Ecovillage Commons Limited

Witchcliffe Ecovillage Residents' Handbook

Supporting our community

Published by Ecovillage Commons Limited

53 Mardo Drive, Witchcliffe 6286

www.ecovillage.net.au

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Acknowledgement of Country

The Witchcliffe Ecovillage is located within the traditional lands of the Wadandi people. We acknowledge the Wadandi people as the traditional custodians of Wadandi boodja, we respect their unbroken connection to country, and we honour their cultural and spiritual relationship to the land and the generosity with which they share their energy, wisdom and knowledge.

We pay our respects to their ancestors and elders past, present and emerging.

We are fortunate to have been gifted our street names and Village Square title 'Wolghine Square' by the custodians of this land and are grateful to the Undalup Association for all their advice and support throughout the development of this project. We commit to walking alongside First Nations people in the care and sustainability of Boodja.

Emergency Contacts

Emergency Contacts		
Fire	Emergency only	000
Bushfire warnings, updates, and information	Dept. Fire and Emergency Services:	https://www.emergency.wa.gov.au/ 133 337
Flood/Storm	State Emergency Service	132 500
Fallen trees on roads	Shire works depot	97805646
Medical	Ambulance	000
	Health Direct	1800 022 222
	Margaret River Hospital	9757 0400
Police	Emergency Margaret River Police (8am – 4pm)	000 9757 8600
Animal Emergency (Local Vets)	Cape Creatures MR Vet Hospital	9757 9700 9757 2163
Wildlife rescue	Wildcare	9474 9055 (After hours) OR 0438 526 660
Wastewater Emergency	TMC Manager	0418 267 959
Stray dogs & livestock:	AMR Shire Ranger	9780 5695

Useful Contacts		
AMR Shire	Roads, verges, bins, rates, stray dogs, etc	9780 5255
Common Property areas	Your strata council	By email
Irrigation Water	Your strata council	By email
Wastewater / sewerage	TMC Witchcliffe	9751 4241 / tony@tmcwaterrecycling.com
Ecovillage Commons land	WEV team / Ecovillage Commons Limited	9757 6688 info@ecovillage.net.au
Bushfire planning	DFES AMR Shire:	https://www.dfes.wa.gov.au/site/ 9780 5255
Energy: Microgrid Path lighting EV charger	Your strata council	By email
Domestic Animals	Strata Council	By email
Licencing, exercise areas, etc	AMR Shire	9780 5255
Barking / nuisance dogs, etc.	Contact owner directly first, then strata council	By email
NBN Co		https://www.nbnco.com.au 1800 687 626

Table of Contents

Introduction

LIVING IN WITCHCLIFFE

Location

The Witchcliffe Ecovillage is nestled in a rural and natural hinterland immediately adjacent to the Witchcliffe village centre, roughly 9 km from Margaret River and 9 km to the beach.

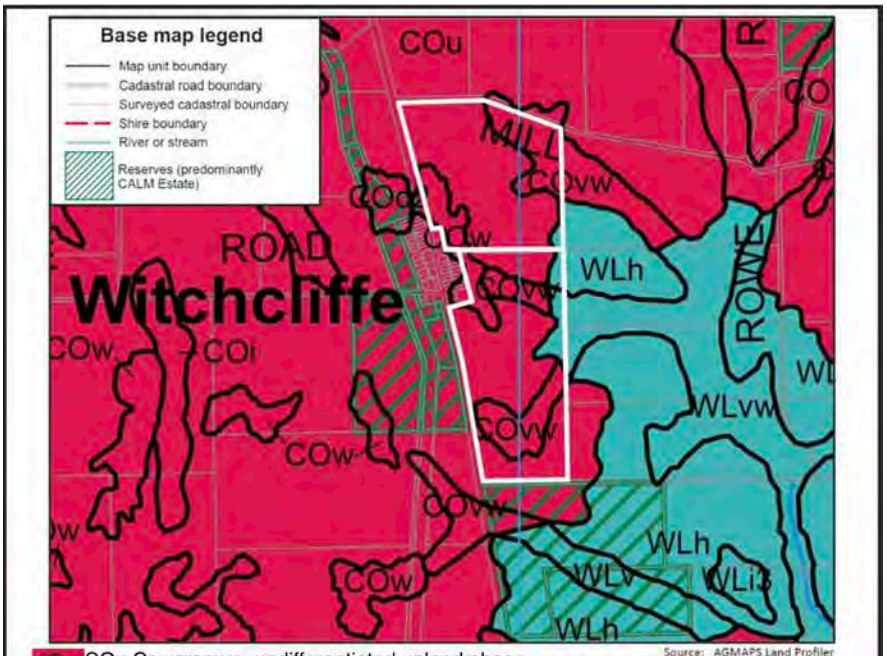
This is beautiful Wadandi country, the country of saltwater people, and this is recognised in the naming of the Wadandi Track, the walking and cycling track which can take you all the way from Witchcliffe to Cowaramup. https://www.amrshire.wa.gov.au/getmedia/e6f34e69-7a1a-4997-a23c-d1520552e7f0/Wadandi-Track-Brochure.pdf

While the whole Cape to Cape region has largely been cleared or logged at some point in the last 200 years, Witchcliffe still has significant remnant forests on private land, proposed native title settlement land and national parks to the east and the west of the locality. The Ecovillage itself is surrounded by significant remnant bushland on farming and conservation properties to the east and municipal land and reserves to the south and west. The Ecovillage's winter creeks form the headwaters of three small tributaries which run seasonally to the Chapman Brook, which then flows south-east to join the Lower Blackwood River, known as Goorbilyup in Pibulmen country, the country of plenty. Witchcliffe boasts beautiful beaches (Redgate Beach is the local swimming, surfing and fishing spot), as well as fascinating caves—all places of great cultural significance to the Wadandi people.

The Witchcliffe village centre is just a few streets, with a charming mix of old and new buildings housing low-key businesses and residences, with an emphasis on vintage wares, upcycling, sustainable and creative enterprises, local wine merchants, and great coffee. The AMR Shire's Witchcliffe Village Strategy identified several development sites (including the Ecovillage) which provided for a limited residential expansion of the town. Witchcliffe will eventually be home to up to 2600 people.

Soil profile

Soils at the Ecovillage typically have a shallow sandy-loam topsoil layer with loam, sand and gravel composites in the upper soil profile to a typical depth of 0.5-1m. Lower soil profiles are typically white to orange/brown clays and gravels. The well-drained upper soils are excellent for productive gardening and the less permeable lower layer helps to retain water in the soil. The Witchcliffe Ecovillage farm and vineyard have been certified organic by NASAA since 2017 and while the land that has been developed has to be removed from certification, the certification still applies to the agricultural lots and vineyard. In the soil profile map below, you can see that most of the Ecovillage arable land is rated "Cou," Cowaramup undifferentiated phase and is moderately to highly suitable for vineyard, annual horticulture, and perennial horticulture land use. https://www.agric.wa.gov.au/land-use-planning/land-capability-assessment



COu COu Cowaramup, undifferentiated upland phase
Lateritic flats, low rises and gentle slopes;Loamy gravels, duplex sandy gravels, semi-wet soils and grey deep sandy duplexes;Marri-jarrah forest and woodland
LAND CAPABILITY: VINES 50-70% of the area is Class 1 or 2.
PERENNIAL HORTICULTURE 50-70% of the area is Class 1, 2 or 3.

COw COw Cowaramup Subsystem, wet flats phase
Poorly drained flats and depressions;Semi-wet and wet soils with grey deep sandy duplexes and pale sandy earths;Marri-jarrah-paperbark-titree forest, woodland and scrub
LAND CAPABILITY: VINES 50-70% of the area is Class 4 or 5.
PERENNIAL HORTICULTURE >70% of the area is Class 4 or 5.

COvw COvw Cowaramup Subsystem, wet values phase
Broad, swampy floored drainage depressions;Wet and semi-wet soils, grey deep sandy duplexes, loamy gravels and duplex sandy gravels;Marri-jarrah-paperbark-titree woodland and forest
LAND CAPABILITY: VINES >70% of the area is Class 1, 2 or 3.
PERENNIAL HORTICULTURE 50-70% of the area is Class 4 or 5.

WLh WLh Wilyabrup, undifferentiated hillslope phase
Gentle to moderate valley slopes;Loamy gravels, Duplex sandy gravels, Brown deep loamy duplexes and Friable red/brown and Brown loamy earths;Marri-jarrah forest and woodland
LAND CAPABILITY: VINES >70% of the area is Class 1 or 2.
PERENNIAL HORTICULTURE 50-70% of the area is Class 1 or 2.

WLvw WLh Wilyabrup Subsystem, swampy valley floor phase
Swampy open drainage depressions;Loamy gravels, Duplex sandy gravels, Brown deep loamy duplexes and Friable red/brown and Brown loamy earths;Marri-jarrah-paperbark-titree forest and woodland
LAND CAPABILITY: VINES 50-70% of the area is Class 4 or 5.
PERENNIAL HORTICULTURE >70% of the area is Class 4 or 5.

Climate

Witchcliffe has a mild temperate/Mediterranean climate with cold, wet winters and warm, dry summers. Summer temperatures average 27° Celsius by day and 14° at night, with infrequent maximum temperatures of 38-40° degrees occurring between December and February. Hot days are generally cooled off with an afternoon sea breeze, and summer evenings are mild. The winter months average 16° by day and 8° at night, with frosty mornings reaching an occasional minimum of 0° between May and July. The maximum sun angle is 80° on December 22nd (summer solstice) and 32° on June 21st (winter solstice).

The average yearly rainfall is around 1000mm, with most rain falling in the winter months and the shoulders of autumn and spring, with isolated but not uncommon heavy rainfall events (max. recorded rainfall in 24 hours, 99.4mm). In summer, the wind is generally south to south-easterly in the morning, with cooling south westerly sea breezes in the afternoon. In winter, the prevailing winds are less predictable, with intermittent cold fronts and storms.

Witchcliffe is rated as sub zone 54 (Mandurah) on the NatHERS climate zone map. Note that this NatHERS sub zone 54 is also shared by Coogee just south of Perth, so is perhaps not truly representative of Witchcliffe's mild dry summers and wet winters, or the wind patterns which are unique to this region.

Witchcliffe is most closely represented by **Zone 6** in the YourHome factsheet, "Passive Design: Design for Climate" (p.99-100). (https://www.yourhome.gov.au/passive-design/design-climate)

The Koppen climate classification which applies to the region is:
Csb Temperate, dry summers with an average temp in the warmest month above 22°C.

It has a **plant hardiness zone of 11a** (using the USDA hardiness metric).

The nearest Bureau of Meteorology weather station to the Ecovillage is Witchcliffe West. This station was activated in 2022 so has limited historical data but provides latest daily observations:

http://www.bom.gov.au/climate/dwo/IDCJDW6081.latest.shtml

For historical weather data from the old Witchcliffe station 009746, which was located on the Ecovillage's southern farmland, please visit http://www.bom.gov.au/climate/averages/tables/cw_009746.shtml.

Wadandi seasons

The Wadandi people recognise six distinct seasons in the south-west of Western Australia which are much more relevant here than the imported four seasons of Europe. You will note that later in the Handbook, the growing guides all use the Wadandi seasons.

Learning the rhythms and patterns of the Wadandi seasons is a meaningful way to connect with, understand and begin to care for the country you are living on. The Undalup Association's seasonal newsletters (2019 – 2020) provide beautifully in-depth descriptions of the Wadandi seasons, with reference to the many natural signals that you can observe and interpret as the seasons change. You can find the archived newsletters on the Undalup Associations website here, you will be amazed by what you learn: https://www.undalup.com.

The Undalup Association facebook page also announces and welcomes the change of each season https://www.facebook.com/undalup/

(Please note: the following summary of the Wadandi seasons contains words and IP that belong to the Wadandi / Pibulmen Cultural Custodian Iszaac Waalitj Webb, which should always be acknowledged when sharing and making reference to this Cultural information.)

Bunuru February to March	Colours: yellow, orange, red Climate: Hottest part of the year, fruiting season. *Known as: Second summer (season of adolescence).*
Djeran April to May	Colours: red, brown, grey Climate: Cooler weather begins, first dew. *Known as: Ant season (season of adulthood)*
Makuru June to July	Colours: Grey, Browns, Red & Black Climate: Cold and rainy *Known as: Fertility season*
Djilba Aug-Sept	Colours: black, blue, green, yellow. Climate: Mixture of wet days with increasing number of clear, cold nights and pleasant warmer days. *Known as: Conception Time*
Kambarang October to November	Colours: blue, green, pink, orange and red Climate: Longer dry periods, the flowering season. *Known as: Wildflower season (season of birth).*
Birak December to January	Colours: green, blue, yellow and orange Climate: Dry and hot. *Known as: First summer (season of the young)*

Your wildlife neighbours

Witchcliffe is home to some of WA's most endangered species: Baudin's White-tailed Black Cockatoos; Western Ringtail Possums; and a tiny rare froglet called Geocrinia alba, the White-bellied frog, which is only found in a 100 km2 range in the Witchcliffe-Karridale area. It is one of the world's rarest frogs and has a dedicated breeding programme at the Perth Zoo, as it is so vulnerable to climate change.

The Masked Owl, the 'ambassador' species for Owl Friendly Margaret River, is Yornitj in the Dworden language of the Wadandi People. It is vital that we use wildlife-friendly methods of controlling rats and mice to avoid poisoning nocturnal birdlife and other fauna.

- Courtesy of Owl Friendly Margaret River

There are many other local wildlife neighbours who you may see and hear around the Ecovillage, including:

Western brushtail possums	Red-tailed black cockatoos	King skinks
Southern brown bandicoots	Black swans	Motorbike frogs
Yellow footed antechinus	Elegant parrots	Quacking frogs
Western pygmy possums	Twenty-eight parrots	Moaning frogs
Bush rats	Willy wagtails	Slender green tree frogs
Splendid fairy wrens	Magpies	Dugites
Masked owls	Pacific black ducks	Tiger snakes
Australasian dotterels	Maned ducks	Pythons
Tawny frogmouths	Purple swamp hen	Water monitors
Spotted pardalotes	Black moor hens	Western bobtail skink
Pied butcher birds	Cuckoo shrikes	New Holland honeyeaters
Little wattlebirds	Fire tailed finches	Rainbow bee eaters

That's just a fraction of the birds, and not counting the insects!

With rehabilitation of conservation zones, landscaped habitat planting throughout the clusters and open spaces, responsible management of domestic pets, and restrictions on common rodent baits and garden chemicals, it is hoped that the whole Witchcliffe Ecovillage can become a place where local fauna species can flourish, but it will take a whole community to make this happen.

Keeping a detailed record of the mammals, birds, reptiles and frogs that are observed at the Ecovillage will contribute to the community's better understanding of how to provide a safe and welcoming environment. Consider keeping a diary in your cluster just for wildlife records (time, date, where recorded, feeding behaviour, etc.,) and share with the wider Ecovillage community to create useful citizen science data (e.g., if White-tailed black cockatoos are observed eating cranesbill flowers each year at certain times, the community should avoid slashing Commons pastures until after the flowers have finished, etc.)

Useful Resources:

Frog ID: Easy to use field guide and mobile app with frog call recordings to help you identify

https://www.frogid.net.au/?gclid=CjwKCAiAgvKQBhBbEiwAaPQw3G8cjAZLNQewkoV3kC1boI98QxSq2_IE4kicKzp9O2vI7nFuCjzUZxoCJ2oQAvD_BwE

Bird ID app: Birds of Australia by Michael Morcombe: https://ecobits.net.au/birds-of-australia-app-review/

Birdlife Australia Margaret River regional group: https://birdlife.org.au/locations/birdlife-western-australia/regional-groups

Owl Friendly Margaret River https://owlfriendly.org.au/

Nature Conservation Margaret River Region https://www.natureconservation.org.au

FAWNA: https://www.fawna.com.au

Bat boxes, bee hotels: Battsenby's Wildlife Habitats (Steve Smith battsenbys@gmail.com)

The Wildcare Helpline is a 24 hour-a-day, seven-day-a-week telephone referral service. The helpline is operated by volunteers on behalf of DPaW and is based at DPaW's operational headquarters at Kensington. The Helpline provides a service for members of the public who find sick, injured, or orphaned native wildlife and are seeking advice on how to find care for the animal. The wildlife volunteers manning this phone will be able to put you in touch with the registered wildlife rehabilitator nearest to you, wherever you are in Western Australia.

Ecovillage street names

The Ecovillage street names generally reflect the Wadandi names of the birds, mammals and plants that live on the Ecovillage land. These names were chosen in consultation with Wadandi elders Wayne and Iszaac Webb, identified during the Ecovillage's Structure Planning consultation process as the appropriate elders to consult on Wadandi cultural issues. One street name however, has an even more significant meaning for the Ecovillage. Wolghine Avenue, the northern entrance to the Ecovillage, which leads to its namesake, Wolghine Square, is named for Wolghine, a cave dwelling ocean spirit associated with the Gnarabup/Witchcliffe area and specifically with a cave called Wolghine Mia, and features in an important story about a fight between land and ocean spirits. The Webbs were supportive of the use of this name as it is very specific to the Witchcliffe coastal area. This must have been known in the early days of white colonisation, as "Walgine" (sic) was the name originally given to Group Settlement 72 in East Witchcliffe, which included the northern half of the Ecovillage land.

Speaking the names of these local animals and plants while you are standing on Wadandi country is a powerful way to connect with the land. An easy way to begin is just to look up at the magpies in the marri trees, and sing *kaya kulbardi*, or lay your hand on the beautiful old survivor peppermint tree near the northern dam and whisper *kaya wannang*… This will hopefully spark the beginning of a growing interest among the Ecovillage community to learn the Wadandi names of the other beautiful animals and plants that make their home on the Ecovillage and surrounding land, and in time become their guardians and advocates.

Wolghine Avenue	Wadandi ocean spirit	**Mardo Drive:**	Yellow-footed antechinus
Willerin Lane:	Willy wagtail	**Yornitj Grove:**	Masked Owl
Karrack Crescent:	Red tail cockatoo	**Kyloring Drive:**	Elegant parrot
Wannang Lane:	Peppermint Tree	**Gnuraren Grove:**	Western ringtail possum
Wurruji Place:	King skink	**Mulal Avenue:**	Purple swamp hen
Chiriger Way:	Splendid fairy wren	**Djarral Lane**:	Jarrah tree
Kulbardi Way:	Magpie	**Gilgie Drive**:	Freshwater crayfish
Mannitj Place:	Baudin's cockatoo	**Wambenger Retreat:**	Brush-tailed phascogale

WITCHCLIFFE ECOVILLAGE & YOUR CLUSTER

Your private lot sits within a stand-alone strata scheme containing a Common Property garden, which sits within the larger Witchcliffe Ecovillage development. The Ecovillage is located within the Shire of Augusta Margaret River and your strata is surrounded by Shire road reserves. Elsewhere in the Ecovillage you will find Shire managed public open space and Ecovillage Commons land and a private licensed wastewater treatment provider, TMC Witchcliffe.

It is important to understand how the pieces of the Ecovillage jigsaw fit together, what unites them, and who owns and is responsible for what.

The vision

All of the Ecovillage strata schemes are united by the same sustainability themes and objectives, reflected in this vision statement that is embedded in your Bylaws:

It is intended that the Ecovillage operate as a highly sustainable, self-reliant community in a regional village setting, incorporating modern technology and human settlement design to enable its community to:

- produce as much energy as it consumes;
- be self-sufficient in water;
- produce organic fresh food produce;
- create less waste;
- care for and regenerate the local environment;
- provide a high level of pedestrian, wheelchair and bicycle access throughout the Ecovillage;
- be socially diverse, inclusive, cooperative and resilient; and;
- respect the culture and traditions of the Wadandi people, the traditional owners of the land.

(Strata by-law 12.2)

It is a place where people live, work, socialise, and provide for their material needs sustainably; where most of what they consume daily can be produced within the Ecovillage, in harmony with the permaculture principles of "*earth care, people care, and fair share.*" Opportunities for affordable housing, social diversity, aged care and community building are an integral part of the Ecovillage design.

The Witchcliffe Ecovillage is designed and developed to enable its community to be as harmlessly integrated into the local environment as possible. This means the community's energy, water and fresh food produce can be produced and harvested on site without pollution, with an emphasis on restoring and protecting indigenous flora and wildlife habitat.

In time, it will grow to be a model demonstration site where people can come to learn how to live more sustainably.

Who owns what?

Of the Witchcliffe Ecovillage's total 119.14 ha, around 12.38 ha* is allocated to privately owned residential lots. The remainder is made up of:

- community gardens (10.12 ha);
- privately owned agricultural lots (26.14 ha);
- privately owned commercial, tourist and village square lots
- AMR Shire Public Open Space: the oval, Village Square, noise bunds, olive grove (5.3 ha);
- Ecovillage Commons land including land leased to the TMC Witchcliffe (42.95 ha):
- AMR Shire roads and verges.

Note: all areas (ha) are approximate only and based on Figure 1. Ecovillage Concept Plan (2022) below (see also Attachment 1).

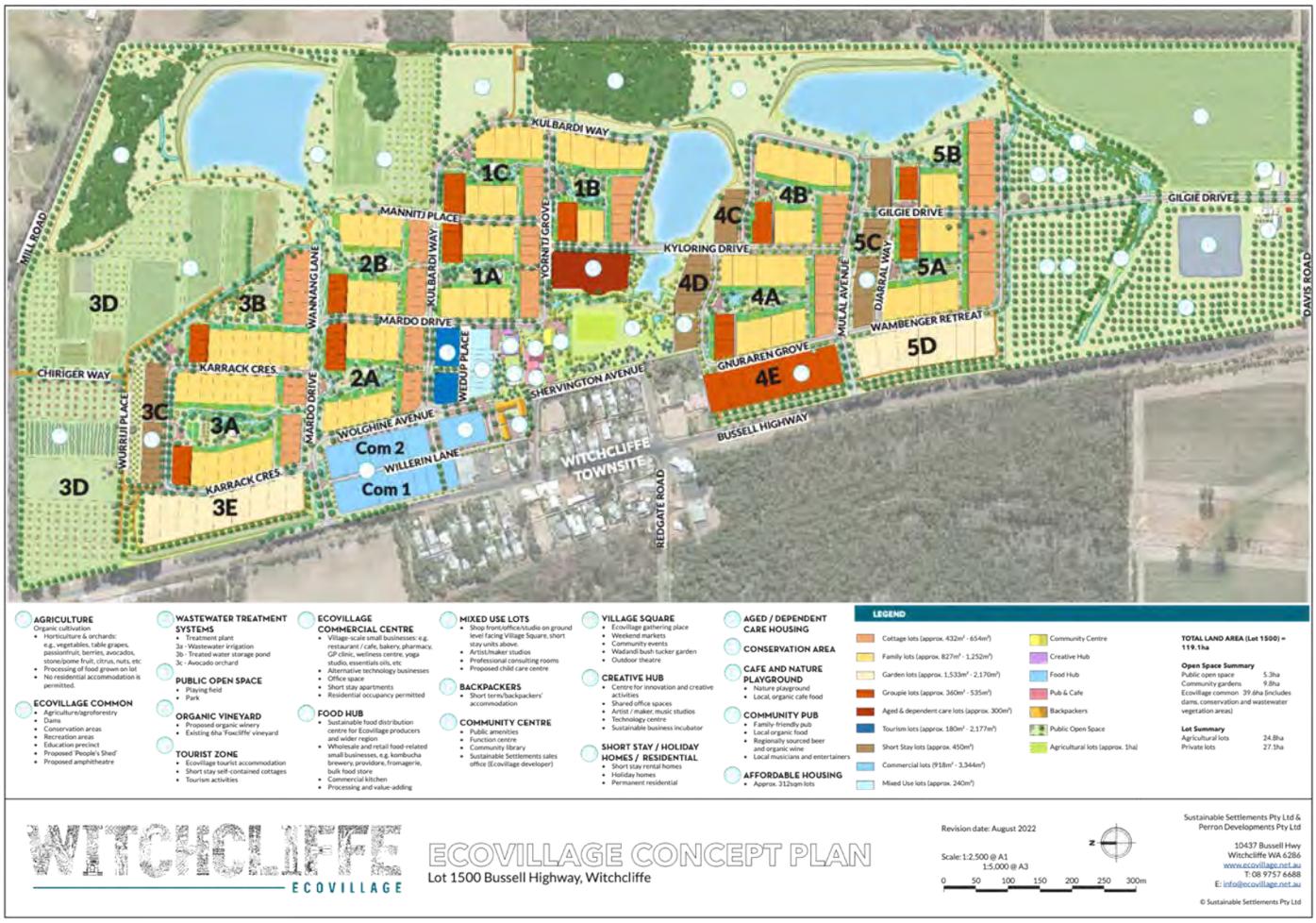


Figure 1. Ecovillage Concept Plan (2022)

Ecovillage Commons

The Ecovillage includes common land, the Ecovillage Commons, which provides infrastructure, facilities and services to the Ecovillage. This includes the community centre in the Village Square, three conservation areas, recreational areas, water storage (dams), pasture areas, education precinct, wastewater treatment area and recycled water irrigation zone. In Figure 2 below, Special Use Zones (2022), the Ecovillage Commons encompasses the Ecovillage Commons and Wastewater Treatment special use zones, and is incorporated into one title, bordered in red (with seraphs joining non-adjacent land).

Once all of the strata schemes in the Ecovillage are registered, the Ecovillage Commons will be owned and administered by a not for profit "limited-by-guarantee" company, Ecovillage Commons Ltd (ECL). Its members at that time will be the strata companies of each cluster and green titled lot in the Ecovillage. The ECL management committee will be made up of six representatives chosen annually, one from each lot type within the 5 stages of the Ecovillage, and will be responsible for the maintenance, upkeep and operation of the Commons.

The ECL will charge its members (the strata companies) for these utilities (e.g. non-potable water and any goods and services it provides) on a 'by lot' basis, and this fee is already included in your strata levies. This includes maintenance and repair of the commons and a management service to maintain land and infrastructure, with particular regard to Augusta Margaret River Shire fire risk management requirements. A biodiversity assessment and management schedule was conducted by a subsidiary of Nature Conservation Margaret River Region as part of the Ecovillage Structure Plan, and will be reviewed and implemented when the Ecovillage Commons is transferred to the ownership of the ECL.

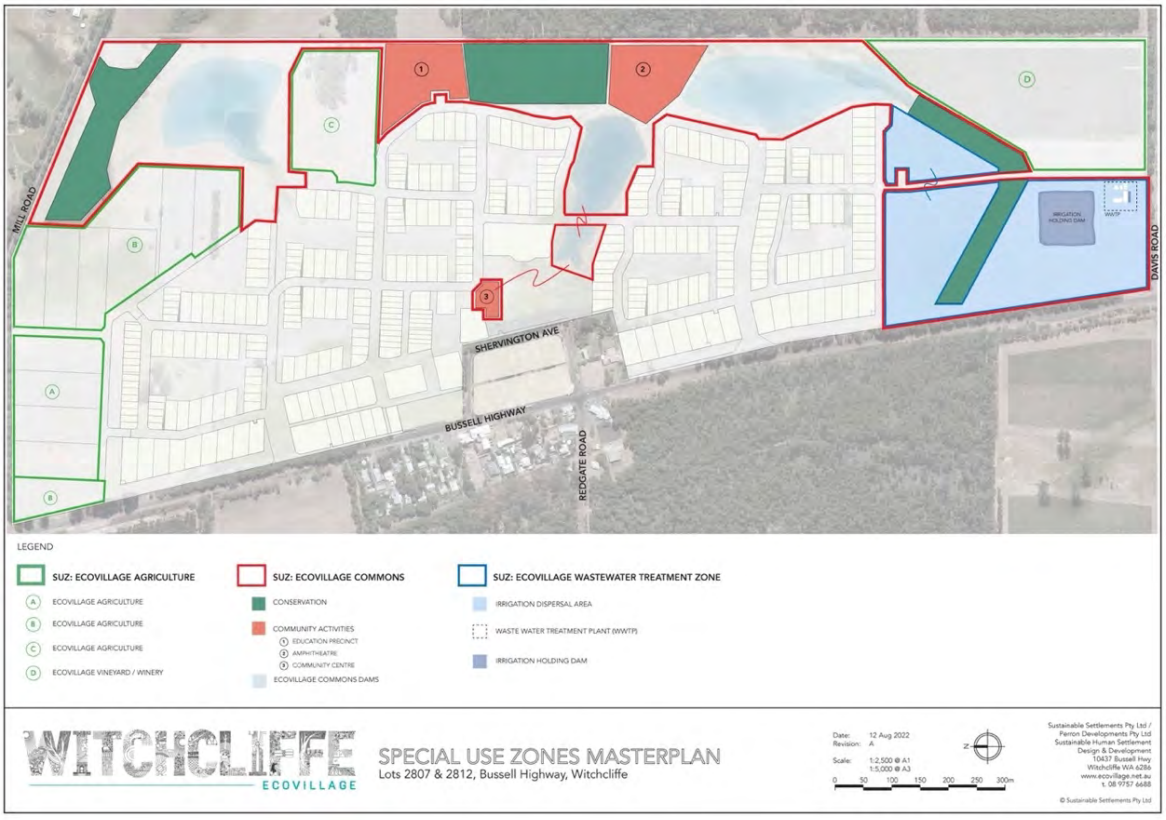


Figure 2. Special Use Zones Masterplan (2022)

Residential clusters

The Ecovillage includes 11 residential clusters (1A through to 5B) that each surround substantial community gardens provided with water from the Ecovillage Commons dams.

Along with the benefits of sharing a large irrigated productive garden together, it is the responsibility of each residential cluster's group of owners to:

- maintain stormwater swales and drains within their Common Property;
- operate and maintain the cluster irrigation tank, pumps and automatic irrigation system;
- ensure that the use of non-potable water is restricted to the irrigation of Common Property and verges;
- provide access to ECL as required to record and monitor water use;
- service the cluster battery and its inverter annually;
- maintain the cluster community shed and rainwater tank and keep them in good repair;
- develop and maintain the community garden consistent with the theme of the development (see section below on Community Garden); and
- maintain the pathways and security lighting on the common property in their cluster.

Strata company

To make this management possible, each residential cluster is a separate strata company or "strata scheme." (The agricultural, mixed use, commercial, short stay, garden and tourism lots are also strata schemes and have bylaws that share the Ecovillage vision and objectives.)

Under the Strata Act WA, a strata company has a number of characteristics (section 14 of the Act) and functions (Part 8 of the Act). At a high level, this includes responsibility for:

- control and management of the property
- insurance
- financial management
- record keeping
- keeping a roll of members and other information
- providing information to members and others.

Strata ownership

The land tenure structure chosen for private lots in the Ecovillage is the **survey strata scheme**. In Western Australia, there are currently two forms of strata tenure provided for by the WA Strata Act (1985). These are "strata scheme" and "survey strata scheme". Both involve a scheme and plan registered with Landgate, and the creation of a strata company which is managed by the strata owners or a strata management company in line with the requirements of its management statement and bylaws, and the Strata Act.

A **survey-strata scheme** provides for privately owned lots to share an external area of common property and infrastructure. No buildings are shown on the survey-strata plan, which is produced by a licenced surveyor. Each lot owner is completely responsible for their own lot and building, just like a conventional

"green," "freehold," or "Torrens" titled lot. Land shared as common property is indicated on the Survey Strata Plan as a separate lot (designated "CP") and common property land can be assigned on an Exclusive Use Sketch, lodged with the Survey Strata Plan, as areas set aside for the exclusive use of individual lots.

Useful Resources:

Landgate has a Guide to Strata Titles which provides an excellent overview of how strata titles operate in WA https://www0.landgate.wa.gov.au/docvault.nsf/web/PS_STPM/$file/1129-Guide-to-Strata-Titles-online.pdf

Strata Communities Association WA (SCAWA) provides excellent resources and courses and is well worth joining: https://www.wa.strata.community

Common Property

In your cluster, the Common Property encompasses all of the land in your community garden, and your "Exclusive Use Areas" (EUA's) or "Garden Plots" as detailed on a sketch plan in your bylaws.

The Common Property for your strata is shown on the Strata Plan for your scheme. It includes all areas not designated as private lots and will have its own lot number (e.g., CP 25). You own the Common Property in common with the other lot owners in your strata, and your "share" is allocated as a "unit entitlement" value (this is also included in your Strata Plan documentation).

Insurance (Strata Assets)

Strata insurance covers: all the infrastructure in the common strata property as well as public liability in those areas. The strata company must maintain a current assets list and a ten-year asset management plan which is reviewed every 5 years.

Lot owners must provide house and contents insurance for their own homes.

Footpaths and Easements

Footpaths that run within the community garden are SHARED COMMON PROPERTY owned by all residents of a cluster and are therefore the responsibility of the strata to maintain. However, an EASEMENT (legal structure) sits over the top of them to enable members of the public to freely traverse them as they would any normal footpaths. This was required as part of our footpath network design, which took them off the streets to instead wind them through the clusters, a key planning feature of the Ecovillage community garden design. All Ecovillage clusters contain easements and notifications in their Strata Plan. In general, the easements relate to underground drainage pipes, public pathways, and in some clusters, underground sewer and energy easements, located in either Common Property or (occasionally) private lots. The notifications variously relate to bushfire risk, proximity to agricultural land, Ecovillage sustainability

requirements, and in some clusters, proximity to Bussell Highway. These sit in the Strata Plan as well as on your certificate of title. Check your strata plan, certificate of title, ask your council members for clarification, or contact Landgate directly.

It is each strata's responsibility to ensure all pathways are kept clear of any plant material including weeds, debris or sand. It is an AMR Shire requirement that all footpaths are clean and cleared to avoid trip hazards and allow easy wheelchair and pram access. This includes weeds in the path joins and EUA vegetation overgrowing onto the paths. All planting should be setback 300mm from edges of paths for safety of path users.

Verge Management

Each cluster will make an agreement with the AMR Shire which acknowledges the planting of fruit and productive trees on Shire vested road verges around the cluster and requires the strata and its residents to maintain these productive trees. In general, each lot owner should maintain the verge adjacent to their lot (weeding, pruning and harvesting fruit) and the strata council should monitor this and incorporate verge upkeep into busy bees if needed.

If they are not maintained, then the Shire could replace the trees in the future, spray weeds, etc, as it is their land, so it's in the best interest of the community to keep them looking tidy, safe and free of fallen fruit.

Stormwater infrastructure & dam water

The common property, road verges, public open space and Ecovillage Commons land include a large network of stormwater collection infrastructure which directs stormwater created by all of the impervious layers of the subdivision—roads, house roofs, tank overflows, paving, pathways, driveways, etc—to the Ecovillage Commons dams. The Ecovillage creates an additional 190 ML of stormwater each year, and the Ecovillage dams provide 250 ML of storage.

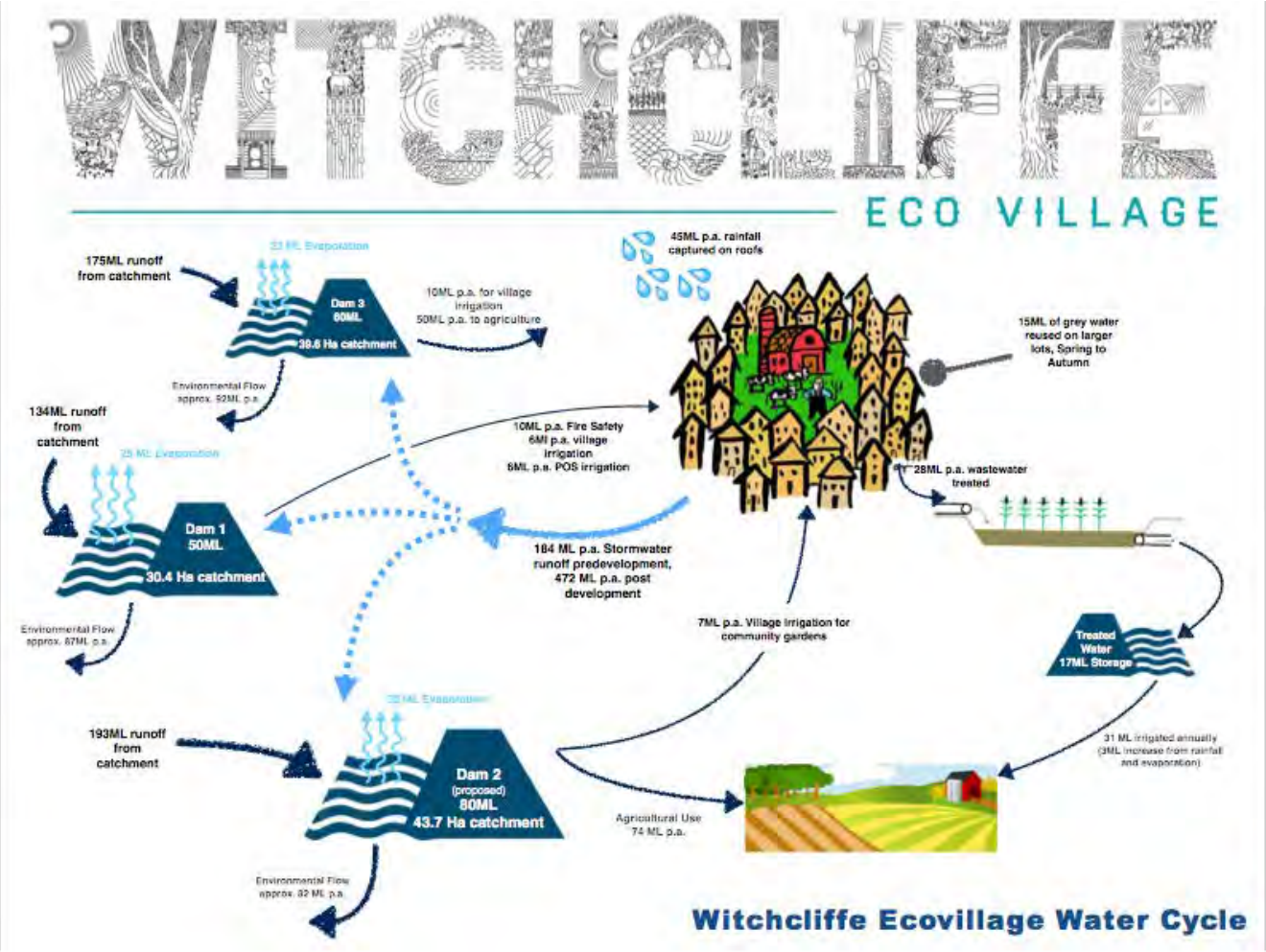
Remember that before the subdivision of the Ecovillage, this was open farmland where rain fell, sat in puddles, soaked in, and wended its way via low points to join winter creeks. This is a far cry from how the land dealt with rainwater when it was forest, a hundred years ago, when the vast networks of tree roots and mycelium opened up the soil and allowed rainwater to soak into the perched water table (clay sponge) beneath the topsoil, with much less draining away to creeks.

To mimic nature in such an altered environment, the ecovillage stormwater is directed overland and through deep swales vegetated with reeds to "polish" the water as it makes its way to the dams. The swales are intended to slow down the passage of water and encourage it to percolate through the soil into underneath the Ecovillage. The swales and basins will often contain sitting water as part of this design.

This dam water provides a non-potable water source for irrigation of Common Property (including the Garden Plots) within each cluster as well as irrigation of agricultural lots, landscaping and POS within the Ecovillage (including verge areas). By using stored stormwater to grow trees and plants in the open spaces across the Ecovillage, the land will eventually absorb stormwater more like a forest, with tree roots and mycelium breaking up the soil and replenishing the perched water table.

The strata council is responsible for managing the use of water within your strata cluster. It is important to respect this water source: use it water-wisely, pay attention to excessive use of nitrogen and phosphorus fertilisers, and do not use it on your private lot. The Ecovillage Dams are valued by the whole community for swimming and recreation and everyone will be responsible for keeping them clean and as full as possible during summer and autumn. If your cluster exceeds its allocated annual usage, the ECL will charge the strata for any excess, and in drought years may need to restrict usage. *See the Gardening section for waterwise gardening tips!*

Do not attempt to manipulate any drain or pipe to speed up the flow of water, do keep an eye out for drains blocked with debris, and keep them clear. This should be a regular busy bee job, and should be an item attended to before any large rain event.



Irrigation management

In order to provide irrigation to the Exclusive Use Area Gardens, communal orchard, community lawn area and trees, each Cluster hosts its own irrigation system. This water supply comes from the Ecovillage Common's dams and consists of :

- A Pioneer 62,000L irrigation tank
- 2 DAB pumps
- irrigation controller (Rainbird), located in their Community Shed.

While the Strata council is responsible for the regular maintenance and operation of the Irrigation system, it is highly recommended that your strata creates an irrigation sub-committee to manage the provision of water to the EUAs, lawn and orchard. If you are familiar with domestic irrigation systems, consider volunteering to assist, and share your knowledge with others in your cluster and in the wider Ecovillage if needed.

Meeting / Community Shed

The Community Shed built in the heart of your Community Garden provides a space to gather, hold social events and facilitate tool sharing / storage for the community. Double-glazed windows and doors, the 'Shed' is a well-insulated 45sqm space with kitchenette, storage room, accessible toilet, large verandah and a north-facing pergola built with the intention of holding a deciduous vine for Summer shade. It has its own rainwater tank (12,200L) and DAB pump (requiring regular inspections by your Strata council, as per the manuals included in your Strata's A3 File). The Jarrah cladding will also require regular maintenance and re-oiling to ensure its longevity. While these tasks are listed in the Strata Council's 10 Year Plan, it is expected that the Council will engage the entire Cluster in these Busy-Bee activities.

Collaboration within and between clusters

Given the Ecovillage cluster design, there are many opportunities for collaboration within and between clusters. Your cluster may have many more ideas than those previously suggested including;

- bulk buying garden supplies, chook food, household supplies, etc., combined memberships (e.g., Digger's Club, Renew), etc.
- Ideas for inter cluster collaboration: knowledge sharing, strata council support, babysitters club, meal trains for those in need, events, scheduled open days for the public, cook offs, kids' veggie competitions (biggest zucchini, ugliest carrot , tastiest tomato).

Bushfire Management

Please refer to bushfire management documents provided with each resident's contract and available in the document library of the Ecovillage website: https://www.ecovillage.net.au/library/document-library/

Witchcliffe Ecovillage Bushfire Management Plan Addendum (2019)

Defined BAL Bushfire Areas information sheet, contour map and report

Strata Council

The Strata Act recognises that it may be impractical for all owners to participate in the day-to-day management of the strata scheme and therefore provides for the strata company to be operated by a council of owners.

NOTE: Wherever your bylaws mention "the council," this is what they refer to—not the AMR Shire council.

At annual general meetings attended by lot owners, a decision is made on how many people will make up each council, with a minimum of 3 and a maximum of 7. Those in attendance then nominated their council members. The council then nominates a chairperson, secretary and treasurer. These council positions also constitute the chairperson, secretary and treasurer of the strata company.

Become familiar with the people in your cluster who have nominated to your strata council, and consider the ways that you can support them in their role and learn what is involved so you can step up and help out in the future. The strata councils form the "backbone" of the Ecovillage community, so respecting their contribution, being caring and kind about their work and decisions, and being involved yourself when you can, are some of the most valuable ways you can contribute to the Ecovillage community.

And don't forget that simple things like reading and responding to strata communications and paying your levies on time are vitally important—if you neglect these things, you are making more work for your neighbours and friends on your strata council.

Council roles

Members of the council of owners do not acquire any privileges by virtue of their position or because they become office bearers of the council. They are required to carry out their duties for the benefit of all owners, without favour. Be really nice to your strata council members—they are only human, and they are voluntarily doing a job that you could have put your hand up for!

Councils will be made up of between 3 and 7 members, with more hands making lighter work. The only three executive positions which need to be filled are:

- Chairperson
- Treasurer
- Secretary

These roles can only be assigned to one person at a time as they are signatory roles, but it is possible to assign non-executive members of the council to "shadow" or supporting roles if the executives need assistance. The non-executive members can also be assigned unofficial roles: Social Events Manager, Busy Bee Co-ordinator, Irrigation Manager, etc.

If you are interested in being on the council, it is strongly recommended you read the *Landgate Guide to Strata Titles* and participate in the Strata Community Association's *Strata Committee Training* webinar.

Forming a resilient and robust council

There are a number of tools and resources available to assist in the formation, support and longevity of a thriving strata council, and thus, cluster community. A very helpful aligned resource is 'A Consensus Handbook,' created by UK not-for-profit Seeds for Change.

A copy has been provided to each Cluster Strata Council and should be made available to interested residents, possibly as part of a shared library in the cluster shed. The ECL also holds copies of this text (and other useful books) in the office and loans are available by appointment.

Participation in the Ecovillage's Creating Community workshops is also highly recommended.

Succession planning

There are a number of ways council roles can be structured to provide further support and/or to allow for succession planning. Whilst some might feel comfortable remaining in a role for multiple years, others might feel a shorter term would be more suitable. Co-roles (ie. each role for 2 years; 1st year in the nominated role with mentor from previous year, second year mentoring that year's elected member) allow for support and knowledge/processes retention within the council.

A common complaint in strata communities is that the same people are always on the council and this can lead to dominance, staleness, people "taking over, or the opposite—no-one wants to put their hand up, so the same people have to do all the work! The simple answer to these problems is for more people to nominate themselves and get involved, and for those who have a tendency to "jump in" to stand back sometimes and let an unfilled vacancy create an opportunity for someone new.

Community building

This is important for the whole strata community, not just the council, but it may be that the strata council is the initial driver to motivate their strata community to learn and practice effective communication, decision making and conflict resolution skills.

There will be many opportunities for the strata owners to collectively make decisions regarding the management and improvement of their Common Property infrastructure, and flash points when conflict may occur and have to be resolved. Perhaps there are funds from a fundraising event, how should they be spent? Maybe there is a need for additional play equipment, but only half of the lot owners have children themselves? Decision making and conflict resolution are much easier to manage if a fair and transparent structure or procedure is already in place, so that stakeholders can feel respected, heard and acknowledged, compromises made and consensus reached, to a point where all stakeholders can "live with" and support the decision made.

Louise Duxbury from Ecotones has provided initial "Creating Community" workshops for Ecovillage residents, which will become the basis for community-led training in the future. Louise has provided her learnings and experience to the community having been a founding member of the Wolery in Denmark, and has thirty years of experience in environmental and leadership training, project development and management, facilitation, advocacy and policy development. The model she discusses in her Creating Community workshop is : ***Consensus Decision Making for Relationship Building.***

"Consensus decision making is a creative and dynamic way of reaching agreement between all members of a group. Instead of simply voting for an item and having the majority of the group getting their way, a group using consensus is committed to finding solutions that everyone actively supports, or at least can live with. This ensures that all opinions, ideas and concerns are taken into account. Through listening closely to each other, the group aims to come up with proposals that work for everyone.

By definition, in consensus no decision is made against the will of an individual or a minority. If significant concerns remain unresolved, a proposal can be blocked and prevented from going ahead. This means that the whole group has to work hard at finding solutions that address everyone's concerns rather than ignoring or overruling minority opinions.

Consensus is used widely by people around the world working towards a more just and equitable society: from small voluntary groups, co-operatives and campaign networks to businesses, local communities and, in some cultures, across much wider regions. The exact process may differ depending on the size of the group and other factors, but the basic principle of co-operation between equals remains the same."

- Seeds for change - https://www.seedsforchange.org.uk/resources

Other topics in the Creating Community workshop include :

- House rules
- Living in harmony (conflict resolution)
- Understanding and respecting each other : Using deep /active listening
- Different ways we communicate and learn : identifying your learning style
- Non-violent communication : Why adopt it in communities?
- Stages of Community Development : forming, storming, norming, performing !
- Facilitation : Key roles and task completion

Useful Resource :

A Consensus handbook, Seeds for Change: https://www.seedsforchange.org.uk/handbook

The Commons Social Change Library : https://commonslibrary.org/

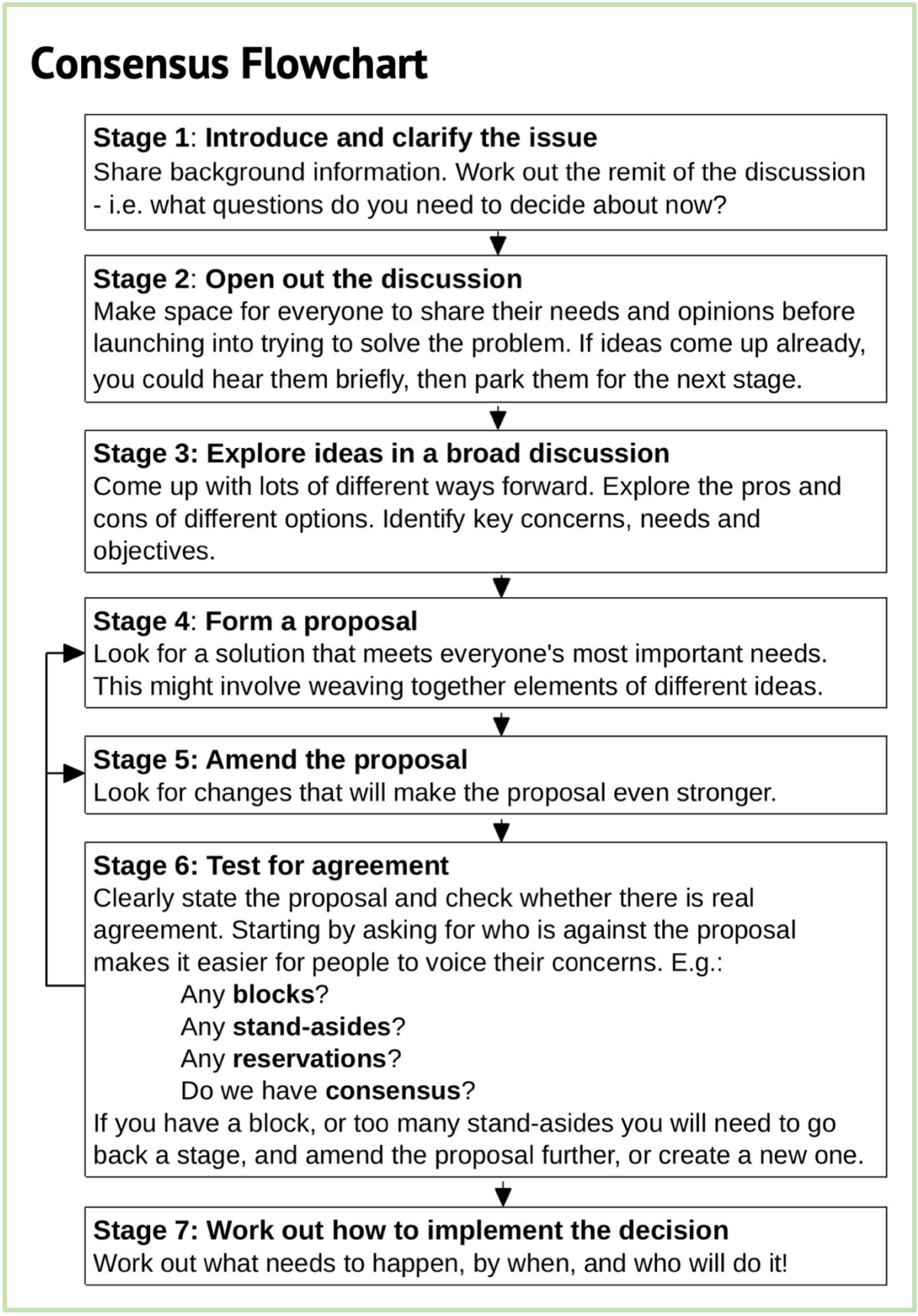
The Sociocracy Group : https://thesociocracygroup.com/

"The Cohousing Handbook: Building a Place for Community" Chris Hanson (1996)

We the People: Consenting to a Deeper Democracy, John Buck & Sharon Young (2017)

Dialectical Behavioural Therapy interpersonal skills https://www.therapistaid.com/worksheets/dbt-interpersonal-effectiveness-skills

T.H.I.N.K. acronym for kind communication https://hslda.org/post/think-before-you-speak



- *Figure 3 Consensus Flowchart, Seeds for Change*

ECO VILLAGE LOTS

Rights

Each individual survey strata lot has the same ownership rights as a green or Torrens titled lot anywhere in Western Australia. It can be resided in, leased out, sold on the open property market, and financed with a mortgage. It has a street frontage, an individual lot and street number, and is zoned Residential under the AMR Shire Local Planning Scheme 1. In addition, each lot shares ownership of and responsibility for the common property within its strata, which is assigned proportionately according to its Unit Entitlement. You can find your lot's unit entitlement in your sales contract's pre-disclosure statement or in a copy of your cluster's Strata Plan.

Responsibilities

Like any property owner in AMR Shire, Ecovillage lot owners must maintain their lot crossover and any culvert underneath it, pay Shire rates, and abide by any local planning policies and regulations. The owner of an Ecovillage lot also has certain additional responsibilities.

They must abide by their cluster's Strata Bylaws, pay their levies promptly, take part in the shared management of their cluster's common property, and maintain any productive (fruit) tree that may have been planted by the developer on their verge.

Your private lots are your own to live in, rent out, bequeath or sell, however, anyone who is a resident or guest on your lot must also abide by the strata bylaws and it is your responsibility as the lot owner to ensure that this occurs. You also have a legal requirement to provide strata information to prospective purchasers/tenants if you sell or rent and a real estate agent can assist you with that.

On resale, an Ecovillage lot owner must also provide potential purchasers or the selling agent with an up-to-date **sustainability features disclosure statement** which will outline the renewable energy and rainwater tank capacity of the house.

Exclusive Use Area / Garden Plots

Although your allocated EUA Garden Plot is on Common Property, it is your responsibility to maintain so it is included in this section.

Residents are granted exclusive use of a garden plot which is intended for organically growing fruit and vegetables, perennial herbs and flowers rather than a native or ornamental garden.

- Water from the nearby dams is provided for this productive use.
- It is not envisioned that the area be dominated by infrastructure such as sheds, furniture or extensive hardstand surfaces.
- Raised garden beds would be in keeping with the proposed use as would incidental seating.
- Large permanent structures are not in keeping with the design principles. If you want to build a small structure in your EUA, ask your council for permission, *as per Conduct Bylaw 6d.*
- When designing consider using local, recycled and sustainable materials wherever possible.

- There is a maximum height limit of 2m for any tree or plant growing in an EUA to avoid overshadowing and root invasion in veggie beds and impacts on neighbour's gardens.
- If you are unsure if your concept will be allowed, present your ideas to your strata company who will determine if what you are proposing is consistent with the by-laws.

For **EUA Garden Plots adjoining public paths**, consideration for pedestrians and cyclists should be paramount. All tall objects are to be setback 50cm from path edge. Objects include raised garden beds, stakes, plants, so as not to obstruct bicycle peddles or cause a hazard. Soft edge plantings of creeping thyme or native groundcovers should be considered.

The **boundary between the EUA** and your lot must be clearly defined with a fence or a landscaping feature (hedge, rock borders, etc) to allow children to understand the delineation but if fenced, must include a gate to your lot.

The adjoining 1m **space between EUAs** is not included in your EUA but can be utilised as agreed to between neighbours. The decision can be made to use that area as a shared path to access garden beds, to plant a boundary low hedge to name a few options.

It is understood that EUA's are for the exclusive use of the property owner and as such **respect** for the property, the plantings and the produce is assumed. Permission needs to be sought to access this garden, to pick produce or to handle the plants. Dogs should not be allowed to urinate on the plantings and parents need to have their children understand that they can't harvest or play in other owner's EUA's. Please note the *Conduct By-laws #6*

However, the EUA is common property and not an extension of your backyard and so you must always maintain a clear path to your garden gate, and permeability to neighbours who may need access past or through your EUA to access Common Property. The EUA Garden Plots are a key part of the community infrastructure in the Ecovillage and they are intended to promote the sustainable production of food, as well as healthy exercise and the sharing of plants, food, knowledge and company. Please do your best at all times to make them a friendly, active, productive space.

Stakes and digging in your EUA

An area of 1m between the boundary of your lot and your EUA is a no dig and no stake area. Generally, the sewer, electrical and irrigation main lines throughout the cluster garden are located in this zone (on the EUA side). Excavation deeper than 50cm is not permitted anywhere in Common Property *(Conduct By-law 9d)*, and particularly not in this area to avoid any damage to services. Refer to the infrastructure plan (in the strata documentation held by your strata council) **before** you dig. Please pay attention to this, as stakes driven through irrigation pipes are the most common cause of damage to the irrigation system and will cause leaks and potential damage to pumps. Damage to underground services can be dangerous, be costly to fix, and cause great inconvenience.

If you think you need to dig deeper than this, please consult your council and refer to the Microgrid Infrastructure Plan (Attachment 2).

Spoon Drains on EUA

Where a spoon or V drain exists in your EUA alongside a walkway or on the boundary of your lot, these **water flow** paths are to be maintained – refer to *Interlot Drainage Plan* (Document Library) for guidance. In general, these drains are between 15 and 30cm deep.

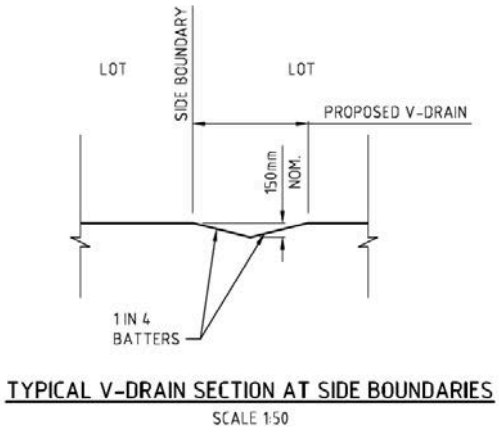
They are an important part of the drainage for your cluster and helps stormwater to drain towards swales and roadways and away from houses and infrastructure. Building up your garden beds with top soil, compost, and mulch will also assist drainage in your EUA.

To maintain universal access to the walkway and/or your lot and allow the water flow to continue unobstructed, a 'bridge' or path crossing can be created. By laying a pipe (min of 150mm diameter) along the path of the water flow, and building up the area over this with soil, an access bridge can be created between the EUA and the footpath. Figures 4 - 6 provide some visual inspiration, and Figure 7 shows a cross section of a V-drain.

If unsure, you may need to seek the assistance of a landscaper or your builder.

Figure 4

Figure 5



TYPICAL V-DRAIN SECTION AT SIDE BOUNDARIES
SCALE 1:50

Figure 6

Figure 7

Living in the Ecovillage

Wastewater

The wastewater plant at the Witchcliffe Ecovillage is a sustainable water recovery facility managed by TMC Witchcliffe. The plant uses a combination of biological and chemical processes to take deep-sewered residential wastewater from Ecovillage properties and clean it to A1 Agricultural standard recovered water. This recovered water is then used for the irrigation of the Ecovillage's community avocado plantation and wood/mulch lot. All biological wastewater plants create biological waste material that is essentially dead bacteria that have done their job. This is another resource from the facility that can be made functional. The goal is to fully compost this material as a community scale value-added resource.

In addition, the facility is designed to be energy efficient, use renewable energy, be aesthetically pleasing and all be contained within closed vessels and a low-profile modular building. The facility also includes an adjacent 30 ML above ground lagoon. This is not part of the treatment process, it is an area for storing fully treated recovered water during the times of the year when it is too wet to irrigate the orchard and tree plantation. The lagoon is over sized to handle a "1 in 100 year" flood event, is fully lined with HDPE, and is securely fenced to exclude animals, in particular kangaroos.

Owner / Occupier responsibilities

The Following are some key considerations, but for a complete list, please refer to TMC Witchcliffe information sheet sent to each resident or contact TMC directly (TMC listed on the Contacts page).

- Where the operator advises that it is in the process of clearing a blockage, the property owner/occupier of the land must limit wastewater into the sewer.
- The property owner/occupier of the land shall not discharge to the sewer: chemicals, paints, pesticides, medicines, wet wipes, nappies, engine oil or other materials not associated with kitchen, toilets and showers.
- As residents would be familiar with, natural cleaning products that specify "Septic friendly" or "environmentally safe" are more than likely going to be suitable. However, TMC is very happy to answer any questions, if you are in doubt.
- Chlorinated disinfectants such as bleach will cause operational problems in the treatment facility by killing the process bacteria responsible for sewage treatment. Strong natural disinfectants such as eucalyptus-based cleaning agents have a similar effect.
- Large Quantities of Animal Fats and Vegetable oils if allowed to enter the sewer line will contribute to line blockages and increased maintenance or loss of service. Excess cooking fats and oils should be absorbed on paper and disposed via the garbage waste service or composted.
- Food waste disposal units macerate food scraps. If excess food scraps enter the sewer network it will contribute to sewer blockages increasing maintenance or loss of service. Food scraps should be composted, used in the worm farm or for the chickens.
- Under no circumstance must "Wet Wipes" or sanitary products be disposed to sewer via toilets or other discharge points. Wet Wipes create significant maintenance issues in sewer lines and pump stations that may limit operation or create blockages.

Greywater management

Greywater produced from the laundry, bathroom and handbasin is a valuable resource which can be reused for garden irrigation. Kitchen greywater is considered "black water" as it contains high levels of greases, oils and detergents and must be discharged to the sewer. Laundry water will require a more advanced system than one servicing just shower and handbasin water, as even septic safe detergents are too alkaline for most plants.

Reusing greywater provides a number of benefits including:

- Reducing potable water demand
- Reducing the amount of wastewater discharged into the environment
- A well-watered, healthy garden (no summer water restrictions apply!).

Greywater can be diverted directly onto your garden via a simple Greywater Diversion Device (GDD). A GDD diverts, filters and delivers water from the household source to your garden via sub surface irrigation (note comment above re laundry water). If you wish to use your greywater for household use, e.g., flushing toilets, it must first be treated to a suitable quality using a Greywater Treatment System.

Around 75 litres of water per person per day is likely to be produced, depending on the greywater reuse system. This will provide sufficient water for irrigating approximately 40m² of garden or lawn per person based on a maximum summer irrigation rate of 2mm per day.

A code of practice for the use of greywater systems is provided by the Department of Health and is available on their website at
http://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/water/PDF/Code_of_practice_for_the_reuse_of_greywater_in_WA_010_v2_130103.ashx

Managing tank water

Individual tanks are required for each Ecovillage property to comply with state and local legislation as there is no reticulated water supply in Witchcliffe. This requirement ensures that each property owner is responsible for their own water quality and adequate storage volume.

The recommendations assume that all households will be constructed with water efficient fixtures and fittings, and that household water consumption will be monitored via tank lever indicators and flow meters. These water efficiency measures are specified in the *Witchcliffe Ecovillage Building Design Guidelines (2020)*.

Where residents wish to have irrigated gardens or lawn on their lot, they will need to source this water within their own lot.

Rainwater tank overflow

In urban environments, wherever a house, driveway, road, path, etc., is constructed, it collects rainwater that can't soak into the ground underneath, and that water must flow somewhere.

All lot owners are responsible for the dispersal of water that collects on the impervious layers of their lot: house roofs, carports, driveway, paving, etc. This is a standard requirement, and in most subdivisions in this region, a sump or other drainage feature would be required on the lot.

In the Ecovillage, much of that rainwater is collected in your rainwater tanks, however, even the largest tanks will overflow in our wet winters. The Ecovillage is designed so that you may direct the flow of water from your property to the nearest low point which will either be a verge swale, road, Groupie laneway or your cluster's internal swale system. The management of stormwater created on your lot should be considered at concept planning stage, as set out in the BDGs.

If your rainwater tank overflows through your EUA or across a verge, a rain garden can be utilised to reduce the flow rate and prevent erosion. Any materials or erosion control on the road side of the street tree planting alignment should be flush with the road kerb and not contain any raised edges or trip hazards to comply with Shire requirements. Figures 9 to 10 below provide some inspiration.

Figure 8 Rain garden layout

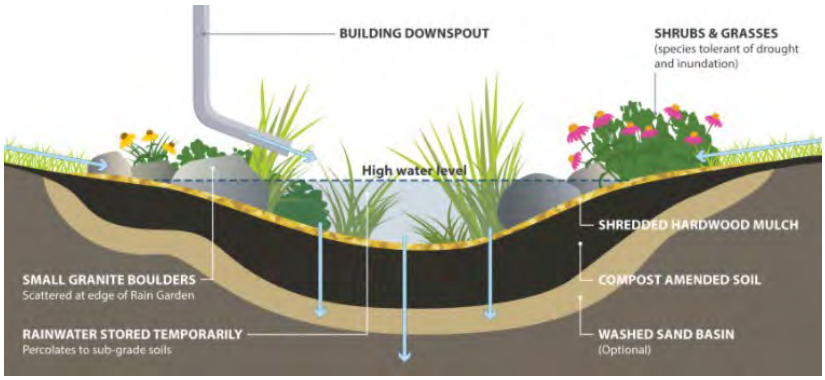


Figure 10 Tank overflow through rockery onto

Figure 9 Tank overflow onto driveway

Rainwater quality

To maintain a high quality of water fit for drinking in your rainwater tank, there are a few simple maintenance tasks that are required. These include keeping your gutters clean, ensuring pre-tank filtration measures such as **first flush devices** and **strainer baskets** are clean and functional, and that **post-tank filtration devices** (membranes, UV filters, etc.,) are maintained and serviced as required. Unlike Colorbond, the Zincalume on Ecovillage roofs remains stable over time, so no paint flakes will end up in your tank, however it is recommended that the first rains after your tank are installed are allowed to flush away to ensure that no post-construction dirt or contaminants end up in your tank.

The Australian Government Department of Health has compiled an comprehensive guide on managing water quality from rainwater tanks and is available on their website at https://www.health.gov.au/internet/main/publishing.nsf/Content/0D71DB86E9DA7CF1CA257BF0001CBF2F/$File/enhealthraintank.pdf. The guide highlights that simple preventative maintenance actions will maintain the quality of your water supply and is recommended reading for owners and residents and should be provided to any tenants.

Just as you have a gauge on your car to ensure you don't run out of fuel or battery charge, a system to measure water usage and available tank storage will help you manage your water use to ensure you do not run out of water and to alleviate any worry about your water supply.

Animals

Dogs & Cats

Local marsupial and bird species are very vulnerable to predation by domestic cats and dogs and the development of housing next to bushland can be a disaster for wildlife. To ensure our wildlife habitat does not become a hunting ground for domestic pets, the Ecovillage strata by-laws strictly prohibits the keeping of cats within the Ecovillage and mandate responsible dog ownership.

- Cats are prohibited. This a requirement of the AMR Local Planning Scheme provisions for the Ecovillage and can't be amended by strata bylaw, or provision of a cat enclosure..
- All dogs are required to be kept indoors between 6pm to 6am every day, to protect nocturnal marsupials, and avoid nuisance dog barking.
- Management of pets is a potential source of conflict between neighbours. The Ecovillage has included some simple, common-sense guidelines in the By-Laws (Conduct By-Law # 24):
    - Note the list of excluded dogs
    - Dogs need to be licenced and microchipped
    - Kept within the lot
    - Be on leash when in or on the common property, including Garden Plot areas
    - Not causing a nuisance.
- Dog owners may consider investing in a dedicated dog poo composting unit to deal with their dog's waste in a sustainable and safe manner (it is generally not considered safe to add to a general compost bin or worm farm).

Bees, chickens and other animals

Keeping animals on your block is governed by the AMR Shire environment & health bylaws.

https://www.amrshire.wa.gov.au/services/environmental-health/poultry-bees-and-health-local-laws

It would be considerate to confer with your immediate neighbours to check if they have any objections to the animals you wish to have on your lot.

- Bee sting can cause a significant reaction for those that are allergic. There may be other locations on the Ecovillage site that would be more appropriate for bee keeping.
- Chickens can be housed on your Garden Plot in a non-permanent structure such as a chicken tractor. Please consult with your strata council if you wish to build something more permanent. The AMR Shire does not permit roosters.
- Other poultry: AMR shire does not permit turkeys, geese or peacocks to be kept on any land zoned residential, mainly for the noise impact on your neighbours. Consider alternatives such as pigeons or quails which are quieter.
- Rabbits are considered a feral and pest animal in the area. Trapping and eradication of these animals is done by the Department of Agriculture and Food, Department of Parks and Wildlife and the RSPCA Western Australia. Calicivirus and myxomatosis are therefore a potential danger to pet rabbits.
- Guinea pigs make great pets, and in a movable tractor, can be very helpful in your garden, trimming, lawn, eating down weeds and converting cover crops and domestic scraps into an excellent low nitrogen fertiliser for your garden. Be careful not to feed them large quantities of lettuce, and ensure they have a small daily supply of vitamin C in their diets.

Guests

It is logical that the owners or occupier of a lot take reasonable steps to ensure their visitors do not behave in a manner that is likely to interfere with the peaceful enjoyment of others. This includes in the Ecovillage Common areas such as the dams, where they must be accompanied by an Ecovillage resident at all times. The lot owner is also responsible for guest's children who, if under 6 years of age, are not permitted to be on common property unless accompanied by a responsible person over 13 years.

Managing Your Common Property

An aspect often overlooked in modern society is that we are all actually part of a larger ecosystem. We may have separate living spaces and seemingly defined boundaries, but in nature, things are much more fluid. As humans, we only survive and flourish through the interaction of a whole lot of processes and activities carried out by the plethora of other living species we share this planet with.

We very much rely on our fellow inhabitants for everything from the food we eat to the living conditions of our environment, not to mention the walking ecosystem we carry around with us.

Living within a community gives us the opportunity to interact with not just the people, but also the plants, animals and microbes that surround us. The health of our community is very much aligned with how well we manage our collective goods and services, and look after the whole.

Developing an awareness of how our actions impact on the world around us enables us to make informed choices that ultimately determine how we are all going to get on. Much can be done in this department as an individual, but others are best addressed together, in collaboration with those we share our community with.

COMMUNITY GARDEN

As a lot owner in an Ecovillage strata cluster, the main area of collaboration with your neighbours will be in the management of your shared Community Garden. Every cluster will come up with their own ways to do this, and hopefully learn, grow and enjoy the process along the way. The following notes and suggestions have been adapted as a starting point for your discussions from the wonderful South Australian handbook: *Growing Community: Starting and Nurturing Community Gardens.*

Developing shared visions and aims for the community garden

At the initial stages, time is needed to develop clear and inspiring shared visions for your community garden. Visioning processes can bring the group together and provide a strong basis for future planning and decision making. This will evolve as the garden grows and develops.

The vision for the garden will develop informally as ideas are discussed and may include discussions with other clusters or visiting established community gardens. Organise garden visits or tours which can spark lots of new ideas. Share images of inspiration.

This can be an opportunity to invite cluster residents to talk about what really matters to them – their hopes, values, commitments, needs and desires, as well as their limitations. This will not only generate ideas, but also strengthen the connections between people in the cluster. There is often significant common ground among participants' hopes for the kind of community garden they would like to see. Start with these general visions before focusing on the more specific details of your garden. Work towards developing a 'vision statement' and set of aims that reflect what people care most passionately about.

A Garden Design Process

Initially this process should be organised by the strata council, unless/until a strata garden committee has been formed and approved. Remember all decisions made about changes or additions to the Common Property must be done as a group and not by individuals acting alone. Remember also that early residents alone do not constitute the whole strata; absent owners must be given a chance to participate in decision making too.

Decide who will facilitate the meeting and introduce new residents.

Invite residents to bring ideas, images of their vision for the garden. Include those residents not physically attending the meeting.

Plan an agenda, allocating time for an icebreaker, everyone to introduce themselves, an introduction to the group.

Discuss the vision for the garden and how to work towards the 'cluster vision statement'. Consider round robin style to include each person. Each meeting will progress the garden design process.

Agree on what tasks need to be completed prior to the next meeting. Allocate task groups. Decide on working bees.

Agree on the place and time for the next meeting.

GETTING STARTED

- Develop a shared vision for the site / refine the vision. Which of these elements will be your initial priorities and which will you work towards implementing in the future?
    - Infrastructure: shared tools, storage areas (composting), irrigation systems, paths, solar panels.
    - Garden spaces: sensory garden, pollinating / insect attracting, bushfoods, butterfly / bird habitat, medicinal herbs, compost growing areas, orchard, raised beds, small plots for children, propagation area.
    - Small animals: chickens, worm farms, other animals
- Site assessment (the research and observation phase)
    - Water: contour of the site, swale functioning, tank water overflow path
    - Access: placement of paths
    - Structures: where to place infrastructure.
    - Note soil condition
- Share design skills
    - Hold workshops to draw on the knowledge within the group and consult with professionals in the wider community.
- Make the design
    - Decide which of the design elements on the wish list will be prioritised and which will be introduced later.
    - Make a map. Include measurements, permanent features, other information.
- Implement the design
    - Take on small sections as time, expertise and community time allows, e.g., soil improvement, green manure crops, pioneer species for wind protection prior to planting.
- Re-design, reassess
    - Some things will work better than others as you continue to learn about the site. Include reassessment of the design in your meetings.

Skills mapping

Initial meetings might include mapping the skills of the cluster residents.

People's resources include: networks and access to materials, practical skills and experience, formal and informal training and education, knowledge.

People's assets include: enthusiasm, passions, interests, values, willingness to learn and their 'insider knowledges' of living with a disability, coming from a non-English speaking background, being a parent, etc.

Record keeping

Reminder of decisions that were made, what worked and what didn't, seasonal activities, details of planting plans, records of regular pest/weed emergence, etc.

- Skills list
- Meeting minutes
- Planting plan / notes (when, what, where)
- Produce / livestock notes
- Busy bee notes (who, what, when)
- Suppliers, providers contact details
- Expenditure
- Items to present to the council for budget consideration.

Building Community

Socialise together. Organise regular social activities so gardeners get to know and better understand each other. Take breaks together, e.g., morning tea. Eat together and share the produce of the garden. Organise working bee days, so people who are not yet moved in can visit the garden at the same time and have a chance to meet everyone.

Celebrate to give recognition to your achievements. Hold harvest feasts, celebrate Wadandi seasons, cultural festivals, birthdays. Invite other clusters. Use celebrations to tell stories about the garden and its gardeners.

Value and share skills and knowledge. Encourage knowledge sharing and mentoring. Share gardening knowledge, produce and recipes.

Evaluating projects

Decide on your outcome, impact and process measures.

- Decide how you will collect, analyse and use your data.
- What gets measured gets done.
- If you don't measure results, you won't fully recognise your achievements.
- If you can't see achievement, you can't reward it or learn from it.
- If you don't recognise failure, you can't address it.
- Clarify responsibility – who is going to do what by when.

Evaluation checklist:

- What are we trying to do here?
- Does it work?
- Is this what we set out to achieve?
- What is its value?
- What has this achieved?
- Has this been successful?
- Why does it work. Why doesn't it work?
- What can we do to make it work better?
- What has been the short to medium term impact of our work?
- What has been the longer-term outcome of our work?

MANAGEMENT OF GARDEN FACILITIES

Meeting / Community Shed

- Decide on a how to share access to the shed—lock box, multiple keys, open shed policy.
- Decide on how to furnish and maintain sundries.
- Strata council to keep multiple sets of keys.
- Timber maintenance – to be undertaken in Busy-Bees as mentioned above in Residential Clusters section (Pg 18)

Irrigation

- Ensure the cover stays on the DAB pumps at all times to protect the pump from the elements which can short the pump out.
- Regular checking of the pump – is it cycling on & off when not in use, which could indicate a leak.
- Check the pre-pump filter and flush clean it – pre, post and during irrigation seasons. This could be a busy bee item.

Figure 11 Pre-pump filter

Orchard and chook pen

The cluster chook pen and netted orchard was constructed by South West Orchard Builders, as detailed in the as-constructed landscape plan supplied to your Strata council.

- Inspect netting regularly for holes at busy bees. Use vineyard netting clips to repair any small holes.
- Keep gates closed to keep pests out.
- Seek help to catch and release any uninvited guests: rabbits, birds or possums will all try to eat your fruit and ringbark trees.
- Decide as a cluster how the chickens (if any) are to be managed, and by whom, and who pays for feed and collects the eggs. Priority should be given to those on smaller lots who have less space to house their own chooks.
- The strata council has ultimate responsibility for the welfare of animals on Common Property, so must keep oversight on how they are being kept.
- Do not leave chickens in non-fox proofed areas of the orchard at night. The Ecovillage is visited by foxes.
- Do not keep guinea pigs in the orchard as they will also ringbark trees.
- Ducks and chooks are not ideal companions in the same enclosure as ducks foul their water, but a few ducks kept in a separate fox-proofed section of the orchard would be a great help to manage snails and pests.

Playground

Be aware that any playground item taller than 60 cm requires a 40 cm deep soft fall zone underneath. In your Common Property playground, this is provided by shredded pine bark, which needs to be fluffed up and kept evenly distributed in the fall zone as children play on the equipment and move the bark around. Please keep the 60 cm fall zone requirement in mind if installing additional play equipment in the future.

The shredded pine bark was purchased from TJ Depiazzi & Sons in Boyanup https://depiazzi.com.au. When this needs supplementing, it may be worth organising to bulk buy with the other Ecovillage clusters.

Lawns

Kikuyu has been installed in community garden areas, contained by footpaths and concrete mow curbs. One of Kikuyu's great benefits is that it uses less water and nutrients than most other lawn varieties. Regular maintenance (weeding, edging and mowing) is required to prevent this fast-spreading grass from encroaching over footpaths and into garden areas. Approximate recommendations are weekly mowing in Summer and every 3 weeks in Winter, though this of course will need to be discussed and agreed upon within your clusters.

Here are a few tips to reduce water requirements:

- Water lawns deeply and then leave a period of time before watering again to encourage deeper root systems. Aim to water no more than once a week during summer and less in cooler periods.
- Accept that your lawn does not need to look like a golf green all through summer and that you can live with some browning off.
- Apply an organic soil wetting agent once a month during hot and dry periods. This will help to absorb humidity from the air and funnel it to the roots as tiny droplets of water. Lawns can last twice as long before they need watering when a soil wetting agent has been applied.

It's important to feed your lawn regularly to keep it healthy and dense, but do not overfeed, as this will cause the build-up of nitrogen and algae in the swales and dams of the Ecovillage.

Apply an organic slow release product every three months when the lawn is actively growing. Give your lawn a boost, especially during stressful periods by applying seaweed solution every couple of weeks. This really helps the lawn cope with heat and lack of water.

In Spring and Autumn apply lime or dolomite to boost calcium levels and prevent the soil from becoming too acidic. The dolomite will also add magnesium to the soil.

Swales

Vegetated swales and drains are shallow, open, vegetated channels primarily designed for conveying water in a longitudinal manner through a drainage pathway. They can also be designed to manage water quality by reducing flow velocities (speeds) compared to bare soil, piped or concreted conveyance systems. They can remove coarse and medium sized sediments and are commonly combined with buffer strips, sediment basins and constructed wetlands to provide further treatment. The main difference between swales and drains is how they hold water. Swales ideally have a trapezoidal cross-section with a flat base, while drains have a shallow 'v'-shaped configuration.

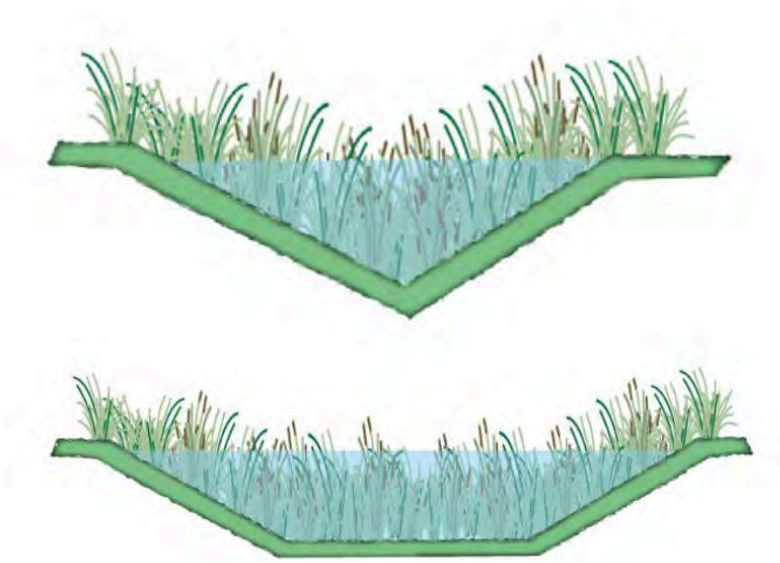


Figure 12 Vegetated drain (top) and vegetated swale (bottom) cross section.

The native reed and plant species planted in the Ecovillage swales were selected based on their ability to take up nutrients and "polish" the stormwater flowing and settling in the swales. They also provide habitat and food for frogs, insects, birds and reptiles, and are not intended to be slashed seasonally. Regular maintenance during busy bees is suggested as per the strata Ten Year Plan, with special attention to removing rubbish and keeping any drain or pipe clear of obstructions.

Community battery & charger

Your cluster contains a 232 kWh Tesla Powerpack battery in the Common Property service yard area to provide storage for renewable energy generated by lot owners' rooftop solar panels, and to provide energy back to households at night. It must be serviced annually in order to maintain its warranty terms and extend the life of the battery, which is warranted to be at 70% useable battery capacity after 15 years (at which point additional cells may be added, in line with depreciation schedule included in the strata Ten Year Plan). The Tesla servicing will cost the Strata Company an estimated $1,000.00 p.a., (with a 2% p.a. increase per annum for a fixed term of 15 years,) and includes servicing of the whole battery module and its inverter.

Lighting

Path lighting is provided to keep pedestrians safe at night. The lighting is designed to minimise light pollution to microbats and nocturnal fauna. The hours of light provided should be determined by the strata council in consultation with owners, with dusk to midnight suggested as a starting point. The lighting is owned, powered and maintained by the strata company.

Lighting should be checked regularly at busy bees and any faults reported to your strata council.

Pathways & public access, maintenance and safety

All concrete pathways in your cluster are covered by easements in favour of the AMR Shire for public access. You must not block off or prevent access on pathways through your cluster. While it is anticipated that most foot and cycle traffic will be respectful to fellow Ecovillagers, signage can be placed on Common Property reminding other visitors that they are on private property, and to not leave the paths or use strata infrastructure.

Health and safety on Common Property

Strata companies must follow current Work Health and Safety Act requirements for all workers, contractors and employees hired to carry out works on Common Property: https://www.dmirs.wa.gov.au/safety-regulation/work-health-and-safety-laws/introduction-whs-laws/introduction-whs-laws/work-0

The following is an informative webinar outlining what the recent WHS Act reforms mean for strata companies and councils. https://www.youtube.com/watch?v=haj6gRH74Do

More generally, for busy bee and other communal gardening activities, consider adapting the following basic WH&S guide to your cluster's needs:

- Decide on suitable jobs/activities for the gardening session.
- Make sure participants have the necessary safety gear for all activities: gloves, covered shoes, masks etc.
- Arrange for children to be supervised by parent/responsible adult at all times.
- Select appropriate tools and equipment needed for activities.
- Always follow workplace policies and safety measures.
- Be aware of safety measures regarding heights, ladders, need for scaffolding or safety harness, etc., if accessing the shed roof, orchard structure or any other high infrastructure.
- Be prepared for bites and stings in the garden, e.g., bees, wasps, and soldier ants.
- Be aware of snakes—keep a snake bandage in the meeting shed and wear gaiters and gumboots to access potential snake habitat.
- Ensure equipment, materials and substances are labelled, stored and used correctly as specified in manufacturer instructions.
- Collect, clean, and put away all tools and equipment used at the end of the session.
- Record activities undertaken as well as any other relevant information in the garden diary.
- Record/report any WHS issues or risks.

Busy bees and rosters

Busy bees and rosters are a great way to get maintenance jobs done in the Common Property that the strata company might otherwise have to pay a contractor for, and their format can be decided upon by your strata council in consultation with owners. There might be some jobs where your strata decides it's easier to hire someone, others where it's fun to do together.

Your strata might like to nominate the timing of busy bees to be centred around the Wadandi seasons, or other significant dates / milestones your cluster communities have identified. Jobs like cleaning the shed or mowing the lawn in the growing season could be rostered by lot to share the load around, with anyone unable to carry out their rostered job able to swap, barter or pay another resident to do the job. Be creative and kind, not everyone will have the same skills, but you all have something to offer.

Encourage people to bring their specific skills to the busy bee—someone who is not physically able to mow the lawn might organise the afternoon tea, a couple of parents could host a kids activity so other parents are free to prune or weed, etc. The Ten Year Plan sets out some regular maintenance checks and activities that have been incorporated into the "To Do List" below.

Community garden rhythms across the year

Daily

- Tend to poultry requirements

Weekly

- Community recycling activities
- Rotate poultry as necessary
- Feed, empty and maintain worm farms as needed
- Pest management, including rodents

Monthly

- Mow, slash and weed around gardens as needed to keep tidy
- Clean out poultry housing and pen as needed
- Shed clean
- Check the softfall – shredded pine bark – fluff up and rake regularly

Quarterly

- Check rainwater tank & DAB pump
- Check and manual repair of netting / fox proofing
- Check and manual repair of coop
- Weeding of swales and ensuring all drainage pipes are clear
- Check pathway lighting
- Winter and Summer pruning of fruit trees
- Clean gutters on shed

Annually

- Net fruit trees as required
- Safety check (shed, furniture)
- Termite check
- Organised by council:
    - Tesla battery service
    - EV Charger Service
    - Annual load test and RCD check by electrician

Harvesting and preparing foods

Each cluster can make collective decisions on how to share their common harvests, it does not have to be by unit entitlement, which is the Strata Act norm, but could be by participation (hours put in to pruning and harvesting, busy bees etc.) by equal share, on basis of needs, or on a more casual basis. It is important to come to an agreement and establish the ground rules so that everyone feels like it is fair. *Harvest of communal crops is covered by Governance By-Law #24.*

There are a number of common methods of preserving that residents might enjoy individually or as a group activity.

- Drying/Dehydrating
- Canning – Water Bath Canning, Steam Canning and Pressure Canning
- Freezing
- Freeze Drying
- Fermentation
- Preserving in Salt and Sugar
- Pickling

There are a number of books in the Ecovillage library to reference.

This might be an opportunity for a future Ecovillage recipe book as a community building or even fundraising activity.

Permaculture Gardening at Witchcliffe Ecovillage

Introduction

Witchcliffe Ecovillage has been conceived with the aim of building the most sustainable human settlement possible in this day and age, based on the permaculture principles: **"earth care, people care and fair share."** The production of locally grown organic food is integral to the Ecovillage's sustainability strategy, as the carbon and water costs of buying pre-packaged fresh food from far away is a significant contributor to your household's environmental impact.

Growing food in your garden can be rewarding and challenging in equal parts, especially if you are new to gardening. To this end, the Ecovillage approach to gardening must start from the soil up and take notice of the growing conditions and challenges specific to the site.

There are five key components to growing a permaculture garden successfully in the Ecovillage:

- Waterwise gardening
- Soil management and plant nutrition
- Propagation and planting
- Organic weed management
- Organic pest and disease control

The Ecovillage's lead horticulturalist, Mark Tupman has provided the following guide—enjoy! (NOTE: Please respect Mark's IP when sharing or updating this handbook.)

1. WATER WISE GARDENING

Water is a precious resource and Western Australia is being severely impacted by climate change, resulting in some of the driest years on record. The average (Perth) household uses around 40% of their water in the garden, which makes it a great place to start saving water.

It is strongly recommended that you focus the landscaping inside your lot on:

- locally native plants to encourage birds and wildlife;
- waterwise Mediterranean plants, many of which are productive and do well here with little summer watering once established;
- small lawn areas; and
- plants that can cope with greywater if you have a greywater system.

Biology in the form of plant roots, earthworms, bugs, fungi, bacteria etc… is what underpins formation of well aggregated (crumbly), carbon rich (dark), stable (structured) soil. Such qualities are what determine the rate at which water can get into and how long it is held in the soil.

Your EUA Garden Plot has access to summer irrigation, so this is where you should grow your veggies, herbs and mini fruit trees, as they have a higher water requirement. However, you still need to pay attention to minimising water consumption so the whole Ecovillage can enjoy the dams throughout the year.

Josh's House is a well-documented example of a Perth waterwise household and the project's website provides some great Living Labs Factsheets on water wise gardening:

https://joshshouse.com.au/resources/living-labs-lifestyle-factsheets/

Local conservation group **Nature Conservation Margaret River Region** is also a great source of information relevant to the Witchcliffe environment and provides this excellent factsheet:

https://www.natureconservation.org.au/wp-content/uploads/2019/07/Waterwise-Gardens-1.pdf

South West Catchments Council has created this wonderfully comprehensive *Coastal Gardens Planting Guide*

https://swccnrm.org.au/library/download-info/capes-coastal-gardens-guide/

Planning and design

- Select waterwise plants that are best suited to specific conditions (shady, windy, full sun).
- Choose hardy, deep-rooted plants for sloping areas where water tends to run off rather than infiltrate the soil. Place thirsty plants in depressions where water collects.
- Group plants with similar water requirements together.
- Garden design ideas and compatible species lists are available from the Water Corporation at www.watercorporation.com.au

Timing

Autumn (April and May) is one of the best times to plant if you are needing to be water-wise, due to the cooler weather. But of course to achieve a thriving garden full of a variety of fruits and vegetables, you will need to consider the best times of the year for each seed or seedling. Give your new plants the best chance to thrive by considering water availability and planting at the right times. If there are warm days coming up, consider temporary shade structures which can be as simple as chicken wire / shade-cloth or a propped up fallen branch.

Lawn

Lawns typically need more water than hardy shrubs and groundcovers. They are also higher maintenance, so when planning your garden, carefully consider whether you need lawn, and if so keep it to the minimum area required. If you do decide to have lawn, choose a water-efficient species such as Saltene, Zoysia or one of the soft leafed Buffalos. Consider a native *dichondra* lawn in low traffic areas. Soil preparation is also important to improve the water efficiency of lawns. Ideally, lawn would be watered using your greywater.

Mulch

There are three main types of mulches – feeding mulch (such as pea straw, shredded lupins or lucerne hay), woody mulch (such as wood chips or pruning's), and permanent mulch (such as gravel or pebbles).

Good waterwise mulches have coarse and irregular texture, allowing water to penetrate and the soil to breathe, whilst reducing evaporation and keeping the soil cool. Soft mulches (such as feeding mulch) break down rapidly to feed the soil and need topping up regularly. These are suited for fruit trees, vegetable gardens and other hungry plants. Woody mulches are better suited to deeper rooted hardy plants (such as natives) and are ideal for exposed areas as they are less likely to blow away. Permanent mulches are mainly used for landscaping effects but also play an important role in retaining soil moisture.

Irrigation systems

Substrata (under the mulch) drip irrigation is the most efficient way to water your plants. Water is applied directly to the roots, eliminating evaporative losses and overspray. As the water is applied to the soil rather than the foliage, fewer fungal diseases are experienced.

Hand watering can be a very efficient method of watering – particularly if you use a 'trigger' nozzle to ensure minimal water wastage when moving between plants. It is important to ensure not to over water using this method. Try to keep hand watering to twice a week except in very hot conditions.

By applying the right amount of water in the cool hours of the day and using drip irrigation you will save water and allow your garden to thrive.

Maintenance Tips

- Regularly check your irrigation system for leaks and blockages. Also check for dripping taps.
- Adjust your irrigation controller according to the seasons and switch it off in the event of rain and over winter.
- Apply compost and organic matter to aid water penetration if you have non-wetting soil.
- Regularly top up your mulch to retain moisture in the soil.
- Sweep paths and driveways rather than watering them.

2. SOIL MANAGEMENT AND PLANT NUTRITION

Good soil

Did you know that plants are microbivores?

That's right, we now know that the healthiest plants get most of their nutrition from the metabolites of bacteria they actively consume at their root tips. Another nutritional preference is compounds that are pre-manufactured by microbes living on or around them. What is more the underground microbial network that lives in association with plants is unrivalled in its capacity to access, acquire, assemble, cycle and deliver essential nutrients from the environment, in a readily available form. In truth, plants cannot take up nutrients in their mineral form, which is why those not growing biologically are so dependent on soluble fertilization! This is a far cry from the optimal and balanced nutrition that microbes provide and is somewhat akin to us trying to get our nutrients from tablets as opposed to wholesome, well-prepared food.

It's worth mentioning that the **elements** plants need in the greatest quantities are the **carbon, oxygen, hydrogen and nitrogen** found in air and water. Again it is the microbes that stick soil mineral particles together, creating the crumbly texture that enables good water infiltration and gas exchange. The same humus substances that stick mineral particles together also hold onto water and nutrients and give stability and structure to what would otherwise be subject to washing away and/or dissipating back to the atmosphere.

So it is for good reason that plants allocate a significant portion of the carbohydrates they make, to fuel those that live on and around them, for the goods and services these organisms offer up in return are indispensable.

As the finite sources of fertilizers around the world diminish and climatic events become more unpredictable, the best way to reduce our reliance on external inputs, regulate atmospheric cycles, and build resilience into our food production systems is to bring our soils back to life with all the wonderful organisms that are only too happy to be there, doing what they do best.

SOIL MANAGEMENT AND PLANT NUTRITION PROGRAM

The aim of a soil management and plant nutrition program is to provide plants with the optimal nutrition they require, primarily through the establishment of biologically rich, fertile and functional soils that promote good hydration, air exchange and nutrient availability & cycling.

Associated costs, labour and environmental implications are considered in the decision making process regarding chosen soil management and plant nutrition measures.

Cultural Practices:

- Avoid tillage practices that are damaging to the soil environment.
- Include cover crops in cropping programs to protect the soil, create mulch, fuel soil microbe activity and improve soil structure.
- Use companion plantings and crop rotations to maintain biodiversity above and below ground.
- Cycle organic residues and by products through composting, vermiculture and animal systems.
- Apply compost, bio-stimulants, inoculants etc… at planting to encourage the establishment of a strong plant-microbe biome.
- Liquid feed seedlings to get them off to a good start at recommended rates and frequency.
- Make use of foliar nutrient applications, as they are the most efficient way to get required nutrients into plants.
- Mulch exposed soil in summer to conserve water, protect the soil surface, provide habitat and food for decomposers and build organic matter.
- Only use soluble fertilisers, if needed, in the quantities required through the growing season and avoid applications during the wet season because soluble nutrients are prone to leaching.

Image: Cover crop (mixed) with organic fertiliser

Image: Cover crop (mixed) with no fertiliser

Supporting Information

The following is a list of locally available organic inputs that have been used successfully in the Witchcliffe Ecovillage demonstration gardens.

Lime	Guano Gold	Phospot (Ecogrowth)
Dolomite	Blood and Bone (Biosafe)	Diatomaceous Earth (G.E.Co.)
Gypsum	Seamungus (Neutrog)	Fish Hydrolysis (No Frills)
Sulphate of Potash	Bounce Back (Neutrog)	Seaweed Liquid (No Frills)
Rock Phosphate (Ecogrowth)	Eco Prime Natural (Ecogrowth)	EcoVital (Ecogrowth)

For an extensive list of allowable inputs, see Table A1, "Permitted Materials for soil fertilising and conditioning" from the National Standard for Organic and Biodynamic Practice NASAA

Table A1 Soil fertilising and conditioning

Substances	**Specific conditions/restrictions**
Animal manures	Application must be composted or followed by at least two green manure crops in cropping system.
Blood and bone, fish-meal, hoof and horn meal, or other waste products from livestock processing	Following application, uptake of such products by livestock does not form part of the animals diet.
Compost	Should be produced in accordance with Australian Standard 4454-1999 or recognised equivalent system.
Minerals and trace elements from natural sources, including: • calcium (dolomite, gypsum, lime); • clay (bentonite, Kaolin, Attapulgite); • magnesium; • phosphate (rock phosphate, phosphatic guano); • potash (rock & sulphate potash); • elemental sulphur.	Must not be chemically treated to promote water solubility
Epson salt (magnesium sulphate)	None
Microbiological, biological and botanical preparations	Products derived from genetic modification technology are prohibited
Mined carbon-based products	Peat to be used for plant propagation only
Naturally occurring biological organisms (e.g. worms) and their by-products	None
Plant by-products	From chemically untreated sources only
Perlite	For potting/seedling mixes only
Sawdust, bark and wood waste	From chemically untreated sources only
Seaweed or algae preparations	None
Straw	From chemically untreated sources only
Trace elements & natural chelates, e.g. ligno sulphonates & those using the natural chelating agents e.g. citric, maleic & other di-/tri-acids	Not synthetically chelated elements
Vermiculite	For use in potting/seedling mixes only
Wood ash	From chemically untreated sources only
Zeolites	None

Worm farming

Of course there will be many Ecovillagers familiar with worm farming, and others who would like to increase their worms' productivity. Chat to your neighbours about productivity successes and remember the ADAM principle (below).

A – Aliveness – compost is a 'living creature' full of worms and healthy microbes

D – Diversity – food scraps, dry leaves, fine woody mulch, grass, hair, herbs etc

A – Aeration – allow air into your worm farm

M – Moisture – all living things need water, but make sure your worms don't drown (Or cook in the Summer!)

Worms will eat anything that was once living,

- Leftover vegetable scraps, fruit and vegetable peelings
- Tea leaves / bags and coffee grounds
- Vacuum cleaner dust or hair clippings (also animal)
- Torn up newspapers, egg cartons or soaked pizza cartons
- Crushed egg shells (these will also help with the pH balance)

The greater the variety of material you use, the better the casting will be. Every time you add food to your worm farm, remember to sprinkle over a handful of soil from your garden. The worms will use the grit in the soil to help grind up the fresh food waste.

You'll find worms easy to look after if you remember they have sensitive skin:

- Make sure you harvest the worm tea regularly so your worm farm doesn't fill up with liquid and drown your worms.
- Pour a bucket of water through your worm farm each week to keep it moist – remember to open the tap first so you don't drown your worms (you can do this more often in hot weather).
- Feed your worm farm small amounts of fruit and vegetable scraps, but no garden waste. Worms like to eat most vegetable scraps (except raw potatoes and peelings) they love fruit especially melon, pineapple and apple peels (they don't like citrus), they enjoy herbs (but don't like strong flavours like chilli, onion and garlic).
- Worms will also eat soaked and ripped paper, hair, tea bags and crushed shell. Worms eat their body weight in food each day. Although they are not actually eating the food, but the bacteria on the surface of the food.
- Your worm farm is best kept sheltered from wind and sun.

Composting

Few things have stood the test of time like the practice of turning organic material into compost to enhance plant fertility. We are continually discovering more about the wonderful properties of good old compost and it remains one of the most valuable resources growers have at their disposal.

The Art of Making Fine Compost

So what is this amazing stuff and how do we make it?

Composting is essentially a revved up version of the decomposition that happens to plant and animal residues that end up on the soil surface.

Through the actions of **microbes**, nutrients held in dead organic materials are released and made available for plant uptake once again. What remains, gradually gets broken down into the humus fractions that are all important for soil structure, holding capacity and nutrient exchange. Numerous compounds are produced in the process that stimulate surrounding biology, induce pest and disease resistance and promote plant growth.

In nature, this all happens quite slowly and is very much dependant on availability of materials and prevailing conditions. With composting, we set up systems for efficient decomposition, and the turnover of a quality by-product.

Figure 13 Up close and personal with saprophytic fungi, integral to making great compost!

To make compost well, we need to provide the various composting microorganisms with a good balance of the food, air, water they require and suitable living conditions.

Their basic foods include:

- Carbon-based materials: straw, grass clippings, crop waste, shredded newspaper, etc.
- Nitrogen-rich materials: manure, blood and bone, fish emulsion, legumes, etc.
- Green plant materials: greens, weeds, grass clippings, woodchips, crop residues, seaweed, etc.
- Mineral nutrients: rock dust, clay, etc.

Carbon-based materials provide the energy that fuels microbial activity. The lignin, cellulose and chitin in woodier materials are also an important food source for saprophytic fungi.

Nitrogen-rich materials are integral for building protein. Bacteria, in particular, require nitrogen in large amounts and although free-living, nitrogen-fixing bacteria can acquire nitrogen from the air, it takes a lot of energy and more time.

A mixture of roughly 60% dry carbon based materials, 10-20% nitrogen rich materials and 20-30% green plant materials by volume is bound to support strong microbial activity.

Fresh plant and animal materials, while not essential, bring a range of active microbes and vitamins, hormones and enzymes that contribute to the overall diversity and health of the biology in the compost heap.

Locally sourced ingredients tend to harbor microbes that are well adapted to that environment, resulting in compost with better microbiology for your situation. Also, using plant material in your compost that is of a similar nature to your crop type, favours microbe groups that readily associate with and support those things you want to grow.

Adding minerals, especially those that contain nutrients found lacking in your soil, sponsors microbe populations that extract and convert those nutrients into organic states that plants can readily utilise.

Hydration is a must if microbes are to remain active, otherwise they go dormant or die. When making compost, dry ingredients should be wetted, and throughout the life of a heap, moisture levels must be monitored and maintained to prevent it from drying out. On the flip side, if it's too wet, air supply is compromised and some nutrients are prone to leaching. Ideally compost materials are kept moist but shouldn't drip when squeezed.

Oxygen is critical for the respiring organisms that drive the rapid decomposition, taking place in a freshly made compost heap. When there is a ready supply of food, water and air on offer, these microbes really get working and burn lots of energy in what is referred to as the thermophilic phase of composting. This is handy because the heat generated can destroy undesirable pathogens and weed seeds. However, without adequate aeration, the inherent oxygen quota is quickly exhausted and aerobic activity is compromised, coupled with the occurrence of undesirable anaerobic microbes.

Compost can be turned during the thermophilic phase to replenish oxygen levels and rotate materials through the hot centre of the heap. This involves checking with a thermometer and systematically turning the pile within defined periods of time at certain temperatures. *The Soil Food Web* champion a bio-complete compost system of this nature:

https://webinar.soilfoodweb.com/webinar-2-multiplying-the-beneficial-microbes/60203

Alternatively, some composting systems are built in such a way as to allow air to enter from the bottom and circulate through the heap via air channels or pipes. The Johnson-Su bioreactor is a great example of this sort of system:

https://www.csuchico.edu/regenerativeagriculture/_assets/documents/johnson-su-bioreactor.pdf

Material **bulk** is also necessary for the microbe activity associated with rapid decomposition. Preferably, a compost heap is built in such a way that it holds shape to a width and height of least 1.2m, either with succinct stacking or the use of a bay or cage to contain the materials.

Exposure to extreme weather can be problematic so it's best to set up your compost in a somewhat sheltered spot out of direct sunlight. Providing a semi-permeable (to allow for gas exchange) protective covering reduces evaporative water loss and generally helps to regulate conditions within the heap, making for more uniform decomposition.

As the supply of high-energy foods like fats, proteins and complex carbohydrates diminishes, a compost heap starts to cool down and the saprophytic fungi contingent gets going. Strong **fungal colonisation** is integral to the development of top quality compost and beyond this point, disturbance should be minimised to avoid damaging the fragile hyphae.

Thereafter, a diversity of composting worms can be added to the heap for all the benefits that they bestow and to further the decomposition process.

Over time the heap shrinks and **facultative organisms,** that are capable of switching to anaerobic respiration and fermentation when oxygen supply is limited, get involved. With their unique metabolism, they break down remaining organic materials into ever-smaller humus fractions, that are increasingly resistant to further decomposition. These fractions adhere to clay particles in the organo-mineral

complexes that underpin the formation of micro aggregates and lasting soil carbon. As such it's not a bad idea to incorporate some clay when making compost.

Regardless of the chosen method, the art of making fine compost lies in our ability to manage these different stages of decomposition so that the various microbe groups can do their thing and reward us with high quality, mature compost, that is simply the best for growing healthy plants.

Soil Management Recipes

The following are some ways you can use your compost to populate your garden with microbes and kick start your plant's nutrition.

Biological priming

Plants and the microbes that live on or around them function as a whole system. Microbes promote the health of plants they associate with as it is in their best interest to look after their energy suppliers.

The range of services carried out by different microbes in the plant rhizosphere include:

- acquiring and metabolising nutrients from the soil profile and making them available to plants
- producing growth regulating hormones and enzymes
- suppressing pathogenic microbes and inducing resistance to pest and disease attack
- triggering physiological changes within plants to cope with environmental stresses

The population of beneficial microbes in a farming situation is largely determined by the inherent characteristics of the local environment and land management practices.

High quality compost contains a diverse population of beneficial micro-organisms and their bio-chemical by products that are known to trigger root growth, exudation and further colonisation by microbes in the rhizosphere, promoting the establishment of a healthy plant, microbe system from the start.

Compost Slurry for Seed Coating (recipe for 5kg seed)

- Place 250g of sieved Compost/Vermicast in a fine mesh bag
- Place in a bucket with a little water and massage to extract a concentrated slurry with the consistency of a runny pancake batter.
- At this stage you can also add microbe foods ie. 1 teaspoon of molasses (carbohydrate), 50mL of warm milk (protein) and 10mL of Liquid Seaweed (trace elements and growth promotants).
- Continue mixing until the seed is dry and not sticking together.

Optional additions:

Commercially available mycorrhizal fungi and rhizobia inoculants can also be added in small amounts at this stage, lightly coating the seed.

Compost Extract for Plant and Soil Application

- Compost can be placed in a fine mesh bag and agitated/massaged submerged in water with enough water to make a runny soup.
- Before application, microbe foods such as fish hydrolysate, milk, molasses, seaweed etc…can also be added.
- Compost extract and foods can also be watered in with seed or seedlings at planting and applied to the foliage of plants and/or the soil to promote the establishment of a healthy plant microbiome and stimulate soil biological activity.

3. PROPAGATION AND PLANTING

General Planting Program

The aim of the planting program is to plant species and varieties that provide for our needs and are well suited to our environment, using appropriate methods and techniques that give the most favourable outcomes. Ideally, we source planting material has not been chemically treated and look to breed, select, save and store as much of our own stock as possible. For advice on what grows well in Witchcliffe, ask your neighbours, attend a Witchcliffe Ecovillage gardening workshop, join Eat Your Greens (a local permaculture gardening facebook group) and join the Witchcliffe Permaculture Group *(Pg 89: Important Resources and Links).*

Cultural Practices:

- Use healthy seeds/seedlings for planting.
- Ensure seasonal and environmental conditions are suitable for the species and varieties to be planted.
- Prepare planting media to meet the requirements of species you are planting.
- Use propagation techniques that are appropriate to the chosen planting material.
- Apply beneficial pre-planting seed treatments such as compost, bio-stimulants and inoculants to establish a healthy plant microbiome from the start.
- Plan groupings, intervals and successions of plantings to make the best use of growing spaces.
- Plant at suitable spacing and undertake appropriate thinning and training in the early stages of growth.
- Liquid feed young plants with organic fertilisers and bio-stimulants such as fish hydrolysate, liquid seaweed etc… to support establishment.

Bunuru February	March
Direct Sowing • new potatoes, peas, lettuce, coriander, beetroot, rocket, spinach *Plant in pots and trays* • leeks, celery, spring onions, brassicas (cauliflowers, broccoli, kale, cabbage, brussel sprouts)	*Direct sowing* • rocket, beetroot, spinach, silver beet, peas, lettuce, coriander, fennel, dill • cool season root vegetables - carrots, swedes, turnips, parsnips, radishes *In pots and trays* • brassicas (cauliflowers, broccoli, kale, cabbage, brussel sprouts) *Transplanting* • leeks, celery, spring onions, brassicas
Djeran April	**May**
Direct sowing • rocket, beetroot, spinach, silver beet, peas, lettuce, coriander, fennel, dill • root vegetables – carrots, swedes, turnips, parsnips, radishes • winter potatoes (provided it is a frost free area) • cool season cover crops – grains, legumes etc… *In pots and trays* • brassicas - cauliflowers, broccoli, kale, cabbage, brussel sprouts • onions *Transplanting* • leeks, celery, spring onions, brassicas	*Direct sowing* • root vegetables – carrots, swedes, turnips, parsnips, radishes • rocket • garlic • cool season cover crops – grains, legumes etc… *In pots and trays* • brassicas, onions *Transplanting* • leeks, celery, spring onions, brassicas
Makuru June	**July**
Direct sowing • garlic • cool season cover crops – grains, legumes etc… *Transplanting* • brassicas, onions	*Direct sowing* • broad beans *Order planting material spring /summer*
Djilba August	**September**
Direct sowing • rocket, beetroot, spinach, silver beet, peas, lettuce, coriander and carrots	*Direct sowing* • rocket, beetroot, spinach, silver beet, peas, lettuce, coriander, carrots • potatoes

• broad beans *In pots and trays* • spring onions	• sweet potatoes under clear plastic or cover for warmth • warm season cover crops – grains, legumes etc… *In pots and trays* • spring onions, leeks • sweet potatoes • in hothouse – tomatoes, cucumbers, squash, pumpkins, capsicums, eggplants, chilli, celery • herbs – thyme, sage, marjoram, parsley
Kambarang **October**	**November**
Direct sowing • potatoes, sweet potatoes • Corn, beans, squash, pumpkins, sunflowers • warm season cover crops – grains, legumes etc… *In pots and trays* • tomatoes, cucumbers, squash, pumpkins, capsicums, eggplants, chilli, flowers • herbs – thyme, sage, marjoram, parsley, basil *Transplanting* • Tomatoes, cucumbers, squash, pumpkins, capsicums, eggplants, chillis, flowers	*Direct sowing* • potatoes, sweet potatoes • corn, beans, squash, pumpkins, sunflowers • warm season cover crops - grains, legumes etc… *In pots and trays* • tomatoes, cucumbers, squash, pumpkins, flowers • parsley, basil *Transplanting* • tomatoes, cucumbers, squash, pumpkins, capsicums, eggplants, chillis, flowers
Birak **December**	**January**
Direct sowing • potatoes • beans, squash, pumpkins, sunflowers • warm season cover crops - grains, legumes etc… *In pots and trays* • tomatoes, cucumbers, squash *Transplanting* • tomatoes, cucumbers, squash, pumpkins, capsicums, eggplants, chilli, flowers	*Direct Sowing* • last sowings of summer crops - cucumbers, zucchini/squash, bush beans • new potatoes *In pots and trays* • leeks, celery *Transplanting* • tomatoes, cucumbers, squash, pumpkins, capsicums, eggplants, chilli, flowers Order planting material for autumn/winter

Companion planting and crop rotation

It's well established that biodiversity plays an important role in the health and resilience of living systems. The combination of organisms (or organisers as I like to call them) and the different roles they play makes for a productive, dynamic program. Having a diversity of plants supports a diversity of microbe and animal life above and below ground that in turn carry out services of benefit to the plants.

Crop rotation and companion planting are the gardeners' interpretation of the fancy ecological terms – temporal diversity and spatial diversity. In nature, spatial diversity, i.e. a good mix of plant species all growing together, is the most predominant mode. That said there are also natural successions of plant communities over time, such as in the occurrence of pioneer species that colonise degraded or marginal landscapes and make the way for higher plants to follow. Both of these strategies can be utilised in a growing program.

Companion planting is all about combining crops that grow well together or inter-planting crops with complimentary species. It is important to consider the different growth habits of companions in the sequencing and/or spacing of plantings.

Based on your objectives you may use species that:

- are understood to grow well next to each other
- support specific microbe populations that acquire nutrients from the environment, improve soil structure and manufacture beneficial plant compounds
- attract animals, birds and insects to help with pollination, pest control and fertility
- ward off or confuse pests
- handle various environmental conditions well and support or protect their neighbours in tough times

It's worth noting when choosing to grow a bunch of plants together that they have the potential to benefit or compete with each other.

Most annual species deliver significant amounts of carbon rich exudes to the biology around their roots, contributing to soil fertility, for much of the growing cycle. This is the case from the vegetative growth stages right through to flowering and early fruit set.

When the process of fruiting begins, fruit fill becomes the number one priority and plants then direct most of their supply that way instead of towards the roots. This is an expensive time and it is when you will often see old leaves start to lose colour and disease set in.

At this stage, plants will take what they need from the soil reserves so it's a good time to terminate non-crop plantings if you don't want to hinder nearby and subsequent crops.

Crop Rotation

When planning your rotations, you want to ensure the timing of the growing seasons between crops match up and that the successions work well culturally for each type of crop.

Objectives behind rotating crops include:

- repelling crop specific pests and diseases or breaking their breeding cycles with crop sequences they find unfavourable
- interrupting weed reproduction cycles with a range of crops that have different growing seasons
- improving the growing conditions for subsequent crops by preceding them with a mix of plants that contribute to the structure and fertility of the soil
- loosening up the soil and recovering leached nutrients with deep/tap rooted species.

Planting Plan

The following planting plan contains a mix of well-established **rotations and companions**. It includes the use of **cover crops/green manures** that aren't grown for produce. They do however play an important role in the cropping program as they improve soil fertility and structure, provide mulch material and smother weeds. Some crops are harder to grow than others as they are susceptible to weed pressure or because they have high nutrition requirements. As such this plan has been laid out in two cycles that each begin with crops that are easier to grow and/or improve the growing conditions for the more demanding crops that follow.

The suggestions outlined do not have to be adhered to strictly, but rather give good examples of successions and inter-plantings that work well with the seasons.

Cycle 1

Autumn/Winter – COOL SEASON CEREALS & LEGUMES

LEGUMES and CEREALS grow well together and do great things for the soil. The best way to prepare new beds for a cropping program is with a cover crop using a mix of species predominantly from these two families.
You can also grow peas, broad beans and cereals for harvest.

Spring/Summer – CUCURBITS

CUCURBITS grow great amongst the stubble and mulch from the previous seasons crops.

WARM SEASON LEGUMES and FLOWERS can be inter-planted amongst established stands mid way through the growing season as can Buckwheat which attracts bees to help with pollination when it flowers.

Autumn/Winter – ALLIACEAE & APIACEAE

These well known companions may be grown with each other or following on from one another. They are best planted in autumn but there is another short planting window around the changeover from winter to spring.

Early crops can be inter-planted or followed with COOL SEASON LEGUMES over winter.

Other common companions include members of the BRASSICA, CHENOPOD and ASTER families

Cycle 2

Spring /Summer – WARM SEASON CEREALS & LEGUMES

If the soil is good or if you have good quantities of compost you can grow crops from either of these families.

Where the soil is not great they can be used as part of a warm season cover crop mix that is terminated before seeding.
Corn and beans are considered classic companions.
SQUASH species and warm season flowers like PHACELIA also go well in the mix.
Autumn/Winter – BRASSICAS, CHENOPODS AND ASTERS

These demanding families grown for their leaves, roots and flowers benefit from the goodness left behind by the warm season cereals and legumes. First plantings can be started in the latter half of summer.
Early crops can be inter-planted with BORAGE and DAISY species or a bit later with COOL SEASON LEGUMES and CEREALS once they are established.

Spring/Summer – SOLANUMS AND ASTERS/BRASSICAS

Some members of the BRASSICA family planted previously release root exudates that repel certain SOLANUM pests. There are warm season species from the ASTER family that do a similar thing and can be planted alongside your tomatoes and peppers.
Other common companions include BASIL and WARM SEASON FLOWERS such as marigolds, zinnias, sunflowers, chamomile, cosmos, cleome and sweet alyssum.

Common perennial companions that are better around borders or edges of production gardens include:
Lovage, Sage, Tansy, Chives, Marjoram, Nasturtium, Thyme, Tansy, Yarrow, Mint, Cress, Dill, Rosemary, Parsley, Comfrey, Horseradish, Chervil, Pyrethrum, Hyssop, etc…

Plant Families

When planning a crop rotation schedule, it helps to know what family your plants belong to. Below is a list of commonly grown vegetable and cover crop plants.

COOL LEGUMES	CEREALS	CHENOPODS
Peas	Oats	Spinach
Broad Beans	Rye	Beetroot
Lupins	Triticale	Silverbeet
Vetch	Barley	Sugarbeet
Clovers	Wheat etc…	Quinoa
Lentils etc…		Fat hen etc…
ALLIACEAE	**APIACEAE**	**BRASSICAS**
Onions	Carrots	Cabbage
Leeks	Celery	Cauliflower
Garlic	Coriander	Broccoli
Spring Onions	Parsnip	Turnip
Shallots etc…	Fennel	Swede
	Parsley	Mustard
	Queen Anne's Lace etc…	Rocket
		Asian Greens etc…
WARM LEGUMES	CEREALS	SOLANUMS
Climbing Beans	Millet	Tomatoes
Bush Beans	Corn	Capsicum
Haricot Beans	Amaranth	Chillies
Berlotti Beans	Sorghum etc…	Eggplants
Cowpeas		Potatoes etc…
Fenugreek etc…		

CUCURBITS	ASTERS	COMPANIONS
Cucumbers	Lettuce	Basil
Pumpkins	Sunflowers	Borage
Squash/Zucchini	Marigolds	Buckwheat
Watermelon	Calendula	Assorted Flowers
Rockmelon	Chamomile	Phacelia etc…
Gourds etc…	Artichoke etc…	

WEV Vegetable growing difficulty rating	
Easy	Artichoke Globe & Jerusalem, Asian Greens, Broad beans, chilli, Coriander, Dill, Lettuce – Leaf, Pak Choi, Pumpkin, Radish, Rocket, Silverbeet, Spring Onion, Squash/Zucchini, Swede, Turnip
Medium	Asparagus, Beetroot, Bush Bean, Climbing Bean, Broccoli, Cabbage, Capsicum, Cauliflower, Chinese Cabbage, Corn, Cucumber, Eggplant, Fennel, Garlic, Kale, Kohl Rabi, Leek, Lettuce – head, Okra, Peas, Rockmelon, Sweet potato, Tomato, Watermelon.
Difficult	Brussel Sprout, Carrot, Celeriac, Celery, Onion, Parsnip, Potato, Spinach.

Cover Cropping in the South West

Multi-species cover cropping is a practice that's catching on fast and for good reason – it is one of the most important tools to emerge out of the regenerative movement happening around the world.

Vastly improved soil function and fertility, smothering of seasonal weeds, growth of high quality forage and attracting beneficial insects are outcomes that can all be achieved with a well-executed multi-species cover crop. *That said, there are a number of important considerations that must be taken into account when planning a cover crop.*

Reasons for growing a cover crop

Cover crops can be used in a wide range of situations. It is important to know beforehand what the reasons are for growing a cover crop as this dictates the species and rates you use in a mix.

There are annual species that are usually included as staples in most mixes. These can be used as a bulk base mix for a range of situations to which other species are added in order to tailor it to desired outcomes. The portions used vary with context and the emphasis on other species in the mix.

Broadly Speaking:

- Base mix cool season species generally include annual cereals (oats, cereal rye, triticale, barley etc…), legumes (field peas, vetch, white lupins etc…) and brassicas (tillage radish, kale etc…)
- Staple warm season species include cereals (millet, sorghum etc…), legumes (cowpeas) and other forbs such as sunflowers, phacelia etc…
- The inclusion of a good portion of seasonally appropriate annual cereals, legumes and other forb species from different families *(see Plant Family table above)* is recommended for rapid initial soil improvement and to generate biomass. Perennial species are great for deeper long term soil development.
- The use of established annual and perennial grasses, clovers and other herbaceous species like chicory that can handle repeated grazing are standard for forage situations.
- In orchard and vine situations a range of both annual and perennial species may be suitable. In cropping or vegetable production situations there are perennial species and some annual species that can become weeds so it is best to check before planting.
- Fast growing, short lived species can be used as a filler crop between seasons. These include species like Buckwheat, White Lupins, Field Peas, Turnips etc…
- Tall or vigorous annual cereals, legumes and broadleaf forbs can be used to smother seasonal weeds.
- There are numerous seasonal flowering species from a range of forb families, that you can add to a mix if you want to attract beneficial insects i.e. BRASSICACEAE, ASTERACEAE, APIACEAE, LAMIACEAE, CHENOPODIACEAE, BORAGINACEAE etc…
- Many edible species go well and may be included in a multi-species mix. These include Cereals, Sunflowers, Rocket, Coriander, Silverbeet, Asian Greens, Turnips, Radishes, Kale, Lettuce, Pumpkins, Squash, Corn, Black Eyed Beans, Flaxseed, Chicory etc…

Composition of a cover crop mix

A good cover crop mix should have enough of the species you want, none that you don't want, and reasonable representation from a range of family groups. The critical mass and proximity between types of plants and the microbe communities they support determines the supply of goods that can be shared via the underground network. This makes all the difference to the health, growth and resilience of a mixed cover crop and its effectiveness.

Image: Different Cover crop species planted in separate beds

Image: Different Cover crop species planted all together

Sowing a cover crop

The right temperature range, adequate moisture and minimal competition from weeds in the early stages of growth are all essential if cover crops are to do well. In most cases, getting the seeds into the soil as opposed to broadcasting them on the surface is more successful. Exposed seeds are prone to drying out and being eaten by wildlife.

Cool Season

Sowing cool species as close to the break of season as possible helps them get a jump on weeds and make good growth before winter.

Warm Season

Warm season cover crops are sown as soon as temperatures are warm enough for the species involved. Weed management prior to planting is critical but care must be taken not to break up or expose the soil too much with hot, dry conditions on the way.

Giving it a good start in life

Getting a cover crop off to a good start goes a long way towards ensuring its success. In biologically compromised soils, seed coating or *in situ* application of biological inoculants and biostimulants is well worth doing to get the whole soil plant-microbe system off to a strong start. Further applications of things like compost extract, fish hydrolysate, liquid seaweed, fulvic acid, molasses and deficient nutrients etc… are most effective when the plants are young.

Getting the most out of a cover crop

Focusing on photosynthesis is a good way to think about managing cover crops in terms of building soil. The energy harvested from sunlight by plants is what drives all living processes (in this way, the capacity summer cover crops have is greater, if you can grow them). The more vegetative growth you get out of a cover crop, the better. Once plants start to set seed however, they drastically cut back on root exudation, use up significant amounts of water and nutrients. Grazing or slashing before seed set can be used as a strategy to initiate vegetative regrowth from a range of species including grasses and clovers .

The grasses and forbs grown in diverse cover crops are very much the type of higher plants found in the fertile grasslands, meadows and prairies that came later than forests in the evolutionary picture. These next level communities sequestered large quantities of atmospheric carbon in stable carbon based soil humus structures at a rapid rate.

Putting it simply, cover crops are not only a great strategy we can implement to benefit our operation but also one of the best measures at our disposal to help mitigate climate change.

Cover Crop Seeding Rates

In a home garden situation, a good seeding rate for a mixed species cover crop is around 1kg/100m2.

Remember that bigger seeds weigh more per unit so in order to get similar amounts into the mix it is best to include larger quantities of bigger species seed and reduce the rates of the smaller species seed.

An example cool season mix for 100m2 would look something like this:

- 300g of annual cereals (oats/rye/barley)
- 600g of annual legumes (vetch, peas, lupins)
- 100g of smaller species (brassicas, flaxseed, clovers, flowers)

Seed saving

Anyone with access to a garden can save seeds. It's easy and there are numerous reasons to do so.

Once upon a time gardeners would have to save their own seed if they were to keep growing their favourite vegetables, flowers and herbs. Under this rich tradition a vast diversity of local varieties were circulated in communities around the globe. Nowadays, the domain of seed keeping has gradually been handed over to big companies that largely determine what's available. Their selection criteria are primarily based on objectives such as production, appearance and storability with qualities like taste, smell, colour and resilience further down the list. Unfortunately we have already lost the majority of our old varieties along the way.

It's time to reinstate a seed growing revolution in the backyard.

Isn't it amazing that these little plant offspring packages contain all the genetic information to grow into a fully functioning plant, harnessing nothing but the surrounding sun, air, water and soil minerals.

We now know that, like us, plant seeds also have a **microbiome**. That's right, plants growing in association with beneficial microbes deposit a ready to go microbe population in their seed so that when it eventually germinates, no time is wasted on getting a healthy plant-microbe system underway.

If you plant a wide diversity of different seeds in new ground, you introduce a beneficial population of microbes and start a diverse plant community, which is just what's needed to support an active and diverse microbial community. Commercial seeds that are produced in more sterile conditions are found wanting in this department.

When we save our own seed we also get to choose what traits we prefer and select those that suit our growing conditions. Admittedly there are successes and failures along the way but it's well worth having a go and over time you build on your successes.

By simply saving seeds, we play a part in preserving some of the great diversity this living world has on offer and ensuring a wide choice of tasty varieties for the generations to come.

Plant Sex

Asexual Reproduction

By this mechanism complete new plants can grow from vegetative parts of parent plant material provided they have enough supplies to stay alive whilst establishing themselves.

The new plants are essentially clones as their genetic makeup is identical to the parent they came from. Common asexual reproduction practices include; layering, division, striking, cuttings, planting bulbs and tubers etc.

Sexual Reproduction

Sexual reproduction only happens between organisms of the same species. In certain species the individual is either male or female, in others they can be of both sexes and some species actually change sex in their lifetime.

There is a range of pollination strategies, some species only pollinate themselves and others use wind and animals to spread their pollen further afield. So the seed we collect has inherited the combined genetic traits from the male and female parts, that may be found on the same plant, plants growing next to each other and those a greater distance apart.

Selecting, Collecting, Sorting and Storing Seed

In nature, plants have been reproducing themselves for millennia. With some basic observation, we can see how each species goes about it.

Once you've worked out what plants you want to save seed from, it's usually just a matter of allowing the reproductive part of the plant, be it a fruit, a pod or head, to reach maturity in order to obtain viable seeds.

You can then collect an adequate representation of these from healthy plants that meet your criteria.

Once harvested the seed needs to be sorted, this may involve removal from fruiting bodies, cleaning if necessary, removing any poor specimens and then drying thoroughly, away from pests.

Dried seed is then packaged, labelled and stored in airtight containers under dry, dark and cool conditions.

Annual Edibles Seed Saving Chart

Seed Saving Rules

Plants species can only breed with varieties of same species e.g. *Brassica oleraceae*, however it is unlikely that they will breed with surrounding plants if they are self-pollinators but likely if they are cross-pollinators.

Those that are predominantly self-fertile or localised are adapted to get by on a narrower gene pool. Those that get around have evolved with a wider gene pool that needs to be maintained if they are to not become

inbred. *You need to ensure that you either save seed from a reasonable representation of plants or bring in new genetics occasionally to maintain healthy populations.*

While seed can be saved from some species without having to worry about what's growing next door, others are likely to cross with different varieties that might be growing in the neighbourhood. Without a co-ordinated approach to seed saving, that seed you saved from your broccoli might end up producing some sort of weird broc-cauli :-/

FAMILY	GENUS	SPECIES	COMMON NAME
AMARANTHACEAE	Amaranthus	spp.	Amaranth
ALLIACEAE	Allium	ampeloprosum	Leek
		cepa	Onion
Cross		fistulosum	Sp. Onion
Pollinator		sativum	Garlic
		shoenoprasum	Chives
ASTERACEAE	Artemesia	dracunculus	Tarragon
	Calendula	officinalis	Calendula
	Cichorium	endiva	Endive
		intybus	Chicory
	Cynara	scolymus	Globe Artichoke
Self	Helianthus	annus	Sunflower
Pollinator		tuberosus	Jerusalem Artichoke
	Lactuca	sativa	Lettuce
	Matriaria	chamomilla	Chamomile
	Tagetes	sp	Dandelion
	Trogopogon	porrifolius	Salsify
APIACEAE	Celery	graveolens	Celery, Celeriac
	Anethum	graveolens	Dill, Chervil
Cross	Coriandrum	sativum	Coriander
Pollinator	Daucus	carota	Carrot
	Foeniculum	vulgare	Fennel
	Pastinica	sativa	Parsnip
	Petroselinum	crispum	Parsley
BRASSICACEAE	Armoricacia	rusticana	Horseradish
	Brassica	hirfa	Mustard
		juncea	Wasabi/Mustard Gr, white
		nigra	Black Mustard
Cross		oleracea	Kale, Collard, Cauliflower,
Pollinator		rapa	Turnip, Chinese Cabbage
		mapus	Swede
		navinosa	Tat-soi
		parachineasis	Pak-choi
BRASSICACEAE cont ..	Eruca	sativa	Rocket
	Raphanus	sativa	Radish, Daikon Radish
	Nasturtium	officinale	Watercress
CANNACEAE	Canna	edulis	Arrowroot
CHENOPODIACEAE	Beta	vulgaris	Beetroot, Silverbeet
	Spinaceae	oleracea	Spinach
CONVOLULACEAE	Ipomea	batatus	Sweet Potato

CUCURBITACEAE	Citrullus	lanatus	Water Mellon
	Cucuouis	melo	Rock Mellon
		sativus	Cucumber
	Cucurbita	maxima	Pumpkin
		moschata	Butternut
Cross		mixta	Japanese Pumpkin
Pollinator		pepo	Zucchini, Squash
	Lagenaria	siceraria	Gourd
	Sechium	edule	Choko
CYPEAECEAE	Eleocharis	dulcis	Water Chestnut
FABACEAE	Phaseolus	vulgaris	Climbing Bean
	Vinca	faba	Broad Bean
Self	Pisum	saticum	Pea
Pollinator		coccineus	Sc. Runner Bean
LAMIACEAE	Mentha	spp.	Mint
	Melissa	officinalis	Lemon Balm
	Ocinum	basilicum	Basil
Cross	Origanum	spp.	Oregano, Marjoram
Pollinator	Rosmarinus	officinalis	Rosemary
	Salvia	spp.	Sage
	Thymus	vulgaris	Thyme
	Lavendula	officinalis	Lavender
LILIACEAE	Asparagus	officinalis	Asparagus
POLYGONACEAE	Rheum	rhubarbarum	Rhubarb
ROSACEAE	Sanguisorba	minor	Salad Burnet
SOLANACEAE	Capsicum	annum	Capsicum, Chilli
Self Pollinator		pubescens	Tree Chilli
SOLANACEAE cont …	Lycopersicum	esculenum	Tomato
(capsicums/chillis		pimpinellifolium	Cherry Tomato
can cross if grown	Physalis	peruviana	Cape Gooseberry
close together)	Solanum	melongena	Eggplant
		muricatum	Pepino
		tuberosum	Potato
VALERIANACEAE	Valerianella	locosta	Corn Salad

Potting Mix Recipe

A good potting mix has some coarse ingredients to ensure there is air in the root zone, some water-holding ingredients to ensure they don't dry out and, if the seedlings are to be grown on in the mix, some nutritional value.

Depending on what you are propagating these ingredients can be adjusted i.e. cutting mixes need to be very well-drained so may have a higher proportion of course ingredients. If you are going to transplant seedlings at a very young stage, your seed-raising mix for small celled trays etc… would not need to include as much nutritional value as the mix that would be used when you transplant them to grow on. The smaller/finer the seed you are planting the finer the mix should be; for larger seeds such as pumpkins the compost may not need to be sieved at all.

As a general rule of thumb - a good blend of a third each of coarse particle, water holding and nutritional ingredients will get seedlings off to a vital healthy start.

1/3 coarse particle ingredients:	Sand, Vermiculite
1/3 water holding ingredients:	Composted sawdust, peat, clay, sieved vermicastings / compost
1/3 Nutritional ingredients:	sieved vermicastings / compost / slow release fertiliser pellets

While slow-release pellets are often included in commercial potting mixes they are no substitute for good compost or vermicastings.

A great cheap but effective potting mix for the home garden is simply made up of 50% healthy garden soil and 50% compost.

4. WEED MANAGEMENT

So what is a weed?

Well, it's a plant that is growing where we don't want it! But, knowing nature in all its infinite wisdom, there must be a reason why they occur in the first place. If we cast our perspective beyond our immediate human concerns, we may see that often weeds are not as bad as they seem. Before we rush out and eliminate every weed in sight, it may serve us well to get to know more about them. What sort of weeds do you have, how do they grow, why are they there, why are they an issue, might they be of some benefit etc…

Getting to know your weeds is always a good thing. If in the end they are found guilty as charged, you will at least have a better understanding of how to deal with them. In many instances, however, you may find that weeds are serving a purpose and inadvertently doing you a favour. Often weed infestations occur in degraded or damaged environments, as they are the resilient types of plants that will grow where others can't.

In this way they start the repair process by:

- protecting and holding onto soil
- providing habitat and food for resident microbes and wildlife
- acquiring, accumulating and cycling nutrients that are deficient or prone to leaching
- cleaning up pollutants/toxins

Another thing worth noting is that annual herbaceous plants, which many of our weeds are, **spend most of their life pumping goodness into the soil**, essentially priming it for the demanding reproductive stage of growth that comes later when they flower and set seed. Only then, do they become a competitive threat to your neighbouring tomato. There are of course, exceptions (did someone mention kikuyu?) but generally speaking, taking good care of our land fosters growing conditions that favour nicer weeds. Some of them may even be edible.

So, getting to know what your weeds are, why they are there and when and where they are a problem is all part of learning how to live with and better manage them.

Weed management program

The aim of a weed management program is to limit the adverse impact they can have on crop production, general operations and aesthetics.

The proposed effectiveness and benefit of chosen measures is weighed up against associated costs, labour and environmental implications.

Cultural Practices

- Avoid introducing propagation material from unwanted weed species.
- Foster soil conditions that promote the growth of desirable plants over weeds.
- Make use of rotations to interrupt weed lifecycles.
- Implement appropriate weed control measures prior to planting.
- Use favourable sowing techniques and seedlings to get a jumpstart on weeds.
- Target watering and nutrition to crops as opposed to weeds.
- Carry out weed control at the appropriate stages of growth for effective control.
- Plant non-competitive covers or companions in between crops to discourage weeds.
- Be aware of disturbance/movement of soil that may contain weedy propagation material.
- Minimise reproduction and spread of existing weed species.

When notifiable weeds are noticed in the common areas, on agricultural lots, or (after Ecovillage Commons is handed over to the community) in the conservation forests, it would be prudent to report those to your strata committee who should then communicate this to the appropriate person.

Control Measures

There are a number of measures that can be used to terminate or hinder weed growth and reproduction. Control measures are generally easier to apply and more effective when weeds are young and unestablished but can also be used to prevent established weeds from reproducing.

They include:

- smothering
- removal
- competition
- slashing
- grazing
- flame/steam weeding
- organic herbicides

Weeds common to Witchcliffe

These are the weeds that we have found in the WEV Demonstration garden - this list is by no means exhaustive. As mentioned above, you will quickly work out which weeds have a role to play in your gardens.

Summer weeds

COMMON NAME: Crab Grass, Pigweed, Kikuyu, Wireweed, Fathen, Fleabane.

Winter weeds

COMMON NAME: Fumitory, Chickweed, Flatweed, Staggerweed, Milk/Sow, Thistle, Kikuyu, Dock (curled), Wintergrass, Goosefoot, Wild Radish, Oxalis (soursob) Yellow, Oxalis (wood sorrel) Pink , Dandelion, Common Ryegrass, Scarlet Pimpernel, Mallow, Burr Medic, Storksbill, Yorkshire Fog, Cape Daisy, Mouse Ear, Chickweed.

A great Weeds reference book for the South West is: *Western Weeds: a guide to the weeds of Western Australia* – 2nd Edition, by Hussey, Keighery, Cousens, Dodd and Lloyd.
As well as this lttle easy-to-use flipbook, *Southern weeds and their Control*, by Moore and Wheeler.

Of course there are a number of weeds (Arum Lily, Bridal Creeper etc) which present a major threat to biodiversity and are thus addressed in the Augusta Margaret River Shire Weed Management Plan and the local conservation organisation Nature Conservation. You can I.D. these notifiable weeds here in Nature Conservation Margaret River's Environmental Weeds Information Sheet.

Supporting Information

Locally available organic inputs

Herbicides – Pelargonic acid (Slasher) and acetic acid/hydrochloric acid (Farmsafe)

For a list of allowable inputs, see: "Permitted Materials for Pest and Disease Control" from the National Standard for Organic and Biodynamic Practice https://www.agriculture.gov.au/biosecurity-trade/export/controlled-goods/organic-bio-dynamic/national-standard

5. ORGANIC PEST AND DISEASE MANAGEMENT

As it is for weeds, so it is for pests and diseases, for they too have a place in the grand scheme of things. Often, pests and diseases arrive on the scene to take care of inefficiency. For instance, if a type of plant is not growing well in a certain situation they come along and get rid of it, making way for something that will grow well there. If the growing conditions are not good enough to support the higher plants we favour, they tend to be eliminated and replaced with things that grow better which are often…you guessed it – weeds :-/ Many of the soil-borne diseases are actually beneficial organisms that simply function differently, as the situation dictates. If we can set the scene right by managing our growing environment in such as way that supports the healthy growth of plants we want, they won't be so susceptible.

There are numerous ways that this works.

For starters, healthy plants have the **nutrition** they need to carry out all their important processes. This enables them to photosynthesise efficiently, make proteins, build strong structures and manufacture a range of compounds that are associated with better defence or immunity.

Plants that have all the nutrients and conditions required to efficiently carry out the process of photosynthesis, can produce the surplus energy needed to make complex carbohydrates and fats. Many pathogens and chewing insects find these substances unpalatable.

With access to the right nutrients, plants can also manufacture enzymes that enable the rapid conversion of nitrogen into proteins. Sap-sucking and piercing insects simply don't have the digestive systems to metabolise complete proteins and cannot live on such plants.

When a plant is able to build **strong structures** it is less prone to injury and infection and also difficult to get into. There is a range of physical defences, such as microscopic leaf spikes or glossy leaves, that plants can make if they have the energy and materials available to do so.

So too are they able the produce a vast array of **defensive compounds** that ward off pests and diseases. This phenomenon, called 'acquired systemic resistance', bestows many of the medicinal, taste, colour and keeping qualities we find so appealing.

Finally, like us, plants are a living ecosystem, they are both surrounded and colonised by a plethora of **beneficial microbes** that aid in their defence.

So when our plants are being attacked by insects or succumb to a disease of some sort, we can assume that, in part, the system is not as healthy it needs to be.

As always, there are some exceptions to the rule. Mammals and birds, like us have the digestive system and appetite for the very same carbohydrate, protein and oil rich leaves, fruit and seeds we like.

In this case, it's clearly us or them, and by one means or another, we have to keep them at bay.

Pest and Disease Management Program

We manage pests and diseases to minimise their adverse impact on crop health and production. The effectiveness and benefit of chosen measures is weighed up against associated costs, labour and environmental implications.

Cultural Practices

- Get plants off to a healthy start.
- Plant out established seedlings (species appropriate).
- Provide crops with what they need to optimise health and resistance to attack and/or infection.
- Plant crops types that are less prone to pest and disease attack.
- Time plantings to avoid active pest and disease seasons.
- Ensure crops are grown in suitable conditions.
- Minimise the reproduction and spread of undesirable pests and diseases.
- Avoid bringing in problem pests and diseases.
- Develop diverse growing ecosystems with habitat for predators and other beneficial organisms that keep pest and disease populations in check.

Pests, diseases and weeds are generally very good at reproducing and spreading. The green vegetable bug you don't deal with or the mice you're hosting in your yard could well end up also being a problem for your neighbours, this season or the next.

Control Measures

There are a number of organic pest and disease control measures that can be used to terminate or hinder pest and disease growth and reproduction. The chosen control measures and timing of applications is very much determined by the nature of pest and disease infestations.

- Use barriers, traps and repellents to protect crops.
- Use recommended biological controls for specific pests and diseases.
- Targeted application of permitted baits and sprays.
- Manual removal and termination!!

This is a brief list of the pests found in the Ecovillage Demonstration Community Garden to date. It is advisable to keep an updated Pest Diary. This will allow you to forward plan for prevention of pests you may have discovered seasonally, and allow for collective decision-making around pests that may appear on multiple properties or Common property. As a cluster, you might have some common pests that you manage communally. (e.g. larger order of iron chelate to share)

28 spot ladybugs	• Regular spot spraying of susceptible plants i.e. capsicum, potatoes etc… with natra soap. • Regular hand removal • Plant less susceptible, non-nightshade crops instead. • Remove habitat, particularly blackberry nightshade.
Green shield bug	• Remove habitat and old crop refuse that harbours them. • Regular bi-weekly spraying of bugs in and around plants. • Removal of host plants. • Plant less susceptible crops instead. • Plant well established healthy plants.
Cabbage White Butterfly	• Larvae are most active during spring so best to grow brassicas in autumn. • Spray fortnightly or as needed with Dipel. • Plant substitute, non-brassica crops during active pest season. • Use umbellifer plants to encourage predatory wasps and native plants to encourage insectivorous birds. • Plant out as well established healthy seedlings.
Diamond Back Moth	• Larvae are most active during spring-summer so it's best to grow brassicas in autumn. • Spray fortnightly or as needed with Dipel. • Plant substitute, non-brassica crops during active pest season. • Plant out as well established healthy seedlings.
Snails, Slugs and Slaters	• Apply organic bait (Protect-Us) as needed. • Run ducks through the garden as much as possible • Protect young plants with physical barriers or repellent substances (coffee grounds, lime, wood ash, diatomaceous earth) • Minimise habitat near susceptible crops (mulch and weed mat) • Plant crops that are less susceptible to attack • Plant well established healthy seedlings if possible
Mice and Rats	• Protect young plants with physical barriers. • Minimise habitat near susceptible crops • Plant crops that are less susceptible to attack • Minimise access to sources of food • Regularly set, check and reset effective traps in areas they are likely to frequent • In severe outbreaks put out owl-friendly first-generation poison baits in enclosed bait stations • Get an enthusiastic Jack Russell
Rabbits	• Install rabbit proof fencing • Use in situ, temporary shade cloth, netting or exclusion mesh to protect plants as needed • Organise a local area rabbit virus bait program • Get an enthusiastic Jack Russell! • Use tree guards for fruit trees, as high as a rabbit can stand and reach as they can ringbark trees.
Parrots / Wood Ducks	• Lay shade cloth or exclusion mesh temporarily over new plantings until seedlings are established • Use bird netting or exclusion mesh to protect fruiting and seeding crops

Recommended Pest and Disease Control Inputs

- Iron chelate snail and slug pellets (e.g., Protect-us) (still use with care around pets and children
- Dipel (Yates Natures Way)
- Synertrol Horti Oil (Organic Crop Protectants)
- NatraSoap (Yates Natres Way)
- Diatomaceous Earth (the Green Life Soil Company) Caution—wear mask to avoid dust inhalation.
- Pyganic (Sumitomo Chemical Company)
- Home made Chilli garlic insecticide :

All-round Insecticide Recipe

Chop four large onions, two cloves of garlic, and four hot chillies. Mix them together and cover with warm, soapy water and leave it to stand overnight. Strain off that liquid and add it to five litres of water to create an all-round insecticide. *ABC Gardening Australia*

For an extensive list see Table A2 below, "Permitted Materials for plant pest and disease control" from the National Standard for Organic and Biodynamic Practice NASAA

Substances	Specific conditions/restrictions
Ayurvedic preparations	None
Baits for fruit fly	Substances as required by regulation. Baits must be fully enclosed within traps.
Boric acid	None
Biological controls	Naturally occurring cultured organisms e.g. *Bacillus thuringiensis.*
Diatomaceous earth and naturally occurring chitin products	None
Essential oils, plant oils and extracts	None
Homeopathic preparations	None
Hydrogen Peroxide	None
Iron (III) phosphate	None
Light mineral oils, such as paraffin	None
Lime	None
Natural acids (e.g. vinegar)	None
Natural plant extracts excluding tobacco/	Obtained by infusion and made by the farmer without additional concentration
Pheromones	None
Potassium Bicarbonate	None
Potassium permanganate	None
Pyrethrum	Extracted from *Chrysanthemum cinerariaefolium*
Quassia	Extracted from *Quassia armara*
Rotenone	Extracted from *Derris elliptica*
Ryania	Extracted from *Ryania speciosa*
Seaweed, seaweed meal, seaweed extracts	None
Sea salts and salty water	None
Sodium bicarbonate	None
Sterilised insect males	Need recognised by certification organisation where other controls are not available.
Stone meal	None
Vegetable oils	None

Table A2 "Permitted Materials for plant pest and disease control" from the National Standard for Organic and Biodynamic Practice NASAA

Owl Friendly Rodent Control

As per Conduct Bylaw 9b, only wildlife-friendly baits may be used in your home, garden or Common Property. The following is advice provided by Owl Friendly Margert River.

Rodenticides directly harm native wildlife such as bush rats, quenda and possums as well as their intended target of introduced rodents. They indirectly harm many more through 'secondary poisoning'. Evidence is mounting that rodent baits are being eaten not only by the obvious candidates but also by reptiles, which themselves are quite resistant, and by invertebrates such as insects which are unaffected. This means that wildlife at risk of secondary poisoning includes owls, phascogales, brush-tailed possum, quenda, chuditch, mardo, dunnart, daytime birds of prey and insectivorous birds. Even if not directly killed by internal haemorrhaging, wildlife that have ingested rodenticides are more likely to hunt unsuccessfully, get ill, or be killed on roads.

- Courtesy of Owl Friendly Margaret River

1. Avoid baits if possible

Before putting any pets and wildlife at risk from rat baits, firstly:

- keep your place clean and tidy, clean up brush piles and rubbish, secure compost heaps
- use poultry feeders which prevent spillage
- pick up fallen fruits
- seal holes and other potential entry points in buildings and enclosures
- use traps – a wide variety of traps is available; careful positioning is necessary to be effective and reduce harm to non-target species, particularly with lethal traps that 'kill first and ask questions later'.

Place all traps and baits out of reach of non-target animals – noting that setting baits and traps where there is a reasonable chance of killing or catching native wildlife is in fact illegal unless licensed. Always place baits inside bait stations, e.g. TomCat brand.

Some suggestions for attracting rats into traps – pumpkin seed, nuts, dried fruit, roasted oats (roast them in a pan until they have a great nutty smell), bacon.

Do I have black rats or native wildlife?

Many of us have not seen small furry critters close up until one is caught in a non-lethal rat trap. Have I got a black rat problem or am I lucky enough to be sharing my garden with native rats or small marsupials? The National Museum has some helpful ID information.

https://australian.museum/learn/species-identification/ask-an-expert/is-it-a-rat/

2. Select baits that are less harmful to wildlife

Check ingredients on the labels.

Anticoagulant rodenticides can be divided into:

- First Generation ones with active ingredients Warfarin (e.g. in Ratsak Double Strength) and Coumatetralyl (e.g. in Racumin), which work more slowly and break down more quickly.
- Second Generation ones that are more potent and a lethal dose can be delivered in a single feeding. But when ingested, rodents still take days to die and when eaten by wildlife may contain many doses. Active ingredients include Brodifacoum (the chief ingredient in most Ratsak brands), Bromadialone (in some Ratsak products) and Difenacoum (e.g. Talon, Mortein, Ratsak Fast Action, Pestoff Rodent Bait 20R, Klerat).

Our wildlife has a higher capacity to cope with first generation rodenticides so we recommend use of **Racumin** or **Ratsak Double Strength** (but take care not to confuse it with other Ratsak products) – if and when all other means of rat and mice control have been exhausted.

If employing a licensed pesticide company, ask about their practices, ask them to use the safer rodenticides, and better still, choose one that recommends their use.

A recent addition to retail shelves are rodenticides 'based upon natural products' including **Ratsak Naturals** and **Yates Natural**. The active ingredients are corn gluten meal and NaCl (salt). The gluten, accelerated by the salt, apparently causes lethal flatulence because rodents cannot expel gastric gas in the manner we do. These are registered for use in domestic buildings and other indoor situations where alternative food sources can be removed. Well worth trying.

Gardening Calendar

SEASONS	JOBS
BUNURU (Feb-March)	Regular harvesting of summer produce Collect and save seeds from summer crops Weed amongst crops as needed Weekly shield bugs control Order seeds for cool season Prepare potting mix Start to prepare beds for autumn planting Apply autumn mineral amendments Start sowing cool season crops fortnightly Direct plant - lettuce, carrots, peas, beetroot, spinach, coriander, rocket, asian greens etc… In trays - brassicas, leeks, spring onions, celery… Thin, train and trellis crops as needed Liquid feed seedlings fortnightly
DJERAN (Apr-May)	Harvesting of summer crops and first autumn crops Save seeds from summer crops Prepare beds for planting as needed. Sow cool season crops fortnightly Direct plant autumn/winter crops – garlic, lettuce, carrots, parsnips, peas, beetroot, spinach, coriander, rocket, turnips, radish, swede etc… Plant in trays - brassicas, spring onions, onions Thin, train and trellis crops as needed Liquid feed seedlings fortnightly Weed amongst crops as needed Sow cool season cover crops in vacant beds, new areas and chicken runs Make compost for spring cropping Autumn pruning of Stonefruit
MAKARU (June-July)	Regular harvest of autumn/winter crops Apply snail and slug pellets as needed Plant winter crops Plant out onion seedlings Direct sow - broad beans Thin, train and trellis crops as needed Weed amongst crops as needed Sow cool season cover crops in any vacant beds Winter Pruning of Stone and Pome Fruit (if not done in Autumn)
DJILBA (Aug-Sept)	Harvesting of winter crops Order seeds for warm season Prepare potting mix and clean pots/trays for planting

	Prepare beds as needed Sow direct – broad beans, peas, lettuce, baby carrots, rocket, spinach and coriander etc… In trays on heat mat - tomatoes, cucumbers, squash etc… in hothouse Thin, train and trellis crops as needed Liquid feed seedlings fortnightly Start to prepare beds for spring planting Sow spring cover crops in vacant beds Set up, flush and line check all garden, orchard and nursery irrigation Net fruit trees as required
KAMBARANG (Oct-Nov)	Harvesting of first spring crops Prepare beds as needed Apply spring amendments Sow direct – beans, squash, corn, sunflowers, melons, sweet potato etc… In trays – tomatoes, capsicum, eggplant, flowers Plant out early seedlings of tomatoes, capsicum, eggplant, flowers etc… Thin, train and trellis crops as needed Liquid feed seedlings fortnightly Sow warm season cover crops in vacant beds – cowpeas, millet, sunflowers etc… Weed as needed
BIRAK (Dec-Jan)	Save seeds from cool season crops Prepare beds as needed Last summer sowings Direct – beans, squash, corn, sunflowers, melons, sweet potato etc… In trays – tomatoes, flowers Plant out tomato seedlings Thin, train and trellis crops as needed Sow summer cover crops in vacant beds – cowpeas, millet, sunflowers, etc Weed as needed Liquid feed seedlings fortnightly Weekly shield bug control as needed Harvest garlic and onions Regular harvesting of summer crop Summer pruning of Stonefruit

Important resources & links

Ecovillage Document Library

https://www.ecovillage.net.au/library/document-library/

Complete set of documents including;

- Information Handbooks
- AMR Shire Planning Documents
- Ecovillage Design Review Process
- Ecovillage Site Information including;
    - Bushfire Management Plan
    - Exclusive Use Zones
    - Geotech
    - Service Locations (as constructed)
    - Civil Engineering
    - Site Levels and Surface Drainage
    - Microgrid Design
    - Irrigation Plans

Strata

- Strata Titles Act of WA1985 https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_938_homepage.html
- Landgate guide to strata titles: https://www0.landgate.wa.gov.au/docvault.nsf/web/PS_STPM/$file/2725LAND_Landgate_Guide-to-Strata-Titles_Revised_July2022.pdf
- Look Up Strata website and magazine: https://www.lookupstrata.com.au

Community building

- Growing Community: Starting and Nurturing Community Gardens https://www.gawler.sa.gov.au/__data/assets/pdf_file/0021/218604/growing-community-starting-and-nurturing-community-gardens-e-booklet.pdf
- Blogs on this Sociocracy website www.sociocracyconsulting.com are great: https://sociocracyconsulting.com/blog/ The blogs on using rounds as a communication tool in any kind of discussion seem useful.

Permaculture resources

- Milkwood Permaculture: https://www.milkwood.net
- Lower Blackwood LDCD (sustainable agriculture, for workshops and resources): https://lowerblackwood.com.au
- Nature Conservation Margaret River Region: https://www.natureconservation.org.au/ncmrr/
- Transition Margaret River: https://transitionaustralia.net/group/transition-margaret-river/
- Eat your greens: Facebook group
- Witchcliffe Permaculture Group: https://witchcliffepermaculturegroup.com

Organic standards

- Organic standards https://www.agriculture.gov.au/export/controlled-goods/organic-bio-dynamic/national-standard
- Permitted Materials for soil fertilising and conditioning from the National Standard for Organic and Biodynamic Practice:
- Permitted Materials for plant pest and disease control from the National Standard for Organic and Biodynamic Practice:

Books

- WEV book library
- *Western Weeds: a guide to the weeds of Western Australia* – 2nd Edition, 2007, by Hussey, Keighery, Cousens, Dodd and Lloyd
- *Southern weeds and their control*, 2008, by John Moore and Judy Wheeler (N 630.5 WES) https://library.dpird.wa.gov.au/bulletins/86/
- *All New Square Foot Gardening* / by Mel Bartholomew

Wildlife resources

- Frog ID: Easy to use field guide and mobile app with frog call recordings to help you identify https://www.frogid.net.au/?gclid=CjwKCAiAgvKQBhBbEiwAaPQw3G8cjAZLNQewkoV3kC1boI98QxSq2_IE4kicKzp9O2vI7nFuCjzUZxoCJ2oQAvD_BwE
- Bird ID app: Birds of Australia by Michael Morcombe: https://ecobits.net.au/birds-of-australia-app-review/
- Birdlife Australia Margaret River regional group: https://birdlife.org.au/locations/birdlife-western-australia/regional-groups
- Owl Friendly Margaret River: https://owlfriendly.org.au/
- Nature Conservation Margaret River Region: https://www.natureconservation.org.au
- FAWNA: https://www.fawna.com.au
- Bat boxes, bee hotels: Battsenby's Wildlife Habitats (Steve Smith battsenbys@gmail.com)
- The Wildcare Helpline: is a 24 hour-a-day, seven-day-a-week telephone referral service. The helpline is operated by volunteers on behalf of DPaW and is based at DPaW's operational headquarters at Kensington. The Helpline provides a service for members of the public who find sick, injured or orphaned native wildlife and are seeking advice on how to find care for the animal. The wildlife volunteers manning this phone will be able to put you in touch with the registered wildlife rehabilitator nearest to you, wherever you are in Western Australia.