

URBANEDGE
P L A N N I N G L T D


UPPER HUTT SUSTAINABLE LANDSCAPE GUIDE

**TE MAHERE HORANUKU TOITŪ
O ŌRONGOMAI**

IN PARTNERSHIP WITH:



Te Kaunihera o
Te Awa Kairangi ki Uta
Upper Hutt City Council



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 - Improve air quality
 - Reduce waste going to landfill
 - Increase composting to circulate food waste
 - Improve mental and physical well-being

ABOUT US

Urban Edge Planning are experienced practitioners in resource consent preparation and processing, landscape architecture, urban design, District Plan Policy formation, and natural hazard research.

Urban Edge Planning is unique from many other planning consultancies, in that our staff have resource management, landscape architecture and urban design experience working with, or for, the public sector throughout New Zealand at the local, regional and national level.

Our team delivers a comprehensive range of planning, design and assessment services for developments in the greater Wellington Region and beyond.

The team are well versed in working through a broad range of landscape and urban design considerations required on projects within challenging or sensitive environments. We work closely with both our in-house experts, and external partners to design holistic, liveable, affordable spaces that build resilient communities that are connected with their local environment.

We work collaboratively with clients, architects, planners, civil engineers, transport planners, ecologists, stormwater engineers, and other experts, to address challenges and deliver sustainable solutions that meet the requirements of design guides, while providing for our client's needs.

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PREFACE

The following sustainable landscape design guide seeks to aid the development of sustainable landscapes across Upper Hutt that contribute to the wider ecological network and enhance private and communal resources. Sustainable landscapes feature multi-purpose spaces that contribute to both human needs and functions, whilst simultaneously promoting the health of the environment.

Designing a sustainable landscape in Upper Hutt involves careful planning and consideration of various ecological, environmental, and climatic factors. New Zealand's unique flora and fauna make it particularly important to create landscapes that support local biodiversity and conserve water resources.

By following these guidelines and continuously adapting your environment to local conditions, you can create a sustainable landscape that not only enhances your outdoor space but also supports New Zealand's unique ecosystem. Additionally, you can contribute to the conservation of native flora and fauna in your region.

This guide will be able to assist both the homeowner, those wishing to undertake larger developments and neighbourhood or community scale projects, to follow a sustainable design process. In some instances, consideration should be given to hiring a landscape design professional who can help work through this process, or checking with a local planner to ensure that you are meeting District Plan requirements.

These guidelines are not prescriptive, but rather provide the user with a framework of best practice and performance goals to create sustainable landscape design outcomes. These guidelines apply to the design of landscapes only. Sustainable guidelines for construction activities and operation are not included in the scope of this document.

This guide has been delivered by the team at Urban Edge Planning, with support provided by Upper Hutt City Council. These Design Guidelines are issued by Upper Hutt City Council and may be amended from time to time by Urban Edge Planning or Upper Hutt City Council at their discretion.

INTRODUCTION

BACKGROUND

This guide is built upon a strong foundation of previous work in the Upper Hutt area, reflecting the commitment and dedication of our community to sustainable landscaping. Over the years, our region has seen remarkable progress in understanding and implementing eco-friendly practices in landscaping, driven by the collective efforts of local residents, organisations, and environmental enthusiasts. The valuable lessons learned from past initiatives, the successes, and the challenges encountered have shaped the content of this guide, ensuring that it encapsulates the collective wisdom of our community. As we stand on the shoulders of those who have come before us, we are proud to contribute to an ever-evolving legacy of sustainable landscaping in Upper Hutt. Our goal is to continue this important work, and providing a comprehensive resource that empowers both newcomers and long-standing residents to take meaningful steps towards creating a more sustainable and vibrant landscape for our region.

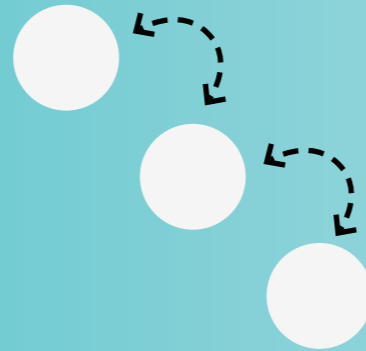
LOOKING TO THE FUTURE

In a world facing unprecedented environmental challenges, the imperative for sustainable landscaping has never been more urgent. As our planet grapples with the far-reaching consequences of climate change, habitat loss, and resource depletion, the need to re-imagine our relationship with the natural world has never been clearer.

Here in the Upper Hutt region of New Zealand, where the breathtaking beauty of our landscapes is both a source of pride and a vital resource, the call for responsible and sustainable landscaping practices resonates strongly. It is our hope that this guide will serve as a beacon of knowledge, offering insights, guidance, and inspiration to transform our region's outdoor spaces into not only aesthetically pleasing environments but also thriving ecosystems that support biodiversity and mitigate the challenges of our times. By embarking on a journey toward sustainable landscaping, we can play a crucial role in preserving the natural beauty and ecological balance of our corner of the world and contribute to the global effort to create a more sustainable future for all.

GOALS

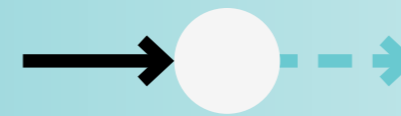
HABITAT STEPPING STONES:



Habitat stepping stones are crucial elements for preserving and enhancing biodiversity in the Upper Hutt region. These stepping stones, or patches of habitat in a landscape, serve as essential connectors for wildlife, helping them move, feed, and breed across the region. As sustainable landscapes increase in the region these stepping stones can become fully fledged corridors that provide links across Upper Hutt that connect the larger forest fragments of Akatarawa Forest and Pakutahi Forest.

Sustainable landscaping practices that prioritise native plantings and diverse vegetation can help create a mosaic of habitats. By recognising the relationship between native plants and the native creatures that evolved in association with those plants, we can create diverse habitats that provide food, shelter, water, and nesting opportunities for wildlife. This will provide the important conditions that bring creatures closer to home by re-establishing the stepping stones and corridors between open space areas. By enhancing habitat quality, we can ensure these stepping stones are thriving and interconnected.

FUTURE FOCUSED SYSTEMS:



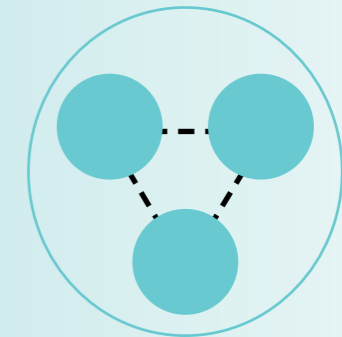
Examine the existing landscape and environment and analyse trends in climate change to define how to adapt existing landscapes to manage anticipated change.

Sustainable landscapes are built to reduce the human footprint in ecologies while also improving amenity for communities and natural habitats. This might include new or revisited technologies or improving on existing systems and solutions.

By incorporating climate-resilient plants, water management systems, and adaptive strategies, these sustainable landscapes help communities cope with changing weather patterns, such as increased droughts, heavy rainfall, and temperature fluctuations.

Sustainable landscapes increase the use of trees and plants that absorb and store carbon dioxide. By promoting carbon sequestration, these landscapes help mitigate climate change by reducing greenhouse gas emissions.

COMMUNITY RESILIENCE:



Sustainable landscapes strengthen connections between people and place. By creating space for community engagement and interaction these spaces can benefit the wider ecology and ensure ongoing access to local produce.

Sustainable landscapes can incorporate features like rain gardens and green infrastructure that help mitigate the impacts of extreme weather events, reducing flooding and erosion. They can feature green roofs, green walls, and permeable pavements that contribute to improved air quality and the management of stormwater, benefiting both the community and the wider environment.

Community gardens and urban farms within sustainable landscapes provide a local source of fresh produce, enhancing food security during times of crisis. They also providing a space for residents to come together, share knowledge, and build a sense of belonging. These spaces can host farmers' markets, connecting local producers with consumers and promoting the consumption of locally grown food.

INTRODUCTION

HOW TO USE

This guide has been designed to help you identify the site specific considerations on your property, and respond to them with sustainable solutions. Whether you are designing your own garden, or a larger community development, this guide will assist with ensuring your adapted landscape is as sustainable as possible.

When working through this kind of analysis, it helps to have a visual aid, such as a plan. This could be based on an aerial image printed out from an online mapping source, a sketch with dimensions of the property boundaries, a digital tool or any format that you are comfortable with. The main thing here is that you will be able to easily, and reliably, add information to it, and produce new versions of it, as your understanding of your site evolves.

GOALS

The first step is to consider what you are hoping to achieve with your sustainable landscape design. Is this part of a development? Is it a communal planting project? Is it a personal project for a home you own? One you rent? All of these are different types of projects that have different requirements. Understanding how you intend to use the site informs whether your current site conditions are opportunities that can be used, or constraints needing consideration or solutions.

Here are some goals you may want to consider:

- Attract wildlife
- Remove unused assets
- Improve permeable surfaces
- Increase edible yield
- Better utilise outdoor entertaining

SITE ANALYSIS

Your initial site analysis will include an essential view of what exists already, such as:

- Building footprints: The location and size of any buildings on the site
- Neighbours: Who your neighbours are, how their property is used, and how that may influence your design
- Services: The location and extent of underground and overhead services, and what can be placed adjacent
- Vegetation: The location of existing vegetation, its suitability and how the root structure can effect assets
- Exposure: How sheltered or exposed the site is to the prevailing winds
- Solar Orientation: How your site is positioned along the sun path and expected light levels throughout the day
- Views: Any attractive views you want to maximise
- Access: Existing access points to the site from the street and access between important locations within the site
- Water sources: Locating any damp areas or water courses such as streams or wetlands
- Boundary treatments: Existing fences and privacy screening

These elements should be shown on your plan before exploring your site in more detail. Whether they represent opportunities or constraints to achieving the aims of your landscape design will come down to how you want the design to function.

Refer to the site analysis sheets on Sheets 06-07 for more detail on how to analyse your site.

SUSTAINABLE GUIDANCE

Once you have a plan with an initial site analysis included, you can work through the main body of the design guide, and consider how the following relate to your site and how you want it to function:

- Water (Sheets 08-09)
- Landform (Sheets 10-11)
- Planting (Sheets 12-13)
- Fauna (Sheets 12-13)
- Community gardens (Sheets 16-17)
- Fire risk (Sheets 18-19)
- Soil (Sheets 20-21)
- Materials (Sheets 22-23)

As you go through these guidelines, you can start to gather ideas and inspiration as to what might work best with your site.

There are exercises on some pages that can help you find out additional information about your site, which can shape your site considerations and what will work within your space.

COLLATION AND DESIGN

Now that you have an increased understanding of sustainable design measures, you can start to work through all the information you have gathered, and find out how you can achieve your landscape design aims with sustainable solutions.

Exemplar designs have been included at the end of the document to help provide inspiration on different project solutions (Sheets 30-35).

If you have a large or particularly complex site, you may need to contact a landscape professional for advice and potentially procure their design services.

Incorporating sustainable landscape practices into our urban and rural environments is essential for creating systems that are well-prepared for the challenges and opportunities of the future. By addressing issues related to climate change, resource conservation, biodiversity, and community well-being, sustainable landscapes contribute to a more resilient, equitable, and sustainable future for all.



GOALS
Sheet 05



SITE ANALYSIS
Sheets 06-07



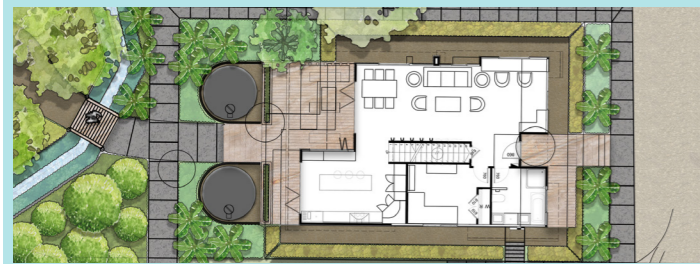
SUSTAINABILITY GUIDANCE
Sheets 08-23



COLLATION AND DESIGN
Sheets 30-35

SITE ANALYSIS - METHODS

BUILDING FOOTPRINTS



Consider the total footprint of any structures on the site, this includes dwellings, garages, sheds, greenhouses, shade houses, pergolas, and any other structures on the property such as bridges and walkways.

POSITIVES:

- Functional connection to internal and external spaces
- Convenient storage
- Specific work areas that will be used for a purpose (greenhouses, workshops)
- Structures creating shade amenity

CONSIDER:

- Disposal of dangerous materials
- Works requiring resource or building consent
- Deteriorating condition of structures
- Unused structures taking up space
- Structures creating unwanted shade

SERVICES



Both above and below ground services should be analysed on a site, especially if excavation is planned.

You can check the estimated location of underground services on the Upper Hutt City Council GIS map viewer and at [Before You Dig](#)¹. Ensure that no large trees are planted within the easements. If your design relies on work taking place in close proximity to any marked services, ensure that you contact a surveyor for assistance.

POSITIVES:

- Stock-take, gain certainty of location of on site services and their condition

CONSIDER:

- Problematic locations and need to design around existing conditions

SOLAR GAIN



Identify micro-climates within your landscape, such as areas with more sun or shade. Identify the site orientation and sun position throughout the day to establish the best position for outdoor entertaining areas and different vegetation types. Note that the position of the sun changes slightly throughout the year, to see where the sun rises and sets at different times of the year you can use an application such as [SunCalc](#)².

POSITIVES:

- Optimise internal and external living areas for the best sunlight access possible

CONSIDER:

- Managing shade amenity to create shade in summer and limit shade in winter.

ACCESS



Analyse what the site access is like on the property. Think about both vehicle and pedestrian access to the site, and how the outdoor areas and service areas are accessed. Where possible try to retain existing access points to minimise works. Ensure good sightlines are retained around vehicle manoeuvring areas for safety.

POSITIVES:

- Street fronting dwellings are often well set up for direct access from the street
- Is your front door visible and easy to find? How can your landscape help direct visitors here?

CONSIDER:

- If a new vehicle crossing location is proposed, or an old one is being decommissioned, then a resource consent may be required.
- Clear pedestrian access for visitors

NEIGHBOURS

Take note of the neighbouring properties to your site. Identify any public areas that could be connected into at the boundaries, such as parks and walkways. Consider discussing your plans with any residential neighbours and property owners, you may find you have a common goal, sharing tools/unused materials or that they have good ideas that you had not considered.

POSITIVES:

- Pool assets/funding for a joint project
- Sharing materials
- Sharing knowledge and ideas
- Connection into shared/public areas to expand usable space
- Social connection

CONSIDER:

- Managing interactions to achieve positive outcomes
- Maintaining privacy where required
- Maintaining surveillance over public spaces and considering public safety

VEGETATION

The existing vegetation on the site should be analysed to determine what is suitable for retention. Identifying vegetation can be tricky. There are, however, several applications that can assist with identification, such as [iNaturalist](#)³ and vegetation identification applications.

POSITIVES:

- Maintain existing coverage, shade and visual amenity
- Maintain and grow natural habitats
- Transplant where possible and use cut wood on site

CONSIDER:

- Invasive pest species
- Plants damaging site assets
- Deteriorating condition in strong weather events
- Over-shading
- Obstructive location

VIEWS

Where possible, take advantage of views out of the property to expand outlook and provide a connection with the wider neighbourhood. Where positive view shafts exist, consider their position and where possible provide a layout that frames, rather than blocks, the view shaft.

POSITIVES:

- Allow visibility to the street for passive surveillance and neighbourhood connection.
- Maximise access to attractive views from living/entertaining areas, and those spaces in your home you intend to spend the most time in.

CONSIDER:

- The best views might not be from the sunnier areas of the house. Balance views and sunlight access.
- Allow views out, but also think about how this affects your privacy, who can see in and which rooms can they see into?

BOUNDARY TREATMENTS

Analyse the existing treatments along all external boundaries, and within the site. If they are in good condition and providing the desired level of privacy and screening, consider their retention to minimise the level of potential waste. If there are boundary treatments in the wrong place, consider utilising the materials elsewhere within the landscape design.

POSITIVES:

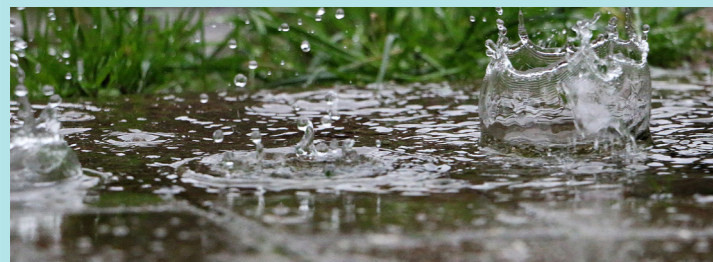
- If you have a fence that needs replacing, consider all your options. Hedges and garden beds can define your boundaries while also providing fauna habitats and food sources

CONSIDER:

- How will changes to shared boundary treatments impact your neighbour? Discuss your planned work with all affected parties. Maybe you can share costs, tools or materials

SITE ANALYSIS - EXEMPLAR

WATER SOURCES



Consider the position of any water sources on the site, these could include ponds, pools, spas, wetlands, swales, or boggy areas. Decide whether these water sources are in the right position and whether retention or removal is intended. Ensure that any works around a swimming pool or spa area complies with [Building Code Clause F9—Means of restricting access to residential pools](#)⁴ and complies with [Upper Hutt City Council's pool safety and inspection requirements](#)⁵. Check tap access points if looking to include an irrigation system.

POSITIVES:

- Integrate and work with overland flow paths
- Raingardens and natural irrigation

CONSIDER:

- Is the water regular, is the source from a water main? Check with council if you find a leak
- Avoid dams or redirect overland flood paths

CLIMATE

Upper Hutt has a temperate climate, however, this is likely to become increasingly varied as the climate changes. Allow for water movement to accommodate large downpours and consider how to create shelter in exposed sites and capitalise on sunlight access in shaded areas.

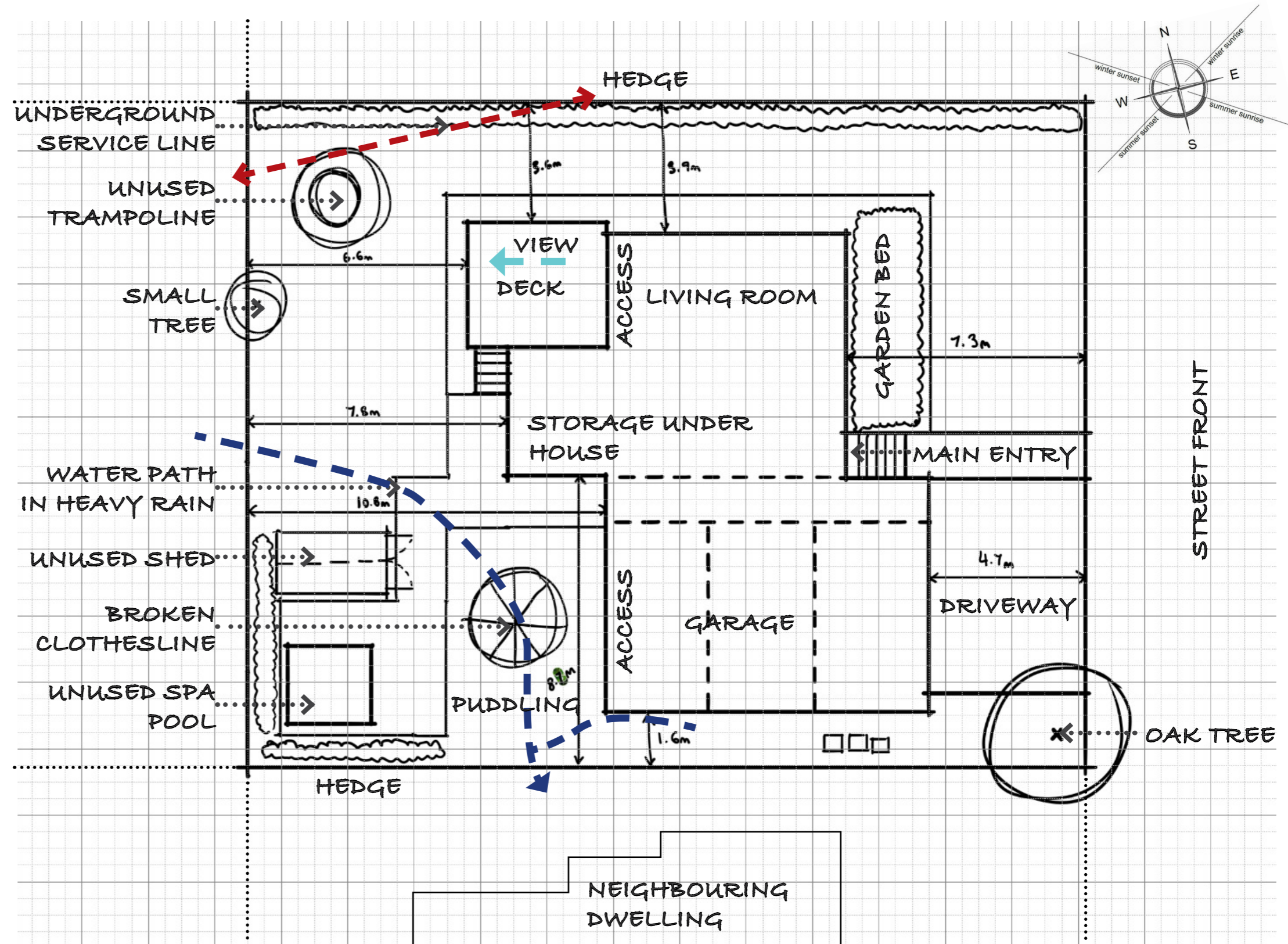
POSITIVES:

- Utilise the site's climate to your advantage, create micro-climates and areas that provide shelter and warmth
- Choose materials and plants that will function both now and with the projected climate changes over the intended lifetime of your design

CONSIDER:

- Design for tomorrow, what works now may not work in future

EXAMPLE SITE ANALYSIS:



SUSTAINABILITY GUIDELINES - WATER MANAGEMENT

BIORETENTION

Bioretention areas are shallow landscaped depressions which are typically under-drained and rely on engineered soils, enhanced vegetation and filtration to remove pollutants and to reduce runoff downstream.

EARTHWORKS MINIMISATION

Reduce sediment and erosion by limiting earthworks. Retain existing drainage systems as much as possible.

WETLAND

Wetlands can be artificially made to manage stormwater, or be naturally occurring, water drainage occurs through soil.



NATIVE PLANTING

When treating water with planting, consider using diverse native plant species to provide food for birds and insects all year round. Multi-tiered planting can form micro-climates to accommodate species that are sensitive to climatic extremes. Ensure plants tolerate varying water levels.

RAIN GARDEN

Rain gardens are designed to slow water movement into Council system

SWALE

Swales are open channels that allow both evaporation and absorption, while transporting water in heavy rain events to a desired location.

DETENTION TANK

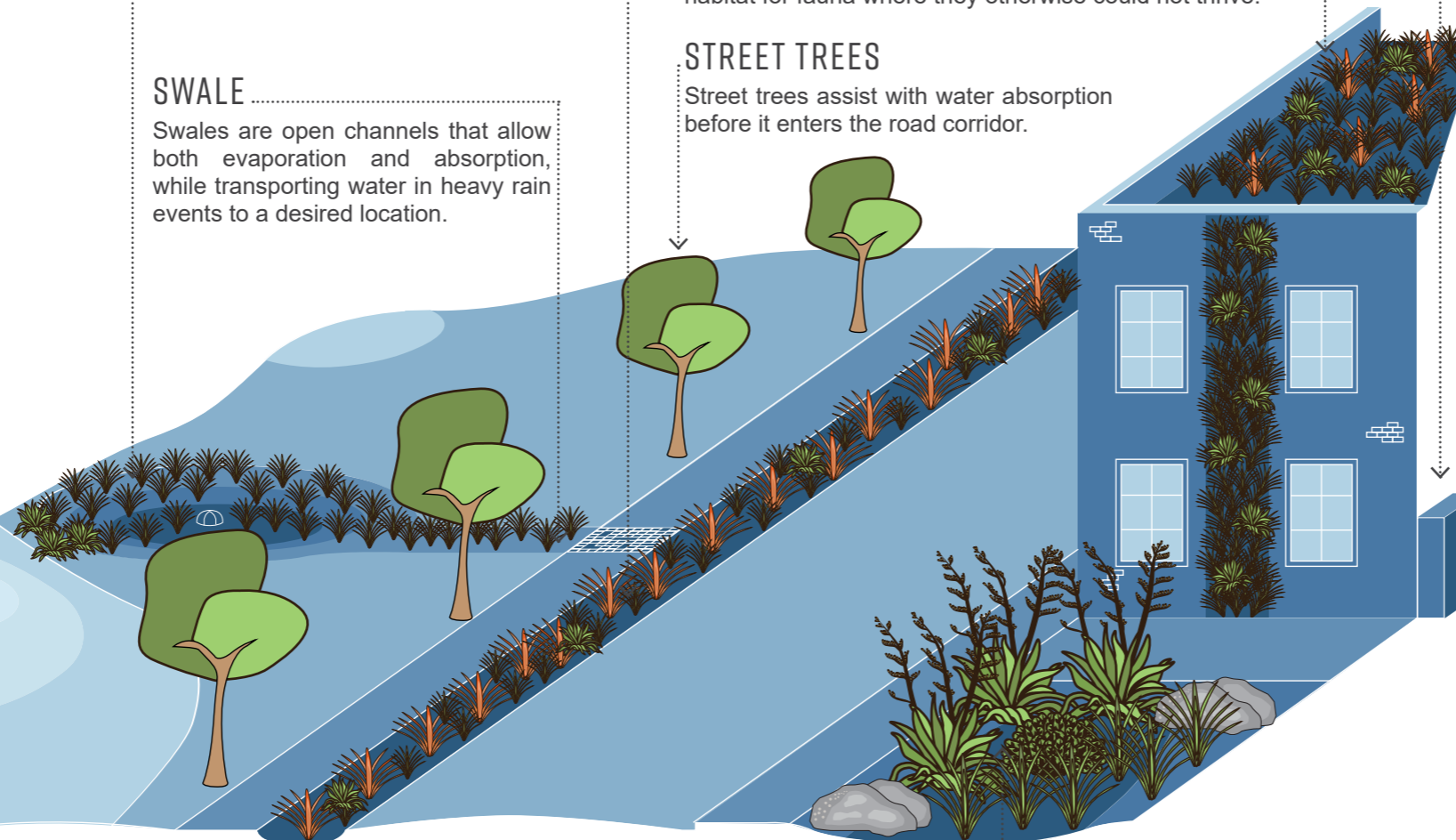
Detention tanks store rainwater from roofs and other impervious areas, you can get one at a reduced rate from [Upper Hutt City Council](#).

GREEN ROOFS AND LIVING WALLS

These building methods can improve the water quality of the stormwater that leaves the roof or wall, reduce the rate and volume of the stormwater, while providing beneficial habitat for fauna where they otherwise could not thrive.

STREET TREES

Street trees assist with water absorption before it enters the road corridor.



PERMEABLE SURFACE

Permeable surfaces such as gravel, permeable pavers and permeable concrete allow water to be absorbed into the subsurface and are a great alternative to concrete.

FOUND A LEAK?

If you have a water leak or water outage on your property then it is a good idea to contact Upper Hutt City Council about it. For urgent noise, water and animal issues you can call (04) 527 2169

WET TOLERANT PLANTING IDEAS



Semi-aquatic plants, **rushes** (*Juncus* and *Typha* sp.) have adapted to growing in wet situations, so can be a helpful plant on the margins of wetlands and lakes, or on damp ground.



There are several **Carex** species that thrive in wet conditions, **makura sedge** (*Carex secta*), **pukio** (*Carex virgata*) and **rautahi** (*Carex geminata*) are some great ones to start with in boggy areas.



Once the dominant tree in swamp forest, **kahikatea** (*Dacrydium dacrydioides*) are large trees growing up to 60m high. Their large buttress roots are great at absorbing water logged soils.



Nīkau (*Rhopalostylis sapida*) are a popular, hardy tree that can handle both damp to wet areas as well as dry situations, however prefer a well-drained medium, so avoid use in saturated soil. Great in rain gardens.



Their iconic white feathery flowers might catch your eye. **Toetoe** and **kakaho** (*Austroderia* sp.) are commonly found in areas adjacent wetlands, and are well suited to both wet and dry conditions.



Oioi (*Apodasmia similis*) is an attractive and hardy reed that can tolerate varying water levels. It is well suited to rain gardens, wetlands, salt marshes, lake margins and wet or coastal sites.



Harakeke (*Phormium tenax*) is great at absorbing water and thrives in water-logged soil such as wetland edges and along riversides.



Areas that are consistently under water can sustain a variety of sedges and rushes such as **raupo** (*Typha orientalis*), **jointed twig rush** (*Machaerina articulata*), and **kutakuta** (*Eleocharis Sphacelata*).

WATER SENSITIVE URBAN DESIGN METHODS

WATER SENSITIVE URBAN DESIGN (WSUD)

Water Sensitive Urban Design (WSUD) is an approach to urban design, planning, engineering and landscaping that aims to manage and treat water in a sustainable and environmentally friendly manner. The approach integrates the urban water cycle, including stormwater, groundwater, wastewater management and water supply into the urban fabric.

The primary aim is to mimic natural water systems and reduce environmental degradation and the negative impacts of urban development on water quality, aquatic ecosystems, and local communities. In doing so WSUD has the opportunity to simultaneously improve the aesthetic and recreational appeal of our landscapes.

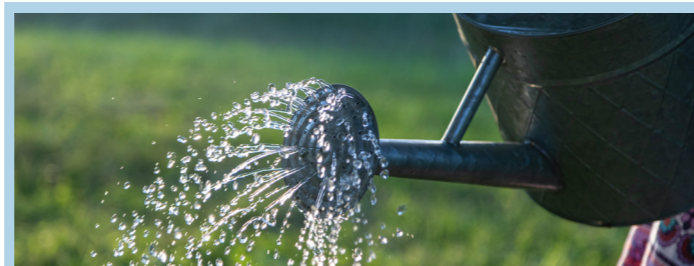
Water conservation and environmental sustainability are significant concerns in Aotearoa, so integrating WSUD principles into your garden, development or community can contribute to a more sustainable landscape for everyone.

It is important to note that hazards such as flooding and ponding can influence the appropriate usage of a site. Special attention should be given to any areas on your site that have been prone to flooding in the past. Engaging a specialist is recommended if any hazards on your property are life threatening or impacting the structural stability of yours or your neighbour's property.

With the increase of rising sea-levels and mass storm events, potential future flood hazards should also be taken into consideration. Upper Hutt City Council has created a [GIS map viewer](#)⁷ that outlines potential hazards across the region, this will provide up to date information on any mapped hazards that may effect your property that should be taken into consideration.

Remember that the specific implementation of WSUD on your site may vary depending on factors such as your location, soil type, climate, and planning regulations. Consulting with local environmental authorities or landscaping professionals can provide valuable insights and guidance tailored to your specific circumstances.

HOMEOWNERS +



IRRIGATION

Implement efficient irrigation systems. Unlike spray irrigation, drip irrigation is a slow feed method that delivers water directly to the plant's root zone, providing consistent quantities and intervals. Another option is to direct down spouts into garden areas or detention tanks. Consider the re-use of greywater for manual watering, and use rain barrels or other water harvesting methods to collect rainwater for garden use.



DETENTION TANKS AND GREY WATER

Above ground storm water detention tanks work by collecting rain water from roofs during downpours. They hold the water until the demand on council stormwater systems has reduced before releasing it into the system. Find a detention tank with a tap installed so that water can be accessed for watering the garden. Consider installing a grey water diverter and filter to further save on water.



MINIMISE HARD SURFACES

Work to maximise the amount of permeable surface that is provided on a site. This might include the use of planting beds, decks, gravel or permeable concrete/paving treatments that allow natural water penetration into the soil below the hard surface where it is required.

DEVELOPERS ++



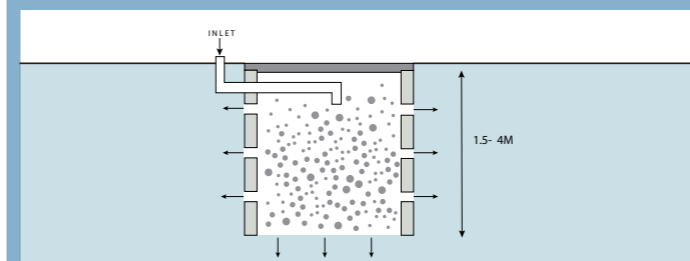
RAINGARDENS, SWALES AND BIORETENTION

Gardens that lie below the level of the surroundings and are specifically designed to absorb rainwater that runs off from a surface such as a patio or roof. Specific plants and soils are required to ensure these systems drain and filter correctly.



GREEN ROOFS AND LIVING WALLS

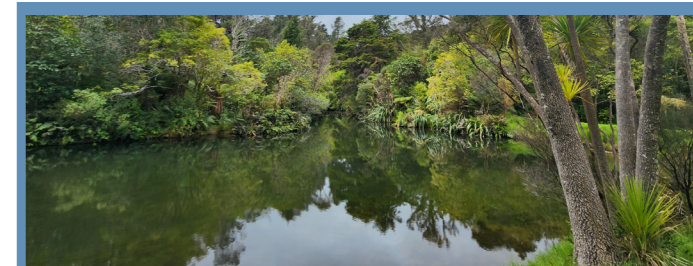
Similar to detention tanks in that they capture rain water and slow its progress into the council system, through water absorption by plants and evapotranspiration. Soil substrates, species selection and building structure require specialist design.



SOAKPITS

These work in a similar manner to stormwater detention tanks, except they are placed underground, usually under a shared driveway. There is no access for water re-use, but the system is typically gravity based and are constructed on site with off-shelf products. This solution can assist with providing stormwater neutrality and uses up less space than above ground detention tanks.

COMMUNITIES +++



WETLANDS AND STREAM RESTORATION

Is there a stream or wetland in your local reserve? Consider working together with your neighbours, local community groups and Council to improve these spaces by increasing appropriate planting and ensuring run-off from neighbouring properties is appropriately treated before entering these spaces.



EDUCATION

Encourage your local community to integrate WSUD into their spaces. By working together we can increase community resilience to large storm events by capturing, slowing and reducing stormwater run-off across the catchment.

RESOURCES

For more information on Water Sensitive Urban Design solutions you can check out the [Wellington Water Sensitive Design for Stormwater Guideline](#)⁸

To check flood hazard overlays on your site you can visit the [Upper Hutt City Council GIS map viewer](#)⁹

For more information on wetland restoration you can check out [Greater Wellington](#)¹⁰, [The Wetland Trust](#)¹¹, or [DOC](#)¹²

Upper Hutt City Council provide support for purchasing a [200L water tank](#)¹³ for your home at a reduced rate.

Tips and tricks on more things you can do to [conserve water in Upper Hutt](#)¹⁴

LANDFORM - SYSTEMS

BANKS AND FLOOD MANAGEMENT

Past flood management work for Te Awa Kairangi - Hutt River has included the introduction of flood banks or levees, that have become a well recognised landmark of the valley, as well as creating recreation space. These are managed by Council and only exist in public land.

ROLLING HILLS

Can contain sediment disruption. Hazards include fault lines, ground shaking and slips.

RIVERS AND STREAMS

Do not obstruct the flow of water and allow room for flood events. Avoid damming and allow for fish passage.

FLOOD PLAIN

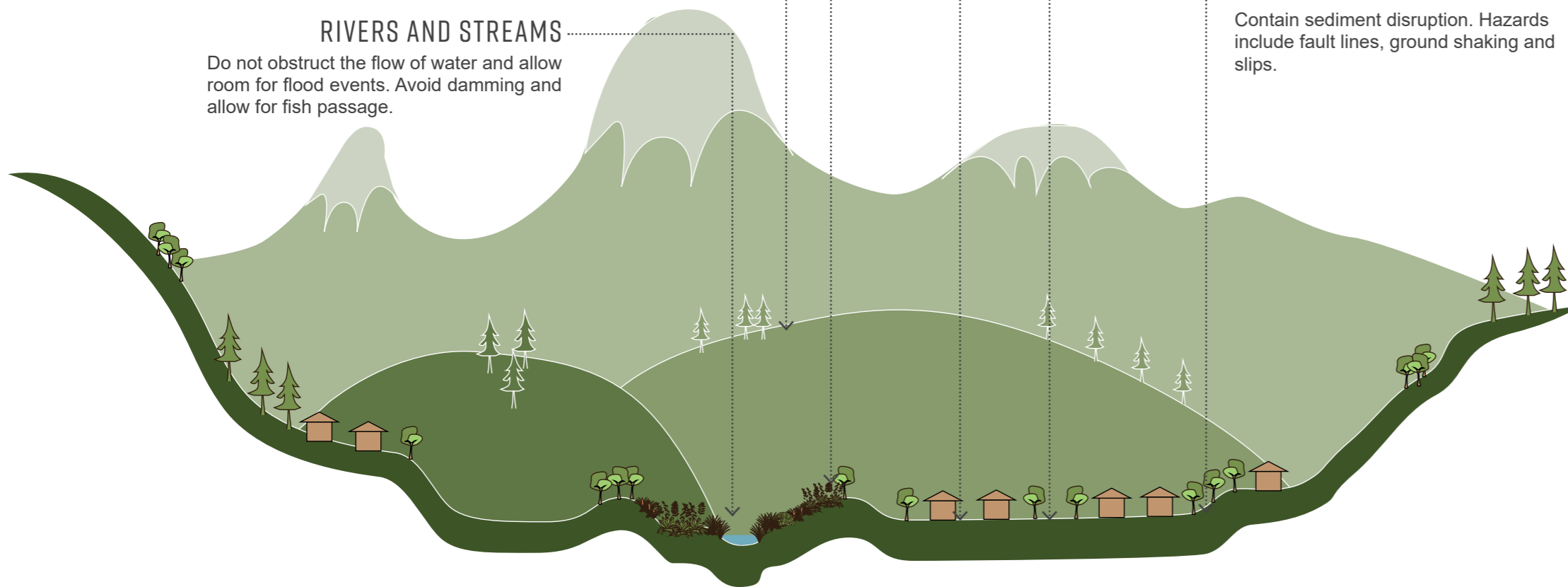
At risk of flooding, likely to require raised floor levels and water sensitive design solutions.

OVERLAND FLOW PATHS

Allow water movement across overland flow paths and prevent sediment runoff.

STEEPLY SLOPING

Contain sediment disruption. Hazards include fault lines, ground shaking and slips.



STEEP SLOPE PLANTING IDEAS



Great on steep banks and on the flat, **Huanangāmoho** (*Chionochloa flavicans*) is a small easy-care shrub that has white feathery flowerheads and helps to stabilise banks. Carex and sedge species will also stabilise slopes.



There are several **coprosma** sp. that are great for erosion control including, **tātaraheke** (*Coprosma acerosa*), **mingimingi** (*Coprosma propinqua*), **taupata** (*Coprosma repens*) and **karamū** (*Coprosma robusta*).



Pōhuehue (*Muehlenbeckia complexa*) is a hardy, vigorous, shrubby ground cover, that is ideal for banks and other difficult sites. It creates a dense tangled mass along both rocky and sandy sites.



Manatu / ribbonwood (*Plagianthus regius*) has a rapid growth rate and is beneficial for screening and streamside stabilisation. It has a shallow root depth so is best mixed with other species.



Mānuka (*Leptospermum scoparium*) is hardy, grows vigorously, has a wide ecological tolerance, and forms a well developed root system that helps to stabilise banks.



Wharariki (*Phormium cookianum*) and **harakeke** (*Phormium tenax*) are helpful in eroded areas as they have a fibrous and deep penetrating root system that soaks up water and minimises slips.



Tī kōuka (*Cordyline australis*) has a distinctive taproot with numerous laterals at all levels, with an adventurous root system making it great for planting on slopes where stabilisation is required.



Tarata (*Pittosporum eugenoides*) is suitable for revegetation on disturbed but not exposed waterlogged or low fertile sites. Its widespread root network is beneficial for streamside stabilisation.

RETAINING

If you require retaining that is greater than 1.5m in height, you will need to obtain a building consent from Council. Any retaining walls 1m or more in height where people could fall will require a 1.1m fence to provide safety from falling. It is recommended you seek geotechnical engineering input and provide a safety from falling fence that is 1.1m or greater.

Upper Hutt is a mountainous valley and there are 40 named mountains in the Upper Hutt region. These are primarily located in the Remutaka ranges and the Tararua ranges. No matter where you are in Upper Hutt, landform will have both opportunities and constraints for the work you intend to do. Flat areas of land are typically built on the flood plains of the Hutt River and both overland flow paths and flooding should be considered. Topics which are discussed further on the WSUD pages, 08-09. However your land is formed, it is always best to work with the existing condition, as changes you make to your site, may have effects that extend to neighbouring properties.

LANDFORM - OPTIONS AND OUTCOMES

TOPOGRAPHY

It is always best to work with your existing topography as much as possible, so that you can limit the amount of earthworks required. This will not only be less expensive, it will also:

- Reduce loose sediment associated with earthworks which can increase runoff and enter water systems (see also WSUD, pages 8-9)
- Retain more of your existing topsoil layers over larger areas to maintain soil health and allow it to continue to develop (see also, soil pages 18-19)
- Retain existing flow paths and established ecologies without displacing water or fauna habitats.

When earthworks are required, consider your options. Terracing or a batter slope generally result in a better outcomes for soil health, biodiversity and WSUD than a single large retaining wall.

HOW STEEP IS STEEP?

If your site has less than a **1% slope** (1m high for every hundred metres across, 1:100), then it will be prone to ponding and water saturation. This might not be a bad thing. Consider rain gardens to accommodate water intake.

2% slope (1:50) is the maximum slope allowed for sports fields. They feel pretty flat, but they still require some slope to ensure water run off and prevent ponding.

8% (1:12.5) is the maximum slope allowed for pedestrian access ramps. Think about the access ramp to your local doctors, that will be about a 7-8% slope.

12% (1:9.1) is the maximum slope allowed for a public road. Although there are some legal roads in NZ that are steeper that were constructed before this rule came into effect.

20% (1:5) is the maximum slope allowed for a private driveway. If you think about some of the steeper driveways in your area, that is about what a 20% slope feels like. If you have a large area of land that is 20% or steeper, think about how you are going to manage the maintenance of that area.

30% (1:3) and above can result in more difficult access and maintenance. Consider hydroseeding native grasses and low maintenance plants to large areas on slopes over 30%.

50% (1:2) and above are very steep and plant maintenance won't be possible without specialist equipment and training. Trees growing on these slopes will be adding a gravitational pull to the slope. Getting a geotechnical expert involved to assist with slope stabilisation to minimise risks of slips is recommended.

INTERVENTION

If you have a site that slopes greater than **33%**, that is to say, for every 3m across the site rises 1m (1:3), then access and maintenance to those areas is going to be increasingly difficult, and any changes to the land form will be highly intrusive and potentially costly.

Remember that if you introduce retaining walls to your site, they will require ongoing maintenance and may eventually need to be replaced. For large retaining walls, think about how you will access them with earthmoving equipment when they need to be replaced/repared. How are other structures placed in relation to that wall when that day comes? Is there a way of avoiding placement of long term structures in the way of maintenance access to retaining walls? This is particularly significant when retaining is forming a structural wall of a house.

Due to a lack of information on the stabilising characteristics of native plants, exotics such as poplar have often been used for bank stabilisation. In general, information on the below-ground characteristics of plants is pretty limited worldwide due to the costly and time-consuming effort required to examine the root systems of plants, particularly those of trees. However, Manaaki Whenua Landcare Research have provided a helpful study on the stabilising characteristics of some of our most common native restoration plants. While most of the trial species exhibited similar values for each parametre for the first 2 years of growth, ribbonwood outperformed all the species for both above and below ground biomass - and was second to tutu in lateral root spread. The relative position of these species changed as the plants grew and at age 5, the cabbage tree was a top performer for a number of growth attributes. Note that tutu is highly poisonous to both people and stock, with the poison also carried by bees in honey, so plant with caution.

Vegetating a slope with hardy native plants helps to bind soil and minimise erosion. A combination of different root structures including fibrous and tap roots can work together to help stabilise banks and reduce runoff and erosion. Herbaceous and shrubby plants have shallower root systems while larger trees usually have spreading and deeper roots.

Plants help to slow erosion of clay banks in the following ways:

- Foliage breaks the impact of rain drops
- Plants take up water, which reduces runoff
- Plant roots improve permeability of the soil
- Plant roots and stems increase soil roughness
- Plant roots bind the soil and help to reduce slips

SLOPE STABILISATION METHODS



BATTER SLOPES

Batter slopes can be used where the slope of the land does not exceed 33% (18.4° or 1:3) for planted batters, or where it does not exceed 20% (11.3° or 1:5) for grass slopes that will require mowing/line trimming. Use wool or coconut matting on planted slopes, and secure it well in high wind areas.



PLANTED MSE WALLS

Mechanically Stabilised Earth (MSE) walls can be made from a variety of materials, from a sustainability perspective, the preferred material is usually the earth filled fabric variety. Vegetation can be directly planted into this type of MSE wall. There are a number of specialist suppliers who can provide guidance on their suitability for your project.



TERRACING

If a formed garden bed is preferred, terracing is a useful tool to create accessible beds that can be used for habitat creation, decorative planting or edible gardens. There are several off the shelf products that are available for DIY projects, provided the retaining is not going to exceed 1m in height, or is being applied to a slope no greater than 45° (100% or 1:1), however it is always recommended that a professional is consulted before implementation. Ensure that fall from height requirements are followed.



POLE HOUSE

If you are working on a new housing project, instead of excavating to create a flat building platform, consider how new buildings can work with the existing landform. Pole supports can be used to elevate the floor level over sloping sites with out the need for expensive, and disruptive, earthworks that damage the soil quality, any existing fauna habitats and increase sediment in rainwater run off.



CLIMBERS ON SUPPORT FRAMES

Where tall retaining walls are required, support frames can be added for native climbing species (such as Tecomanthe speciosa - Three Kings vine) that can create habitats for native fauna, or edible climbing species (such as Passiflora edulis - passionfruit) to create a source of food while adding visual appeal and screening the retaining structures.

RESOURCES

For steep sites check out [Ngā tikanga whakatō tipu kia toitū ai Restoration planting techniques](#)¹⁵

For planting ideas to climb up and screen retaining structures, check out page 50 of the [Wellington Regional Native Plant Guide](#)¹⁶.

Manaaki Whenua Landcare Research have provided a helpful study on the [Stabilising characteristics of native plants](#)¹⁷.

PLANTING - METHODS

PRUNING

Regular pruning helps maintain the shape and health of native plants. Prune dead or damaged branches and encourage a bushier, more compact growth.

DISTANCE FROM BUILDINGS

Ensure that trees are planted a sufficient distance from building foundations to avoid structural or maintenance issues. This distance will vary dependant on tree selection, however a good rule of thumb is to plant the tree at least twice the height of the tree's estimated mature height away from the building. On smaller sites a root barrier can be utilised to prevent invasive root growth.

WATERING

While many native plants are adapted to New Zealand's climatic conditions, newly planted ones may need regular watering until they establish. Use a mulch layer around the base of plants to help retain moisture and suppress weeds. A drip irrigation system can be used to minimise water usage for vegetation.

PLANTING ON A SLOPE

When planting on a slope, create a small terrace or flat area before digging the hole, by cutting into the slope. This allows the water to soak into the root zone rather than running down the slope. Dig the hole three times as wide as the plants root ball and plant so that the roots and trunk are positioned vertically. This allows for a small flat area to include a small portion of mulch to minimise it falling down the slope, however on steep slopes coconut matting is recommended.

EARTHWORKS MINIMISATION

Reduce sediment and erosion by limiting earthworks. Retain existing drainage systems as much as possible.

PLANT HEALTH

Regularly check the condition of plants for pest damage and disease. Early detection of issues allows for prompt intervention. Use environmentally friendly pest control methods as much as possible, especially when planting is adjacent a water way.

LOCATION

Select native plants that are well-suited to your local climate and soil conditions. Consider factors such as sunlight, rainfall, and soil type.

PLANT SPACING

Plant spacing varies dependent on the species, however a general rule of thumb is to space the plant out approximately the same distance as the plants mature width. For example, a plant that is expected to grow 2m wide would be planted 2m from the next plant of the same variety so they do not grow into each other. However, if that plant was to be placed next to one growing 1m in width, you could plant 1.5m apart - 1m of room for the larger plant, and 0.5m for the smaller plant. If you are planting a hedge, reduce the spacing to half of the mature width.

STAKES

Use stakes to provide support when adding additional tree species to the mix. These can be constructed from reused bits of timber. Ties can be made from material scraps, an old pair of leggings is ideal as it is also stretchy. Ensure the stakes are positioned outside the root ball and planting pit to prevent root damage. Consider adding extra ties in windy areas.

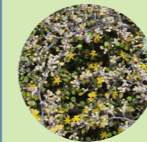
LOW-MAINTENANCE PLANTING IDEAS



Hebes are low-maintenance shrubs with attractive foliage and flowers. They are well-suited to the New Zealand climate and provide a variety of texture and colour to your planting palette.



Astelias are tough, low-maintenance plants with distinctive, arching leaves that can range in colour from green to silvery-gray. They thrive in a variety of conditions from full sun to partial shade.



Corokias are hardy shrubs with small, leaves that come in a range of sizes from ground-covers to large shrubs. Several corokia varieties also make a great low-maintenance hedge.



Coprosmas are versatile shrubs with narrow or glossy leaves and often colourful foliage. They are drought-tolerant once established and provide great textural variety in a variety of sizes.



Pittosporum are known for their attractive foliage and adaptability to various growing conditions. Commonly used for hedging and screening.



Libertia are known for their attractive sword-like leaves and clusters of small, star-shaped flowers. Will thrive in a sunny position and relatively drought-tolerant once established.



Rengarenga has attractive, strappy leaves that are often green or variegated, with clusters of small, star-shaped, white flowers. It can tolerate a range of light conditions, from full sun to partial shade.



Native sedges like **Carex** are hardy and come in a range of different colours and sizes. Make sure that you pick the right sedge for your water conditions and they will create a great low-maintenance solution in your garden.

PLANTING - MAINTENANCE

CARING FOR YOUR GARDEN

Creating and maintaining a sustainable garden involves practices that minimise environmental impact, promote biodiversity, conserve resources, and enhance overall ecosystem health.

Plants that are adapted to Upper Hutt's climate often need less care and attention. They'll be hardier and more likely to survive than plants from other areas. Use eco-sourced native plants where possible. This helps ensure that the plants are naturally adapted to the local area and conditions.

Mulching helps retain soil moisture, suppress weeds, and improve soil structure, which minimises the ongoing need for maintenance.

Consider planting cover crops during the off-season to protect the soil, prevent erosion, and add organic matter. It is also good practice to rotate crops to minimise disease and pest issues, while maintaining soil fertility.

Choose manual or electric tools over petrol and diesel powered ones where possible, hand tools and reel mowers are more energy-efficient than gas-powered equivalents.

Remember that you don't need to have a perfectly manicured garden, leaving gardens a bit messy and adopting a more natural and less manicured approach can benefit wildlife. Leaving fallen leaves on the ground provides shelter for insects, spiders, and small creatures while helping to suppress weed growth, did you know that some moth species overwinter as pupae in leaf litter?

Stacks of branches or brush can also create habitat for insects, lizards and birds. Don't be afraid to allow some areas of your garden to grow wild with tall grasses and hardy natives, this provides habitat for ground-nesting birds, and insects. Allowing flowers to go to seed and leaving dead or decaying plant material can be a resource for many insects and micro-organisms. This natural decay is part of the nutrient cycle in ecosystems.

Stay informed about sustainable gardening practices, local ecosystems, and environmental issues. Attend workshops, read books, and participate in community gardening events. Share your sustainable gardening knowledge with your neighbours and fellow community members, and consider collaborating on environmental projects together.

By incorporating these tips into your gardening practices, you can contribute to the health of your local ecosystem, reduce your environmental footprint, and create a garden that thrives in harmony with nature.

METHODS



PRUNING AND DEAD-HEADING

Prune your plants to shape them, remove dead or diseased branches, and encourage healthy growth. Remove spent flowers to encourage more blooms and maintain the plant's appearance. Sometimes plants will start to grow over others, trim them back to give them some extra space. Group the clippings in a messy bit of your garden to provide habitat for wildlife.



SUPPORT STRUCTURES

Provide support for tall or top-heavy plants by staking them to prevent bending or breaking. Use guards while plants establish to protect from pests and the elements. Trellises, arbours, A-frames, hoops and pergolas can be made from a range of sustainable materials, and can be installed to support climbing plants.



HARVEST

When harvesting, be gentle to avoid damaging the plants. Use clean and sharp tools to ensure a clean cut and minimise stress on the plants. Additionally, always follow specific recommendations for each type of plant, considering factors such as ripeness, maturity, and time of day.



CLEAR-STEM AND SHAPE

Shaping a plant involves pruning and training it to achieve a desired form, size, or structure. Proper shaping enhances the aesthetic appeal of plants, promotes healthy growth, and can be essential for maintaining desired sizes in gardens or landscapes. Clear-stemming is the practice of removing lower branches from a tree's trunk, creating a clear stem, which improving visibility beneath the branches.



PROTECTION FROM PESTS AND DISEASES

Regularly check your plants for signs of pests or diseases. Early detection allows for prompt intervention, and the ability to use more sustainable methods. Encourage the presence of natural predators like ladybirds and beneficial insects to control insect pest populations and remove diseased or dead parts of plants to prevent the spread of diseases. Invest in traps for mammalian predators.



REPLACEMENT

The lifespan of plants is determined by their specific growth habits and life cycles. While natives are likely to have a much longer life-cycle and be more sustainable, many exotic flower species and vegetables are annuals, biennials, and perennials, and will require replacing at the end of their cycle. There are also cases where older plants decline due to disease, pest issues, or environmental stress.



OBSERVATION:

Keep a close eye on your plants. Look for changes in colour, size, or overall health, as these can be indicators of underlying issues. Remember, individual plants may have unique care requirements, so it is essential to tailor your approach based on the specific species you are growing. Regular attention and adjustments to your care routine based on plant needs and environmental conditions will contribute to the overall health and vitality of your garden.



SEASONAL CARE

As weather patterns become more extreme, plants may require some additional protection. Protect plants that are susceptible to frost with a frost cloth and mulch around the base of plants to insulate the roots. In the heat of summer try to provide extra shade and water during extreme heat.

RESOURCES

Interested in companion planting? Check out the Upper Hutt [Success of Companion Planting](#)¹⁹ guide

Looking for advice on how to get started? check out the Upper Hutt [Beginners Gardening Guide](#)²⁰

For tips on how to keep your landscape and local environment pest free in a sustainable way, visit [Pest Free Upper Hutt](#)²¹

For ideas on what to grow and how to log your plants join [Growathon](#)²²

FAUNA - CREATING HABITATS

NECTAR FEEDERS

If you have limited trees that produce nectar during winter, or are still waiting for yours to grow, consider including a nectar feeder. These help native birds with a water source, as well as a bit of extra sugar to keep them going.

FEEDING STATION

Native birds that you are likely to attract to your garden prefer to eat fruit, nectar, insects, and foliage, so consider feeders where you can include these over seed or bread feeders. Top them up regularly in winter when natural food sources are more scarce.

PESTS AND PESTICIDES

Avoid invasive plant species that can harm the local environment and avoid using pesticides that can harm beneficial insects and pollinators

PLANTING IDEAS



Mānuka and **kānuka** (*Leptospermum scoparium* and *Kunzea ericoides*) provide an important source of pollen and nectar for native bees, flies, moths, beetles and geckos.



Ti kōuka (*Cordyline australis*) flowers provide nectar for bees, flies, other insects and geckos. The white flowers are pollinated and then become fruit which provide food for birds like kererū.



Kōwhai (*Sophora microphylla*) have prolific yellow flowers that appear in spring. Native birds such as the tui, bellbird, kākā and kererū all benefit from kōwhai trees, especially their nectar.



Pōhuehue (*Muehlenbeckia* sp.) are popular with lizards, especially when they are interspersed with large rocks and boulders. They also provide an important host plant for copper butterflies.



Kōtukutuku (*Fuchsia excorticata*) is the world's largest fuchsia and one of Aotearoa's only native deciduous trees. The flowers are rich in nectar and are loved by tūī, bellbirds and silvereyes.



Nettle (*Urtica* sp.) is an important host plant for admiral butterflies. There are several native species, but be careful where you plant them, as they have quite a sting! They prefer a shady and sheltered spot.



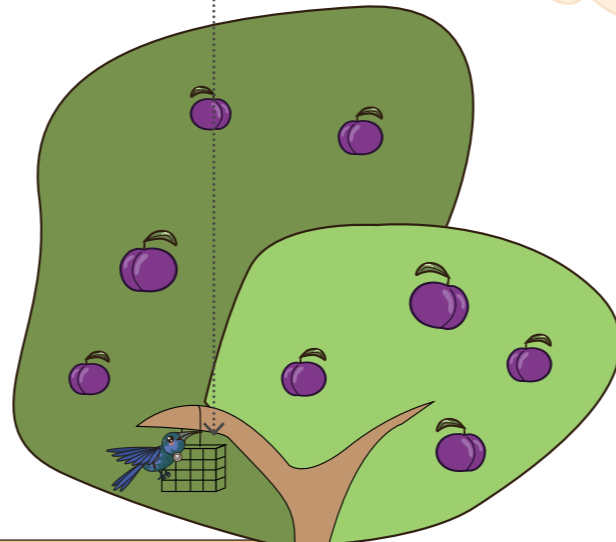
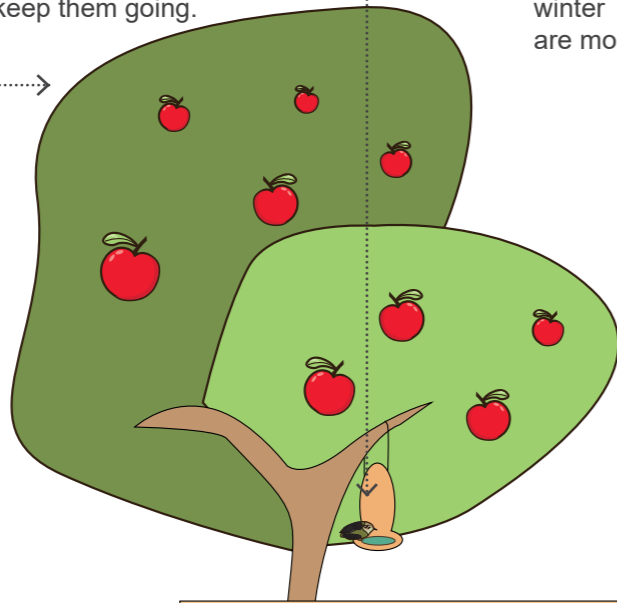
Loved by pollinators, **koromiko** (*Veronica/Hebe* sp.) are one of the largest genus of flowering plants in Aotearoa, with over 100 species and varieties, you are sure to find one flowering at almost any time in the year.



Harakeke (*Phormium tenax*) and **wharariki** (*Phormium cookianum*) support a large community of fauna, providing shelter and an abundant food resource for birds, bats, geckos and insects, including nesting for ngaro huruhuru (native bees).

TREES

Consider native trees with large flowers and/or fruit for native birds. Exotic fruit trees will also provide food for larger forest dwelling species while providing food for you too!

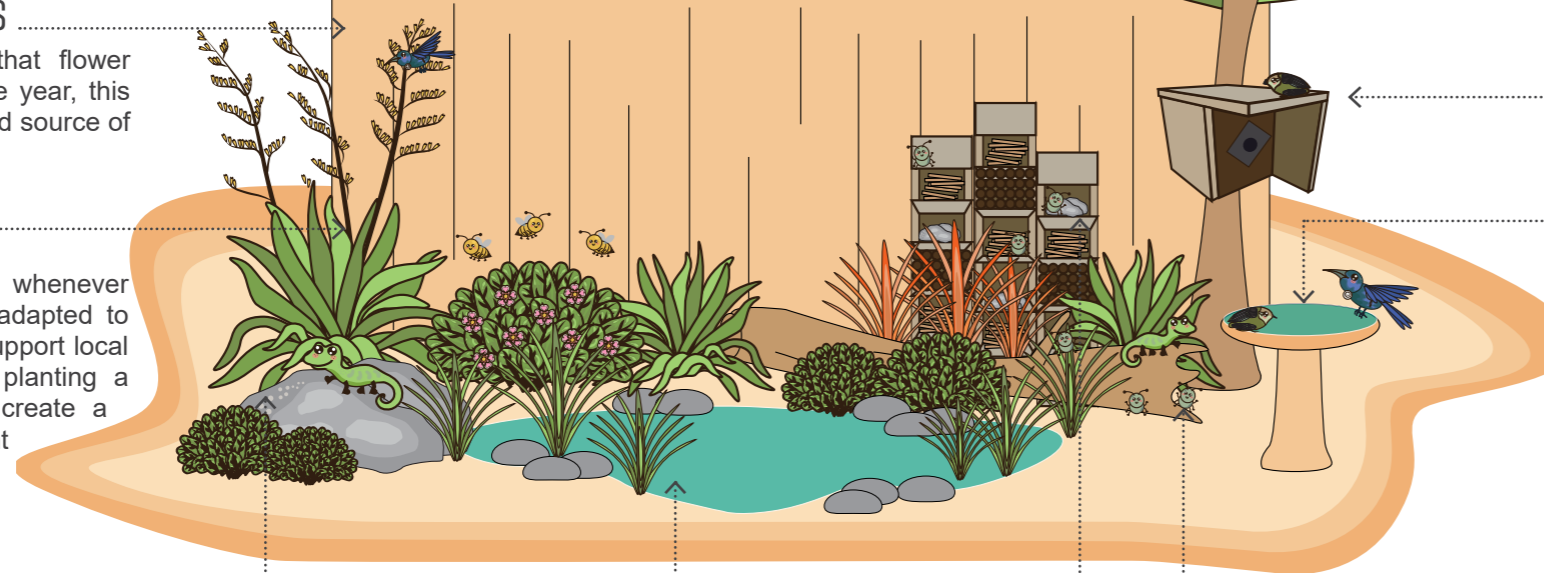


FLOWERING TIMES

Chose native plants that flower at different times of the year, this will provide a year-round source of food for pollinators.

BIODIVERSITY

Choose native plants whenever possible, as they are adapted to the local climate and support local wildlife, and consider planting a variety of species to create a diverse and resilient ecosystem.



TĪTĪTĪPOUNAMU BOXES

Most native birds don't require our help for finding shelter, and exotic species create competition with our native birds, however our native tītītipounamu (rifleman) love these special boxes.

BIRD BATHS

Bird baths provide a water source for birds and invertebrates, which is important during hot summers, when water sources elsewhere. If your bird bath is deep, consider adding some stones so that invertebrates can climb out safely.

LIZARD HABITAT

Dense low growing native shrubs and ground covers dispersed with rocks and logs create great habitat for skinks and geckos. Don't forget to add a hidden water bowl inside, and create lots of places for them to hide.

PONDS

Not only can ponds provide a water source for birds and invertebrates, but they can be planted with native aquatic plants, and provide useful microclimates for aquatic fauna.

BUG HOTELS

Bug hotels can be made of a range of materials, (sticks, stones, bamboo, straw etc.) trial different types and see what you can attract.

LOGS

Leave some areas of your garden wild - when tree branches and leaf litter fall, consider keeping them in your garden rather than tidying them all away, they provide a great habitat for invertebrates, skinks and geckos to hide. If you live in a high-risk fire zone, ensure that these areas are not in close proximity to your dwelling.

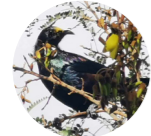
FAUNA - ATTRACTING WILDLIFE

ATTRACTING FAUNA

BIRDS



Kererū



Tūi



Kākā



Tauhou



Tititipounamu



Kākāriki



Ruru



Korimako



Pīwakawaka



Kārearea



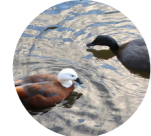
Karoro



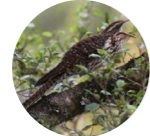
Miromiro



Pōpokotea



Pūtangitangi



Koekoeā



Kōtare

SKINKS, GECKOS, AND EELS



Copper Skink



Ornate Skink



Barking Gecko



Raukawa Gecko



Northern Grass Skink



Ngahere Gecko



Glossy brown Skink



Tuna / eel

INVERTEBRATES



Ngaro huruhuru



Butterfly



Wētā



Cicada



Glowworm



Snail



Moth



Spider

SPOTTED ONE? DON'T FORGET TO POST YOUR SIGHTINGS ON [INATURALIST!](https://www.inaturalist.org)

HOMEOWNERS +



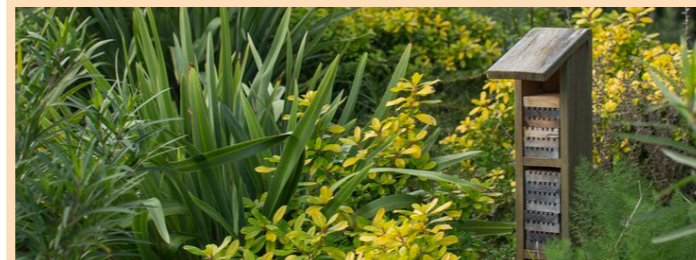
BUG HOTEL

Creating a bug hotel can be a fun and educational project that benefits both the bugs and your garden's overall health. By providing a variety of habitats and materials, you can attract and support a diverse range of insects and other small wildlife. These can be made from recycled materials such as palettes or masonry blocks. Let plants grow through to provide additional protection and habitat.



PROVIDE A WATER SOURCE

Water sources are important for our native fauna, especially during hot summers when their usual water sources may have dried up. Invertebrates require a shallow water source filled with stones so that they don't drown, this needs to be topped up often. Birds love bird baths as they have the space to splash around. If you have more space on your site consider including a pond.



FEEDERS AND HABITAT BOXES

There are a range of different feeders and habitat boxes available, but many on the market are aimed at exotic species. The best feeders for attracting native birds are ones that include fruit or sugar water. Many of our native birds won't use bird houses, but there is a special house you can make for tītītipounamu. You can also make lizard habitat using rocks and dense ground-covering vegetation.

DEVELOPERS ++



SHARED SPACE

Including spaces for fauna within developments is an important aspect of sustainable and environmentally friendly urban planning. This approach benefits both the environment and the well-being of residents by creating attractive and sustainable living spaces. Integrate a variety of habitats within the development, including within the garden areas of each unit to attract a variety of different species.



GREEN ROOFS AND LIVING WALLS

As density increases across our cities it can be harder to find space for our important fauna to live alongside us. Green roofs and walls are a great way to increase biodiversity across high-density sites without reducing yield. These spaces can also create inviting outdoor spaces for residents. For inspiration check out the green walls at Victoria University.



RETAIN HIGHLY VEGETATED AREAS

Before designing a development, conduct a thorough site assessment to identify existing flora, fauna, and potential habitat, and how these areas can be retained, protected and integrated into the development. Consider the local ecosystem and the types of fauna native to the area and how they can be attracted with additional habitat creation.

COMMUNITIES +++



HABITAT STEPPING STONES

Green corridors and stepping stones connect fragmented or isolated ecosystems, and serve as pathways for fauna to move between different areas, facilitating gene flow, species migration, and the exchange of genetic diversity. Consider how your local project will contribute to playing a role in supporting the fragmented green network across Upper Hutt.



EDUCATION

Install educational signage and habitat installations in public green spaces that informs the community about the importance of the local fauna and how they can contribute to their conservation in their own spaces.

RESOURCES

Get to know Upper Hutt's pollinators at [The Gardians](#)²³

Bird fan? Check out [DOC's Guide to attracting birds to your garden](#)²⁴

Want to create a Pollinator Path through your neighbourhood? Check out [Pollinator Paths](#)²⁵

Love lizards? Check out [DOC's Gardening for Lizards](#)²⁶ and [NZ Herpetological Society Lizard Friendly Garden](#)²⁷

Want to create a Rifleman box? Check out these instructions from [Otago Peninsula Biodiversity group](#)²⁸

Check out the [Forest and Bird Upper Hutt branch](#)²⁹ who are helping restore habitat in the local area

COMMUNITY GARDENS - CREATING SPACES

PICNIC AREA

Consider up-cycling some picnic tables and adding them to your community garden to provide a shared space to enjoy the produce with your neighbours.

FOOD FOREST

Loosely arranged, food forests allow food to grow wild, with limited maintenance provided. Food forests have a heavy reliance on companion planting, and need to be checked regularly for crops. Native edible plants can be integrated into the food forest areas.

ORCHARD

A mix of orchard trees, can include citrus trees, nut trees, stone fruit, and pip fruit. Orchards can be planted in formalised lines or you can chose a more organic approach.

GARDEN BEDS

In-ground garden beds are planted directly into the soil, this reduces the additional cost of planter boxes, but can increase maintenance. Raised beds can be more easily accessible as the soil is built up higher, ensure that they are replenished with compost regularly. Raised beds can be constructed from recycled timber and lining.

GLASS HOUSE

Glass houses can be used to increase yield for plants that require additional warmth and protection to increase the variety of crops that can be grown. Consider using second-hand windows to create your own.

TOOL SHED

A shared tool shed with your local community can reduce waste and extra expenses by reducing the need for multiples of items not often used.

NATURE PLAY

Nature play areas that include stepping logs and balance beams can be made from recycled timber and encourage play and natural discovery.

HERBAL LAYS

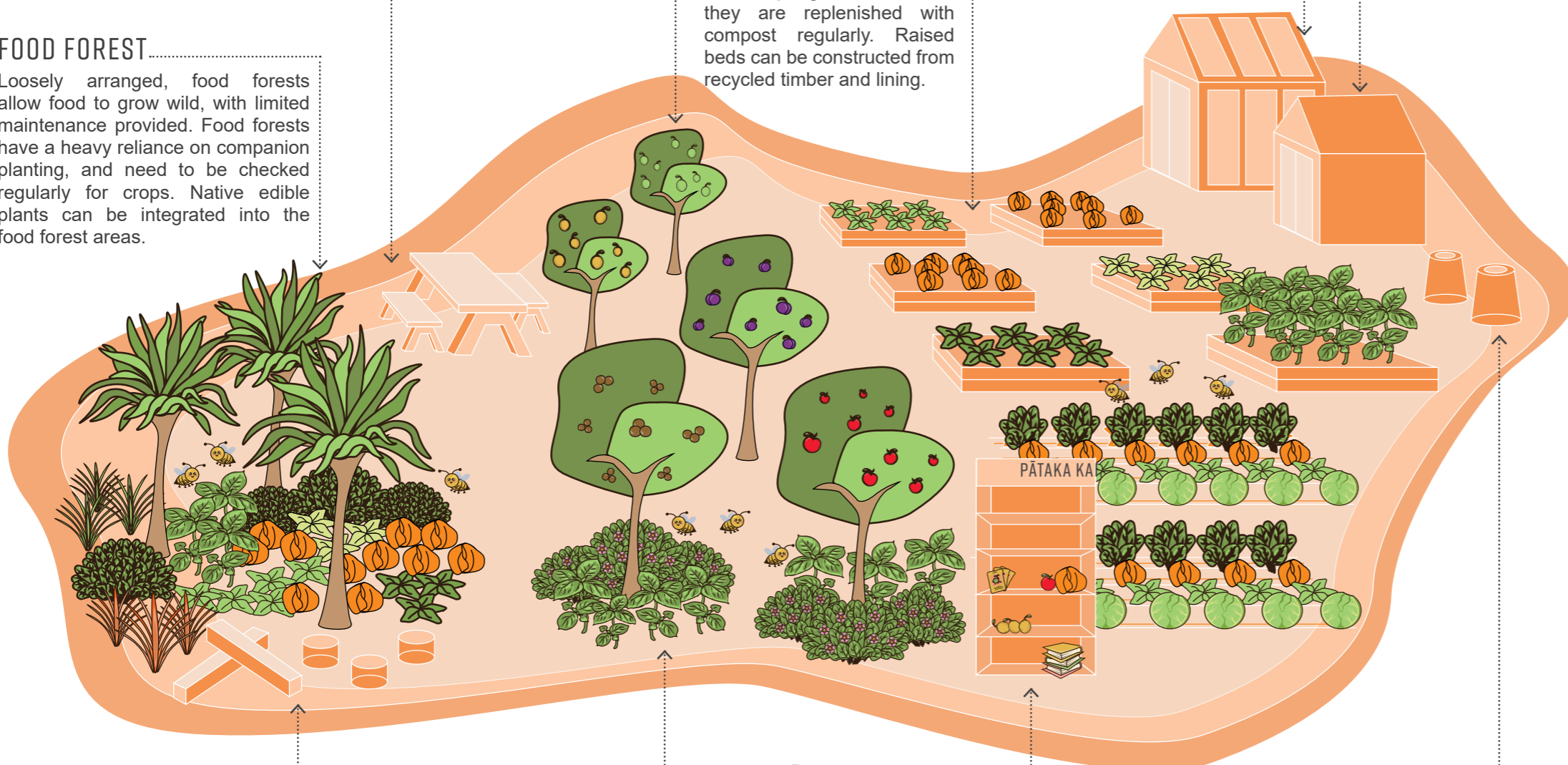
Herbal lays can be added around fruit trees to improve nitrogen levels in the soil and attract beneficial insects.

PĀTAKA KAI

Community pantries, seed banks and libraries provide a way for neighbours to be able to swap and donate surplus produce, seeds, books and games. "Take what you need, and leave what you can".

COMPOSTING AREA

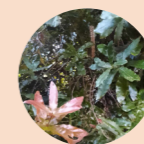
Include a composting area with worm bins within your community garden design to produce healthy soils and reduce food waste.



EDIBLE PLANTING IDEAS



Citrus trees are low maintenance, and love a location with lots of sun and shelter from the wind and protection from frost. Try starting with Lemon Meyer and Tahitian Lime.



Nut trees like free draining, deep, fertile ground with lots of sun and shelter from the wind. The best varieties of nut trees to plant in the Wellington region are almond and hazelnut.



Stone fruit trees grow best on a warm, sunny site with protection from the wind and frost. The soil should be free-draining, fertile and moist. Plum trees are the most successful stone fruit to try.



Pip fruit trees generally like warm and sunny sites, with well drained soil and space for root growth. Try your favourite apple, pear, nashi or quince variety.



Berries need well-drained soils with good protection from wind and frost. Raspberries, strawberries, cranberries, gooseberries and currants.



An array of **vegetables** can be grown in Upper Hutt. We recommend starting with some simple salad greens, then start trialling your favourite vegetables. A glass house can be really helpful for increasing yield and variety.



Herbs are a great way to start making an edible garden, plant these around your fruit trees to create a herbal lay, or in a pot by your kitchen for easy access. Some great starter herbs are rosemary, parsley, mint, borage and thyme.



There are several **native edible plants** that you can plant in your garden and harvest from. Kawakawa leaves make a great tea, puha is great in a boil up, and the tender shoots of pikopiko ferns can add a beautiful decoration to kai.

COMMUNITY GARDENS - YOUR NEIGHBOURHOOD

FIND YOUR LOCAL COMMUNITY GARDEN OR URBAN FARM +



CLYMA PARK COMMUNITY GARDEN

[Clyma Park Community Garden](#)³⁰ is located in Clyma Park in Elderslea. The planter beds radiate out like a sunburst. The gardens are community lead, and teach seed to table principles for the local schools.



BIRCHVILLE COMMUNITY GARDEN

[Birchville Community Garden](#)³¹ is located in Rata Park in Birchville. The garden includes vege boxes, a fruit orchard, and a Pātaka for sharing harvests. You can also join the celebrations at their spring and harvest festivals.

MANGAROA FARMS

[Mangaroa Farms](#)³² is a community food hub and resilience education centre located in the Te Awa Kairangi water catchment in Upper Hutt at 108 Whitemans Valley Road. It is a living laboratory for transitioning dairy & pine into regenerative agriculture & native forests. They have a large market garden and regularly host volunteer days and workshops.



TIMBERLEA COMMUNITY GARDEN

The [Timberlea Community Garden](#)³³ is located in Timberlea Park, Upper Hutt. It features a Pātaka (food pantry) where produce from the gardens and from the wider community can be contributed for collection by those in need.



TAWAI PARK COMMUNITY GARDEN

[Tawai Park Community Garden](#)³⁴ is located in Tawai Park in Trentham. It includes vege patches, a community orchard, garden shed, composting area, and even a green house! They run lots of great workshops and events.



MAHINGA KAI

The [Mahinga Kai Urban Farm](#)³⁵ is situated behind Lane Park Church, and is part of 4 A Better City. They use regenerative techniques like poly cropping, no-till, natural fertilisers, and make their own compost by collecting food waste from around Upper Hutt which is composted behind Brewtown. They sell boxes of veggies, will be offering workshops and courses soon, and are welcoming to new volunteers joining in.

OR START YOUR OWN ++

No community garden near you? Starting a community garden in your neighbourhood is a great way to bring the community together, promote sustainable living, and enjoy the benefits of gardening. If you are a developer creating a large development in Upper Hutt, including a shared space or community garden is a great way to assist with providing community connections and support within the new development. It also provides additional recreational spaces that are crucial in developments with small outdoor areas.

1. GATHER SUPPORT AND INTEREST

Start by talking to friends, neighbours, and community members to gauge interest in a community garden. Attend local community meetings or events to network and find like-minded individuals or organisations that may be willing to support your initiative.

2. FORM A COMMUNITY GROUP

Establish a core group of individuals who are enthusiastic about the project and willing to take on leadership roles. Assign responsibilities within the group, such as a co-ordinator, treasurer, outreach person, and garden manager.

3. SITE SELECTION

Identify potential locations for your community garden. Consider factors like sunlight, soil quality, accessibility, and water availability. Upper Hutt City Council may be able to help provide insight into existing and proposed uses of public spaces. Contact the Upper Hutt City Council to discuss your community garden project. They may provide guidance on regulations, permits, and any available support or resources.

4. DEVELOP A PLAN

Create a garden plan that outlines the layout, size, and design of the community garden. Determine whether the garden will be divided into individual plots or used for communal gardening.

5. FUNDRAISING AND RESOURCES

Estimate the costs involved, such as garden beds, soil, tools, and water infrastructure. Explore funding options, such as grants, donations, sponsorships, and community fundraisers. Seek donations of materials or tools from local businesses or individuals.

6. ORGANISATIONAL STRUCTURE:

Decide on the legal structure of your community garden, whether it's an informal group or a registered non-profit organisation. Establish rules and guidelines for garden use, membership, and responsibilities. Consider liability insurance to protect the garden and its members. Determine membership fees or participation requirements, if applicable. Develop a fair system for allocating garden plots to members.

7. GARDEN DEVELOPMENT

Prepare the garden site by clearing and preparing the soil, setting up water access, and installing any necessary infrastructure. Acquire gardening supplies, tools, and materials. Establish a schedule for garden maintenance, including weeding, watering, and composting. Encourage members to participate in regular workdays to maintain the garden collectively.

8. COMMUNITY OUTREACH

Promote the community garden project through local newspapers, social media, community centres, and word of mouth. Organise informational meetings or workshops to engage potential gardeners and volunteers. Organise garden-related events, workshops, and educational programmes to foster a sense of community and knowledge sharing.

RESOURCES

To check out some great community initiatives see the [Upper Hutt Community Map](#)³⁶

For help selecting fruit tree varieties that work in the Wellington Region check out [WCC Growing Fruit Trees](#)³⁷

To contact your local community garden visit [Upper Hutt Community Gardens](#)³⁸

FIRE RISK - ZONES

ZONE 1:

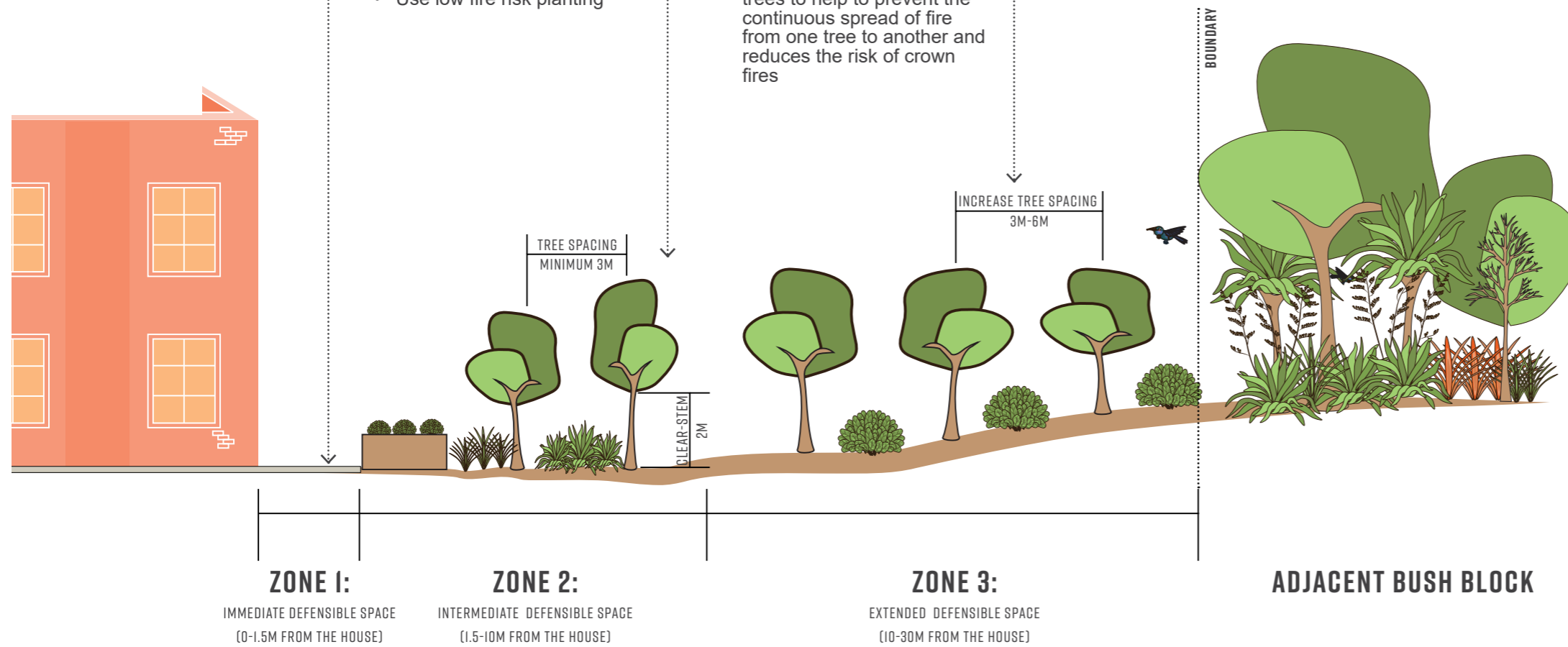
- Remove dead vegetation, leaves, and other flammable materials
- Use non-combustible materials like gravel or stone mulch
- Trim and maintain grass to a short height
- Ensure there is ample clearance between trees and the structure

ZONE 2:

- Thin out trees and vegetation to reduce fuel continuity
- Maintain a spacing of at least 3m between trees to hinder fire spread
- Trim lower branches of trees to 2m height to prevent ground fires from reaching the canopy
- Create fuel breaks such as driveways or gravel paths
- Use low fire risk planting

ZONE 3:

- Implement selective clearing to reduce fuel loads
- Maintain a separation between tree crowns to inhibit crown fires
- Space trees and shrubs to minimise the risk of fire jumping from one to another
- Regularly clear away dead vegetation and maintain a well-manicured landscape
- Increase spacing between trees to help to prevent the continuous spread of fire from one tree to another and reduces the risk of crown fires



LOW FIRE RISK PLANTING IDEAS



Kotukutuku / tree fuchsia (*Fuchsia excorticata*) are small semi-deciduous trees that have interesting twisted branches and a low burning point. Their large flowers are also attractive to bees.



Horoeka / lancewood (*Pseudopanax crassifolius*) is a narrow tree with hard sword-like leaves that do not burn easily. They have an interesting architectural shape that changes with maturity.



Five finger (*Pseudopanax arboreus*) is a common revegetation species that has a low burning point and is beneficial to include within the defensible green belt on your property.



Kawakawa (*Macropiper excelsum*) has large glossy heart shaped leaves that contain moisture, and have the dual purpose of being a beneficial edible plant used in teas and numbing creams/



Broadleaf species such as **Puka** and **Papauma** (*Griselinia littoralis* and *Griselinia lucida*) have large fleshy leaves and make great hedging along boundary treatments.



Raurekau, kanono, karamu and taupata (*Coprosma australis*, *Coprosma grandifolia*, *Coprosma robusta* and *Coprosma repens*) are all types of coprosmas that are more resistant to fire due to their glossy leaves.



Hangehange (*Geniostoma ligustrifolium*) is a small tree that is native to the Wellington region and a common component of understorey and forest margins. It is also an important source of nectar and fruit for the native hihi.

RESOURCES

A great resource for fire safe planting and appropriate species is available on the [Fire and Emergency Flammability of Plant Species](#) ³⁹ page.

FIRE RISK - MITIGATIONS

MINIMISING RISK

Following a significant bushfire in Trentham in 2022, the critical importance of fire-safe planting has gained even greater prominence. The aftermath of this event underscores the urgency for proactive measures in managing vegetation to reduce the risk of wildfires. Moreover, the link between these wildfires and broader issues such as climate change and rising temperatures becomes more evident.

Rising temperatures contribute to drier conditions and extended fire seasons, amplifying the potential for devastating wildfires. In this context, prioritizing fire-safe planting not only safeguards individual homes but also aligns with a broader commitment to mitigating the effects of a changing climate.

Living in a rural area or on the rural/urban interface exposes you to the increased potential dangers of wildfires. However, you can mitigate these risks by effectively managing the vegetation surrounding your home.

ZONES

Creating defensible space around your house involves dividing the area into different zones, each serving a specific purpose in protecting your home from wildfires.

The most effective method of safeguarding your home is to diminish the intensity of an approaching fire. This can be accomplished by establishing a cleared zone around your house, free from any flammable materials such as scrub vegetation, overgrown grass, leaves, and twigs. This serves as a protective zone, allowing heat and embers to disperse more effectively.

These zones collectively create a protective buffer around your home, reducing the risk of an approaching wildfire causing significant damage. It's important to adapt these guidelines based on the specific characteristics of your property and the surrounding environment. Regular maintenance and vigilance in managing vegetation and potential fuel sources contribute to a more effective defence against wildfires.

EFFECTIVE PLANTING

By replacing highly flammable species with those of lower flammability, you can decrease the fire hazard and establish a defensible space around your home. Under the right conditions, any plant will burn but some plants are less flammable than others.

In addition to safeguarding your immediate surroundings, strategically placing low flammability species can contribute to breaking up flammable landscapes. They can act as a buffer zone along the borders of urban areas or help minimise the fire hazard in the proximity of individual properties. Taking these measures not only enhances your safety but also plays a role in overall wildfire prevention.

Maximise the use of broadleaf evergreen plants as they have a high moisture content in their leaves, which can act as a natural fire retardant, and are generally less prone to ignition.

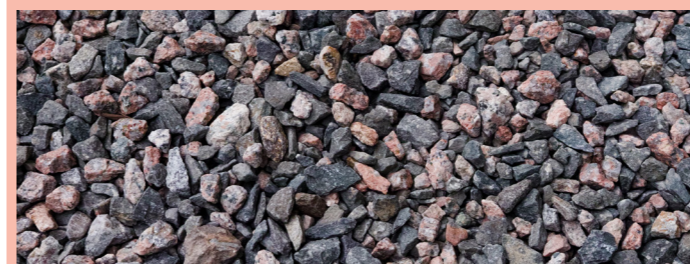
Ensure that the selected plants have a low level of volatile oils, as these can contribute to the rapid ignition and combustion of plants. Plants with leathery or thick leaves is another sign of reduced susceptibility to ignition as they are less likely to dry out quickly, especially in arid conditions.

If you live in a rural zone or adjacent to the bush you should avoid highly flammable species adjacent to the house. Some common species to avoid in these areas are **manuka, kanuka, tree ferns, ake-ake, mingimingi, totara eucalyptus, pine** and **gorse**.

It is important to note that while low fire risk species may have characteristics that make them relatively low-risk, no plant is entirely fireproof, especially in extreme fire conditions. The overall fire risk in an area depends on a combination of factors, including the specific species present, local climate, moisture levels, and the overall vegetation management practices in place.

When designing a fire-resistant landscape, it's advisable to consider a variety of low-risk plants and implement appropriate wildfire mitigation strategies. Additionally, consulting with local fire authorities or horticulturists familiar with the region can provide valuable insights for effective vegetation management.

LOW FIRE RISK MATERIALS



MULCH

Gravel and rocks are non-combustible and can be used for pathways, driveways, and as a ground cover in fire-prone areas. Avoid the use of organic mulches such as wood chips in fire-prone areas as they are more flammable.



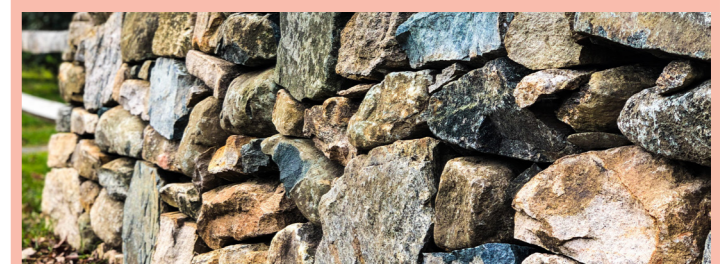
IRRIGATION

Install drip irrigation systems to keep the soil around plants consistently moist, reducing the likelihood of vegetation becoming dry and flammable. Watering regularly and avoiding overgrown, dry vegetation can help maintain a more fire-resistant landscape.



OUTDOOR FURNITURE AND STRUCTURES

Opt for outdoor furniture and structures such as pergolas and sheds that are made of metal rather than wood, as metal is less flammable. Concrete structures are also durable and fire-resistant, and can provide utility without adding to the fire risk. When using concrete try to opt for ones with recycled concrete aggregate for a more sustainable option.



WALLS AND FENCING

Metal fencing, such as wrought iron or steel, concrete block, or stone fencing is less likely to catch fire compared to wood fencing. Dry-stack or mortared stone walls can serve both aesthetic and fire-resistant functions in the landscape.



LIGHTING

Choose lighting fixtures that generate less heat and are less likely to cause ignition. LED or low-voltage systems are often safer options.



DECKING

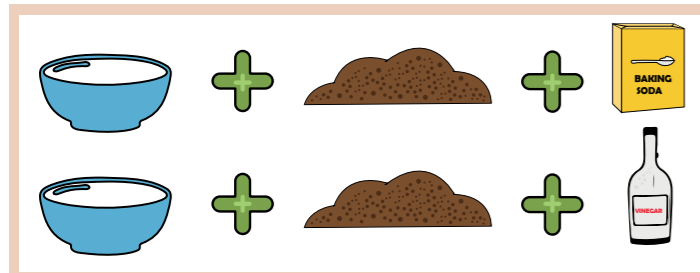
Consider using composite or fire-resistant treated wood for decks, fences and outdoor structures.

SOIL - TYPES AND TESTING

WHAT KIND OF SOIL DO I HAVE?

For an overview of the soils in the Upper Hutt region, check out the [Landcare Research Soil Maps](#).

For a more detailed look at your soil, you can test it at home. The key things you are testing for are PH, water absorption, soil structure and type.



MUD PIE TEST: PH LEVELS

Place 2 tablespoons of soil in a bowl and add 1/2 cup of white vinegar, if the mixture fizzes, you have alkaline soil. (High PH).

Place 2 tablespoons of soil in a bowl and moisten it with distilled water. Add 1/2 cup of baking soda, if the mixture fizzes, you have acidic soil. (Low PH).

Still stumped? You can pick up an at home soil PH test from your local library or the Council building for more exact results.



PERCOLATION TEST: WATER ABSORPTION

Take a spade, a long ruler, a timer (or a watch) and a large bucket of water (at least 4L).

Dig a hole about 30cm deep and wide and stand a ruler in to check the depth.

Tip all the water into the hole, filling to the top as quickly as possible, then start the timer. If the water level drops more than 10cm within the hour, your soil drains quickly (high percolation).

If the water drops less than 2.5cm within the hour your soil drains slowly (low percolation). Ideally, your soil should drain somewhere between 10 and 2.5cm per hour.

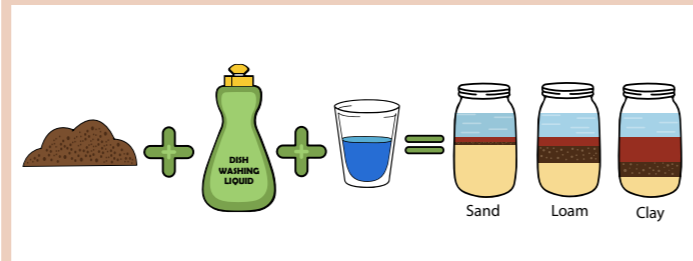


DROP TEST : SOIL STRUCTURE

Dig out a 20cm cube of soil with a spade and drop the block of soil onto a hard board in a plastic tub from 1m high.

Drop the block of soil three times (drop not throw), and gently crumble the biggest remaining blocks of soil but only as much as they crumble without much force.

Separate the blocks and crumbs from large to small manually. A good soil structure gives a mix of soil crumbs and blocks, called aggregates or peds, and enough space for air and water to enter and move through the soil.



JAR TEST : TESTING SOIL TYPE

Find a glass jar with a lid (1 per area to be tested, or reuse for different tests).

Fill to one-third full with soil, collected from a few centimetres below the surface to avoid top soil, removing pebbles and roots and crushing any lumps of soil.

Add clean water to about two-thirds of the jar so that it is full, and one teaspoon or dish washing liquid or powder.

Add the lid and shake well, then allow it to stand for 24-48 hours. The soil will settle in layers, sand at the bottom, silt above and then clay at the top.

Use a ruler to measure the depth of each layer and the percentage of each layer against the total depth in the jar.

WHAT DOES IT MEAN?

SOIL ACIDITY: Different plants have different acidity preferences. Some plants such as hydrangea will even change flower colour based on the pH level of the soil in which they are grown, which is a result of the availability of aluminium ions.

PERCOLATION: If you have a high percolation rate, water moves quickly through your soil, so it is fast draining. The draining capacity of your soil will determine what kind of plants you can introduce. It also helps to know what you can expect from your soil in heavy rain events, so you can be prepared.

SOIL STRUCTURE: Whether you have very dense or very fine soil structure, the remediation methods are very similar. Slowly add compost and mulch to the soil, gently turning it through, be careful not to overwork the soil. Plants improve soil quality, so it may be a good idea to add a sacrificial crop in preparation for your permanent garden bed. Consider species that will help to bind nutrients like phosphorous and nitrogen into the soil, like legumes. Once established, cut the stems and compost before planting with your desired species.

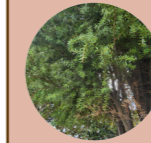
CLAY: If you have more than 30% fine clay particles, you have clay soil. Clays swell and shrink as they become wet and dry. They take longer to warm up in spring and wet clay soils are easily damaged when dug up or walked on. Drought is particularly damaging to clay soil. It provides a great foundation for plants by anchoring roots securely in the soil. The firm grip can help plants survive better in extreme temperatures. Clay soils tend to hold on to potassium, calcium and magnesium well, though the texture can be difficult for growing edible plants and will likely need some breaking up and remediation for this kind of gardening.

SILTY SOIL: Is slippery when wet, not grainy or rocky. If you have more than 80% silt content, then you have silt soil. Silt soil is very vulnerable to erosion. They are often considered more fertile because they have a higher capacity for holding nutrients like calcium, magnesium and potassium.

SAND: If you have more than 85% sand sized particles, then you have sandy soil. Sandy soil is a gritty type of soil consisting of particles from weathered rocks. They tend to be more acidic and are often good for root vegetables, alliums (onions and chives etc.) and herbs. Sandy soils do not hold onto nutrients well, and plants might need some help with soil conditioning and composting to be able to thrive.

LOAM: You have loamy soil if you have about 40% sand, 40% silt and 20% clay sized particles. If you have loamy soil, you have excellent growing conditions, providing a good balance of stability, drainage and nutrient holding materials. Most plants can grow in loamy soil, though composting is still recommended.

VARYING SOIL PLANTING IDEAS



Totara (*Podocarpus totara*) is adaptable to various soil types, including those that are slightly alkaline. They can thrive in a range of conditions, from sandy loam to clay loam, as long as the soil is not waterlogged.



Cabbage Tree (*Cordyline australis*) can thrive in neutral to slightly alkaline soils, they can grow in a range of soil conditions, including sandy and clay soils, however prefer well-drained clay rather than heavy, waterlogged clay.



Many **Coprosma** species can grow in a range of soil types, including those with slightly alkaline pH. Many Coprosma species can thrive in both sandy and clay soils, as long as they are well-draining. *Coprosma acerosa* is often used on sand banks.



Kowhai (*Sophora microphylla*) is a beneficial nitrogen-fixer and is good for primary succession planting. While it is more commonly associated with well-drained soils and loamy conditions, it can adapt to various soil types, including rocky and clay soils.



Many **Akeake** (*Olearia*) species can grow in alkaline soils, particularly in coastal regions. Olearia thrives in well-draining sandy soils, but can adapt to clay soils, provided the clay is not compacted and has good drainage.



Numerous **Hebe** (*Veronica species*) are tolerant of a wide pH range, making them suitable for alkaline soils, and many species within this genus can adapt to different soil types, including sandy and clay soils, provided they are well-draining.



Legumes (peas, lentils, beans, lupin, sweet clover etc.) as well as comfrey, are great at binding nitrogen and phosphorus into soils, and can grow in poor quality soils. They can be used as 'Green Manure'.

SOIL - IMPROVING AND BUILDING

IMPORTANCE OF SOIL

Living Soil is essential to a healthy garden. It should contain a combination of annelids, insects, invertebrates, fungal hyphae, protozoa, nematodes and microbes. When the soil is balanced, it will be able to soak up water into the aquifer.

There are many different types of soils with varying components that can be added to improve them. The three basic soil types are sand, silt and clay. The smallest particles create clay soil and the largest particles make a sandy soil, with loam being an even blend of the three.

If the site has dense clay soils some soil remediation is recommended to allow the water to drain and soak into the soil and plant root zones. Soil is made up of lots of layers. A healthy soil includes stacking compostable materials such as leaves, newspaper, grass clippings and cardboard on top of the soil. Over time, worms and micro-organisms decompose the material and turn it into a rich, nutrient-dense soil. Plants with a deep root structure that are planted in organic matter on top of the compacted soil will extend their roots to assist with breaking up the clay.

Anaerobic (no oxygen) soils that are saturated with water promote soil diseases which can negatively impact any new planting. Excessive disturbance of the soil should be avoided, a healthy soil has pockets filled with air that the water can travel through. When soils are eroded, graded, or disturbed, their structure becomes compacted, which is damaging to the microbes in the soil. Microbes are also damaged by fertiliser and pesticide use. If water can not easily pass through the soil it sits on the surface and evaporates before being utilised by the plants and increases overland flows.

When watering the soil, utilise collected rainwater as much as possible, and irrigate only to maintain the water balance in the soil. Too much water saturates the soil and results in the anaerobic conditions that promote diseases, whereas too little can result in microbes drying up or going dormant.

Enhance soil health through composting, mulching, and the addition of organic matter. Avoid the use of chemical fertilisers and pesticides that can harm the soil and local wildlife.

Mulch is used as a top layer of the soil to control weeds, retain moisture and regulate temperature.

Occasionally soil will need extra help, conduct a soil test to determine nutrient deficiencies before applying additional fertilisers. Always opt for organic fertilisers and keep to the recommended doses to avoid over-fertilisation, which can harm the environment. Integrate fertilisation with other sustainable gardening practices like crop rotation and companion planting to promote healthy soil and plants.

SOIL AMENDMENT/REMEDIATION



MULCH

Apply mulch around plants to retain soil moisture, suppress weeds, reduce erosion, increase the soil's nutrient intake and improve soil quality. Organic mulch includes ingredients like wood chips, straw, or leaf litter, and is typically the healthiest, and cheapest option. Be aware that organic mulch can leach the soil of nitrogen as it decomposes, so add a nitrogen rich fertiliser to your soil before applying mulch or substitute with extra compost.



COMPOST

Apply 1 part compost to a minimum of 2 parts native soil. Compost can be easily made at home, but will take at least 2 weeks to prepare, and up to 2 years to fully mature. Note that meat and dairy cannot be added to compost. You can build your own compost bin from reused wooden pallets which provide good aeration to the soil. Consider creating shared composting facilities in developments.



BOKASHI

Bokashi is a Japanese composting method that utilises beneficial micro-organisms to break down organic matter. The extra heat and faster fermentation process means that it is safe to add meat scraps and dairy products to Bokashi that cannot be added to compost. As the organic waste ferments, it releases a nutrient-rich liquid which can be used as a liquid fertiliser to add when watering plants.



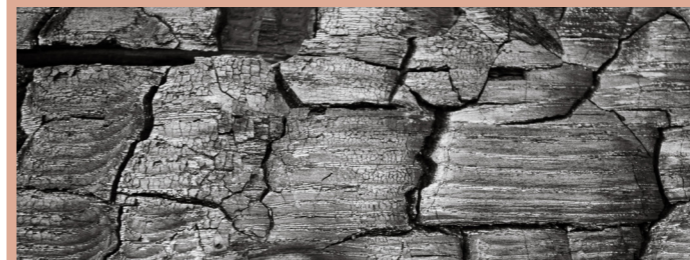
WORM FARMS

Worm castings (vermicompost) are nutrient-rich organic matter produced by earthworms. They improve soil structure, water retention, and nutrient availability. The by-products of a worm farm can be used as a natural fertiliser. The best kind of worms to use are red or tiger worms, as opposed to regular garden worms.



MANURE

Well-composted animal manure, such as cow, horse, or chicken manure, is rich in nitrogen. It can be used to provide a steady supply of nitrogen to plants. Ensure that the manure has been properly composted to eliminate pathogens and weed seeds and reduce the risk of burning plants due to its high nitrogen content.



BIOCHAR

Biochar can be used to improve soil structure, assist with the retention of water and nutrients in the soil, provide beneficial habitat for soil microbes, regulate PH levels, and even sequester carbon. Biochar can help expedite the composting process, absorb odours, provide better drainage, and reduce emissions that composts naturally emit.



LEGUMINOUS COVER CROPS

Leguminous cover crops like clover, vetch, or alfalfa have the unique ability to fix atmospheric nitrogen in their root nodules with the help of nitrogen-fixing bacteria. When these cover crops are incorporated into the soil, they release nitrogen, benefiting subsequent crops. Alfalfa meal is a slow-release organic fertiliser that improves soil structure and adds organic matter to the soil.



SEAWEED AND FISH EMULSION

Seaweed is rich in nutrients and contains a variety of minerals, trace elements, and growth-promoting substances that can enhance soil fertility and plant health. Fish emulsion is often used as a foliar spray or soil drench to provide quick nitrogen uptake for plants.

RESOURCES

For an overview of the soils in the Wellington region, check out the [Soils Map View](#)⁴⁰ by Landcare Research.

For more composting tips visit the [Upper Hutt City Council Composting](#)⁴¹ page, the [Sustainability Trust](#)⁴² and [Love Food Hate Waste](#)⁴³.

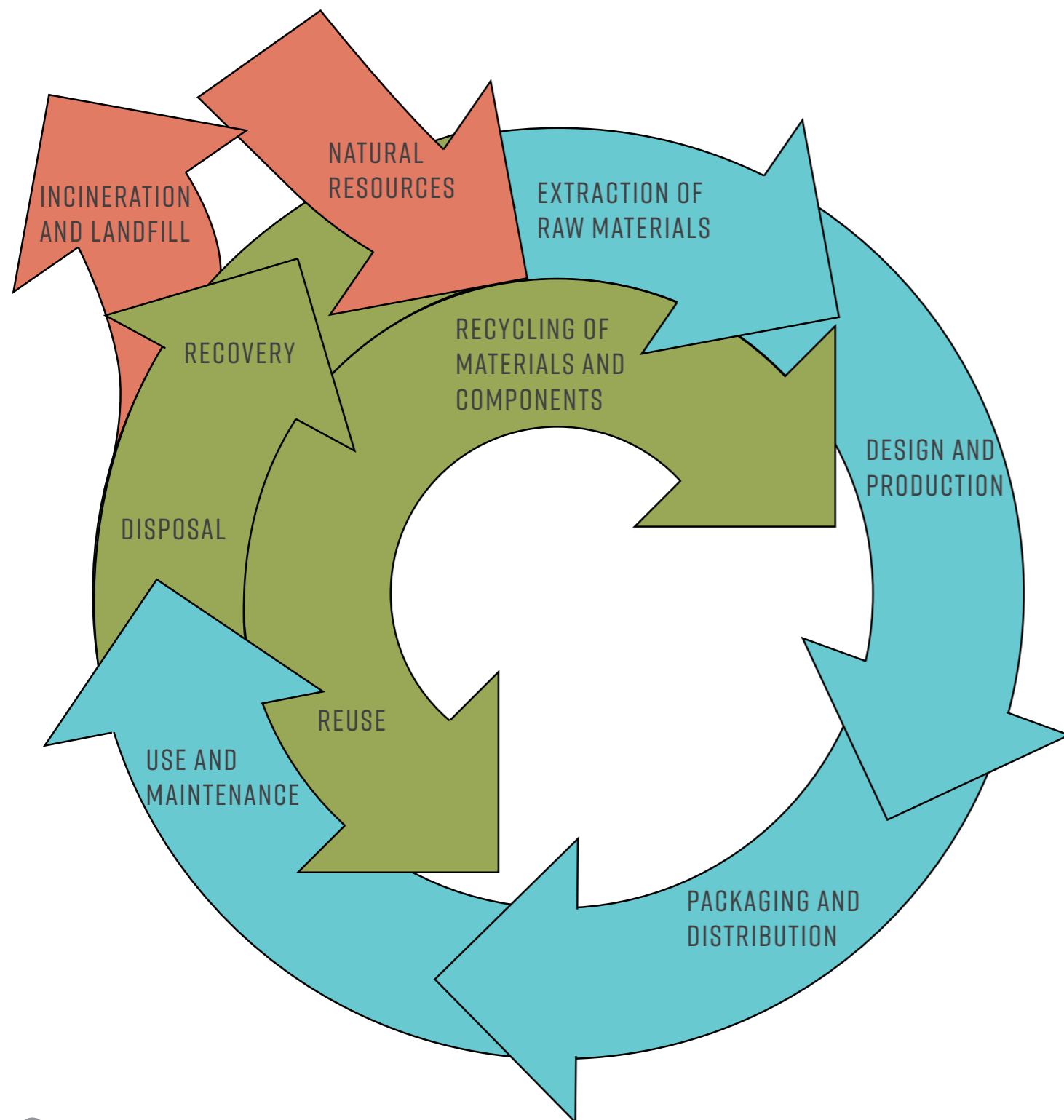
Not sure what you can put in your Bokashi bin? Check out this handy [Guide from Wellington City Council](#)⁴⁴

For instructions on how to make your own composting station out of reused pallets check out [Joe Gardener](#)⁴⁵

Local charity [The Good Carbon Farm](#)⁴⁶ are repurposing forestry slash in Akatarawa to make biochar, and are happy to help you fulfil your biochar needs.

MATERIALS - IMPACTS AND ISSUES

PRODUCT LIFE CYCLE

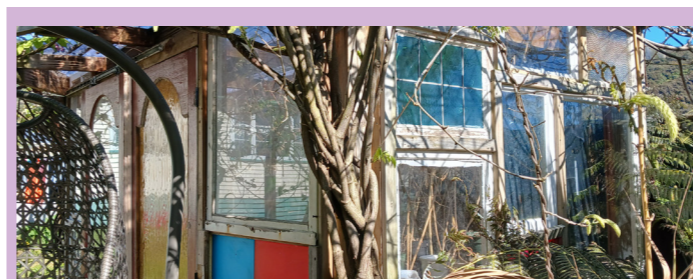


SUSTAINABLE SUPPLIES

Sustainable landscaping is about reducing waste and minimising the impact on the environment.

By buying materials that are locally sourced, it supports the local economy, and reduces the transportation-related carbon emissions associated with each product. It is important to consider the life cycle of each material and whether it will provide a benefit to the environment. The more items you can fix or reuse and save from landfill the better!

Using sustainable landscape materials in New Zealand is essential for reducing environmental impact and supporting local ecosystems. Here are some sustainable landscape materials you can consider for your garden or outdoor projects.



REUSED OR SALVAGED MATERIALS

Look at the existing materials you have on your site, and see if any can be reused or repurposed before throwing them away. Scour local salvage yards or online marketplaces for used building materials, garden ornaments, or decorative elements that can be repurposed in your landscape. You could try making a new pathway with salvaged bricks, or a glass house from old windows.



TOOLS

Rather than buying tools that you may only use a limited number of times, consider borrowing them from your local community tool shed or hiring them instead of buying. Visit your local tool library to see if they can help you find what you need or fix that broken item you were going to throw away. Your local hardware store may also have tools available to hire. When buying choose electric over petrol.

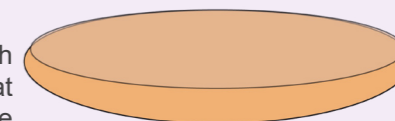
MAKE IT YOURSELF

Here's something you can try at home! Creating a water feeder for New Zealand fauna can be a beneficial and simple project. Native insects, birds and reptiles need access to water for drinking and for some, regulating the humidity inside their nests. Many water sources dry up during winter or are too deep for many of our native critters, so here's a basic guide on how to make a water feeder in your own backyard!

You will need:

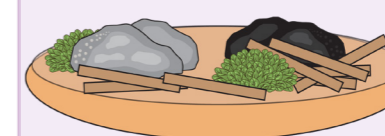
Shallow Container:

Use a shallow dish or tray with a flat bottom. This could be a shallow bird bath, a plant saucer, or any similar container.

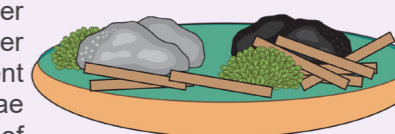


Landing pads:

Place some landing pads in the container to provide a surface for the insects and lizards to balance on while they drink. This could include stones, marbles, rocks, sticks, moss, water-tolerant plants, pinecones, or other small non-toxic items you can find within your garden.



Water: Fill the container with fresh rainwater. Make sure to keep the water level shallow so that insects and reptiles can drink without risk of drowning. Remember to change the water regularly to prevent the growth of algae or the breeding of mosquitoes.



Good location: Place the water feeder in a quiet and safe location in your garden. For lizards place between some rocks in a shady spot, for insects place in a sheltered sunny spot and for birds place near trees. Spend some time observing the water feeder to see if it is being used, and if needed, you can adjust the design based on their preferences. If you find that the water is drying up too quickly, try a deeper container or add an upturned jar filled with water with holes in the lid that can drip out slowly.



MATERIALS - SUSTAINABLE SOURCES

MATERIALS



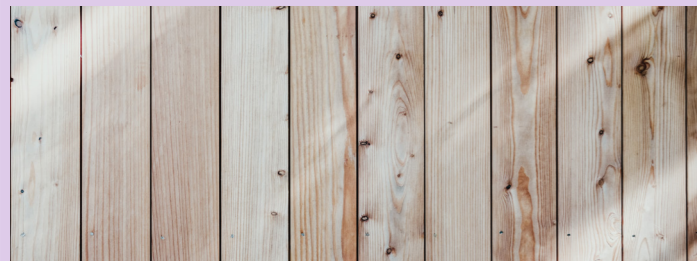
LOCAL GRAVELS AND AGGREGATES

When choosing gravel or aggregates for paths and driveways, select locally sourced materials to reduce transportation-related carbon emissions.



NATURAL STONE

Locally sourced natural stone, such as limestone or basalt, can be used for pathways, walls, and garden features. These materials have a long lifespan and blend well with the New Zealand landscape. Locally sourced stone is more sustainable than sourcing stone from overseas as it reduces transportation-related carbon emissions.



SUSTAINABLY SOURCED TIMBER

When building fencing, or other outdoor structures, opt for sustainably sourced timber certified by organisations like the Forest Stewardship Council (FSC). Consider locally grown timber to reduce transportation emissions.



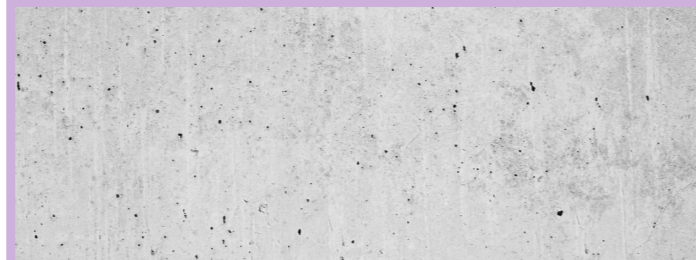
PERMEABLE PAVERS

Choose permeable paving materials like porous concrete or permeable pavers. These allow rainwater to infiltrate the soil, reducing runoff, surface flooding, and supporting water to release into the groundwater system.



RECYCLED OR RECLAIMED TIMBER

Using recycled or reclaimed timber for outdoor furniture, decking, or garden structures is an eco-friendly choice that reduces the demand for new resources. Try to source timber that has been recovered from demolition sites.



RECYCLED CONCRETE

Crushed recycled concrete can be used as a sustainable alternative to traditional gravel or aggregate for driveways and paths, drainage material, or basecourse when laying a patio. Recycled Concrete Aggregate (RCA) utilises crushed concrete from demolished structures and can be used as a replacement for traditional aggregates, reducing the demand for new extraction.



LOW-IMPACT LIGHTING

Choose energy-efficient, low-impact lighting options such as solar-powered garden lights or LED fixtures with motion sensors. Consider turning lights off when not in use to minimise light pollution. Moths and other nocturnal insects are attracted to light, and artificial lights, particularly those with a high content of blue and ultraviolet wavelengths, can disrupt the natural behaviours of these creatures.



NATURAL FIBRE MULCH

Organic mulch made from materials like straw or wood chips is a sustainable choice for soil improvement, weed suppression, and moisture retention. Consider hiring a mulcher when clearing felled timber.



PAINTS AND STAINS

VOCs (Volatile Organic Compounds) are chemicals that can be emitted as gases and contribute to air pollution. Water-based paints and stains typically have lower VOC content compared to oil-based alternatives. They also have a lower environmental impact during production and disposal. Look for certifications like Environmental Choice New Zealand.



RECYCLED PLASTIC PRODUCTS

Consider using recycled plastic lumber for outdoor furniture, edging, or raised beds. Recycled plastic diverts waste from landfills and reduces the need for new plastic production.



RAINWATER HARVESTING SYSTEMS

Invest in rain barrels or cisterns to collect rainwater for irrigation and reduce reliance on potable water. You can make your own by reusing old rubbish bins, buckets, or plastic containers. You can get a 200L water tank at a reduced rate from [Upper Hutt City Council](#).

RESOURCES

Visit [Scaife Timber](#)⁴⁷ in Mangaroa, Upper Hutt for recycled and reclaimed timber recovered from demolition sites.

Visit the [MenzShed](#)⁴⁸ in Upper Hutt for help with fixing things and tool use.

SITE DESIGN - COLLATE DATA

REVIEW GOALS



ZONES

Take your site analysis plan and refer back to, your goals, how would you like your site to function better? What do you want to achieve by making changes? Then compare your goals to the sustainability guidance to see what tools are available.

When designing your site, dividing it into different zones can help to create a more organised and aesthetically pleasing outdoor space. Start by evaluating your garden's size, shape, and existing features. Consider factors such as sunlight, shade, soil quality, and any existing structures or natural elements like trees or slopes.

Determine the purpose and functionality of different areas within your garden. Common zones include entertaining, relaxation, gardening, play, and utility areas. Your goals will help you decide how to divide the space effectively.

Create a base plan with accurate measurements. You can use graph paper, garden design software, or trace paper over an aerial for this purpose. Remember to include all of the existing structures, boundaries, vegetation and surface treatments.

Next start to add any potential zone divisions. Consider the flow and circulation patterns within the garden. Physical elements like fences, walls, hedges, trellises, or pathways can be used to create distinct zones. For example, a low fence or hedge can separate a vegetable garden from a seating area.

Design your garden as if it were an outdoor extension of your home. Each "room" can have a specific purpose, such as a dining area, a lounge area, or a play area for children.

Outdoor lighting can help define zones and extend the use of your garden into the evening. Different lighting styles can create various moods and enhance safety.

Choose plants that suit each zone's specific conditions, like sunlight, shade, and soil type. Consider the colour and texture of plants to create visual interest.

Your landscape's needs may evolve over time, so plan for flexibility in your design. Allow for the possibility of reconfiguring zones or making changes to accommodate future needs.

ASSESS GOALS

Remove unused trampoline: Sell / gift / recycle materials.

More birds/wildlife: Create habitats.

More permeable surface: Reduce concreted areas.

Add fruit trees: Use deciduous trees for summer shade, and winter sun access from the north.

Build greenhouse: Use recycled materials, place in a high sun area, ensure that it is in a position that does not create additional shade to other areas of the garden.

Raised garden-beds: Place in a sheltered, high sun, easily accessible location. Use recycled materials to create the boxes. Build to a height that is easily accessible without bending over too far.

Better utilise front yard: Improve access, define the function, improve fencing, and provide an attractive frontage.

Lawn for grand-kids: Space for them to kick a ball around when visiting, and accessible from lawn-mower storage area.

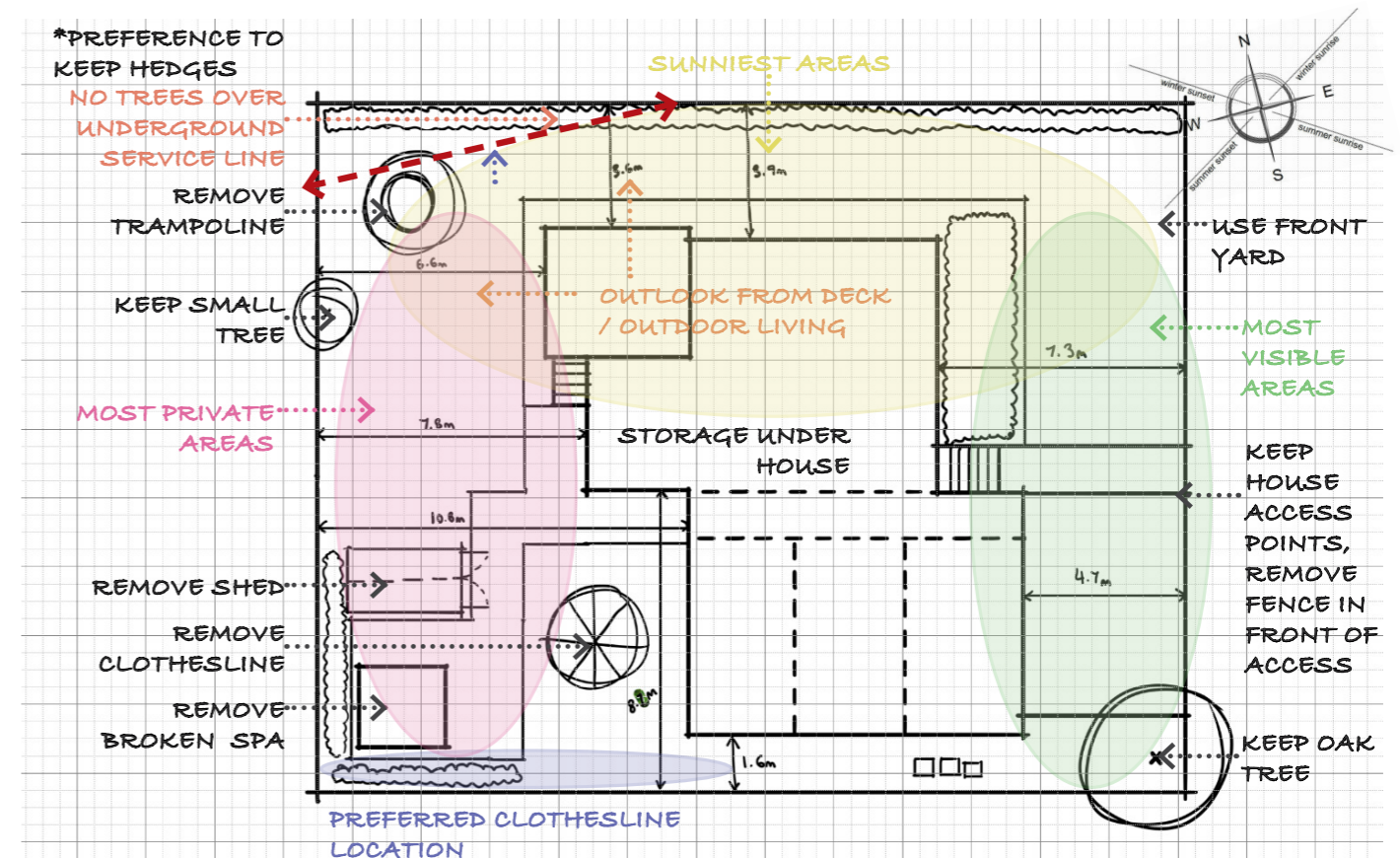
Increase entertainment and living space: Extend outdoor living area or improve access. Make the rest of the garden more inviting.

Replace broken clothesline: Recycle the used materials at the scrap yard, use compact clothesline to maximise usable space, place on south boundary with northern aspect for good clothes drying wind and sun access.

Utilise under-house storage: Existing area under house to be used for storage so that the old shed can be removed and maintain easy access for garden equipment.

Remove under-used shed: Gift to friend who needs additional firewood storage space.

Compost: Create open area or purchase drum. Consider bokashi area adjacent it.



SITE DESIGN - CONCEPT ITERATIONS

CONCEPT ITERATIONS

Next create a few copies of your base plan, so that you can play with different options for how you could implement your ideas. Start by generating rough sketches or drawings that explore various layout ideas that consider different themes, styles, and focal points.

Determine how you want to divide the garden into zones based on your previous zone mapping.

Experiment with different plant selections, including trees, shrubs, flowers, and hardscape materials (e.g., paths, patios), and explore variations in plant placement and groupings.

Trial the placement and design of hardscape elements like paths, walls, fences, pergolas, and seating areas, and look into different materials, colours, and textures.

Explore outdoor lighting options to enhance the atmosphere and functionality of each area. Experiment with various lighting fixtures and placement.

If the landscape design includes water features like ponds or fountains, try different layouts and designs for these elements.

Consider different types of outdoor furniture and accessories for each zone. Test out arrangements to create inviting and functional spaces that compliment the way you use the space.

Ensure that the garden design is safe and accessible. Experiment with pathways and ramps for easy navigation, especially if the garden needs to accommodate individuals with mobility challenges.

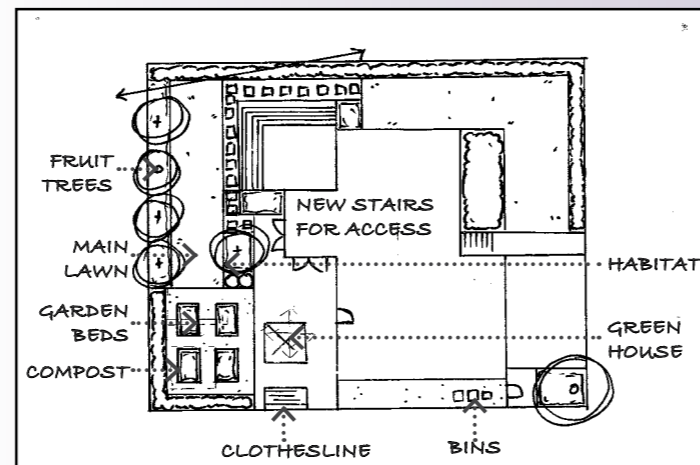
Design with biodiversity in mind. Experiment with plant choices and layouts that attract wildlife and promote ecological balance.

Incorporate eco-friendly practices into the design, such as rain gardens, composting areas, and sustainable irrigation systems.

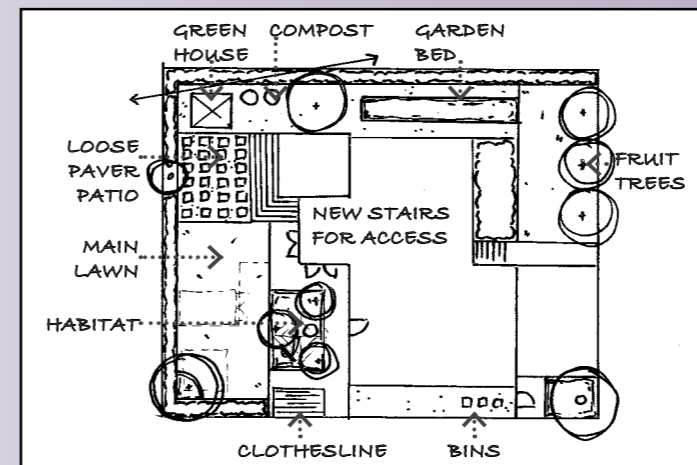
Consider how the landscape will look and function throughout the seasons. Experiment with plant choices that provide interest, texture and colour year-round.

Evaluate the maintenance of different design iterations and choose options that align with your desired level of upkeep.

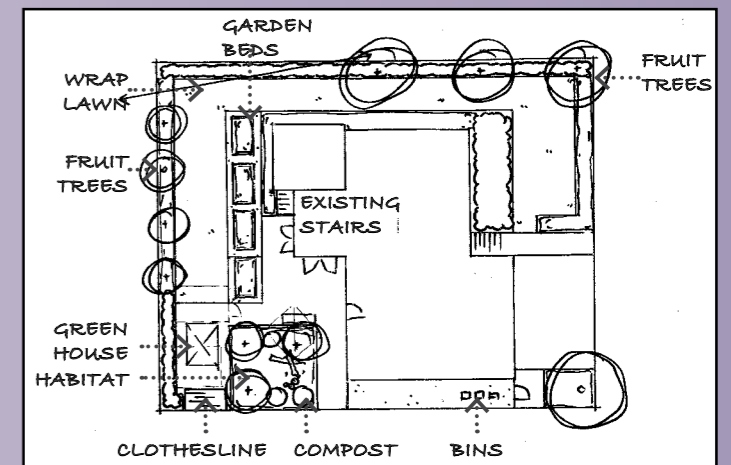
Based on your evaluation, select the concept that best meets your needs and aligns with your goals, then create a detailed landscape plan that includes planting types, hardscape layout, boundary treatments, and construction requirements, for the chosen design iteration.



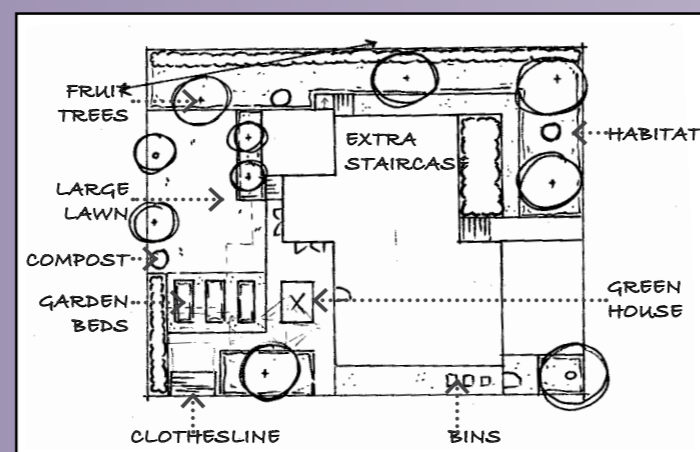
Narrow lawns wrap around house, steps from deck to expand outdoor living space. Greenhouse on existing concrete slab, small fauna habitat area



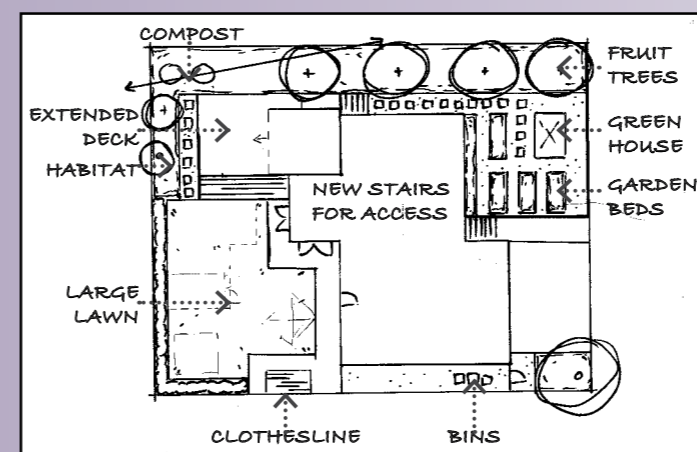
Loose pavers to extend outdoor living area and connect to extended lawn. Frontage used for fruit trees. Relocatable greenhouse by service pipes. Small habitat area.



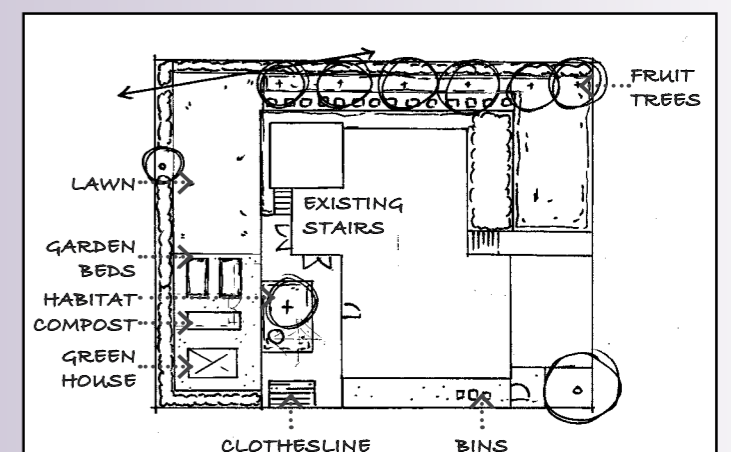
Narrow lawns wrap around house, easily accessed garden beds and formalised frontage. Deck as existing, green house screens clothes lines, garden extended for habitat creation.



Added stair case from existing deck to connect to frontage habitat area. Large north west lawn with garden beds to side.



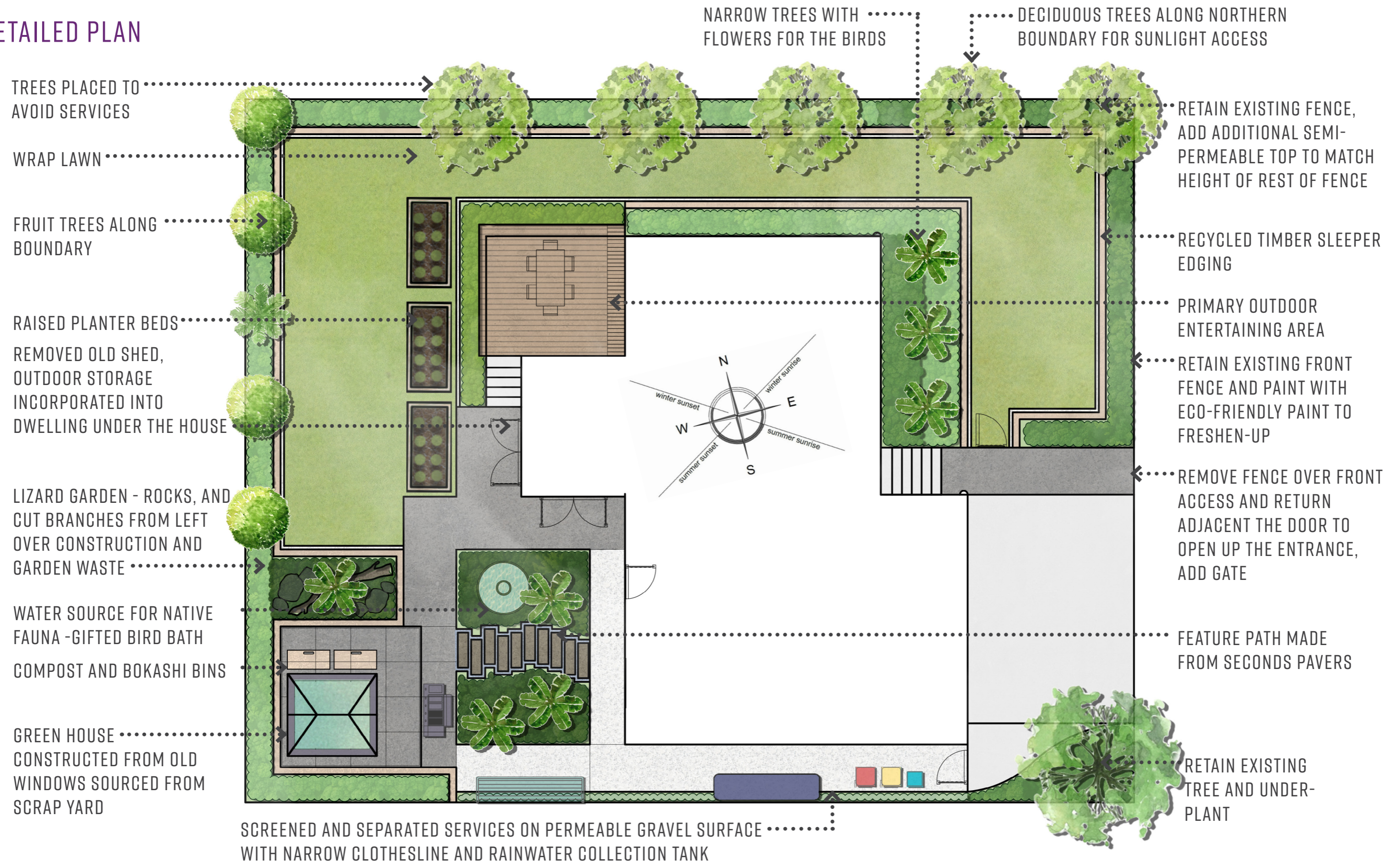
Extend deck, and connect to extended lawn with new stairs. Fruit trees to north boundary, small habitat space to west. Frontage used for edible garden area at the frontage.



Existing deck and stairs, large lawn, planted, open frontage. Habitat screens clothesline from living areas. Garden beds to side of lawn.

SITE DESIGN - PREFERRED APPROACH

DETAILED PLAN



SITE DESIGN - PLANTING DESIGN

PLANTING PLAN



(A) SHRUBS/GRASSES/GROUNDCOVERS (SUN)



(B) SHRUBS/GRASSES/GROUNDCOVERS (SHADE)



(C) POLLINATOR / LIZARD GARDEN



(D) HERBS AND EDIBLE SHRUBS



(E) CLIMBERS



(F) SPECIMEN TREES



(G) FRUIT TREES



(H) NARROW TREES



SITE DESIGN - SURFACES DESIGN

SURFACES AND ITEMS PLAN



SURFACE TREATMENTS



Retain existing concrete



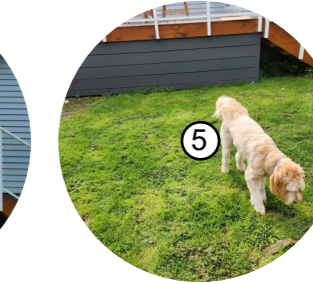
Gravel



Seconds pavers



Existing Deck



Lawn

LANDSCAPING ITEMS



Landscaping rocks



Rainwater collection



Vegetable boxes



Timber garden edging



Water feature



Green house



Compost and bokashi bins



Existing BBQ



Clothesline



Logs for lizard habitat

SITE DESIGN - BOUNDARY TREATMENT DESIGN

BOUNDARY TREATMENTS PLAN



EXISTING BOUNDARY TREATMENTS



--- (Ex) --- Existing fence to be retained and spruced up - paint black with environmentally-friendly paint.

AMENDED BOUNDARY TREATMENTS



--- (F2) --- Add a trellis to the top of the existing fence to improve privacy and allow for climbers to grow up the fence line.

PROPOSED BOUNDARY TREATMENTS



--- (F1) --- 1.4m semi-permeable fence to close in the front garden and sideyard gate to make it safe for the dog. Add matching gate.
 (G1)

--- (HR) --- Add a handrail to the new fenceline to provide support when going up the stairs. Handrail to match existing deck.

SITE DESIGN - COSTING AND QUANTITIES

COSTING YOUR PROJECT

Costing a landscape plan can be a complex task as construction costs are often changing, but it can be broken down into several steps to make it more manageable. Here are some tips to help you with this process:

CREATE A SPREADSHEET:

Start by creating a spreadsheet that includes all the items you will need to buy for your project. This will need to include your total number and types of plants, your different surface treatments, your boundary treatments and any individual items to be purchased.

List these items out in a column. Create a second column for details of the item, a third for the category (materials/plants/surfaces/boundary treatments/items etc.), a fourth for price per item, a fifth for price per m², a sixth for number of items required, and a final column for the total. At the end of the row of items create a total costs column and use the auto-sum command to calculate your total.

Some items are purchased individually, and some are bought by the square metre, so utilise the columns accordingly for each item.

CONSIDER VARIATIONS:

Account for variations in products when you go to purchase them, and consider alternatives to particular products if the ones you are looking for are out of stock.

ROUNDING UP:

Always round up the quantities to ensure that you have a buffer in case some items are broken, plants don't survive or to accommodate design adjustments.

LABOUR:

How difficult is your proposed design? Are there any risky elements? What level of quality are you looking for? Does your project require Resource or Building Consent? For the more complex and risky jobs, it is recommended that you contact a professional to assist with design and installation. If your project is however relatively straightforward, you may be able to install it yourself. If you are looking at engaging a professional, your landscape plan will be a really helpful tool for explaining what you would like to achieve. Ask the professional for a quote before proceeding with your design to ensure that it is within your budget.

QUANTIFYING YOUR ITEMS

To be able to accurately cost your landscape plan you need to be able to work out your quantities. Ensure your plan is drawn to scale, and use this as a basis for calculating your quantities. The landscape professionals will often use special tools for calculating the quantities of surface treatments and number of plants, but there are still ways to calculate this manually without this software. Here are a few tips on how to get started:

MEASURE AREAS:

You can use your site plan for accurate measurements to calculate the area of surfaces such as lawn, concrete, paving and planter beds. Things like edging and construction materials may need to be measured by the linear metre.

Remember to include an additional buffer for quantities if your site is on a slope. The steeper the slope, the more contingency you should allow for. Calculating the area of a sloped site requires attention to detail and accuracy in measuring both horizontal distances and changes in elevation. It is important to understand the slope's topography and use the appropriate methods to calculate the area effectively. For very steep or complex slopes, it may be best to consult with a professional surveyor or a landscape architect who has experience working with sloped terrain. They can ensure accurate measurements and area calculations.

CALCULATE PLANT SPACING:

Determine the recommended spacing for each type of plant, considering their mature size. This will help you calculate how many plants can fit in a specific area. (See Planting Methods on Sheet 12 for tips on how to calculate spacing). If the plants you are using have varied plant spacings, it can help to draw circles that represent the mature size of the plant to help determine the number of plants required. If the plants within your bed have the same spacing, you can calculate the number of plants per square metre, by multiplying the area of each planting bed by the desired plant spacing to calculate the number of plants needed for that area. Be sure to account for any irregular shapes and adjust your calculations accordingly.

A helpful formula is:

$$\text{Plants per square metre} = (1 / \text{spacing in metres}) \times 2.$$

$$\text{Total plants per bed} = \text{Plants per square metre} \times \text{area.}$$

For example, if your plant spacing is 0.5 metres, your calculation would be $(1 / 0.5) \times 2 = 2$. $2 \times 2 = 4$ plants per m². If your planter bed area is 3m², your formula would be $4 \times 3 = 12$. Which means you need 12 plants for that garden bed.

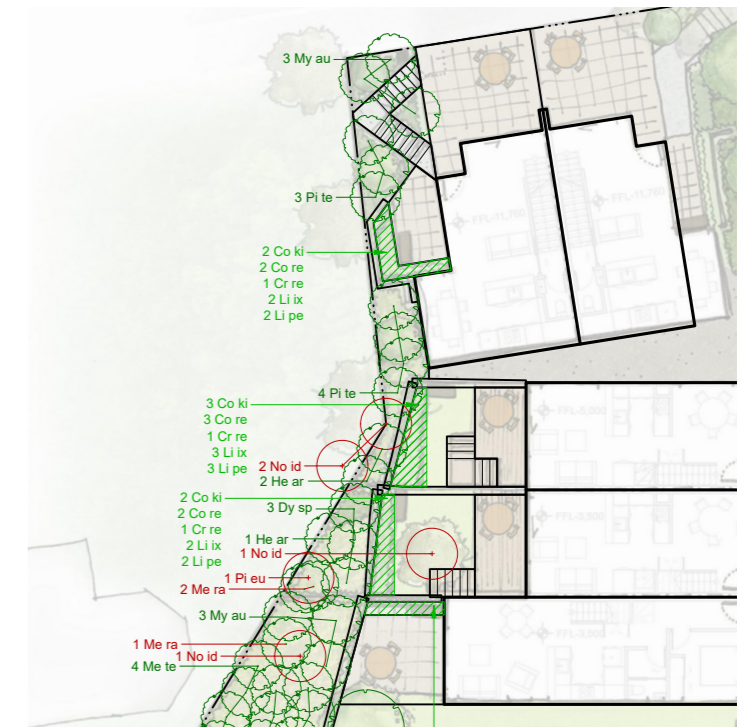
BUDGET ESTIMATE

Once you have the quantities, research the cost of each item, surface material and plant species, including and any additional materials required (e.g., mulch, soil, irrigation components). Create a budget based on these estimates. Don't be afraid to shop around, as the first price you find may not be the best one. It can also really help to go into the stores rather than trying to do all your costing online. The people in the store can give you direct advice on the products, give you a quote, and help you find the perfect product for the job. Going to your local scrap yard can be a great way to find budget-friendly items on your list, and help provide a new life for a product that may have otherwise been discarded.

REVIEW AND ADJUST:

Periodically review and adjust your plan and cost estimates as the project progresses, taking into account any changes or unforeseen challenges. Remember that landscaping projects can vary greatly in complexity and cost, so it's essential to be flexible and adaptable in your approach.

EXEMPLAR PLANT CALCULATIONS



EXEMPLAR COSTING

Item	Details	Category	Cost per m ²	Cost each	Number	Amount
Fruit trees 25L	Approx 2m height	Plants		\$100.00	4	\$400.00
Specimen trees 35L	Source from local nursery	Plants		\$150.00	5	\$750.00
Plants PB5	Source from local nursery	Plants		\$10.00	250	\$2,500.00
Narrow trees 25L	Approx 1.6-2m height	Plants		\$100.00	7	\$700.00
Green house	made from windows from scrap yard - check at site	Items		\$50.00	10	\$500.00
Planter boxes	Locally made by friend	Items		\$50.00	3	\$150.00
Timber fencing	Standard pine timber	Fencing	\$100.00		8	\$800.00
Paving - Rectangular	Second pavers	Materials		\$10.00	10	\$100.00
Concrete	Cost concrete per m ² 180-240 depending on additions	Materials	\$200.00		2	\$400.00
Fruit trees 25L	Approx 2m height	Materials		\$100.00	4	\$400.00
Clothesline Austral Slenderline 20 Macrocarpa sleeper	6 lines, Frame Size: 3.39m x 600mm	Materials		\$284.00		\$0.00
Installation	200Wx100Dx2100L - trade me bulk order	Materials	\$13.00	\$27.50	45	\$1,237.50
	Will do myself on weekends to minimise costs	Labour				\$0.00
Total						\$7,937.50

SITE DESIGN - IMPLEMENTATION

CONSTRUCTION PROCESS

Once you are happy with your plan and final budget, it is time to start the construction process. Remember that good things take time, and you do not always have to get your landscape finished in one big go. A landscape is a living thing and is always adapting and changing over time, so become attuned to your new space and see what it may need over time as you grow together. Remember that the seasons can often determine when things need to be done. If you are laying any hard surfacing you want to wait for a sunny day, if you are planting natives they thrive best when planted between April and August, edible plants are very seasonal so look up their best planting times before proceeding.

When you start your planting and construction work, follow the plans closely.

Start by removing and safely disposing of any unwanted site material. A clear access to and from the area will be crucial, especially if utilising construction professionals.

This stage includes preparing the soil, installing hardscapes, and planting trees, shrubs, and flowers. Ensure proper spacing and planting techniques are followed.

Address soil quality issues, such as compaction or poor drainage, by amending the soil as needed to create a healthy environment for plant growth.

Plan for minimising ongoing maintenance by choosing low-maintenance plants, installing mulch to suppress weeds and conserve moisture, and establishing a maintenance schedule for tasks like pruning and fertilising.

Add finishing touches, such as decorative elements, garden art, and furniture to complete the design and enhance the aesthetics of the landscape.

Remember to take photos and document your work as you go so that you can reflect on your achievements. Periodically review the landscape as it matures, making necessary adjustments to maintain the health and appearance of your garden.

Remember that the process of constructing a finished landscape design can take time and effort. Be patient and flexible as you work through the various stages, and don't hesitate to seek inspiration from gardening books, websites, or local nurseries. A well-executed landscape design can enhance the beauty and functionality of your outdoor space for years to come.

The following pages contain some inspiration that we hope will spark some ideas, and help you take the first step in creating your sustainable garden.

WORK IN PROGRESS



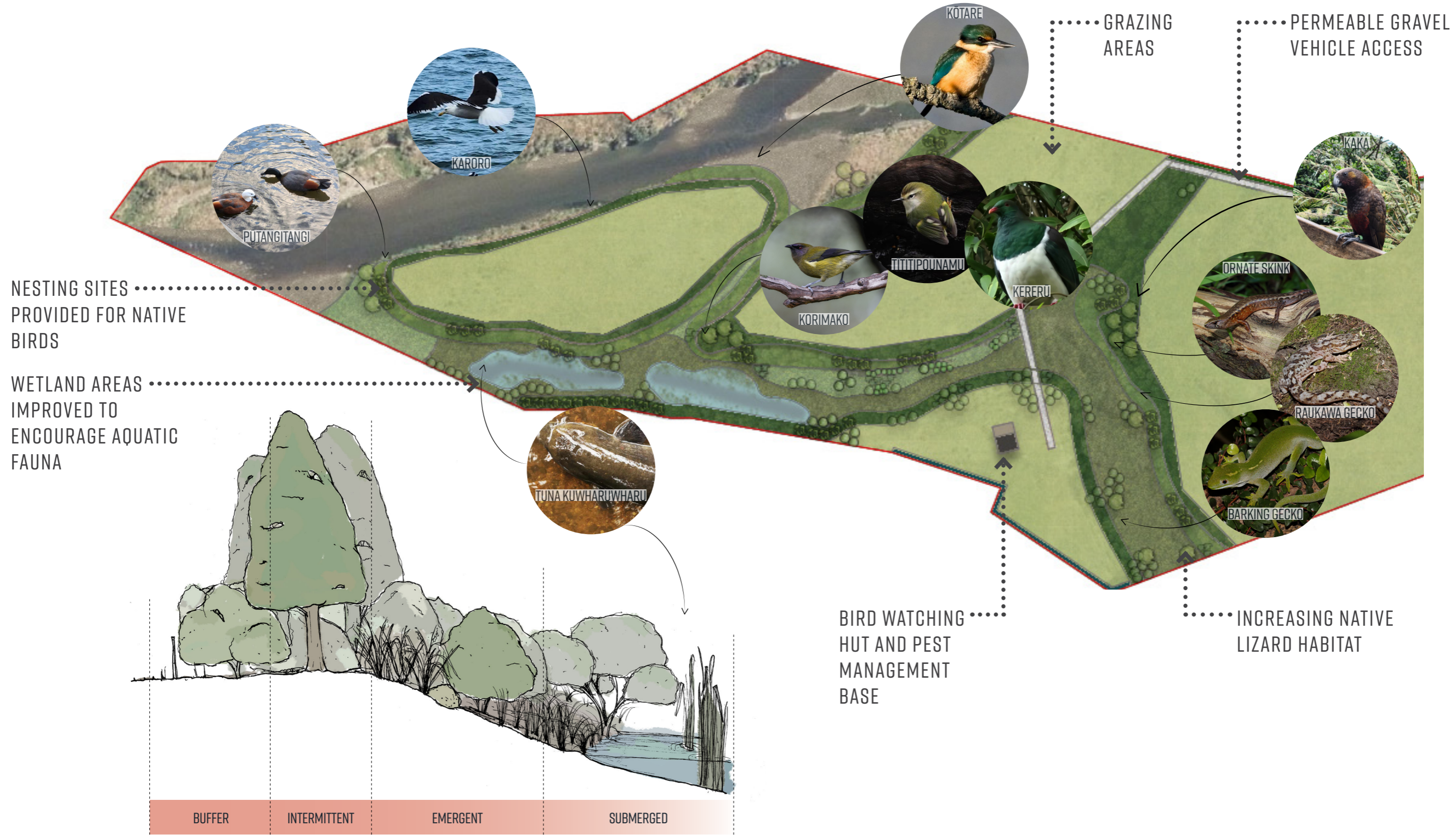
BEFORE



AFTER



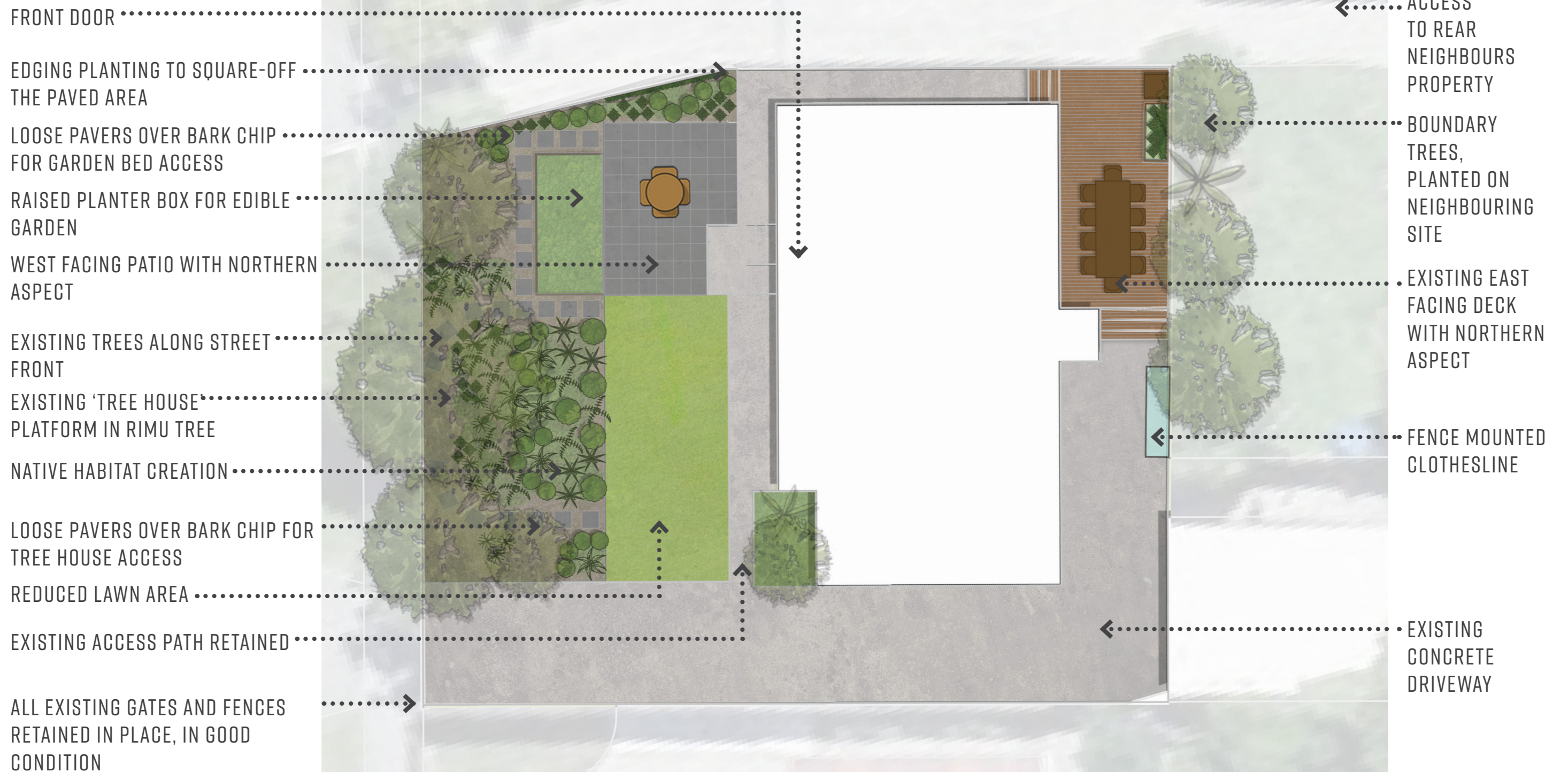
EXEMPLAR INSPIRATION: RURAL WITH WETLAND AND HABITAT REMEDIATION



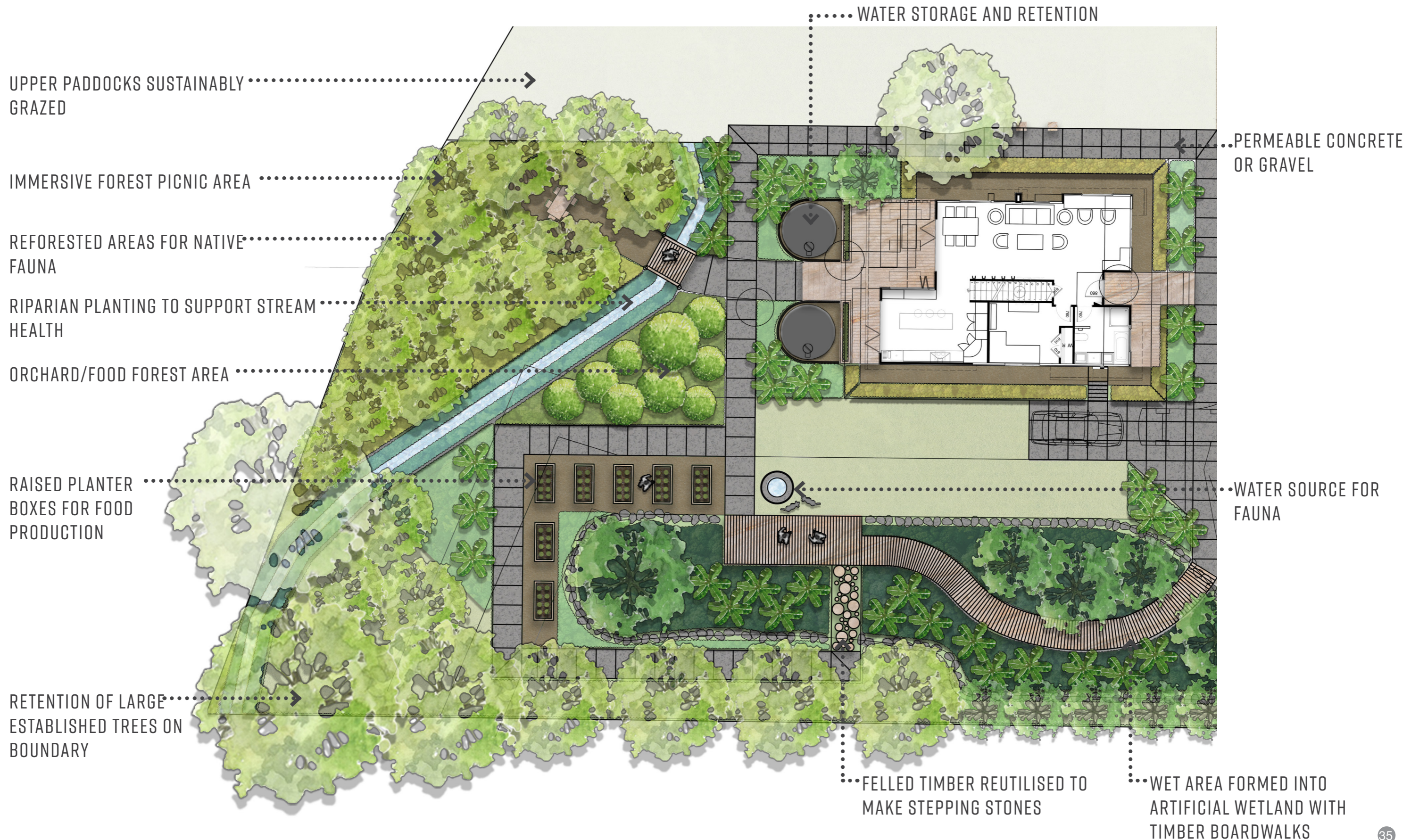
EXEMPLAR INSPIRATION: SHARED SPACE IN A DEVELOPMENT



EXEMPLAR INSPIRATION: SUBURBAN HABITAT STEPPINGSTONE



EXEMPLAR INSPIRATION: LIFESTYLE PROPERTY



EXEMPLAR INSPIRATION: MULTI-GENERATIONAL LIVING



END NOTES

1. Before You Dig: <https://www.beforeudig.co.nz/nz/home>
2. SunCalc application for measuring sunlight access: <https://www.suncalc.org>
3. <https://www.inaturalist.org/>
4. Building Code Clause F9—Means of restricting access to residential pools: <https://www.building.govt.nz/assets/>
5. [Uploads/building-code-compliance/f-safety-of-users/f9-restricting-access-residential-pools/asvm/f9-restricting-access-to-residential-pools.pdf](https://www.building.govt.nz/assets/uploads/building-code-compliance/f-safety-of-users/f9-restricting-access-residential-pools/asvm/f9-restricting-access-to-residential-pools.pdf)
6. Upper Hutt City Council's pool safety and inspection requirements: <https://www.upperhuttcity.com/Services/Health-and-safety/Swimming-pools>
7. Upper Hutt City Council provide support for purchasing a 200L water tank for your home at a reduced rate: <https://www.upperhuttcity.com/Services/Water/Buy-a-200-litre-water-tank>
8. Water sensitive urban design Guideline: <https://www.wellingtonwater.co.nz/assets/Blocks/Building-Development/WSD-for-Stormwater-Treatment-Device-Design-Guideline-December-2019.pdf>
9. Upper Hutt City Council GIS Map Viewer: <https://maps.uhcc.govt.nz/Viewer/?map=cb54215cc7344286b-8b3424a3a29f07f>
10. Greater Wellington Wetland information: <https://www.gw.govt.nz/environment/our-natural-environment/our-unique-ecosystem-types/wetlands/wetlands-in-our-region/>
11. Wetland restoration: <https://www.wetlandtrust.org.nz/>
12. Wetland protection guide: <https://www.doc.govt.nz/get-involved/run-a-project/restoration-advice/wetlands-protection/>
13. Upper Hutt City Council provide support for purchasing a 200L water tank for your home at a reduced rate: <https://www.upperhuttcity.com/Services/Water/Buy-a-200-litre-water-tank>
14. Upperhutt city council water conservation tips and tricks: <https://www.upperhuttcity.com/Services/Water/Water-conservation>
15. Restoration planting techniques: <https://www.wellington.govt.nz/-/media/environment-and-sustainability/sustainability/files/restoration-planting-guide/restoration-planting-techniques-04>
16. Wellington Native Plant guide: <https://www.gw.govt.nz/assets/Documents/2021/10/Wellington-Regional-Native-Plant-Guide-Revised-Edition-2010-Web.pdf>
17. Manaaki Whenua Landscape Research: https://icmlandcareresearch.co.nz/research/research.asp?theme_id=1&research_id=15
18. Success of companion planting guide: https://assets-global.website-files.com/64ec7455083f0a9ef61b-24b6/651a7405a44b12668a5e89ef_UHCC_Companion-Planting_Guide.pdf
19. Upperhutt Beginners Gardening Guide https://assets-global.website-files.com/64ec7455083f0a9ef61b-24b6/652655769abac1b20cc53ae9_UHCC_Beginners_Gardening-Guide.pdf
20. Tips on how to keep your landscape and local environment pest free in a sustainable way: <https://www.facebook.com/PestfreeUpperHutt/>
21. Ideas for what to plant: <https://www.growathon.co.nz/>
22. Upper Hutt's pollinators: <https://www.theguardians.nz/>
23. Guide on how to attract birds to your garden: <https://www.doc.govt.nz/get-involved/conservation-activities/attract-birds-to-your-garden/>
24. Pollinator paths website: <https://www.pollinatorpaths.com/>
25. Gardening for lizards: <https://www.doc.govt.nz/globalassets/documents/conservation/native-animals/reptilesand-frogs/gardening-for-lizards.pdf>
26. Link to information on lizards: <https://www.reptiles.org.nz/conservation/what-can-you-do>
27. Instructions on how to build a rifleman box: <https://www.predatorfreeopeninsula.nz/wp-content/uploads/2021/11/2021-OPBG-How-to-build-a-Rifleman-Nest-Box.pdf>
28. Forest and Bird restoration in Upperhutt Link: <https://www.forestandbird.org.nz/branches/upper-hutt>
29. Clyma Park Community Garden Information: <https://www.upperhuttcity.com/Home/Tabs/New-page/Sport-and-recreation/Parks-and-reserves-directory/Clyma-Park>
30. Birchville Community Garden Facebook page: <https://www.facebook.com/groups/899579170756152>
31. Mangaroa farms website: <https://mangaroa.org/>
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