

# COMMERCIAL PRECINCT

## BUILDING DESIGN GUIDELINES



WITCHCLIFFE  
ECOVILLAGE



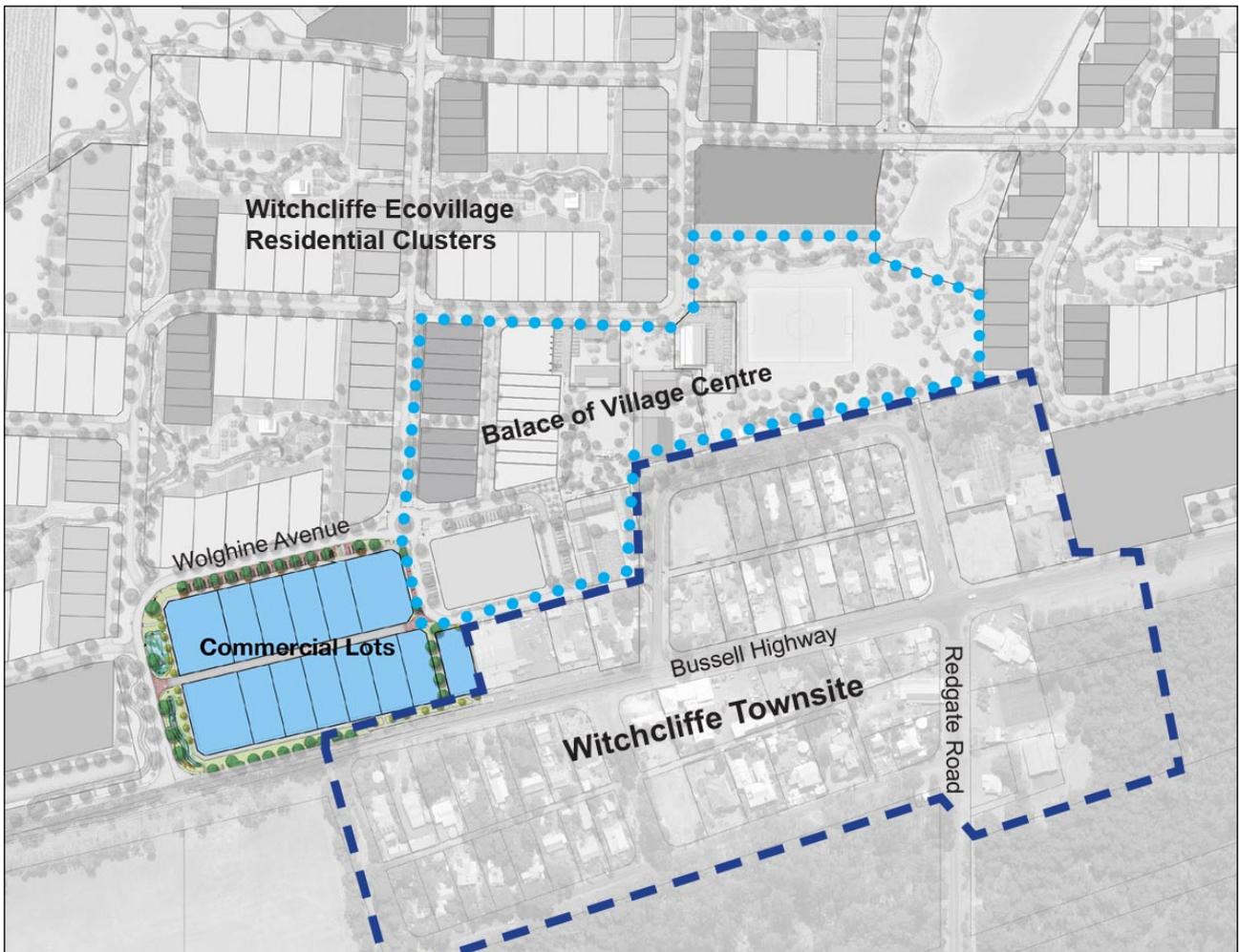
**The Witchcliffe townsite has a unique character that will set the tone for new commercial developments within the precinct**

## Introduction

The guidelines are to be read in conjunction with the endorsed Local Development Plan, the Residential Design Codes (SPP7.3), the Local Planning Scheme 1 (all as may be amended from time to time by WAPC), and the relevant scheme bylaws. Together these documents control development within the precinct.

The Commercial Building Guidelines have been framed to provide a concise outline of requirements for development within the precinct. Because residential is also allowed in the precinct as a secondary use, some elements of the Witchcliffe Ecovillage Sustainable Building Design Guidelines apply (text in Appendix A).

We recommend reference to the whole document for a broader background into the sustainability and aesthetic principals established for the Witchcliffe Ecovillage, as these apply to commercial and residential development. In particular, please refer to Sections 4.1-4.3 on passive solar design and Section 2.3 architectural character, both of which should influence design outcomes within this precinct.



**The Commercial Precinct is an extension of the Witchcliffe townsite, sitting between Bussell Highway and Wolghine Avenue**

## Background

The Commercial Precinct comprises 11 lots (1.9ha in area) that sit between Bussell Highway and the residential areas of the Witchcliffe Ecovillage. This precinct acts as the primary interface between the established Witchcliffe townsite and the village, with half the lots facing inward toward the village and half toward Bussell Highway.

The precinct includes two separate survey strata schemes, as well as one single green title lot (Lot 6) on Bussell Hwy. Commercial Cluster 1 and Commercial Cluster 2 strata schemes both incorporate a small Common Property lot in each scheme to accommodate a shared energy switchboard and single point

connection to the Western Power grid, but have no other property in common. The strata bylaws ensure that uses compatible with the ethos and vision of the Ecovillage are supported and promoted within the Commercial precinct.

All lots in the precinct are zoned Village Centre under the AMR Shire LPS 1, with a variety of permitted and applicable uses according to the LPS 1 zoning table and the scheme bylaws.

The Village Centre zoning provides for “the expansion and consolidation of accessible, small-scale community and retail focal points which serve the immediate needs of a local population catchment in a manner that will preserve the individual character and ambience of each settlement.”



**The Witchcliffe Ecovillage Commercial Precinct, bridging the gap between the townsite and the residential clusters**

The ideal land uses for these lots varies across the site, depending largely on level of visibility to passing traffic, proximity to car parking, ease of on-site access, and adjacent land use interface. As such, we envision a diverse range of commercial, retail, and mixed-use opportunities within the precinct that will meet the needs of Witchcliffe residents, but also those of the broader region and tourists from further afield.

The west-facing lots of the precinct present to Bussell Highway and capitalise on the locational visibility and passing trade associated with a major arterial road. The end lots also present northwards to Wolghine Avenue, a main entry point to the Witchcliffe Ecovillage.

The east-facing lots along Wolghine Avenue interface with residential development across the street. Development on these lots must be sensitive to the adjacent residential scale

and land use. The opportunity here is for smaller scale, more pedestrian-oriented uses, with plentiful on-street parking directly adjacent along a slow-speed street landscaped to provide future tree canopy.

The precinct is bisected north-south by Willerin Lane, which provides vehicular access to the rear of the commercial lots within the precinct. There is also a Pedestrian Access Way, which provides a valuable pedestrian connection between Bussell Highway and Kulbardi Way and the Village Centre.

Typical lots in the precinct are approximately 1000m<sup>2</sup> (20m x 50m), with a couple of larger lots at the ends.



**The precinct plans to build on the Witchcliffe townsite's range of quirky offerings that define its character, which include vintage clothing, vinyl records, handmade crafts, a relaxed cafe, e-bike sales, and an award winning bottle shop**

## Vision

The vision for the precinct is that it becomes a vibrant commercial hub that services the needs of the residents of the Ecovillage as well as those of the broader region. Ideally it includes a diverse range of commercial building typologies including traditional shopfronts, mixed-use buildings, showrooms, workshops, office buildings, short-stay accommodation, and appropriately located residential buildings.

The built form is to be modest in scale and articulated into a series of smaller elements that maintains a rural village character, with architectural references to the typical structures of the region. The building materials are to be naturalistic and where possible locally-sourced, embodying simple sustainability at every opportunity.

The precinct layout and design of the building interfaces will ensure an active public realm. The design requirements will ensure legible business entries, safety at night, and shady car parking. Visually interesting shopfronts and all fresco spaces along with weather-protective awnings and screens will entice locals and visitors to linger longer than they had planned. Together this will lead to thriving businesses within the precinct, and significant employment opportunities for local residents.

Potential businesses that would be a good fit in the precinct include:

- café / restaurant
- yoga / pilates studio / gym
- medical centre / physio / dentist / integrated pharmacy
- holistic wellness centre
- bakery / butcher / health food store / general store
- village scale childcare centre
- recording studio / music school
- offices / consultants
- permaculture / alternative technology centre
- hardware store / garden centre / pet supply / vet surgery
- homewares / craft supplies / eco-clothing store
- artisan store / gallery



**Restaurant / pub typology with active street interface**

## Building Typologies

The following land use / building typologies are envisioned as appropriate for the Witchcliffe Ecovillage commercial precinct. Allowable land uses are dictated by the 'Village Centre' zone within the Shire of Augusta-Margaret River Local Planning Scheme 1, which are then further limited by the Strata bylaws.

These typologies are general in nature, but provide an indication of the type of development that is likely to fit within the design requirements and meet the needs of the broader Witchcliffe community.

The strata bylaws require at least some commercial component to any proposed development.

### **Business Services**

- Main entrance from the street
- Building at front of lot with active frontage
- On-site staff and customer parking

### **Maker Space / Logistics / Workshop**

- Larger footprint with limited built form
- Built form to have direct relationship with street
- On-site staff and limited customer parking
- Designed for truck movements

### **Mixed-Use Business**

- Clean commercial uses at the front / residential at rear
- Residential above commercial use at the front
- Separated entry for business and residential uses
- Resident and staff parking on site

### **Other/Hybrid**

- Multi-use commercial, workshop, residential
- Residential apartments or staff accommodation over commercial
- Commercial use with permanent or seasonal accommodation
- Education or training institution



**An artists impression of Wolghine Square, the focal point of the expanded commercial precinct in Witchcliffe**

## Principles

The following are the key principles that will guide the development of the precinct:

1. Expand the Witchcliffe Village Centre in a manner that maintains and celebrates the rural village character of the townsite while meeting the commercial needs of new businesses.
2. Design the public built interface to create a cohesive streetscape environment that is visually interesting and engaging for pedestrians, with an emphasis on natural and recycled materials and creative, artistic elements.
3. Design street frontages to increase pedestrian safety through natural surveillance.
4. Building materials to be locally-sourced, naturalistic, and low in embodied energy / carbon
5. Buildings to be designed to minimise the need for artificial lighting, heating, and cooling
6. Incorporate native and productive landscaping to provide shade, interest and beauty

# Objectives, Guidance, Requirements

The following section sets out the development requirements for the Commercial Precinct of the Witchcliffe Ecovillage, as outlined in the map on page 3. These are separated into three sections covering urban design, buildings, and resources. Together these provisions aim to guide the delivery of the intended built form outcome for the precinct.

Each provision is separated into three components: objective, guidance, and requirements. The 'objective' states the intended outcome; the 'guidance' provides context, suggestions, or definitions; and the 'requirements' state the specific, measurable outcome that the design must achieve.

Many of the provisions in this document are duplicated in the approved Local Development Plan (LDP), variation of which would require the approval of the Shire. On other requirements not covered in the LDP, the developer may exercise discretion if the proponent can make a strong case of achieving the relevant 'objective' in an alternative manner to what is set out in the specific requirements.

## Urban Design

### 1. Urban Form

#### Objectives

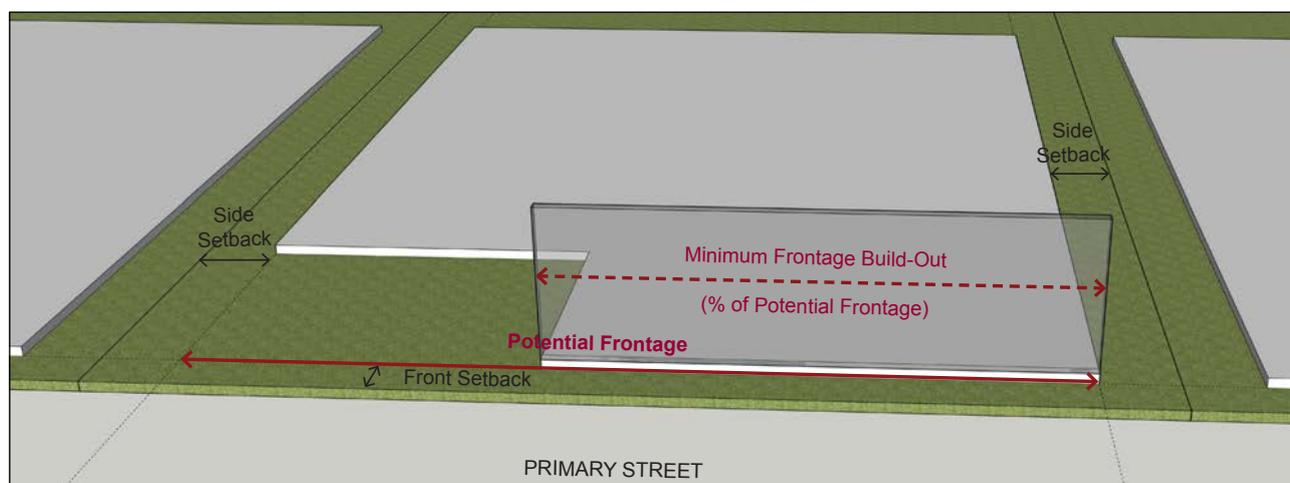
- Building setbacks and heights to create an appropriate street-interface and general building massing that is compatible with the existing buildings within the Witchcliffe townsite.
- Frame streets and other adjacent public spaces with built elements in a manner that creates cohesive and human-scaled 'outdoor rooms' and a relatively consistent street edge

#### Guidance

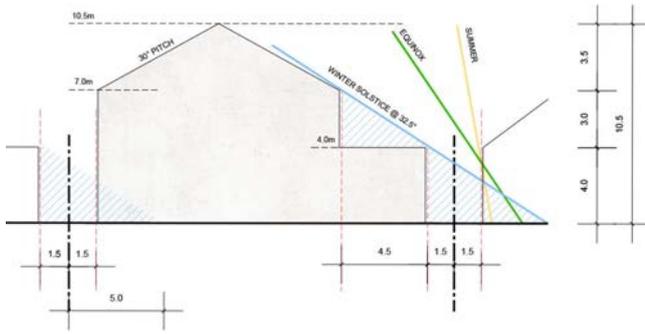
- Primary Streets - Wolghine Avenue and Bussell Highway
- Potential Frontage - width of the lot facing a Primary Street after subtracting the required side boundary setbacks
- Frontage build-out % - extent of building located within 250mm of the minimum street setback line as a percentage of the Potential Frontage

#### Requirements

- Required lot boundary setbacks - as per Figures 1 and 2 of approved Local Development Plan
- Build-out percentage of Potential Frontage as per LDP (Figure 1 and provision 3.3)



**Diagram showing how to measure the Potential Frontage and the Minimum Frontage Build Out requirements**



**Height and side setback provisions from LDP (Fig.3)**

- The maximum building wall height shall be 7.0m
  - Southern building walls above 4m to be setback as per Figure 3 and provision 3.3b of the approved LDP
  - The maximum pitched roof ridge height shall be 10.5m
- Minimum ground floor height (floor to floor) of buildings providing frontage to a Primary Street is 3.0m

## 2. Activation

### Objectives

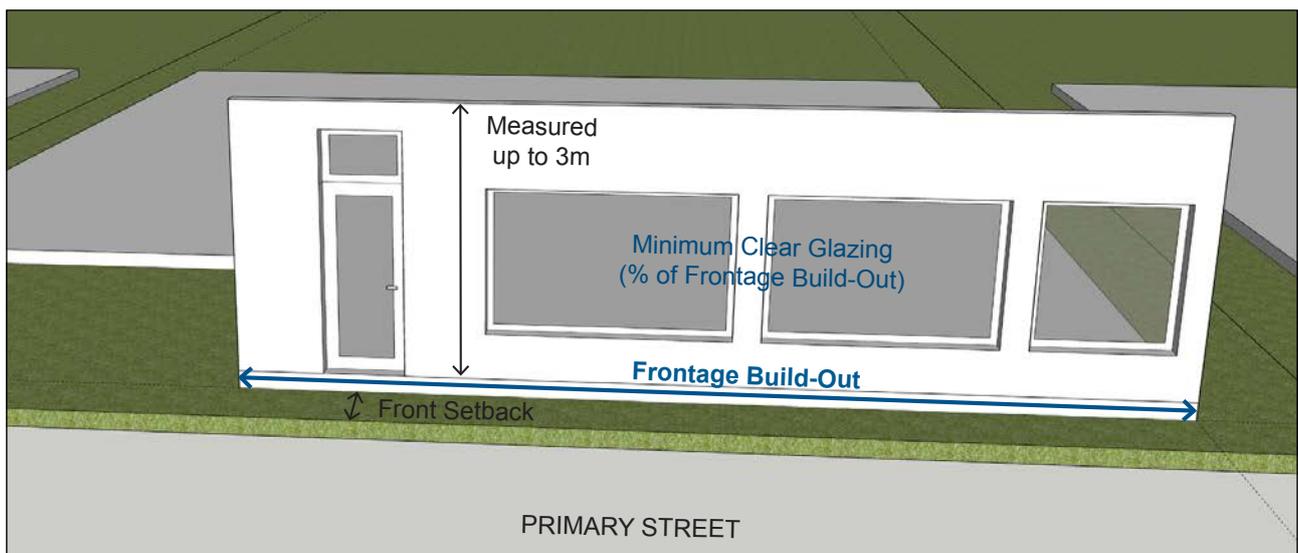
- To support local businesses viability, ensure sufficient clear glazing in appropriate locations facing streets, public access ways and lanes.

### Guidance

- Frontage - portion of the building on or near the lot boundary that is parallel to the adjacent street or PAW
- Ground Floor Glazing % - area of clear glazing as a percentage of the total façade area of a particular Frontage (up to 3m in height).

### Requirements

- Facades of buildings with Frontage to Bussell Highway on Lots 4-6 (SP 84745) and Lot 6 Bussell Highway shall consist of 60% minimum clear glazing.
- Facades of buildings with Frontage to the PAW between Bussell Highway and Kulbardi Way on Lot 6 (SP 84745) and Lot 6 Bussell Highway shall consist of 40% minimum clear glazing.
- Facades of buildings with Frontage to Wolghine Avenue and Kulbardi Way on Lots 1-7 (SP 84744) shall consist of 50% minimum clear glazing.



**Diagram showing how to measure the Minimum Clear Glazing requirement**



**Deep verandahs, inset entries, and covered exterior seating encourage pedestrians to spend time browsing shops even in inclement weather**

### 3. Placemaking

#### Objectives

- Design buildings on visually-prominent street corners with a thoughtful architectural response that meaningfully marks or celebrates the importance of the location.

#### Guidance

- Architectural Response Required – locations where special treatment of the building corner is required as per LDP (Figure 1)

#### Requirements

- Where nominated as an 'Architectural Response' (A) on the LDP plan, development shall be articulated to respond to the corner location. Articulation may include a taller building element, a bay window, a change in cladding material, or an otherwise distinctive architectural element that provides legibility and visual interest to the streetscape.

### 4. Shelter

#### Objectives

- To encourage pedestrian activity within the precinct throughout the year, provide sufficient opportunities for shelter from rain, sun and wind.

#### Requirements

- Development on Lots 4-6 (SP 84745) and Lot 6 Bussell Highway shall include a continuous awning over the adjacent footpath within the public road reserve running the full extent of the Frontage.
- Verandahs, pergolas, and awnings on Lots 1-7 (SP 84744) may extend to the Wolghine Avenue boundary.
- Verandahs, pergolas, and awnings on Lot 6 (SP 84745) and Lot 6 Bussell Highway may extend to the boundaries along the PAW.
- For the awnings extending into the Bussell Highway reserve, the minimum width shall be 3m with a minimum clearance height of 3.0m over the primary footpath thoroughfare. Awning height may reduce at the footpath

edge for certain styles (eg. bullnose veranda) but in no case shall it be lower than 2.4m.

- For Lots 4-6 (SP 84745) and Lot 6 Bussell Highway, timber posts are required to support the western edge of the awnings (in line with the prevailing character of the Witchcliffe townsite).

## 5. Streetscape - Bussell Highway Interface

### Objectives

- The southern Bussell Highway streetscape shall be similar to the prevailing built form pattern prevalent within the Witchcliffe townsite.

### Guidance

- This interface includes a significant proportion of the building at the minimum street setback, extensive ground floor glazing, and a consistent pattern of verandahs that extend from the building edge to cover the adjacent public footpath.

### Requirements

- Development on Lots 4-6 (SP 84745) and Lot 6 Bussell Highway shall present to the Bussell Highway Frontage a built form comprising gable roofs or traditional commercial parapet walls, and exterior materials that are compatible with the architectural character of the Witchcliffe townsite buildings.



**Example of a glazed shopfront building that creates a consistent street-edge, with a verandah extending over the public footpath creating enclosure and shelter**



The buildings facing north to Wolghine Avenue have larger street setbacks and are to be set within a landscaped environment

## 6. Streetscape - North Wolghine Avenue

### Objectives

- The northern Wolghine Avenue streetscape (adjacent to the Ecovillage main entrance) and the northern Bussell Highway streetscape shall create a more landscape-oriented interface with the street.

### Guidance

- This interface includes larger street setbacks, more soft landscaping between the buildings and the footpath, lower glazing requirements, and a more informal arrangement of buildings.

### Requirements

- Development on Lots 1-3 (SP 84745) and the north edge of Lot 7 (SP 84744) shall present to the Bussell Highway and Wolghine Avenue Frontages a built form comprising gable roofs or traditional commercial parapet walls, and

exterior materials that are compatible with the architectural character of the Witchcliffe townsite buildings.

- The entire front setback areas to the north and west of Lot 1 (SP84745), except for any functional area such as a pedestrian path to a door, shall be densely planted soft landscape in beds with low height planting next to the footpath. Areas of mulch or turf only are unacceptable.



The internal Wolghine Avenue streetscape is intended to be intimate and pedestrian-scaled, with variation in street setbacks and built form references that relate to the residential buildings across the street

## 7. Streetscape - Wolghine Avenue

### Objectives

- The internal Wolghine Avenue streetscape (facing the Ecovillage residences across the street) shall include built form that has less formal and consistent street setbacks, and pitched roof forms that reflect the finer grain and individual nature of the adjacent residential development.

### Guidance

- This interface includes a richly varied interface at the street level, with buildings highly articulated, a variety of pitched roofs and street facing verandahs, and a moderate amount of street facing glazing.

### Requirements

- Development on Lots 1-7 (SP 84744) shall present to the primary frontage a built form comprising predominantly gable roof forms and single slope verandahs in response to the prevailing scale and architectural character of the adjacent residential area.



**Example of a shopfront with an easily identifiable and accessible main entry**

## 8. Building Entries and Floor Levels

### Objectives

- Primary entrances to businesses and residences to be easily identified from the adjacent street or public accessway.
- Commercial ground floor levels to be set to enable efficient and direct universal access from the adjacent public footpath to the premises.
- Ground floor levels to be set high enough to ensure no ingress of stormwater in a large flooding event.

### Guidance

- All commercial premises to comply with the Disability (Access to Premises-Buildings) Standards 2010 and the associated elements of the National Construction Code (Vol 1+2 Building Code of Australia)
- A general recommendation to reduce the risk of a flood event: set finished floor level

(FFL) at least 300mm above the low edge of the adjacent road pavement.

### Requirements

- Commercial development shall address the adjacent street (or PAW) with the main pedestrian entrance, which shall remain unlocked during normal business hours.
- Commercial development shall provide access to the premises from the public footpath and on-site parking areas in accordance with the relevant universal access legislation.
- Any residential dwelling or ancillary development constructed at the rear of Lots 1-7 (SP 84744) and Lots 1-6 (SP 84745) shall have a clear connection between Willerin Lane and the main pedestrian entrance, either through direct visual / physical connection or via appropriate landscape treatment.
- Where on-site customer parking is provided, convenient and direct pedestrian access shall be provided to the primary pedestrian

entrance at the Primary Street, either by means of an external pathway or through the building via a secondary entrance.

- A civil engineer must review and sign-off on the proposed site levels and finished floor levels to ensure sufficient clearance for future flood events and reasonable water flow pathways around the building.

## 9. Safety

### Objectives

- Use principles of passive surveillance to support safety in the public realm.

### Guidance

- Passive surveillance can help to reduce anti-social behaviour and crime.
- R Codes Definition (5.2.3): Buildings designed to provide for surveillance (actual or perceived) between individual dwellings and the street and between common areas and the street, which minimise opportunities for concealment and entrapment.
- Key elements include the careful placement of windows, control of fencing height and

opacity, installation of external lighting, night-time activation of public space, and the careful pruning of landscaping

- Major Opening - A window, door or other opening in the exterior wall of a habitable room that provides external means of light or view that is at least 1m<sup>2</sup> in area, glazed in clear material, and has a sill height lower than 1.6m above floor level.

### Requirements

- Development shall provide passive surveillance as indicated on the LDP Plan (Figures 1 and 2). Minimum requirement is provision of at least one Major Opening from a habitable room that faces the street or pedestrian accessway.
- Where a building is located within 6.0m of Willerin Lane, passive surveillance shall be provided on the Willerin Lane Frontage.
- Fencing / walls along Willerin Lane shall be limited to 1.2m in height along 50% of the frontage.



**The Margaret River Night Markets are a good example of well-lit, safe public space**



**Landscape to be incorporated into designs at an early stage and should play an integral role in defining the character of each development**

## 10. Landscape

### Objectives

- Contribute to the landscape qualities of the place by choosing appropriate landscape species and placement to extend existing / intended patterns.
- Consider environmental aspects of the place when locating and designing al fresco seating areas such as access to winter sun, screening winter wind, and mitigating street noise.

### Guidance

- For retaining, boundary, or feature walls, natural limestone or granite from local sources is encouraged.

### Requirements

- A minimum of 15% of the lot shall consist of vegetated landscape.
- Except where street setbacks contain verandahs, al-fresco structures or other functional paved areas, the setback area shall consist only of densely planted soft landscape in beds with low height (<1200mm) planting next to the footpath. Areas of mulch or turf only are unacceptable.
- Car parking areas shall provide shade trees at a rate of 1 tree per 4 bays
- Carpark trees shall be of the deciduous variety and to a maximum mature height of 4.0m
- Fences shall be timber, stained, sealed or painted or left unsealed to weather naturally. Colorbond fencing is not permitted.

## 11. Parking and Vehicle Access

### Objectives

- Minimise the visual impact of on-site parking on streets and pedestrian accessways
- Consolidate vehicle access points to reduce the extent of impervious surface and allow for more soft landscaping

### Guidance

- Primary Streets - Wolghine Avenue and Bussell Highway
- Parking ratios to be based on those used for the Margaret River townsite in LPS1.

### Requirements

- All on-site parking shall be located at least 12m from the Primary Street boundary and screened from the view from the Primary Street.
- Any parking located adjacent to the pedestrian accessway to be set back min. 2m

from boundary, with the setback zone heavily landscaped.

- No direct access to residential garage parking is permitted from Willerin Lane.
- Garage doors where visible from a street shall be timber panel lift.
- Parking bays within the adjacent public street reserve are credited to specific lots (noted on the LDP map in Figure 1), and can be counted toward meeting the Shire's parking requirements.
- Parking requirements vary by land use. Required ratios to be based on those applied to the Margaret River townsite by the Shire of Augusta Margaret River in LPS1.
- Cross-overs to be generally located as indicated in the Local Development Plan map (Fig. 1).
- Cross-over dimensions to be minimised, with widths not larger than 6m and kerb radii not larger than 3m.



**Parking to be heavily landscaped and ideally screened from pedestrian areas by vegetation, low walls or buildings**

## 12. Services

### Objectives

- Design buildings to provide easy access to on-site sewer and power infrastructure.

### Guidance

- Contact Western Power directly to confirm their requirements regarding setbacks to the electrical transformer along Bussell Highway.
- Designs should carefully integrate solar panels, services, rainwater tanks and utilities into the building concept to ensure that they do not detract from the overall aesthetic quality.

### Requirements

- No buildings to be placed within nominated electrical easements along Wolghine Avenue or Bussell Highway aside from verandahs and awnings.
- No buildings to be placed within nominated sewer easement on Commercial Cluster 2, Lot 4 (Strata 84744) Wolghine Avenue aside from verandahs and awnings.
- Buildings to be set back as nominated on the Local Development Plan from the electrical transformer between Commercial Cluster 1, Lots 1 and 2 (Strata 84745) in accordance with Western Power policies.

# Buildings

## 13. Solar Access

### Objectives

- Development of each lot shall take advantage of the solar access zone created to maximise passive solar performance.

### Guidance

- North facing walls to have appropriately sized windows to maximise passive winter heating and natural lighting all year round
- Developments to be designed so habitable rooms are primarily located on the north building edge to facilitate passive solar outcomes

Design in appropriate attachments for solar protection of openings and climate protection for pedestrians.

### Requirements

- All buildings shall comply with the setback and height provisions of the Local Development Plan (refer to Figure 3).
- Residential and tourism units must achieve a minimum NatHERS rating of 8 stars.

## 14. Massing

### Objectives

- New buildings should be of a scale that is appropriate to their context and positively contribute to the Witchcliffe townsite.

### Guidance

- Architecturally the commercial buildings in the precinct shall reflect the local aesthetic characteristics of a southwest rural village, such as:
  - Simple geometric building volumes
  - Regular, rectilinear plan layouts
  - Generally vertical proportions
  - Lightweight structures attached to the exterior (awnings, verandahs, pergolas) to create articulation and facilitate outdoor living



**Eave overhangs, balconies, and verandahs to be used to create articulation and visual interest along the street**

- Buildings to be visually interesting with well-composed facades, but of a consistent architectural language that allows them to be aesthetically compatible with neighbouring buildings.

### Requirements

- Attachments such as verandahs, awnings, shade structures and pergolas shall be constructed from timber.
- Verandah or pergola posts to have cross-sections of min. 120x120mm.

## 15. Walls

### Objectives

- Walls should be an expression of local, natural and sustainable materials

### Guidance

- Outbuilding – an enclosed, non-habitable building that is detached from any dwelling.
- Rammed earth can be used for internal walls as thermal mass, but is not a good insulator so is not recommended for perimeter walls.

### Requirements

- Timber frame walls are preferred. Must be FSC certified timber, verified or certified plantation timber, recycled or reclaimed timber.

- Recycled steel frame construction can also be considered (but not virgin steel for framing).
- Any masonry wall must either be used internally for thermal mass or be built of recycled blocks if used externally.
- Hempcrete and strawbale walls must be rendered externally with natural lime render.
- External stonework must be min. 100mm thick (no stone veneers)
- Cladding options include:
  - Solid timber (either FSC Certified, verified / certified plantation, recycled, or locally milled from paddock fallen / verge trees)
  - Modified wood including: Shadowclad, Vulcan, Accoya, Vacoa, or NewTechWood
  - Approved fibre cement (currently James Hardie Linea Smooth 150 or 180, Axon Smooth 133 or 400). Must be painted.
  - Zinalume for Outbuildings only.
- Tilt-up concrete wall panels are not permitted.
- Generally, wall colours shall be light or mid-tone. Darker tones, including dark stained timbers, in conjunction with lighter or natural timber tones, are acceptable.

## 16. Roofs

### Objectives

- Create a roofscape that is compatible with the existing rural village character of Witchcliffe.

### Guidance

- The roofscape should comprise a mixture of well-proportioned, steeply pitched gable roofs and appropriately pitched skillion roofs, both with overhanging with eaves
- In combination with pitched roofs, concealed roofs behind parapets are acceptable along Bussell Highway
- Colorbond roof sheeting is not a permitted substitute for zinalume.
- Any flat roofs must be a minor design element
- Structural steel beams can be used where required if spans are beyond the capability of laminated timber (preferred).

### Requirements

- Gable roofs to be min. 30 degree slope and generally symmetrical
- No hip roofs visible from a street or public accessway



**Steep pitched roofs are encouraged within the precinct**

- Eaves required on pitched roofs (minimum 300mm)
- Roofing material to be custom orb or standing seam Zinalume sheeting
- Compressed fibre cement sheeting is permitted for linings to eaves.
- All rainwater furniture, flashings, barges, fascias, gutters, downpipes and miscellaneous trim shall be Zinalume.

## 17. Windows

### Objectives

- Windows to have high insulation values and be constructed from durable materials
- Window proportions and configurations to be compatible with the vernacular architecture of the region

### Guidance

- Individual 'punched' windows in a solid wall to be generally vertical in proportion and aligned with other similar windows to create a consistent rhythm in the wall
- Shopfronts may include large windows at ground level that can be horizontal in proportion
- Windows in framed walls to use appropriate trim surrounds / detailing to hide cladding edges.
- Expressed lintels and sills are encouraged

### Requirements

- Overall  $U_w$  maximum 3.0 for all windows (frames plus glazing)
- Window frames to be made from sustainably sourced timber, lead-free uPVC or aluminium.
- Glazing to shopfronts must be clear glass



Well-proportioned, repetitive vertical windows sets up a pleasing rhythm along the street

## 18. Accommodation

### Objectives

- Maintain high standards of design and construction for residential and tourism uses within the precinct.
- Ensure that residential and tourism accommodation is appropriately protected from highway noise.

### Requirements

- Residential or short stay accommodation within the precinct must comply with relevant sections of the Witchcliffe Ecovillage Building Design Guidelines (Residential) which are: 2.3, 3.1-3.7, 4.1-4.5, 5.1-5.5, 6.1-6.10, 7.1-7.6, 8.1-8.8. Please see full provisions in Appendix A.
- Any development of residential or tourism accommodation within the LDP area must demonstrate compliance with 'quiet house' design principles to attenuate highway noise, as outlined in SPP 5.4 Road and Rail Noise Guidelines, Sept 2019 (Section 4.4).

## 19. Signage

### Objectives

- Ensure that any business signage is well-integrated with the building and appropriate for the scale of the townsite

### Guidance

- Creative, playful signage made from natural or recycled materials is encouraged.

### Requirements

- Augusta-Margaret River LPP26 – Signage applies to this precinct, with the following modifications:
  - The following signs will not be supported in the LDP area: C1-C7, H3, I1, J1, K1, L1, M1, M2, N1, O1
  - D2 type signs are further limited to maximum letter height of 500mm and to a horizontal format



**Residential and tourism uses can be creatively integrated with commercial developments, either above or behind non-residential uses.**



**Signage should generally be attached directly to the building or associated awning / verandah**

# Sustainable Resources

## 20. Water Supply

### Objectives

- Ensure adequate potable water supply for the intended use

### Guidance

- Provide adequate rainwater collection and storage to meet the operational requirements for water for the proposed land use and scale.
- Residential / tourism accommodation uses shall provide rainwater collection and storage in accordance with Section 8.2 of the Witchcliffe Ecovillage Building Design Guidelines (Residential).

### Requirements

- Rainwater tanks, where constructed above ground, shall be located at least 12m behind the Primary Street boundary
- Rainwater tanks shall be set back a minimum of 500mm from any lot boundary.
- Rainwater tanks, if visible from the street or PAW, to be constructed of Zinalume.

## 21. Power Supply

### Objectives

- Install sufficient solar panels to meet the power needs of the intended development and land use

### Guidance

- Design building roofs with consideration of solar panel efficiency.
- Consider installing an individual battery on the premises to store excess solar energy.
- Larger system capacity can be accommodated and is encouraged, please discuss system capacity during the Approval Process.



**Solar panels are less conspicuous when they sit flat on a roof or are hidden behind a parapet wall**

### Requirements

- A minimum of 6kW of solar panels and a 5kW inverter shall be installed for each development on the lot. Any residential dwellings will require additional panels and associated inverter with the same requirements.
- Each development is required to connect to the strata switchboard and provide an internet connection with modem and SwitchDin droplet hardware to facilitate microgrid communication and metering.

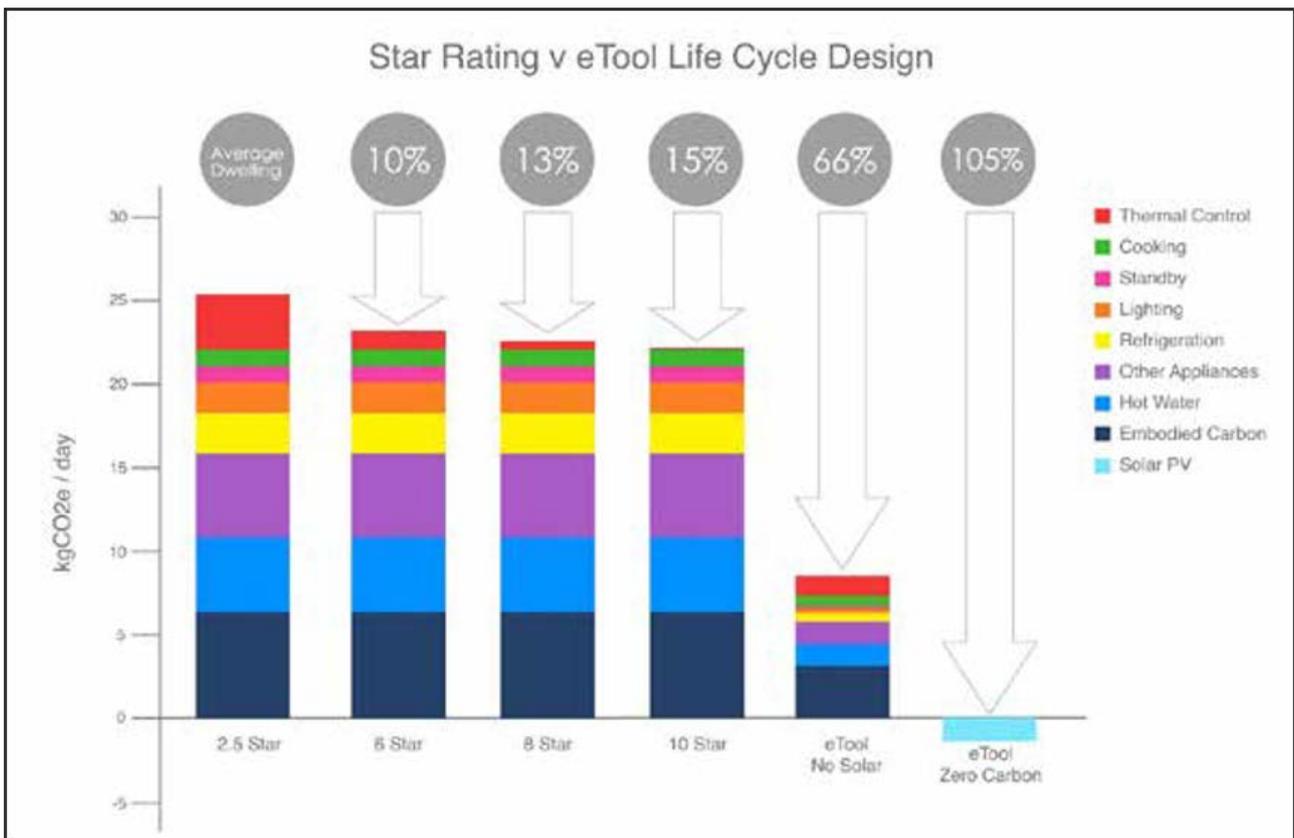
## 22. Energy Efficiency

### Objectives

- Design buildings to minimise the need for artificial heating and cooling.

### Requirements

- Commercial development must demonstrate compliance with Section J of the National Construction Code, Volume 1, Amendment 1.
- Class 1, Class 2 or Class 4 Sole Occupancy Units must achieve a NatHERS thermal rating of 8 stars.



Residential NatHERS Star Rating vs Life Cycle Design (courtesy eTool <https://etoolglobal.com/>)

## 23. Lifecycle

### Objectives

- Achieve low carbon buildings as demonstrated by a lifecycle analysis of each development.

### Guidance

- Development within the commercial precinct is to achieve low carbon buildings, consistent with the high standards established for the Witchcliffe Ecovillage.
- Lifecycle analysis considers the embodied energy / carbon from two areas: operational use and building materials.
  - Operational use. This is any function that requires external energy such as heating, cooling, lighting, hot water heating etc
  - Building materials. This includes the energy required to source the raw resource, refine the resource, transport it to site, and install.
- Passive solar design strategies and selecting energy-efficient appliances / machinery can be effective in reducing the operational energy required for the development.

- Sourcing local, natural, and less-refined construction materials can help to reduce the embodied energy in the development.
- eTool, a Perth-based software company, has agreed to perform customised LCA analysis for each design proposal. This process will include modelling a typical base case for the proposed business, setting a carbon emissions target specific to that business, and working with the purchaser's design team in materials selection, solar system capacity and design approach to achieve the required reduction. The cost for this LCA analysis (approx. \$2000.00) is included in the lot price. eTool's service includes provision of recognised certification that can be used in business marketing.

### Requirements

- Development must meet Life Cycle Assessment Minimum Carbon Emission target of -90% carbon emission compared to OECD average (eTool's 'Platinum' medal).
- Submit LCA report from eTool verifying compliance with the carbon emissions target as part of the design review process.

# Design Review Process

## Concept Design Review

Conceptual designs are to be submitted to the Witchcliffe Ecovillage design team for review to establish that the key principals are being met and the proposed design is consistent with provisions of the Local Development Plan and the objectives of the Witchcliffe Ecovillage Commercial Precinct Building Design Guidelines. This review process needs to be completed prior to submitting any plans to the Shire.

Prior to starting the design process, we recommend a thorough review of the relevant documents, example plans, and checklists. Please ask any clarification questions before committing to any particular design outcome, as this saves everyone time and energy.

Conceptual design submission requirements:

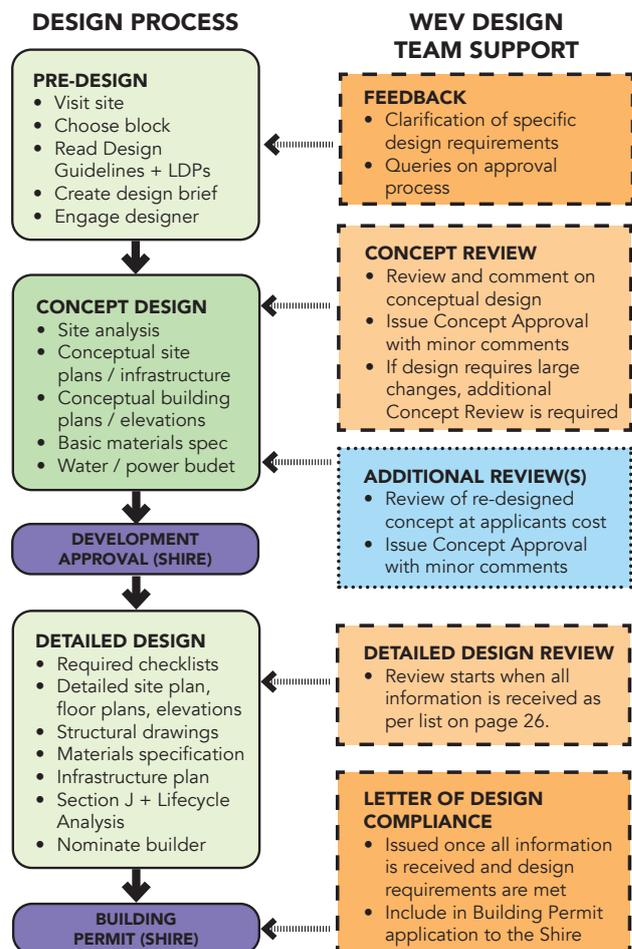
- Site analysis
- Sketch site plans
- Sketch building plans, cross-sections and elevations
- Proposed power systems
- Location of tanks
- Carparking location
- Exterior material selection
- Landscaping and fencing concept plans

The WEV Design Team will undertake one concept review once all of the required drawings and information are provided. We will respond with a detailed email response identifying any design suggestions or areas of concern. If the proposal is substantially consistent with the design intention for the site (as outlined in the applicable provisions), we will issue a Concept Approval email along

with any minor comments to incorporate into your Detailed Documentation. This Concept Approval should be submitted to the Shire with your Development Approval drawings and information.

If the conceptual design requires substantial modification due to non-compliance with the LDP's or BDG's, it will need to be revised accordingly and then reassessed by the WEV Design Team before the Concept Approval letter can be issued. As the developer has only allowed for one iteration of this process, additional concept reviews (if required) will cost the applicant \$500 per review.

Please note, the WEV Design Team will not provide advice or be deemed to be providing approval for land uses, as that is a Shire responsibility and will be dealt with at Development Approval stage.



## Development Approval (Shire)

All development proposals are required to obtain Development Approval (DA) from the Shire of Augusta Margaret River. This process will assess the proposed built form as well as the intended land use against the provisions of the Scheme, the R Codes (for any accommodation component), and the Local Development Plan. Support for the proposed design from the Witchcliffe Ecovillage is required prior to submission to the Shire for DA approval. Any material variation between the DA submission and the concept design approved by the WEV design team may delay issue of our Detailed Design approval at the next stage. For DA submission requirements, please see the Shire's website.

Please also refer to your Strata Scheme's bylaws prior to submitting a DA to ensure that proposed land use is also consistent with the Scheme's Bylaws.

## Detailed Design Review + Approval

Following the Development Approval, the proponent will refine the design and prepare construction documentation and detailed materials specifications. Once these are completed, there is a design review process with the Witchcliffe Ecovillage design team to verify compliance with some of the more detailed requirements of the Design Guidelines. This is a checklist assessment process, the onus is on the proponent to provide all details required and demonstrate compliance with the BDG's.

Detailed Design submissions shall comprise:

- Evidence of Development Approval from the Shire, including stamped plans
- Building Design Guidelines compliance schedule/checklist
- Detailed site and infrastructure plan, including finished floor levels and key site levels to explain the site drainage strategy
- Detail building floor plans, roof plan, elevations & sections
- Carparking plans & specification
- Landscape plans & specification, including fencing
- Services including water storage & location, photovoltaic system and location
- Structural engineering drawings
- Building materials specifications
- Fixtures and fittings schedule
- Schedule of external materials and colours
- Section J Thermal Assessment Certificate
- Life Cycle Assessment Summary & Certificate
- Builders' Waste Management Plan
- Executed Construction Management Agreement and payment of Security Bond

Once the WEV design team deem the application compliant with our requirements, a formal letter of Design Compliance will be issued to the proponent. This letter should be submitted to the Shire with the other documentation required for Building Permit.

## Building Permit (Shire)

A Building Permit is required for all structures (residential, commercial or industrial) including but not limited to new works, alterations, additions, swimming pools, spas (below and above ground), pool safety barriers / fence for pools & spas, patios, retaining walls and sheds.

Building Permits must be obtained prior to the commencement of any building work. To

obtain a Building Permit, an application form (BA01 or BA02, see below) together with one copy of all plans and specifications must be submitted to Augusta-Margaret River Shire Building Services.

Submission requirements can be found on the Department of Commerce website <http://www.commerce.wa.gov.au/building-commission/building-approval-forms-0>.

To speed up the approval process, applicants can engage a private building surveyor to certify plans prior to lodging with the Shire for approval.

- Certified applications - BA01 - approval timeframe 10 business days
- Uncertified applications - BA02 - approval timeframe 25 business days

# Standards During Construction

In order to ensure a quality build, an orderly construction process and to reduce impact on neighbours, the following requirements must be met during construction:

- Construction works must comply with all Shire policies, regulations, and strata bylaws.
- Ensure all trades and contractors are aware of sustainability infrastructure requirements, e.g., correct installation of insulation, correct location of rainwater tank inlet, correct placement of PV array, etc.
- The site must be kept clean at all times during construction to minimise impact on neighbours. All rubbish must be disposed of off-site.
- The lot must be maintained prior and during construction, with grass cut, weeds and rubbish removed.
- Earthworks are to be managed carefully, and dust is to be controlled.
- Storage of all plant and materials to be on the subject lot only (not on adjoining lots, open space or common property even if unoccupied).
- Vehicle parking is not permitted on other lots, open space, median strips or other landscaped areas.
- Vehicle, machinery and worker access to the lot is strictly via Willerin Lane only, not via Wolghine Avenue, Bussell Hwy, Kulbardi Way or the pedestrian access way.
- Existing vegetation is to be protected with tree protection barriers.
- Stormwater is to be appropriately managed (sediment to be controlled and managed so it does not impact downstream swales).
- Swales along road verges must be maintained and not obstructed or filled in, and cross-overs / culverts over swales must not be damaged.

Prior to submitting documentation to the Shire for Building Permit (and before commencing construction), lot purchasers and their selected builders will be required to sign a Construction Management Agreement. This will acknowledge that the purchaser and builder are aware of the requirements for building in the Ecovillage, and that the builder and all trades will comply in an orderly and courteous way.

Owners of lots must also commit to making every effort to ensure minimum damage to roads, paths, landscaping on verges and in community gardens during construction. To this end, WEV will require a security bond of \$1,000 to be held in escrow during the construction process. Owners will be liable for replacement and repair costs of any damage (enforced via each cluster's strata bylaws).

## Appendix A - Relevant Portions of Sustainable Residential Building Design Guidelines

Section	Title	Objective	Guidance	Required
2.3	<b>Architectural Character</b>	Witchcliffe Ecovillage buildings should generally reflect the rustic aesthetic of a small South West village, without needing to replicate or mimic existing building forms. Attention should be given to simplicity of form, expression of natural materials, harmonious proportions, and careful rendering of details and finishes on building facades.	<ul style="list-style-type: none"> <li>• Simple geometric volumes and vertical elements</li> <li>• A mixture of natural earth rendered and timber wall external elements</li> <li>• Use of local, natural and sustainable materials wherever possible in construction and landscaping, such as plantation and recycled timber, straw bale and render, rammed earth, hempcrete, clay, recycled bricks, limestone and granite</li> <li>• Zincalume metal sheeting for roofs and rainwater tanks</li> <li>• Creative and artistic use of recycled and sustainable materials</li> <li>• Predominantly steep (30-45 degree) double pitch roofs with overhanging eaves at gable ends</li> <li>• Skillion roofs with lower pitches, lean to elements and clerestory windows</li> <li>• Loft spaces and dormer windows</li> <li>• Deep overhangs of roof structures</li> <li>• Larger building volumes broken up into parts using design elements</li> <li>• Small punctured openings and double volume openings</li> <li>• Recessed window and doors with proportionate frames</li> <li>• Windows typically vertical or square rather than horizontal</li> <li>• Balconies and verandahs to provide shade, shelter and legible entry statements</li> <li>• Shutters, awnings, solar pergolas, and other seasonally adaptable shade elements</li> <li>• Creative use of garden fencing, stone / rammed earth walls, and landscape features to complement buildings, gardens and streetscapes</li> <li>• Attention to detail in materials, finishes and transitions</li> <li>• Integration of sustainability features into building design, e.g., solar panels</li> <li>• Consideration given to the presentation of all elevations of the home, not just the street façade</li> <li>• Avoid overtly expressed period or regional styles (e.g., Federation, Balinese) as these are not considered consistent with the Ecovillage aesthetic or rural character of the region.</li> </ul>	<ul style="list-style-type: none"> <li>• Comply with requirements in Sections 5.1-5.5 and 6.1-6.10</li> </ul>
3.1	<b>Site analysis</b>	Undertake a detailed analysis of the site prior to beginning the design process to provide a solid basis for design.	<ul style="list-style-type: none"> <li>• Key background information would include review of climate data such as prevailing winds, sun angles, rainfall amounts, and soil quality</li> <li>• Important drawings would include a site feature survey of your block showing: <ul style="list-style-type: none"> <li>- the extent and location of slope;</li> <li>- cadastral boundaries;</li> <li>- relevant Local Development Plan requirements, (e.g., nominated crossover location and building setbacks);</li> <li>- access to services (NBN, electricity microgrid, stormwater drainage) and</li> <li>- interface with the concept designs for the neighbouring lots (if available).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Compile and review relevant background information and drawings prior to attending your Concept Review meeting with the Design Team (see p.25, Design Review Process).</li> </ul>
3.2	<b>Setbacks</b>	Setbacks ensure that buildings are appropriately spaced apart to guarantee access to sunlight, ventilation, privacy and to create landscaped streets.	<ul style="list-style-type: none"> <li>• Carefully review the applicable Local Development Plan to understand the specific setbacks for your block.</li> <li>• Carports and rainwater tanks are subject to the overall building envelope as outlined in the Local Development Plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Adhere to all setbacks specified by the Local Development Plan for your lot.</li> </ul>
3.4	<b>Orientation</b>	To achieve effective solar orientation of the house on site, with internal and external living spaces generally located to face north, and service areas to the south.	<ul style="list-style-type: none"> <li>• The Commercial Lots are positioned on an east/west axis, with setbacks provided on each lot to ensure winter solar access is guaranteed to the north edge of every building. The most effective building footprint on east/west lots maximises the northern facade, with the north and south-facing facades 1.5 to 2.0 times the length of the east and west facades.</li> </ul>	<ul style="list-style-type: none"> <li>• Building floorplans must demonstrate effective solar passive building orientation.</li> </ul>
3.5	<b>Outdoor Spaces</b>	Encourage indoor-outdoor living that takes advantage of solar orientation, promotes social interaction, and integrates exterior spaces into the overall design concept of the dwelling.	<ul style="list-style-type: none"> <li>• Maximise northern exposure into principal outdoor spaces.</li> <li>• Consider function and best time of day/season, e.g., east facing breakfast courtyard, south facing verandah to provide a cool summer space, deck to north with clear sheeting for winter protection and solar pergola for summer shade, etc.).</li> <li>• Plant deciduous trees north of the principle courtyard to provide summer shade.</li> <li>• Ensure landscaping doesn't impact on your or your neighbour's solar access.</li> <li>• Design landscaping to provide wind protection.</li> <li>• Consider providing an undercover-clothes drying area for all year use.</li> <li>• AMR Shire provides households with three wheelie bins for general, compostable and recyclable waste streams. Provide a convenient and discreet area to enable efficient waste management.</li> </ul>	<ul style="list-style-type: none"> <li>• At least one usable open space (minimum dimension 4m) must have direct northern exposure and be located adjacent to an indoor living area for ground floor dwellings.</li> <li>• Shade structures over outdoor spaces to be designed and located to maximise winter sun access to the dwelling (see section 5.4, Shade Elements).</li> <li>• Locate clothes drying in an area that is screened from street.</li> </ul>
3.6	<b>Views</b>	Maximise the impact of attractive views from your block without diminishing the thermal efficiency of your building.	<ul style="list-style-type: none"> <li>• Design your house to emphasise and take advantage of views.</li> <li>• Windows facing east will also let in morning sunlight. Consider placing the kitchen or breakfast nook in this location.</li> <li>• Windows facing west will receive late afternoon sun and will require a design intervention to prevent overheating in summer (see Section 5.4, Shade Elements).</li> <li>• Buildings with views looking north are optimally placed to benefit from large amounts of glazing which captures the view and lets in winter sunlight. Size your eaves and shade structures carefully (see Section 5.4, Shade Elements).</li> <li>• Buildings with views to the south must strike a careful balance between capturing the view and not making windows too large (as this could lead to a poor thermal outcome). One solution to this predicament is specifying high performance windows in this location (see Section 6.8, Window Frames and Glazing).</li> </ul>	
3.7	<b>Service Infrastructure</b>	To ensure an efficient layout of service infrastructure that will minimise visual impact on the streetscape.	<ul style="list-style-type: none"> <li>• Configure optimal locations for essential service infrastructure including solar panels, inverter, rainwater tanks, monitoring interfaces, reticulation controller, bin storage, etc. Consider access, setbacks, visual amenity and functionality.</li> <li>• Locate solar panels to optimise solar collection (see section 8.1, Energy, and section 5.3, Roof Forms).</li> <li>• Calculate the water demand of your household and size your rainwater tanks accordingly (see Section 8.2, Water).</li> <li>• If you plan to provide household batteries, they must be located to comply with safety regulations and provide practical access (see Section 8.1, Energy).</li> <li>• Make provision for stormwater flows and rainwater tank overflows.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide location and specifications for all service infrastructure on detailed Infrastructure Plan.</li> <li>• Aside from solar panels, solar hot water systems and unpainted metal rainwater tanks, all external fixtures must be screened from the street and pedestrian walkways.</li> <li>• Locate your rainwater tanks in a suitable location that addresses LDP setback requirements and doesn't interfere with solar gain to indoor and outdoor living spaces.</li> <li>• Situate rainwater tank to facilitate overflow to stormwater drainage.</li> </ul>
4.1	<b>Passive Solar Heating</b>	Design your house to take advantage of renewable solar energy from the sun to heat your house in winter without overheating in summer.	<p><b>SOLAR GAIN</b></p> <ul style="list-style-type: none"> <li>• The maximum sun angle at Witchcliffe is 80° on December 22nd (summer solstice) and 32° on June 21st (winter solstice). Design windows to maximise sun exposure for one month on either side of the winter solstice, and to minimise direct sun exposure for one month on either side of the summer solstice.</li> <li>• Solar gain during hot weather in the morning (east) and evening (west) must be carefully controlled because of the low angle of the sun. Consider vertical louvers, deciduous vines, adjustable external shades / shutters or deep verandahs.</li> <li>• Efficient solar passive houses are generally no more than 2 rooms deep to allow warmth to penetrate to rooms on the south, and approximately 1.5 times longer on the east west axis.</li> </ul> <p><b>THERMAL MASS</b></p> <ul style="list-style-type: none"> <li>• The key characteristics of thermal mass materials are: high density, thermal conduction, appropriate thermal lag, low reflectivity, and high-volume heat capacity.</li> <li>• Thermal mass materials have poor insulation (R) values, so are not recommended for external walls. Incorporate thermal mass materials in the interior of homes to provide temperature moderating benefits by absorbing heat from the sun (via solar access) during the day and then releasing it at night as temperatures cool.</li> <li>• Materials that are considered good thermal mass include concrete, stone, rammed earth, brick, adobe, and water.</li> <li>• Newer phase-change materials (PCMs) provide thermal mass that may be useful in light-weight construction. While currently more expensive, they take up less room and are lighter so less costly to support on an upper level. These materials include paraffin wax and a range of benign salts, with new products emerging every year.</li> <li>• The WEV Life Cycle Assessment recommended the use of thermal mass wall elements for all internal walls (e.g., single brick, recycled brick, mud brick, stone, rammed earth, light earth construction, etc.) to maximise</li> </ul>	<ul style="list-style-type: none"> <li>• Living spaces must generally be located on the northern side of buildings.</li> <li>• Provide sufficient and appropriately located thermal mass to capture and store winter heat (e.g., thermal mass floor in northern living areas, internal rammed earth wall placed to absorb winter sunshine through glazing, single leaf internal brick walls).</li> <li>• Thermal mass materials can only be used as part of an external wall (e.g., rammed earth) if insulated to Ecovillage R-value standards, see Section 6.7, Insulation.</li> </ul>

4.2	<b>Passive Cooling</b>	To utilise the breeze and the dynamics of heat rising to naturally cool your house in summer and to provide fresh air to internal rooms.	<ul style="list-style-type: none"> <li>• See YourHome, "Passive Cooling" (p.135-48), for advice regarding air movement and cross ventilation, including best window and overhang designs for directing air flow.</li> <li>• Provide appropriate shading to external walls and glazing, see Section 5.4, Eaves and Shade Elements.</li> <li>• Provide reflective and bulk insulation in roof space as per Section 6.7, Insulation.</li> <li>• The prevailing summer winds at Witchcliffe are from the SE in the morning and SW in afternoon.</li> <li>• To achieve effective cross-ventilation, houses should ideally be no more than two rooms deep, with an opening (window or door) allowing air into each room and another on an opposite wall to allow it to exit.</li> <li>• To create higher velocity, the 'upwind' opening (south) should be smaller than the 'downwind' opening (north).</li> <li>• Choose window types with large effective openings such as double-hung, sliding, casement or louvers (high-efficiency well-sealed lower units only).</li> <li>• South facing windows should be thermally efficient and minimised in area to what is necessary to provide cross ventilation and satisfy National Construction Code requirements, in order to avoid heat loss in winter.</li> <li>• Windows / doors located for cross ventilation should also provide insect screens..</li> <li>• We recommend that all living areas and bedrooms should be provided with ceiling fans to provide supplementary air flow when required, see Section 8.6, Heating and Cooling.</li> <li>• Provide thermal mass (e.g., concrete floor, single leaf brick walls, rammed earth feature wall) located internally to lose heat via breezes, ceiling fans or night venting in summer.</li> <li>• Shade thermal mass from direct sun in summer (e.g., eaves, solar pergola, deciduous trees, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>• House designs must demonstrate adequate cross ventilation through primary living spaces and bedrooms with flow- path diagrams and appropriately located thermal mass.</li> <li>• Two storey or homes with vaulted ceilings must provide a mechanism to vent heat in summer via 'stack ventilation' (e.g., clerestory windows, roof ventilators).</li> </ul>
4.3	<b>Natural Lighting</b>	Design and locate glazing to direct natural sunlight to task areas where it is most useful to reduce the need for artificial lighting.	<ul style="list-style-type: none"> <li>• To enable sufficient natural lighting, the extent of glazing should be proportional to room size and volume. The general rule of thumb is that the glazing should be at least 10% of floor area of the room.</li> <li>• Aim to provide light sources from at least two sides in all living spaces to create a balance of dispersed light in the space.</li> <li>• Consider placing rooms on the east and west that would benefit from either morning or afternoon light.</li> <li>• Windows placed higher on the wall allow for deeper light penetration into a room.</li> <li>• Keep building footprint 'skinny' to allow sufficient light to access centre of home from the north.</li> <li>• Regular skylights should be used sparingly, as they cannot be easily shaded in summer, and allow heat loss in winter. Consider a dormer window or thermally efficient skylight instead.</li> <li>• Lighter floor colours naturally bounce light around a room.</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriate glazing is provided so that tasks can be comfortably undertaken during the day without artificial lighting.</li> </ul>
4.4	<b>Room Layout</b>	To achieve internal room layouts that are thermally efficient, comfortable, and functional.	<ul style="list-style-type: none"> <li>• Design floor plan to maximise thermal efficiency (see Section 3.2, Orientation, 4.1 Solar Passive Heating and 4.2 Passive Cooling).</li> <li>• Design floorplan with external expression in mind to create attractive and balanced elevations (see Section 5, Building Form).</li> <li>• Begin with a simple rectangular shape and simple roof form, (see Section 5.3, Roof Forms) and be aware of the impact of any extruding rooms on roof form.</li> <li>• In open plan and/or double storey houses, make provision for areas to be thermally isolated so that heating/cooling energy can be focused only on areas being used.</li> <li>• Consider providing airlocks/mudrooms at commonly used entrances to help maintain a comfortable internal air temperature. These have the added benefit of helping to reduce clutter and keep the house clean.</li> <li>• Consider layouts of existing or proposed furniture to provide functional flow.</li> <li>• Design 'wet areas' (rooms with plumbing) so that they are clustered together and close to the location of the hot water system. Shared plumbing walls will help to minimise pipe runs, saving money and reducing heat loss for hot water.</li> <li>• Consider reducing the number of bathrooms, and conveniently locate at least 1 bathroom with a separate toilet to avoid requiring an additional powder room.</li> <li>• In small homes, consider combining a bathroom and concealed laundry to minimise wet areas.</li> <li>• Locate kitchens and laundries close to each other and provide a convenient doorway to an outdoor service area to provide easy access to carport/garage/store, bin storage and washing line.</li> <li>• Locate built in storage/book cases in hallways to make use of an otherwise redundant space.</li> <li>• Bedrooms are generally the least actively used rooms in a house, used mainly for dressing and sleeping. Consider reducing their size, or incorporating other elements, such as storage, craft or study spaces.</li> <li>• Design guest bedrooms as multi-purpose spaces—yoga room, craft room, study, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Internal room layout allows for effective solar passive design outcomes</li> </ul>
4.5	<b>Accessibility</b>	To design your house to suit your current needs while also allowing the flexibility to provide accessibility to all visitors and accommodate future needs.	<ul style="list-style-type: none"> <li>• As part of the design process, consider accessibility and changing spatial needs, which may include children, grandchildren or elderly parents, or relate to the mobility requirements of yourself or visitors.</li> <li>• The Livable Housing Design Guidelines (4th Ed.) provide dimensions and spatial requirements for three categories of accessibility (Silver, Gold and Platinum), which vary by the degree to which they accommodate those with mobility challenges. (For more dimensions and specifications, visit <a href="http://www.livablehousingaustralia.org.au/">http://www.livablehousingaustralia.org.au/</a>)</li> <li>• To achieve full Universal Access compliance inside and outside of the home, use the standards set out in AS1428.1.</li> </ul>	<ul style="list-style-type: none"> <li>• Design to the requirements of Livable Housing Design Guidelines Silver Category for any detached dwellings on the lot to provide future flexibility and ensure the basic accessibility of your home to visitors with differing mobility needs: <ol style="list-style-type: none"> <li>1. A safe and continuous and step free path of travel from the street entrance and/or parking area to a dwelling entrance that is level.</li> <li>2. At least one level step-free entrance into the dwelling.</li> <li>3. Internal doors and corridors that facilitate comfortable and unimpeded movement between spaces.</li> <li>4. A toilet on the ground or entry level that provides easy access.</li> <li>5. A bathroom on ground or entry level that contains a hobless shower recess.</li> <li>6. Reinforced walls around the toilet, shower and bath to support the safe installation of grabrails at a later date.</li> <li>7. Stairways designed to reduce the likelihood of injury and also enable future adaptation.</li> </ol> </li> </ul>
5.1	<b>Building Facades</b>	To ensure that building facades visible from the street, community garden or pathways are well-composed, expressive, and balanced, with appropriate scaling, legibility, and use of compatible materials.	<ul style="list-style-type: none"> <li>• Design facades according to the principles set out in Section 2.3 Architectural Character.</li> <li>• Design the internal layout of the building with the external expression in mind (see Section 4.5, Room Layout).</li> <li>• Harmonious proportions and the use of natural external materials are key considerations.</li> <li>• Keep the main building volume simple and attach external elements to break up long walls or add shadowlines, such as verandas, balconies, louvers, shade structures, awnings, and bay or dormer windows.</li> <li>• Arrange windows and doors to achieve a visually balanced composition (symmetrical or asymmetrical.)</li> <li>• Windows should generally be rectangular with a vertical proportion.</li> <li>• A separate window surrounded by solid wall tends to be more attractive in a vertical proportion (window panes with a minimum 1:1 height to width ratio) as it relates to human scale and proportion.</li> <li>• Windows ganged together allow for greater flexibility in terms of shape/proportion where a 'window wall' is intended. These are often combined with sliding glass or French doors.</li> <li>• "PunCHED" or recessed openings (to create external overhangs and window sills) are preferred to flush openings and can create visually interesting facades without adding cost.</li> <li>• Avoid long blank walls (&gt;5m) without openings facing the street or community garden. If unavoidable (for example, a west facing wall) explore the use of texture and pattern expressed in natural materials or features such as fences / walls, landscaping, shade structures, etc., to provide visual interest.</li> <li>• Use landscaping features (walls, fences, shrubs) where possible to soften the visual impact of rainwater tanks and carports / garages on the streetscape.</li> <li>• Design simple, high quality and well executed external finishes and details, including gable ends, use of colour, material transitions, etc., (see Section 7, Finishes and Details).</li> <li>• Avoid overtly expressed period or regional styles (e.g., Federation, Tuscan, etc.) as these are not considered consistent with the Ecovillage aesthetic or rural character of the region.</li> <li>• Double storey porticos are not allowed.</li> </ul>	<ul style="list-style-type: none"> <li>• Building form and facades must generally accord with the Ecovillage's adapted aesthetic principles, see Section 2.3, Architectural Character.</li> <li>• Create a comfortable entry experience from the public street, including a separate pedestrian pathway, adequate lighting, and a clearly visible entry door.</li> <li>• Ensure that building facades address and appear attractive from the streets and pedestrian walkways (where applicable).</li> </ul>
5.2	<b>Building Height and Bulk</b>	To ensure that the height and bulk of buildings is compatible with the intended village scale and does not negatively impact the solar access opportunities on neighbouring lots.	<ul style="list-style-type: none"> <li>• On larger lots, buildings can be designed as a collection of smaller segments rather than one large mass. These segments can be used to effectively shape exterior space and create micro-climates. Typical configurations include footprints shaped like a U, T, or L. Overly complex shapes and rooflines will add cost to the build, and potentially increase the operational cost of heating or cooling your home.</li> <li>• Ridge height is generous (see applicable LDPs), slightly higher than the AMR Shire standard but takes into account the Ecovillage requirement for steeper pitches on gabled roofs.</li> </ul>	<ul style="list-style-type: none"> <li>• Building walls are limited in height to 2 storeys (maximum 7m plate height).</li> <li>• Ridge height maximum 10.5m.</li> <li>• Above 4m in height on south buildin edge, the building must be set back 6m from the southern boundary (see Figure 3 in Local Development Plan).</li> </ul>

5.3	Roof Forms	To ensure that buildings have roof types and configurations that fit with the intended character of the Ecovillage and provide for efficient placement of solar panel arrays.	<p><b>ECOVILLAGE CHARACTER</b></p> <ul style="list-style-type: none"> <li>Keep roof forms clear and simple, with one roof type / form clearly dominant and all others minor.</li> <li>Hip roofs are not consistent with Ecovillage architectural character.</li> <li>The preferred and recommended Ecovillage roof forms for residential are: <ul style="list-style-type: none"> <li>Steep (30°- 45°) symmetrical, double pitch gable roofs with overhanging eaves at gable ends;</li> <li>Skillion (10°-15°) with overhanging eaves; and</li> <li>Skillion (20°-25°) with lean to or split gable with overhanging eaves.</li> </ul> </li> <li>Gable roofs take their cue predominantly from steeper pitched roofs as found in barns, using their form to create opportunities for useable loft spaces.</li> <li>A steep gable can look disproportionate in &gt; 8m width at the gable end. Consider reducing building width, increasing plate height, adding loft or bay windows, verandahs / pergolas, or providing feature material transitions to achieve balance. A split gable may also be a solution over a wider span.</li> <li>For skillion roofs, ensure roof pitch and sheeting span are sufficient to provide adequate rainwater run-off, as well as achieve aesthetic outcomes. Skillion roofs can look disproportionate if the span is too short and steep, or if the span is too long.</li> <li>Butterfly, saw tooth, flat roof forms and other configurations with box gutters over internal spaces are not recommended due to the risk of leakage during heavy rain events.</li> <li>See also Section 5.4, Shade Elements, regarding eave requirements.</li> </ul> <p><b>SOLAR PANELS</b></p> <ul style="list-style-type: none"> <li>Design your roof to accommodate your required solar panel array. The minimum 6.0 kW array will occupy approximately 40m<sup>2</sup> roof area.</li> <li>Solar panels are most effective when positioned to face north at a 32° angle (Witchcliffe latitude) to maximise winter solar access, however, efficiency is adequate between approx. 15° and 45°.</li> <li>North facing roof space for PV array can be located on carport if adequately sized and located if your home doesn't provide sufficient north facing roof surface</li> <li>East and west facing placement of PVs will lead to an approximate 15-20% reduction in PV performance (depending on roof angle) and is generally not recommended.</li> </ul>	<ul style="list-style-type: none"> <li>No hip roofs.</li> <li>Gable roofs must be min. 30° pitch (recommend 30°-45° for spans up to 8m wide, 30° for 9-12m wide) and generally symmetrical.</li> <li>Skillion roofs are to be no steeper than 25° with max. 10m spans.</li> <li>Flat roofs or sections of flat roof will be considered only if house design can demonstrate that: <ul style="list-style-type: none"> <li>the design principles of Section 2.3, Ecovillage Architectural Character, have been addressed through built form and material selection;</li> <li>all windows are provided with appropriate external shade elements; and</li> <li>roof has sufficient slope / waterproofing to facilitate rainwater run-off and avoid leakage</li> </ul> </li> <li>Gable dormers to loft spaces must have eaves and same slope roof as primary roof.</li> <li>Flat and skillion roofs must demonstrate aesthetic and functional accommodation of PVs and gutters for rainwater collection.</li> <li>Any box gutter over internal rooms must be sized to accommodate one in 50-year rain events.</li> </ul>
5.4	Eaves & Shade Elements	To design visually integrated shading that allows solar gain in winter but protects walls and glazing from summer heat transfer.	<p><b>EAVES</b></p> <ul style="list-style-type: none"> <li>North-facing gable eaves should be sized so they allow maximum solar penetration for one month on either side of the winter solstice, and are fully shaded for one month on either side of the summer solstice.</li> <li>All other gable eaves to be minimum of 300mm (see Section 7.4, Gable Ends and Eaves). Ideally eaves will be symmetrical and balanced across building elevations visible to the street or community garden, as well as sized to provide shading to walls and glazing as required.</li> <li>Skillion roofs facing north and clerestory windows to north will require case by case assessment of windows and eaves to achieve effective winter solar access and summer shade, and may require additional shade structures (e.g., solar pergola).</li> </ul> <p><b>WINDOW SHADING</b></p> <ul style="list-style-type: none"> <li>North-facing windows should maximise winter solar access, using external shading (eaves, solar pergola, deciduous trees) to minimise heat gain in summer.</li> <li>West facing windows require deep eaves, verandahs or additional shade structures to diminish late afternoon sun in summer.</li> <li>East facing windows are a valued source of morning sunshine to living areas in winter, and are best protected with seasonally adaptable external shading (awnings, fins, deciduous plantings, etc.)</li> <li>Ensure that fixed shading structures over west and east facing windows still allow lower angled winter sun penetration to living rooms.</li> </ul> <p><b>EXTERNAL SHADE STRUCTURES</b></p> <ul style="list-style-type: none"> <li>Individual external window shades can augment eaves in protecting key windows (gable end to west or flat roof).</li> <li>Balconies, porches and verandahs should be designed as integral parts of the façade, complement the style and construction materials of the building, and only provide beneficial shading impacts on rooms below.</li> <li>Balconies and verandahs may project into boundary setbacks areas as identified in the applicable LDP.</li> </ul>	<ul style="list-style-type: none"> <li>Adequate roof eaves/overhangs (responsive to orientation) must be provided over all external walls of the dwelling (unless a parapet wall and flat roof is specified, in which case all glazing must be separately and adequately shaded.)</li> <li>All other gable overhangs and eaves to be minimum of 300mm.</li> <li>Verandahs, pergolas, patios and other external shade structures over outdoor spaces on the north must not exclude winter solar access to northern glazing.</li> <li>Balconies and verandahs must be supported by posts or columns of at least 120mm x 120mm (or ground floor of house).</li> <li>Balconies may cantilever no more than 750mm without visible support structures such as brackets.</li> <li>Balconies and verandahs are to be no less than 1.8m deep to provide a functional sitting area.</li> </ul>
5.5	Carports and Garages	Minimise the impact of vehicle parking on the streetscape and encourage social interaction.	<ul style="list-style-type: none"> <li>Consult the applicable LDP for your lot for crossover locations and garage and carport setbacks.</li> <li>Free standing carports (steep gable or skillion roofed) are the preferred design outcome as they have less visual impact from the street than an attached garage with double doors, and the open design encourages neighbourly interaction as residents come and go.</li> <li>The design of the carport should complement the main structure either by mimicking the roof configuration (same roof slope and type) or by 'deferring' to the primary building by keeping the profile low to minimising visual impact. In both cases, streetscape impact is the primary consideration.</li> <li>Gabled carports can easily incorporate a loft storage space for surfboards, etc., and lockable storage at ground level.</li> <li>If carport gable is to be filled in, keep finish and detail simple.</li> <li>Garages can incorporate an upper floor studio (with window to the street frontage) or covered outdoor living area to maximise space and (where applicable) take advantage of views.</li> <li>Preferred garage doors are sectional or tilt doors in timber.</li> </ul>	<ul style="list-style-type: none"> <li>Carports and garages must meet all setback requirements of the applicable LDP.</li> <li>Garage and carport construction and roofing materials to reflect and / or complement main building.</li> <li>Gable roofs to carports must reflect the pitch of the main house (if main house has gable roof).</li> <li>Carports are required to have min. 300mm eaves.</li> </ul>
6.1	Sustainable Materials	To minimise the carbon emissions and environmental impacts associated with the construction and life cycle of buildings in the Ecovillage.	<ul style="list-style-type: none"> <li>Choose materials that will assist you to achieve the thermal performance and carbon negative objectives required by Sections 13 (Solar Access) and 23 (Life Cycle Analysis).</li> </ul>	<ul style="list-style-type: none"> <li>Provide a detailed schedule of all construction materials and finishes with detailed design application.</li> <li>All timber must be Australian certified plantation, FSC certified, locally milled from fallen paddock or verge trees, or recycled timber.</li> </ul>
6.2	Unconventional Construction Materials / Methods	To ensure non-standard construction methods comply with building standards and conform with Ecovillage sustainable design requirements.	<ul style="list-style-type: none"> <li>Innovative sustainable construction methods will be considered by the Design Team; however, house plans will need to comply with National Construction Code (NCC) requirements in order to gain Augusta Margaret River Shire development approval. If you are considering using a non-conventional building method, it is recommended that you check with the AMR Shire Planning Department prior to beginning design work. Tiny houses on wheels, shipping container buildings, and earth ships, etc., would fall into this category.</li> </ul>	<ul style="list-style-type: none"> <li>Wall framing to be constructed from timber or recycled steel.</li> <li>Walls must be constructed of locally sourced, low carbon, and/or renewable materials wherever possible.</li> </ul>
6.3	Walls	To use sustainable wall construction materials which provide excellent insulation values and provide internal thermal mass.	<ul style="list-style-type: none"> <li>In order to achieve carbon negative outcomes, you should choose low carbon, thermally efficient wall construction materials wherever possible.</li> <li>Exterior wall assemblies must meet the insulation requirements of these design guidelines (see Section 6.7, Insulation).</li> <li>Internal walls that add thermal mass (e.g., rammed earth, fast brick, mudbrick, stonework) can help moderate temperature swings if located correctly (see Section 4.1, Passive Solar Heating, and 4.2, Passive Cooling).</li> <li>SIPs that are sealed to Passive House standard will require a mechanical ventilation system, (see Section 6.9, Sealing and Ventilation) which will need to be factored into the building's life cycle assessment.</li> </ul>	<ul style="list-style-type: none"> <li>Wall framing to be constructed from timber or recycled steel.</li> <li>Walls must be constructed of locally sourced, low carbon, and/or renewable materials wherever possible.</li> </ul>

6.4	Foundations	To provide building foundations that play a useful role in the heating and cooling strategy of the home.	<ul style="list-style-type: none"> <li>• "Slab on ground" is the most common approach to housing foundations in a cool climate. This is a cost-effective way to achieve thermal mass inside a building and can even serve as the internal floor surface (with appropriate treatment). Production of concrete is responsible for significant greenhouse gas emissions, so it is important to minimise your building footprint as much as you can by eliminating wasted spaces.</li> <li>• The WEV LCA Report recommended the inclusion of local supplementary cementitious materials in the slab foundations (e.g., Boral fly ash) to reduce the GWP of the slab. This is available locally and is no more expensive than normal cement mixes. It has slightly different qualities to conventional cement (e.g., slower curing time) but has many overall benefits. Recommend incorporation of up to 30-40% fly ash into concrete mix if covering building slab with additional floor cover such as timber. Not recommended for concrete floor slabs that will be cut and polished.</li> <li>• Other "green cement" products will be considered and approved as alternative materials become available in WA.</li> <li>• Rammed earth flooring is also an option for home builders and provides a small saving in greenhouse warming potential (GWP) but does require additional concrete wall footings.</li> <li>• Most Ecovillage lots will provide a level building site, however, on sloping sites, building 'on stilts' with columns and footings is an approach that allows the building to float above the ground. This is not recommended without the provision of either: <ul style="list-style-type: none"> <li>- a suspended slab; or</li> <li>- timber floor with the addition of underfloor insulation (e.g., R-2.0 underfloor batts) to prevent heat loss; and</li> <li>- either appropriately located thermal mass internal walls, or new generation "phase change materials" to buffer temperature changes.</li> </ul> </li> <li>• For more information on phase change materials, see <a href="https://renew.org.au/sanctuary-magazine/building-materials/changing-phase-are-pcms-living-up-to-their-promise/">https://renew.org.au/sanctuary-magazine/building-materials/changing-phase-are-pcms-living-up-to-their-promise/</a>.</li> <li>• Insulation is required below a suspended slab with no habitable rooms below (e.g., above a garage), however, slab edge insulation does not require insulation. See Section 6.7, Insulation.</li> </ul>	<ul style="list-style-type: none"> <li>• House designs without a concrete slab must demonstrate equivalent thermal performance outcomes through the incorporation of thermal mass materials.</li> </ul>
6.5	Spanning Elements	To select spanning elements which are structurally appropriate and environmentally responsible.	<ul style="list-style-type: none"> <li>• The two most common spanning materials in a house are steel and timber. Concrete is occasionally used (e.g., suspended slabs) but these are always reinforced with steel to handle the tension load.</li> <li>• Structural steel beams allow for long single spans and portal frames. However, steel is a high embodied energy material and expensive. Cold formed steel is often used in construction for smaller structural members, but it is difficult to recycle. As such, timber should be substituted wherever possible (timber laminated beams or trusses should be able to achieve the required spans in most cases).</li> <li>• To minimise structural costs, consider the maximum spans of standard timber beams and design accordingly.</li> <li>• Suspended slab for second storey is permitted if thermal mass and noise attenuation qualities are required. Alternative load bearing cementitious flooring systems will also be considered.</li> </ul>	<ul style="list-style-type: none"> <li>• Timber is to be used as the primary spanning material unless it cannot reasonably be used to meet the structural needs of the design.</li> </ul>
6.6	Roofing Materials	To ensure that roofing within the Ecovillage reflects excess summer heat from the building and provides a consistent aesthetic.	<ul style="list-style-type: none"> <li>• Light coloured and reflective roofing materials such as zincalume or steel sheeting reduce heat gain in summer. Dark coloured steel sheeting or tiles (concrete, slate, or clay) absorb heat and increase heat gain in summer.</li> <li>• Zincalume steel provides up to four times the serviceable lifespan of galvanised steel sheeting.</li> <li>• Roofing materials that incorporate solar electricity generation can be approved as a variation if they provide an environmental advantage over standard roofing material and PVs.</li> <li>• 'Green' roofs planted out with vegetation or grasses are allowed, provided there is still sufficient impermeable roof space for rainwater requirements (see Section 8.2, Water). Green roof proposals must include a management plan and safe access considerations and be National Construction Code, Vol. 2 compliant.</li> </ul>	<ul style="list-style-type: none"> <li>• Roofing material must be zincalume sheeting (not galvanised or Colorbond).</li> <li>• Allowable metal profiles are corrugated or standing seam. Other profiles can be considered with approval from the WEV Design Team.</li> </ul>
6.7	Insulation	To optimise the amount of insulation within the building envelope in order to minimise the requirement for heating and cooling.	<ul style="list-style-type: none"> <li>• Choose add-on insulation products which are non-toxic, durable, and resistant to fire, water, and vermin.</li> <li>• Reflective foil barriers combined with a layer of air provide directional resistance to thermal flows in walls and ceilings, ensure it is installed correctly to achieve desired effect and avoid condensation issues.</li> <li>• Ensure that wall wraps for timber framed weatherboard walls are vapour permeable to prevent condensation / air quality issues.</li> <li>• Vapour permeable sarking (rather than reflective foil) is recommended for use in roofs with higher levels of ceiling insulation in our cold winter, warm summer climate zone.</li> <li>• Avoid cellulose blow-in insulation (e.g., recycled newspaper) as this may be flammable and can promote pests and mould.</li> <li>• Avoid wool insulation as it has a high carbon footprint and may be flammable.</li> <li>• Ensure that corners of walls, ceilings and floors are properly insulated as this is where most thermal gaps occur.</li> <li>• The WEV LCA indicated that slab edge insulation is not required in our climate (see Section 6.4). In addition, it does not facilitate visual inspection for termites.</li> </ul>	<ul style="list-style-type: none"> <li>• All house roofs, walls and non-slab floors (open to the exterior) assemblies must achieve minimum R-Values as follows: <ul style="list-style-type: none"> <li>- Roof / ceiling: R5</li> <li>- Walls: R2.8</li> <li>- Non-slab floor exterior exposure: R2.7</li> </ul> </li> <li>• Add-on insulation materials must be installed correctly, with attention to detail to ensure even distribution and no gaps.</li> <li>• Any thermal mass material forming part of the external walls must be paired with an additional component that provides a layer of insulation sufficient that entire wall assembly complies with minimum R value.</li> </ul>
6.8	Window Frames and Glazing	To design and locate efficient windows that maximise winter solar gain, natural light, and cross-ventilation, while minimising conductive heat transfer through the building envelope.	<p><b>GLAZING</b></p> <ul style="list-style-type: none"> <li>• Given the cool climate in Witchcliffe, winter heating is the priority. As such, the design requirement for windows is low thermal transmittance (U-values) for all windows and high solar penetration (SHGC) for windows facing north.</li> <li>• The SHGC difference between awning and fixed frame windows is caused by the relatively larger frame to glass ratio in an awning window; therefore awning windows to north should be slightly larger than fixed/sliding windows.</li> </ul> <p><b>FRAMES</b></p> <ul style="list-style-type: none"> <li>• Conventional steel and aluminium frames are generally considered to be thermally inefficient and require expensive "thermal breaks" to avoid compromising your home's thermal performance. However, the WEV LCA Report found no benefit from thermally broken frames in our mild temperate climate.</li> <li>• Aluminium window frames were assessed by the WEV LCA to have a higher GWP than plantation timber or lead free UPVC frames, but they have been included as an option to provide a wider design choice.</li> <li>• Choose operable window types (casement, sliding, etc.) that provide adequate cross flow ventilation while also sealing effectively to avoid heat loss in winter.</li> <li>• Lead free uPVC frames provide a lower cost and maintenance free alternative to timber frames and are available as efficiently sealed double and triple glazed units, however uPVC frames may have a shorter life span than timber or aluminium.</li> <li>• Louvre type windows are not recommended unless they are thermally efficient, tight sealing units.</li> <li>• A high Solar Heat Gain Coefficient (above 0.45) is recommended on north-facing windows for passive heating</li> </ul>	<ul style="list-style-type: none"> <li>• House design plans must specify window frames / glazing type and must meet the following requirements: <ul style="list-style-type: none"> <li>- Overall Uw maximum 3.0 for all windows (frames plus glazing)</li> <li>- Window frames are made from sustainably sourced timber, lead-free uPVC or aluminium.</li> </ul> </li> </ul>
6.9	Sealing & Ventilation	To avoid creating air gaps in the building envelope that can transfer heat / coolness in or out of a building, and to avoid creating air quality issues through lack of ventilation.	<p><b>SEALING</b></p> <ul style="list-style-type: none"> <li>• Minimise the number of penetrations in the insulation layer of the building (e.g., select light fixtures that do not project into the roof space). Where it cannot be avoided, ensure an air seal around the penetration, and where possible add insulation to compensate.</li> <li>• Pay attention to common leakage points. Consider draught proofing.</li> <li>• Design airlocks at frequently used external door openings.</li> <li>• Choose external doors and windows with airtight seals and ensure gaps between window frames, door frames, skirting boards and walls are effectively sealed.</li> </ul> <p><b>VENTILATION</b></p> <ul style="list-style-type: none"> <li>• Blower-door testing measures the air tightness of a building in "air changes per hour at 50 pascals" or ACH@50Pa. The average Australian home gets an airtightness score of a breezy 15 ACH@50Pa and is generally draughty and expensive to heat and cool. Your house designer / builder can advise you of the expected airtightness score of your new home.</li> <li>• A sustainable home built with attention to detail to sealing common gaps and penetrations should score between 3 and 7, and will maintain excellent air quality as long as there are operable windows, exhaust fans and no indoor pollutants in winter time when windows are closed for long periods (e.g., gas cookers, wood fires).</li> <li>• A very airtight home, with a score of 1-3 may require a small mechanical ventilation with heat recovery (MVHR) unit to avoid condensation and air quality issues in winter.</li> <li>• An extremely well-sealed house, e.g., to Passivhaus standards with a score less than 1, will require a centralised MVHR system.</li> <li>• Choose external doors and windows with airtight seals and ensure gaps between window frames, door frames, skirting boards and walls are effectively sealed.</li> <li>• Roof spaces should be provided with adjustable ventilation to vent summer heat and avoid winter heat loss.</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid unsealed recessed down lighting.</li> <li>• If using ventilated skylights, refrigerator floor vents, wall vents etc., ensure that they can be made airtight in winter.</li> <li>• Ensure exhaust fans are ducted and have non-return bales.</li> <li>• Houses built to Passivhaus or similarly airtight standards (&gt;1 ACH@50Pa) will require a MVHR system.</li> </ul>

6.10	<b>Termite, Vermin and Wildlife proofing</b>	Design new buildings to exclude termites, wildlife and vermin.		<ul style="list-style-type: none"> <li>All houses must be constructed with roof spaces and wall cavities sealed to exclude animals.</li> <li>Sub-soil chemical termite treatment is not permitted; provide physical termite barriers placed under slab in accordance with AS3660.1-2000.</li> <li>Houses using straw bale construction or panels must use wire or fibreglass exclusion mesh between straw and render, or other method of vermin proofing.</li> </ul>
7.1	<b>Exterior Wall Finish</b>	To ensure that the exterior wall finish is compatible with the intended architectural character and sustainability objectives.	<ul style="list-style-type: none"> <li>The Witchcliffe Ecovillage will achieve a cohesive architectural sense of place through the use of an external palette of natural building materials and finishes, prioritising local, renewable, durable and low-embodied energy materials, (e.g., timber weatherboards, hemp render, lime and clay / earth renders, recycled or mud brick).</li> <li>Artificial and composite cladding products are not encouraged, unless they are products that can demonstrate a sustainability / embodied energy advantage and still adhere to the aesthetics of the materials palette.</li> <li>A homeowner wishing to use an alternative cladding or render finish must submit a detailed case to the WEV Design Team including the product source, specifications and life cycle assessment information.</li> </ul>	<ul style="list-style-type: none"> <li>All external building finishes to be in accordance with Ecovillage aesthetic principles and materials palette as described in Section 2.3 Architectural Character.</li> <li>Stonework must be a minimum of 100mm thick (no stone veneers).</li> <li>Metal sheeting for cladding is only permitted on sheds / outbuildings (not Ancillary Dwelling) and if selected must be Zincolalume</li> <li>Any external brick walls must use recycled or mud brick.</li> <li>The following cladding materials are permitted:</li> </ul> <p><b>TIMBER CLADDING</b> Any solid timber cladding is allowed that can be verified as one of the following:</p> <ul style="list-style-type: none"> <li>FSC Certified (Forest Stewardship Council)</li> <li>Plantation Timber (with a chain of custody document or Statutory Declaration)</li> <li>Recycled Timber</li> <li>Locally milled timber sourced from fallen paddock / verge trees (a Statutory Declaration required from miller)</li> </ul> <p><b>MODIFIED WOOD CLADDING</b> The following modified wood cladding is approved for use:</p> <ul style="list-style-type: none"> <li>Shadowclad external plywood panels by Carter Holt Harvey</li> <li>Vulcan thermally modified timber cladding by Austim</li> <li>Accoya chemically-modified (vinegar) timber cladding</li> <li>Vacoa thermally modified timber cladding by Mortlock Timbers</li> <li>NewTechWood composite timber cladding (recycled plastic / wood fibre)</li> </ul> <p><b>FIBRE CEMENT CLADDING</b> The following fibre cement cladding options are approved:</p> <ul style="list-style-type: none"> <li>Linea Weatherboard Smooth 150 or 180 horizontal cladding and Axon Smooth 133 or 400 vertical cladding by James Hardie (product is supported by a detailed EPD that demonstrates the life-cycle / sustainability of the product and manufacturing process). Simulated or faux wood grain profiles are not permitted.</li> </ul>
7.2	<b>External Material Transition</b>	To ensure that material transitions occur in locations that maintain the integrity of the design and the cladding material.	<ul style="list-style-type: none"> <li>External elevations should generally be made up of no more than two primary cladding or visible materials (e.g. timber weatherboards and rendered straw bale / hemp.)</li> <li>Ensure that attention to material choice and details are applied to the whole house, not just the façade.</li> <li>Lighter-appearing materials should generally be located above heavier-appearing materials on the building facade.</li> </ul>	<ul style="list-style-type: none"> <li>Joints between cladding materials in the same plane must be formed using a transition element such as a 'negative detail' (notch) or overlapping trim.</li> <li>No exterior material changes on an outside corner (inside corner only).</li> </ul>
7.3	<b>Application of Colour</b>	To encourage an overall approach to colours within the Ecovillage that is consistent with the intended rural village aesthetic.	<ul style="list-style-type: none"> <li>If painted, external walls should be predominately light or mid-tone with some allowance for feature elements of brighter colour or darker tone.</li> <li>Contrasting colours are allowed on trim and elements such as fascia boards, downpipes, window frames, architraves, balustrades, etc.</li> <li>Dark timber finishes are permitted, as are untreated hardwood weatherboards.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid larger areas of bright, stark, or incongruous colours that do not suit the overall naturalistic palette of the Ecovillage.</li> </ul>
7.4	<b>Gable Ends and Eaves</b>	To ensure that gable ends and eaves are well-detailed, transitioning between materials at the appropriate locations.	<ul style="list-style-type: none"> <li>Pay attention to the finish of all roof eaves as this seemingly minor detail will have a substantial impact on the visual presentation of your house.</li> <li>Raked eaves may be left open with rafters/trusses exposed as long as the attic space is sealed.</li> <li>Raked eaves closed with an angled soffit are consistent with the Ecovillage architectural aesthetic.</li> <li>"Boxed" eaves should be avoided, or closed with a flat soffit with raised heel.</li> </ul>	<ul style="list-style-type: none"> <li>Gable ends should be of a consistent exterior material, or if a material change occurs horizontally it should be at plate height; in line with the horizontal eaves; at upper floor height; or at the bottom of primary windows.</li> <li>Transitions between gable ends and hip roofs need to be carefully detailed using one of two approaches: <ul style="list-style-type: none"> <li>Line entire eave on the rake, and lining follows rafter angle around the corner on the hip roof.</li> <li>If horizontal eave lining is desired for hip roof, gable end must feature material change / moulding at the lower edge of the lined eave to create a regular triangle of one consistent material at the top of the gable end.</li> </ul> </li> </ul>
7.5	<b>Flooring</b>	Choose flooring surfaces that are low global warming potential (GWP) and suit your lifestyle and personal sensitivities.	<ul style="list-style-type: none"> <li>The type of flooring you use in your home makes very little difference to its thermal performance, as long as you have a concrete slab providing thermal mass. However, there is significant variation between the global warming potential (GWP) of some commonly used flooring materials.</li> <li>Wool carpet, in particular, was assessed as having a high carbon footprint, while sustainably harvested timber and linoleum were the materials with the lowest footprints. For people who are sensitive to dust mites and allergens, suggest avoiding carpet altogether, and if it is chosen, please choose carpet that is free from PFAS and PVC. Whatever flooring materials you choose, make sure that all glues, sealants, backings, underlays, etc., used to install them have little or no VOC (see Section 7.6, Internal Air Quality).</li> <li>Whatever flooring materials you choose, make sure that all glues, sealants, backings, underlays, etc., used to install them have little or no VOC (see Section 7.6, Internal Air Quality).</li> </ul>	<ul style="list-style-type: none"> <li>No specific requirements.</li> </ul>
7.6	<b>Non-Toxic Materials and Finishes</b>	To ensure excellent indoor air quality in all new homes to promote a healthy environment for residents, and to prevent off site pollution and health impacts caused by the manufacturing of materials and finishes.	<ul style="list-style-type: none"> <li>When purchasing new furniture, ensure materials and finishes have low toxicity and do not contain PFAS, a potentially toxic fire-retardant chemical.</li> <li>Many standard construction materials / finishes (e.g., chipboard / plywood, resin and laminate countertops, vinyl, paint) may contain high Volatile Organic Compounds (VOC) levels and are not permitted.</li> <li>Fibre cement board is allowed to be used internally in wet areas and as lining for eaves / outdoor ceilings.</li> </ul>	<ul style="list-style-type: none"> <li>All materials chosen in the construction and finishing of your home must be below the CETEC VOC emission benchmark (0.5mg/m<sup>2</sup>/hour over 24 hours or 7 days, depending on the material).</li> <li>All internal glues must be low-VOC, and paints and stains must emit zero VOCs.</li> <li>Ensure installation of composite stone benches adhere to all safety standards for workers' lung health.</li> </ul>

8.1	Energy	To ensure a self-sufficient, resilient, renewable electricity power supply to meet the needs of all Ecovillage households.	<ul style="list-style-type: none"> <li>Solar panels are to be considered as an integrated design element of the building. The permitted roof angles (see Section 5.3, Roof Forms) are designed to allow optimal solar energy production (between 90-100% if facing north) and present an aesthetically pleasing streetscape.</li> <li>The minimum PV requirements have been designed to cater for the average Ecovillage household's energy requirements and provide renewable energy self-sufficiency. If your household has higher energy needs (e.g., greater use of appliances, higher than average heating or cooling requirements) or would like to generate additional energy for sale back to the grid, there is no restriction on households installing additional PV's and batteries.</li> <li>As electric vehicles grow in popularity and accessibility and reduce in price, it will be important to ensure that all houses in the Ecovillage can provide a convenient outlet for slow charging of electric vehicles in their carports (10Amp is sufficient).</li> <li>As of 2019, all solar PV systems, inverters, and storage batteries installed in Australia must comply with the following Australian Standards: <ul style="list-style-type: none"> <li>AS - 477 Grid-connections of energy systems via inverters. AS/NZS - 3000 Electrical wiring rules.</li> <li>AS - 1768 Lightning protection. AS/NZS - 1170.2 Wind loads.</li> <li>AS/NZS - 5033 Installation of photovoltaic (PV) arrays.</li> <li>AS IEC - 62619:2017 Secondary cells and batteries containing alkaline or other non-acid electrolytes / Safety requirements for secondary lithium cells and batteries, for use in industrial applications.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Submitted plans must include an Energy Budget and Infrastructure Plan.</li> <li>Each dwelling must meet minimum 6.0 kW PV and comply with all relevant Australian Standards.</li> <li>All lots must supply and maintain a connection to the strata owned microgrid.</li> <li>All homes must be fitted SATEC NMI meter to enable integration with the strata microgrid.</li> <li>The use of bottled gas for heating, water heating and indoor cooking is not permitted.</li> </ul>
8.2	Water	To ensure sufficient potable water supply to meet your household's water needs.	<ul style="list-style-type: none"> <li>Recommended minimums are 50m<sup>2</sup> of roof and 18,750L of tank storage per person.</li> <li>Seek expert advice from a licensed plumber to ensure an appropriately sized pump is fitted to the rainwater tank.</li> <li>It is recommended that houses are fitted with integrated "smart" water monitoring systems.</li> <li>Additional information is available regarding the management and use of rainwater tanks in the Australian Dept of Health's "Guidance on Use of Rainwater Tanks," (<a href="https://www1.health.gov.au/internet/main/publishing.nsf/Content/0D71DB86E9DA7CF1CA257BF0001CBF2F/\$File/enhealth-raintank.pdf">https://www1.health.gov.au/internet/main/publishing.nsf/Content/0D71DB86E9DA7CF1CA257BF0001CBF2F/\$File/enhealth-raintank.pdf</a>).</li> <li>Ensure efficient use of water within the home by installing high efficiency WELS rated fixtures and appliances.</li> <li>Overland flow paths for stormwater runoff and rainwater tank overflow from private lots through community gardens to the stormwater system located within their community garden must be maintained.</li> <li>Pre-tank filtration can provide a very high standard of water quality, depending on filtration system.</li> <li>UV treatment systems may be installed post-tank but do add an energy consumption factor to household energy budget. UV treatment systems are covered by Australian standards, see <a href="https://ww2.health.wa.gov.au/Articles/U_Z/Ultraviolet-disinfection-of-drinking-water">https://ww2.health.wa.gov.au/Articles/U_Z/Ultraviolet-disinfection-of-drinking-water</a>.</li> </ul>	<ul style="list-style-type: none"> <li>Submitted plans must include a Water Budget and Infrastructure Plan, demonstrating that 100% of water requirements can be met by onsite water collection and storage.</li> <li>Tanks to be fitted with an external tank level gauge and/or integrated flow monitoring device to assist in monitoring usage and detecting water leaks.</li> <li>Rainwater filtration systems (pre- and / or post- tank) must be installed to guarantee water quality and safety and reduce tank maintenance.</li> <li>Any roof discharge points not connected to rainwater tanks and rainwater tank overflows must be managed by connection to a rain barrel or rain garden and directed to vegetated areas that will spread and slow down water flows.</li> </ul>
8.3	Wastewater	To provide sustainable wastewater treatment that retains and reuses grey and black wastewater on site.	<ul style="list-style-type: none"> <li>Installation of a household greywater system is recommended to supply additional water for gardens.</li> <li>Composting toilets are not allowed by WA Health Department regulations on any residential lot that has a sewer connection.</li> </ul>	<ul style="list-style-type: none"> <li>All houses must be connected to the Witchcliffe Ecovillage wastewater treatment system.</li> <li>All houses in Witchcliffe Ecovillage must install dual plumbing to allow for greywater separation for water recycling. Connections are required only from the bathroom(s). Connections to the laundry are optional and need to be carefully considered as water can become quite alkaline, which is inappropriate for some landscaping.</li> <li>A grey water 'Builder's Kit' is to be installed during construction to facilitate connection of the grey water system and to avoid costly retrofitting if the system is not commissioned at completion of construction.</li> <li>All greywater recycling must be via WA Health Dept. approved systems.</li> </ul>
8.4	Internet / NBN	To provide high-speed fibre internet connections to every dwelling and commercial building.	<ul style="list-style-type: none"> <li>The Witchcliffe Ecovillage will provide National Broadband Network (NBN) fibre to the premises (FTTP) connections via the common service trench to all lots to facilitate telephone and high-speed data services for every building in the development.</li> <li>FTTP is the highest level of NBN service provision available and will ensure households and home businesses will enjoy a higher level of NBN service and capacity than is available with the fibre to the node connections or satellite services generally provided in rural areas.</li> </ul>	<ul style="list-style-type: none"> <li>NBN connection is required to every home to enable energy monitoring and metering networks.</li> </ul>
8.5	Hot Water Systems	To ensure that hot water systems are well-insulated and high-efficiency to minimise energy use.	<ul style="list-style-type: none"> <li>Hot water systems should be chosen to fit within the overall electricity budget of the house and sized to suit the living requirements of the household.</li> <li>Heat pump hot water systems are highly efficient (up to 80% energy savings) and are more efficient in our colder climate than solar hot water systems, but can be variable in quality and carbon emission performance. Preferred heat pump hot water systems use low greenhouse warming potential (GWP) refrigerant gas (e.g., CO<sub>2</sub> or R32) and must be higher quality, leak free units. We are able to offer excellent discounts on Reclaim, which are high quality units that meet these standards.</li> <li>Solar thermal panels for solar hot water systems only have one function - to produce hot water. Once the tank is hot, the panels are idle. In contrast, solar PV panels can produce hot water via a heat pump, as well as run other appliances inside the house, charge the batteries, or an electric car, etc., so it is more effective to use the space on your roof for PVs rather than a solar hot water system.</li> <li>For more information, see the extensive analysis of electric-based systems in this review: <a href="https://renew.org.au/renew-magazine/buyers-guides/hot-water-buyers-guide/">https://renew.org.au/renew-magazine/buyers-guides/hot-water-buyers-guide/</a>.</li> </ul>	<ul style="list-style-type: none"> <li>All hot water systems must be electrically powered or boosted, no LPG gas.</li> <li>Heat pump systems must demonstrate that refrigerant used has low greenhouse warming potential.</li> <li>Include nominated system in Energy and Water Budget and Infrastructure Plan.</li> </ul>
8.6	Heating and Cooling	To ensure energy efficient heating and cooling of homes and avoid local air pollution.	<ul style="list-style-type: none"> <li>Ceiling fans provide a very efficient and low energy approach to summer cooling and are recommended in all living spaces. Locate fans above main occupation areas (dining tables, lounge suites, beds, etc.). While fans do not actually cool the air in rooms, the air movement they create cools people very effectively.</li> <li>Choose a fan which has reverse or "winter" mode, to assist circulation of warm air around living spaces in cold weather, particularly in living areas with raked ceilings.</li> <li>Reverse cycle air conditioning units powered by renewable energy are a relatively efficient, convenient and inexpensive way to provide occasional heating / cooling capacity. Make sure you choose a system which: <ul style="list-style-type: none"> <li>has the most energysaving stars for COLD climate zone you can afford (aim for 3 3.5 star cooling and 4 star heating);</li> <li>is suitably sized for your living space's area/insulation/glazing/shading (use an online calculator);</li> <li>has an "eco" mode and an automated timer; and</li> <li>provides air filtration.</li> </ul> </li> <li>The new Zoned Energy Rating Label for air conditioners is explained here: <a href="http://energyrating.gov.au/sites/new.energyrating/files/documents/Factsheet%20How%20To%20Read%20The%20ZERL%20For%20Air%20Conditioners.pdf">http://energyrating.gov.au/sites/new.energyrating/files/documents/Factsheet How To Read The ZERL For Air Conditioners.pdf</a></li> <li>The ZERL For Air Conditioners.pdf.</li> <li>The smaller the area you are heating or cooling, the more efficient the air-conditioning system, so try to design spaces which can be shut off with doors to create zones, so you are not heating or cooling unused space.</li> <li>Another heating system to consider is hydronic heating (radiator or in-slab) powered by heat pump hot water systems, but be aware of the variable quality and Greenhouse Warming Potential (GWP) of different heat pump models (see Section 8.5, Water Heating).</li> <li>Underfloor hydronic systems may also assist in cooling the house in summer.</li> </ul>	<ul style="list-style-type: none"> <li>Space heating and cooling provision and specifications (including Zoned Energy Rating Certificate) are to be included in Infrastructure Plan and Energy and Water Budget.</li> <li>Air conditioner energy rating certificate must demonstrate the appliance suitability for area to be heated/cooled, and demonstrate a minimum 3.5 star (cooling) and 4 star (heating) rating for COLD climate zone.</li> <li>Any selected pellet stove must not exceed 0.8g/kg particulate emissions (Australian Certified). See list of units on the Australian Home Heating Association website. <a href="https://www.homeheat.com.au/wood-heaters/certified-wood-heaters/">https://www.homeheat.com.au/wood-heaters/certified-wood-heaters/</a></li> <li>Gas or wood fired space heating is not permitted.</li> <li>Underfloor hydronic system must specify low GWP heat pump system.</li> </ul>

			<ul style="list-style-type: none"> <li>• Gas space heating contributes to carbon emissions, gives off fumes inside your home, and is only available in expensive and inconvenient LPG bottles in the Margaret River area.</li> <li>• Wood burning stoves and heaters are not recommended for everyday use in built up areas as they are inefficient converters of fuel to heat, contribute to carbon emissions, cause local air pollution to neighbours and residents with breathing difficulties, and are generally fuelled by unsustainably harvested forest hardwoods. They are not recommended in well-sealed houses, as they burn oxygen inside the home and require ventilation. In poorly sealed homes, they pull in cold air from outside. Outdoor fire pits are allowed.</li> <li>• We recommend pellet heaters over solid fuel combustion heaters due to their efficiency and low particulate emissions (dependant on make and model), use of plantation softwoods, convenience, and ability to regulate temperature via thermostat control and timers.</li> <li>• For more information see <a href="https://www.energy.gov.au/households/heating-and-cooling">https://www.energy.gov.au/households/heating-and-cooling</a>, and the YourHome and Renew websites.</li> </ul>	
8.7	Lighting	To ensure that lighting design is fit-for-purpose and energy efficient.	<ul style="list-style-type: none"> <li>• Avoid applying a generic "lights per m2" lighting approach, and instead design a specific lighting plan for each room. Focus direct lighting (downlights) over task areas such as benchtops and work areas and use indirect light (uplights, wall brackets) for general ambient lighting. Use lamps to provide additional locational lighting related to furniture configurations.</li> <li>• Create lighting zones on separate switches, rather than one large bank of lights controlled by one switch.</li> <li>• Consider the colour temperature that is appropriate for each room and use. Colour temperature in lighting ranges from warm white (2700-3500K) to natural white (3500-4500K) to daylight white (5000-6000K). Higher colour temperatures become more blue and less yellow, are less cosy and are better for detailed tasks. Choose warm spectrum lights for bedrooms and night-time living spaces, as blue spectrum light disrupts melatonin production and can impact on sleep cycles if used at night.</li> <li>• We recommend LED lighting for efficiency and to avoid any lighting higher than 4500K.</li> <li>• Keep external lighting to a minimum and face away from neighbours to avoid light pollution.</li> <li>• Use low bollard-type or at-ground lighting outside rather than taller pole lights.</li> </ul>	<ul style="list-style-type: none"> <li>• Submit a lighting plan with house plans.</li> <li>• All lighting for dwellings (interior and external) must be high-efficiency.</li> <li>• All external lighting must be directed away from neighbours.</li> </ul>
8.8	Free Standing Appliances	To assist households in choosing appliances that are energy and water efficient.	<ul style="list-style-type: none"> <li>• Use the highest rated water efficient appliances possible (4-6 WELS star rating).</li> <li>• Use the highest rated energy efficient appliances possible (4-10 Energy Rating stars).</li> <li>• Carefully select refrigerators and freezers that suit your family size and requirements, and ensure seals and motors are well maintained.</li> <li>• To ensure efficient operation of appliances, provide ducting/minimum clearances as per appliance specifications.</li> <li>• If using a tumble dryer, choose one with a heat pump to increase efficiency.</li> <li>• Consider appliances that do not require standby power, or install smart management devices.</li> </ul>	<ul style="list-style-type: none"> <li>• Include indicative freestanding appliance specifications, including star ratings, in Energy and Water budgets.</li> </ul>