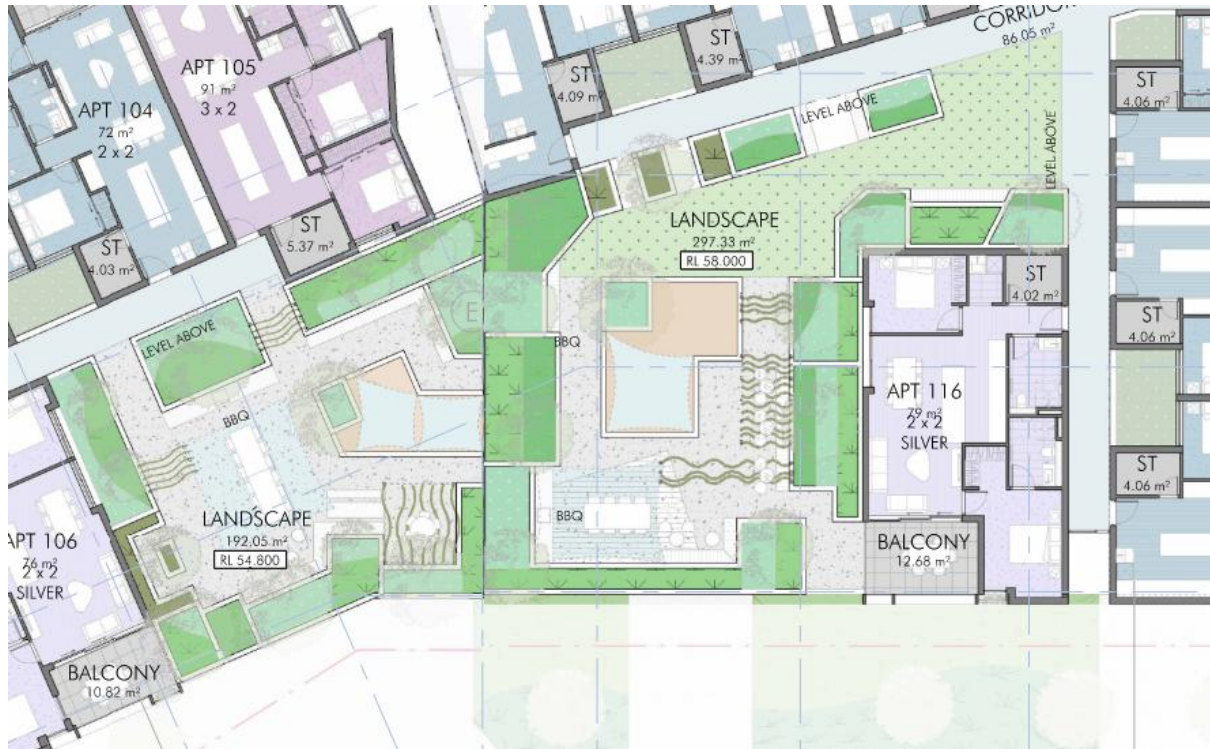
- | | |
|-------------------------------|---|
| • Improved building envelope: | 5% Margin on Section J Compliance |
| • Efficient Services | 10% Margin on Section J Compliance |
| • Low water use | WELS rated fittings and appliances |
| • Controls | Automated lighting and car park ventilation |
| • Performance Verification | Assessment to NABERS Apartments tool |

4. Community Benefits

The design provides a variety of apartment sizes, providing additional dwellings for a range of family sizes close to amenities and community facilities – helping to grow the Ellenbrook community.

4.1 External Amenities

Both blocks are provided with external amenity spaces with barbeques for communal living.



The BBQ areas will provide a connection to nature and the community.

4.2 Additional Street Activation

The local area has a large number of residences, but relatively few local commercial spaces such as cafes. The proposed two small commercial tenancies can provide improved diversity of amenity for the local community.

5. Climate Resilience

FCDS has undertaken a base review of the project and the potential likely impacts of climate change on the site, based on the following likely impacts of climate change in South West WA:

Variable	Current	Predicted	Expected Change	Possible Range
Annual Average Temperature (°C)	25.8°C	29.3°C	+3.5°C	28.4 – 30°C
Number of days over 35°C	28	63	+35	50-72
Annual Average Rainfall (mm)	851.7mm	698mm	-18%	536 – 809mm
Summer	40.5mm	38.5mm	-5%	27.9 – 55.1mm
Autumn	144.1mm	135.4mm	-6%	98 – 162.8mm
Winter	398.2mm	282.7mm	-29%	223 – 338.5mm
Spring	147.5mm	94.4mm	-36%	60.5 – 126.8mm
Annual Average Potential Evaporation	1800mm	1836mm	+2%	1818-1872mm
Annual Relative Humidity	55%	54.4%	-0.6%	53.7 – 55%

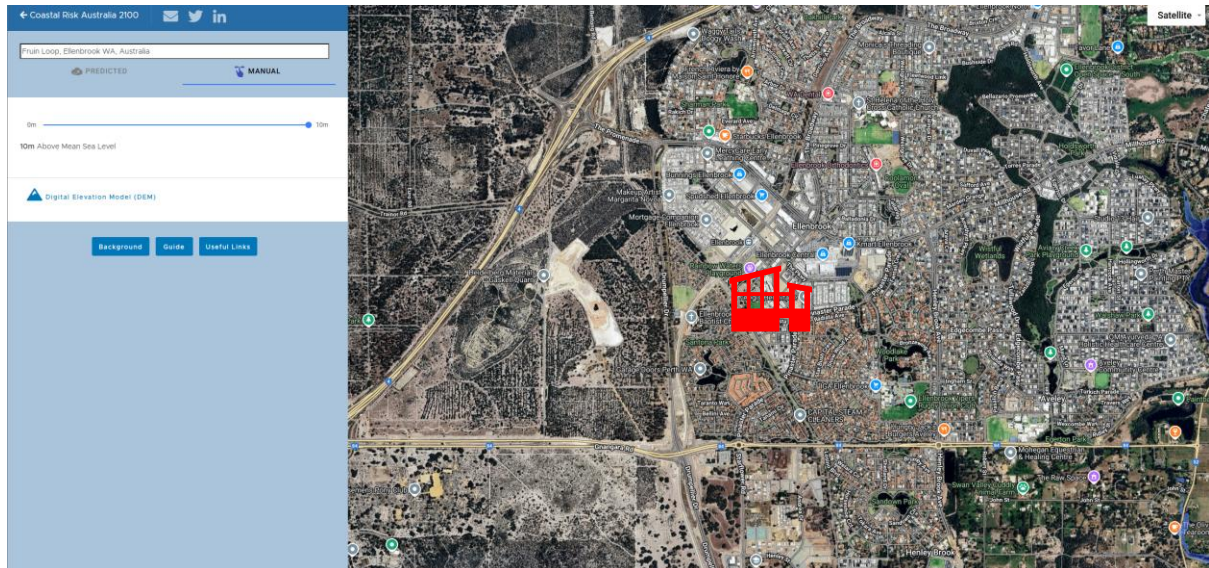
5.1 Risk Review

The development site is not considered to be at significant risk of climate impacts, as confirmed through the GBCA climate change risk assessment checklist:

Checklist	Criteria Response	Future Climate Exposure Reviewed?	Risk to the project identified?	Risk treatment identified?	Design / Operational Measure
Has the project area been previously impacted by extreme climate events?	No	Yes	No	No	NA
Is the project located in a cyclone zone?	No	Yes	No	No	NA
Is the project located in or adjacent to a bushfire prone area?	Yes	Yes	No	No	NA
Is the project located in or adjacent to a flood prone area?	No	Yes	No	No	Local high topological point. Access at various points and levels.
Is the project located at or adjacent to the coastline or tidally influenced waterway?	Yes	Yes	No	No	NA
Will the project accommodate occupants vulnerable to the impacts of climate extremes?	Yes	Yes	No	No	Improved envelope. Efficient Air Conditioning Onsite generation.

5.1.1 Flood Risk – Very High Inundation Scenario

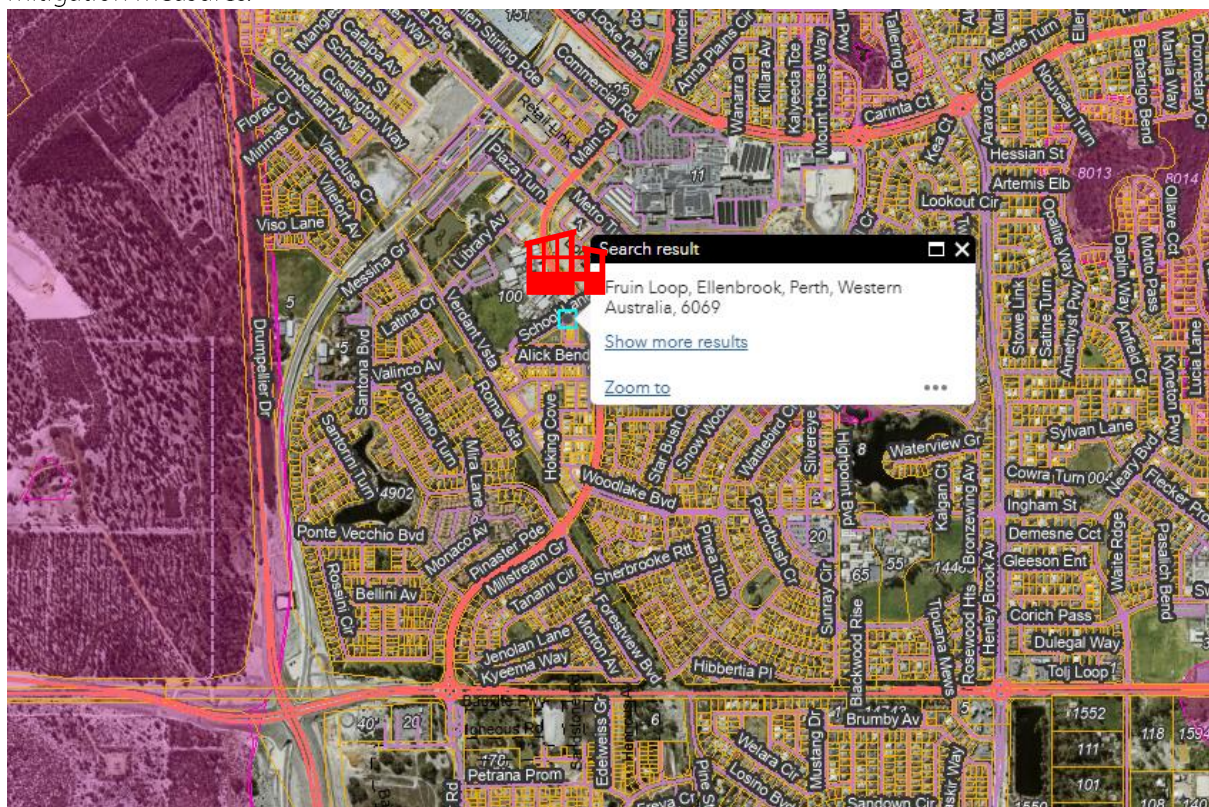
Coastal risk maps indicate that the site is well above inundation even under a 10m high sea level rise.



Above: Coastal Risk Australia

5.1.2 Bushfire Prone Areas

Bushfire zone maps show that the site is on the edge of a bushfire prone area and should consider risk mitigation measures.



Above: Bushfire Prone Areas - DFES

5.2 Design Response

Notwithstanding the low risk rating, the design team have included the following features to mitigate risks and provide an improved outcome for occupants and the local community:

Climate Change Impact	Risk	Proposed Response
Increased temperatures lead to increased bushfire risk and intensity.	Moderate due to current classification of site.	Multiple orientations for natural ventilation. Provide filters on air conditioning units to mitigate bushfire smoke infiltrating into apartments.
Rising sea levels and increased flood risk.	Very low	Ensure structure can adapt to changing water levels.
Reduced rainfall	Increasing requirement for irrigation, increased cost of scheme water.	Utilise smart irrigation, including moisture detection and prioritise drought tolerant planting. Utilise native planting where possible.
Increased temperatures lead to increased reliance on air conditioning.	Building is unable to provide comfortable environment for extended periods.	Provide high efficiency air conditioning systems with automatic controls. Upgrade building envelope in excess of BCA minimum requirements. Reduce urban heat island effect.
Increased temperatures lead to increased power demand.	Operating cost increases as electrical prices increase. Power security becomes questionable.	Good control systems and energy efficient design. Potential for solar photovoltaics for renewable generation.

5.2.1 Water Efficient Fittings

Where provided, fittings and appliances will target high water efficiency, generally within 1 Star of the best available WELS rating for each fitting type:

Fixture Type	Minimum WELS rating	Maximum Flow Allowable
Taps	5 stars	4.5-6 L/min
Urinals	5 stars	1.0 L / Flush + Smart demand flush device
Toilets	4 stars	<3.5 L average flush <4.7L full flush, <3.2 half flush
Showers	3 stars	6.0 – 7.5 L/min
Clothes Washing Machines	4 stars	Size Dependent
Dishwashers	5 stars	Size Dependent

Low flow fittings save water, operational costs, carbon emissions and energy use when they utilise hot water.

5.2.2 Native or Drought Tolerant Planting

The design team will be including water efficient planting and irrigations to target a 30% reduction in water use against Green Star benchmarks and to minimise operational costs and carbon emissions.

Building license documentation will include these elements.

5.2.3 Urban Heat Island Mitigation

The project team intend to meet Green Star best practice guidelines for urban heat island by maintaining 75% of the site as either vegetation, shaded areas or elements with a 3-year SRI of 64 or greater.

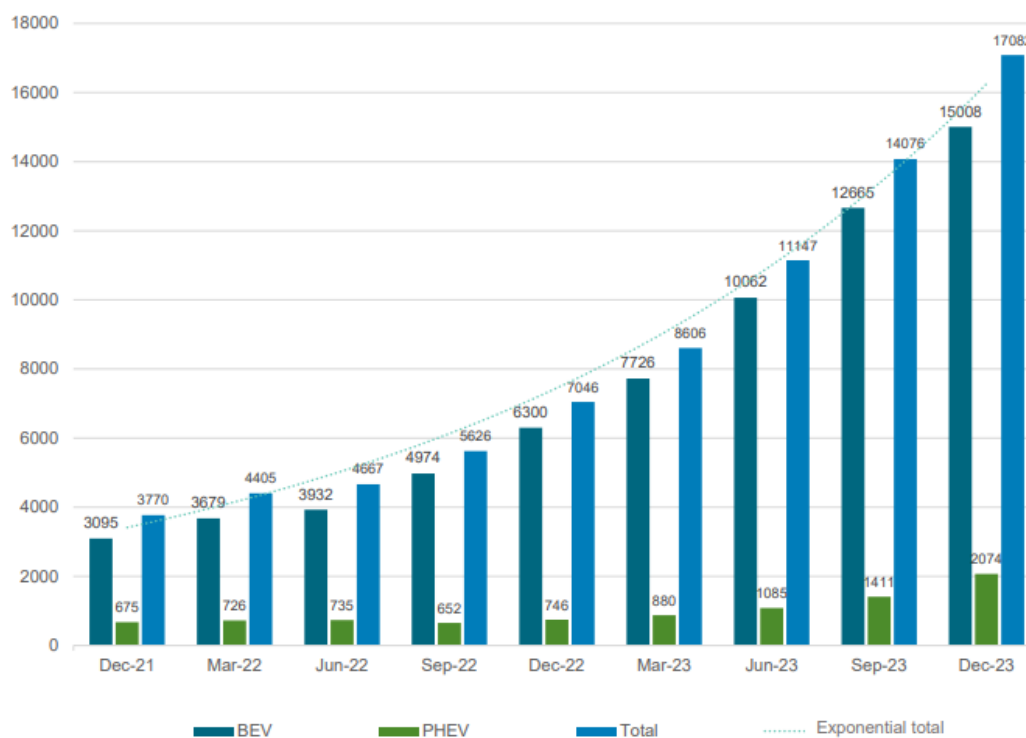
Building license plans and finish selections will demonstrate this performance outcome.

6. Sustainable Transport

Increasingly, Perth drivers are transitioning away from tradition Internal Combustion Engine vehicles – with the current rate of 6.6% of new vehicles (2023) set to be ~10% by 2025 and more than 50% in 2030 (<https://www.watoday.com.au/politics/western-australia/future-planning-is-this-the-year-petrol-will-disappear-from-wa-20231218-p5esbe.html>).

The graph below shows the uptake in electric vehicles since the end of 2021 (Western Australian Electric Vehicle Analysis Summary 2023 Q4 – Department of Transport):

Figure 1: Cumulative electric vehicle data December 2021 – December 2023



Recognising this shift, the Ocean Gardens design will be seeking to facilitate alternate transport options, as described in the following sections.

6.1 Electric Vehicle Facilitation

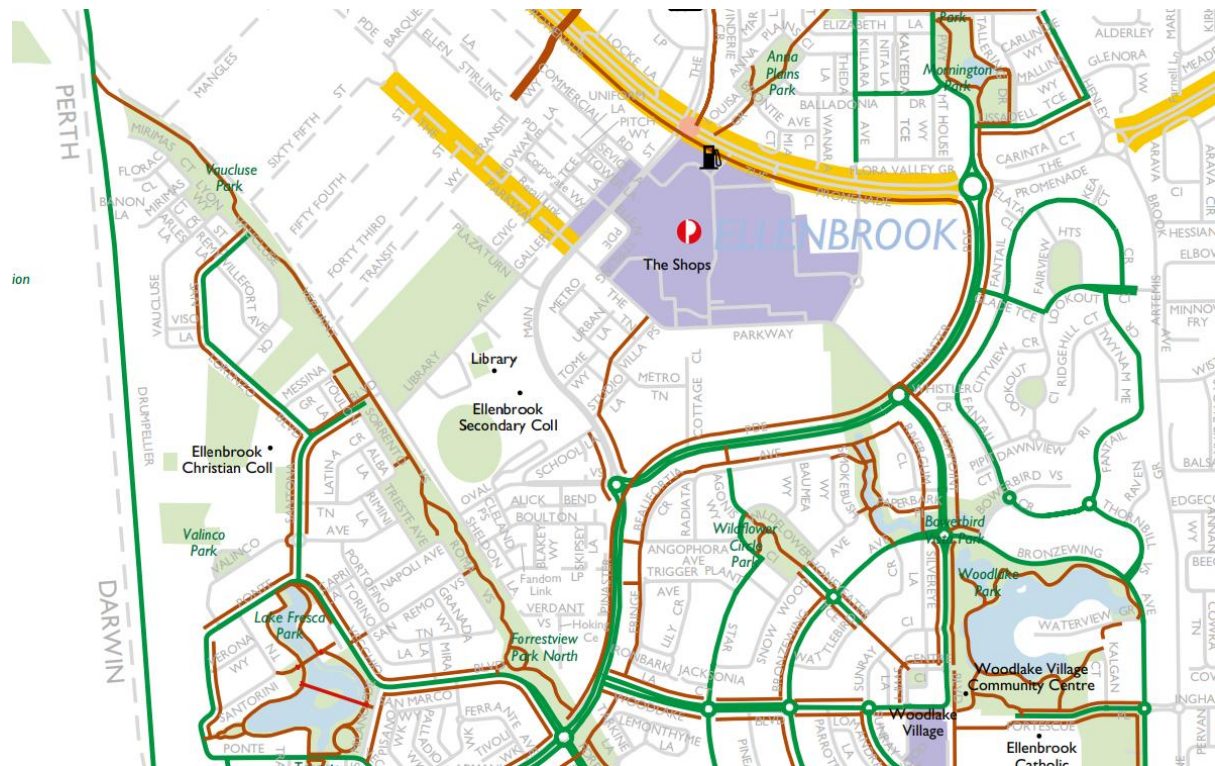
The design will include a dedicated EV distribution board for the carpark, sized to cater for up to ~30 EV chargers. The design will include key infrastructure provisions, including:

- Load management systems to deliver at least 12kWh per bay between 11PM and 7AM daily
- Space to allow for electricity metering, as part of the embedded network provision
- Cable containment consideration to provide chargers to all bays
- Potential for use of 7kW / 32A type two chargers
- Chargers for 10% of bays at opening

Electrical design documentation will show these provisions at building license stage.

6.2 Alternative Transport

The designers will be seeking to encourage the use of active transport through connection to pedestrian and bike infrastructure.



Above: Department of Transport's Swan and Stirling Bike Route map

7. Feature Summary

Many of the features proposed above offer performance improvements across a range of themes. The following table outlines the proposed features and the demonstration pathway – aligning with national best practice benchmarks – selected for the project team.

Design Feature	Benchmark Performance	Verification Method	Healthy Living	Building Footprint	Climate Resilience	Community Benefits	Sustainable Transport
Alternate Transport	100% Car Bays as EV Ready, including distribution boards and load management.	Design documents at Building License	X	X		X	X
Ecological Value	100% Site previously cleared, improved ecology score	Design documents	X	X	X	X	X
Efficient Envelope	10% Improvement over BCA 2022	Building License Report	X	X	X	X	
Acoustic Performance	Db L'nTw at 55 Between Apartment levels	Report	X			X	
Native Planting	Demonstrate 30% reduction in water use against Green Star Standards	Report at Building License		X	X	X	
Fossil Fuel Free Site	No fossil fuels for domestic hot water, cooking or heating	Design documents		X	X		
Renewable Energy	30kWp Solar PV Panels, connection point for onsite storage	Performance Specification and Layouts		X	X	X	
Urban Heat Island	Achieve 75% of site with a 3-year SRI of 64 or greater	Design documents	X	X	X	X	
Waste Plan	Waste store to allow for three streams	Design documents		X			
Embodied Energy	Target 10% reduction in life cycle footprint through efficient design and material selection	LCA Report at Building License		X	X		
Water Efficiency	WELS rated fittings – Within 1 Star of best available	Design documents		X	X		
Low Toxicity Materials	Utilise low VOC and formaldehyde internal finishes, adhesives and sealants.	Material review at Building License	X				
Low Carbon Materials	Utilise R32 Refrigerant and improved materials to improve life cycle carbon by 10%	LCA Report at Building License		X	X		
Natural Ventilation	Comply with AS 1668.4 for natural ventilation to all apartments	Report at Building License	X	X	X		
Operational Footprint	20% reduction in operational energy through envelope and services.	Report at Building License		X	X	X	
External Communal Amenities	External dining space with nature interaction	Plans at Building License	X		X	X	



Planning | Design | Delivery | Performance

www.fullcircledesign.com.au

Please Contact:

Graham Agar

0412 475 819

Graham.Agar@fcds.com.au