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Te Whakaoranga o Te Puhinui | Te Puhinui Regeneration Strategy

NGAA MAHINGA KAI O TE PUHINUI - PRODUCTIVE LANDSCAPES GUIDANCE DOCUMENT

Revision C | April 2023

Prepared by



For



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LIMITATIONS

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Introduction

This document is a technical report intended to support decision making in the re-establishment of mahinga kai sites throughout Te Puhinui. It contains both quantitative and qualitative information about food gathering and production in Te Puhinui derived from a range of sources including desktop analysis, spatial analysis of the Puhinui catchment and interviews with people experienced in community food systems.

For the purpose of this report, mahinga kai refers to all traditional wild harvest and food gathering as well as contemporary food, fibre and medicine production and harvest. While this document is intended to support mahinga kai in Te Puhinui, it focuses primarily on productive landscapes where humans are actively managing soil fertility and food production systems.

The document includes

- Introduction and Overview of Productive Landscapes for Te Puhinui
- Productive Landscape Zones
- Productive Landscape Zone Matrix
- Practical Guidance, Considerations and Recommendations
- Productive Potential of Te Puhinui Mapping
- Urban Transect
- Stakeholders, Collaborators & Potential Partners
- Appendices

Types of Production

There are three broad types of productive landscapes:

1. Intensive

Small scale fresh fruit and vegetables and some livestock requiring more energy input per square meter than extensive systems. Soil fertility is maintained through inputs such as compost, manure, worm castings, fish meal etc. Produce typically doesn't store or transport well.

2. Extensive

Large scale crops such as grains and legumes in temperate climates which stores and transport well and pastoral systems including dairy and meat. Soil fertility is maintained through crop rotation and fallow periods.

3. Wild Harvest

Hunting and harvesting of plants and animals from both terrestrial and aquatic environments. Few inputs are required to produce food in comparison to intensive and extensive systems. Productivity and health of the wild resource is managed by changing the frequency and scale of harvesting.

Scales of Production

Home

Whether a kitchen or home garden, medicinal plants or a small backyard orchard, these productive landscapes focus on growing for home use and typically happen within a home environment.

Community

These productive landscapes involve establishing and maintaining productive landscapes with members of the community and typically occur outside the immediate home environment, often on public land. These food systems include community gardens and orchards and produce food to feed multiple households. These systems often prioritise non-food production benefits such as health and wellbeing, and community participation and inclusion as well as growing food.

Gardens for Health identifies seven different types of community gardens in Auckland. These are:

1. Teaching Gardens - originally designed around teaching people how to garden through a 6 month gardening cycle learning how to grow from seed to table. There are 7 of them in Auckland. Examples - Maangere, Manurewa, East Taamaki.

2. Traditional community gardens - everyone works together, does the work and reaps the benefit - Can produce 3-5 tonnes/season (March-May). Examples - Calvaria Ramarama, Calvaria Bombay
3. Maaori community market garden - x1 person leading the operation and whaanau based participation model. Garden serves the wider community. Example - Papatuuuanuku Kookiri Marae, Maangere East
4. Church/Trust gardens - members of a congregation or organisation come together to grow food. There are lots of this model gardens in South Auckland. Examples - Umutaha in Rarecress Reserve; Papakura; West side of Pukekohe
5. Healing/Wellbeing Gardens - gardens that focus on/prioritise health and wellbeing outcomes. Examples - Dingwell Trust Garden (just outside Puhinui); Wesley (Afghanistan)
6. Age Care gardens - Gardens that are within the grounds of retirement villages or directly associated with senior citizen facilities and services. Examples - Waitaakere Garden, MetlifeCare Retirement Village, Henderson; Abbeyfield Kitchen and Wellbeing Garden, Sandringham.
7. Educational Gardens - Gardens that focus on learning about food production as part of a school curriculum. Example - Maangere College.

Market

These productive landscapes prioritise producing large quantities of food in a way that is commercially profitable. Market gardens and commercial orchards are typical examples of this scale of production but emerging models include collective market gardens whereby many growers work together to produce food at commercial scale and share profits and risks. Market scale food systems can sell their produce to local consumers or markets further afield.

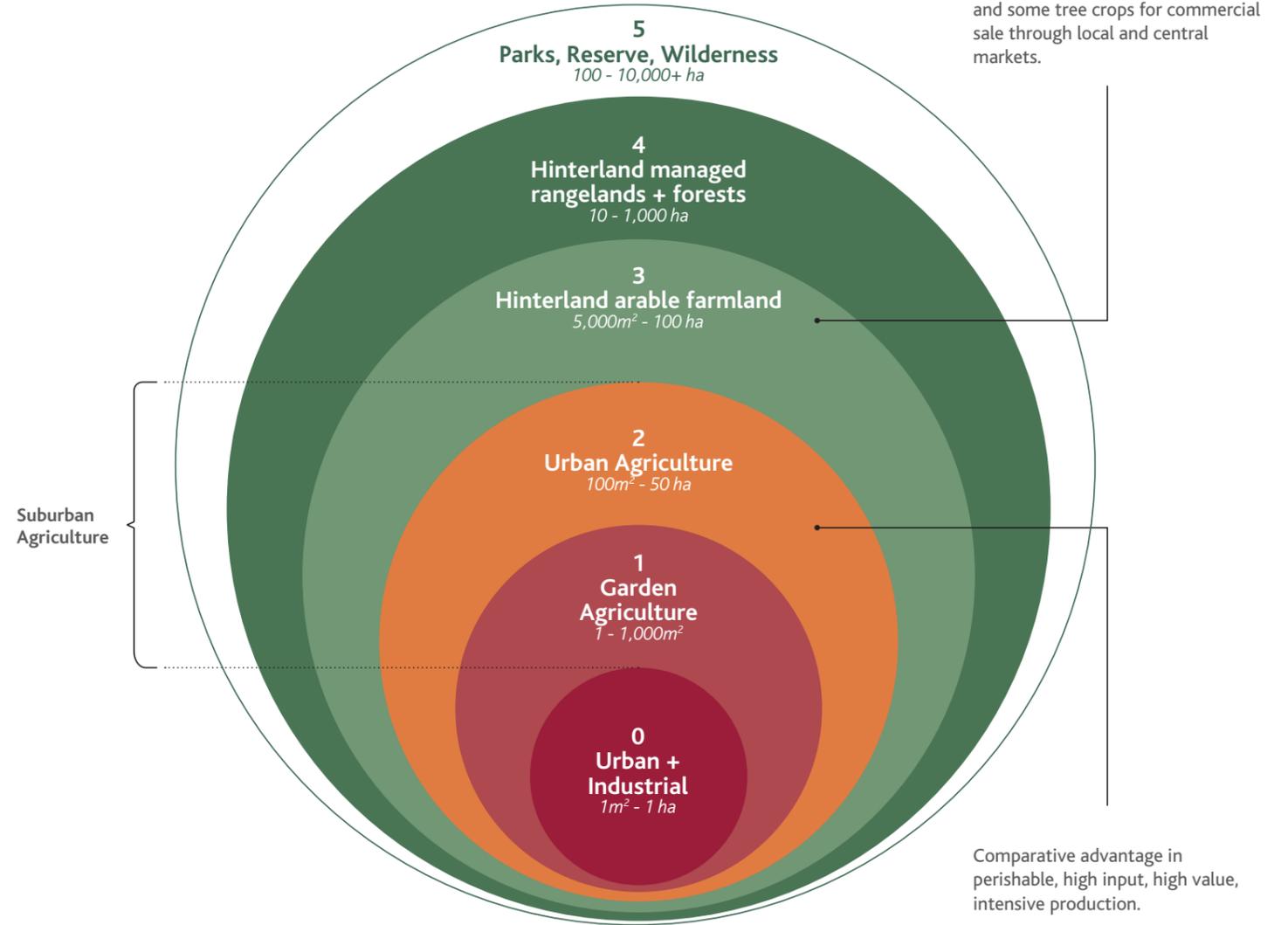
Key Ingredients for Successful Local Food Systems - A Summary

- Be purpose/mission focused and driven.
- Secure land and water.
- Start small and grow incrementally.
- Foster ground up food production - identify and support passionate local individuals and groups to grow people as well as food
- Foster trust between:
 - funders, landowners and growers
 - 'experts', coordinators and local growers
 - growers and consumers
- Involve community anchors and connectors and experienced food producers from the outset.
- Encourage/promote core group governance.
- Grow crops that do well locally.
- Work to remove barriers and obstacles to local food production (government agencies have a particular role to play here).
- Develop the minimal amount of structure and organisation required to make that system work well.
- Focus on prime location and secure medium to long term tenure.
- Make cultural food connections.
- Work with nature - use and mimic natural processes and patterns to grow food sustainably.
- Ensuring everyone gets a 'return on investment' and emphasize learning by doing and having fun
- Documenting experimentation and trialing different methods and systems. Share your learning journey.

Productive Landscapes

Productive Landscape Zones (PLZ) is a permaculture concept that organizes a site such as a garden, a farm or a catchment like Puhinui into areas requiring similar types and amounts of management and maintenance. On a practical level, a PLZ is determined by how often the area and the elements in it need to be used and maintained. Organising different types of food systems using PLZs helps to understand the indicative size and scale of land area, resources, labour and investment required to establish and maintain the food system. The PLZ should also reflect the underlying environmental patterns and natural processes of a site including climate, landform, soils, water and vegetation. The PLZs are numbered 0 to 5. Zones 1 and 2 are intensive systems requiring frequent access, management and maintenance. Zones 3 and 4 are extensive systems while zone 5 are lightly managed areas for wild harvest.

This diagram presents the relative size requirements of the different productive landscape zones and their different land uses.



● Zone 1 - Gardens



The most intensively managed zone including annual vegetables, salad mixes, and herbs; flowers for cutting and beneficial insects; small fruit plants, dwarf and espalier fruit trees; some small livestock such as worms; bees; chickens, poultry and rabbits as well as other garden infrastructure such as compost bin, worm farm and bokashi systems; tunnel houses; propagation frames / potting shed; tool or garden shed; green house; coops and small animal enclosures; rain barrels, small tanks or ponds, greywater recycling, reticulated irrigation; terracing, planted swales, rain gardens, and infiltration trenches. Zone 1 areas often include social spaces such as decks, courtyards, lawns, BBQ or pizza ovens. They are intensively managed and should be visited every day. They require larger energy input per square meter than any other PLZ.



● Zone 2 - Orchards and Forest Gardening



An area of intensive food production including annual and perennial vegetables and staple crops with long growing seasons; flowers for cutting and beneficial insects; larger shrubs and fruit bushes; orchards and forest gardens; some market crops; larger composting areas; mushroom logs/hay bales; animals such as bees, chickens and poultry, pigs, goats and fish and fire retardant and shelter planting. Water management strategies vary with every site but would typically include a combination of bore water, water storage tanks, greywater recycling, reticulated irrigation, terracing, planted swales, rain gardens, and infiltration trenches. Structures may include tool or garden shed; workshop; propagation area; coops and small animal enclosures. Animal shelters are often positioned between zones to allow people and animals easy access to two adjacent zones. Zone 2 systems are typically used quite intensively, needing care a couple of times a week. Maintenance techniques include regular weeding and care, composting and regular application of compost and other nutrient sources, irrigation, animal care, spot mulching, tree guards during establishment, planting guilds and groundcovers, and seasonal pruning.



● **Zone 3 - Farm**



Extensive productive areas for large sites, typically in rural and rural residential areas. Land uses include terracing, vegetated swales and contour planting, forest gardens and orchards of larger fruit and nut trees; mushroom logs/ hay bales; commercial field crops; woodlot for firewood and timber; sown pasture for livestock such as cattle, horses, sheep, pigs and goats; fire retardant and shelter planting; as well as animal shelters, workshops, barns and other farm structures; and vehicle and foot access for maintenance. Zone 3 systems and landscapes typically need to be visited two to three times per week with intensive periods of work a few times a year either during harvest or annual maintenance seasons. Soil fertility is managed through the use of perennial vegetation, green manures, fallow periods and/or animal manure as the area tends to be too large to maintain using a home compost system. Management techniques include crop rotation; coppicing; light pruning; spot irrigation and tree guards during plant establishment, stock care and rotation, infrastructure maintenance for permanent fences, access and water systems.



● **Zone 4 - Forestry and Grazing**



Extensive productive areas for large rural sites which typically involves a combination of grazing and forestry. Land uses include pasture for larger grazing animals such as horses, sheep, goats and cows and a wide range of forestry systems including agroforestry, native and analog forestry for timber and firewood, large nut trees; shelter planting; dams, pond and/or lakes, wetlands and natural waterways; and vehicle and foot access. Zone 4 landscapes typically need to be visited two to three times per month or less and need to be maintained periodically. Management techniques include coppicing, pruning and shaping trees for timber, stock care and rotation and infrastructure maintenance for fences, access and water systems if any.



○ Zone 5 - Ecology and Wild Harvest



Land that provides core and broad scale ecosystem functions, inspiration, education as well as small, but not insignificant yields. Zone 5 includes patches of remnant vegetation and native ecosystems, riparian corridors, wetlands and natural waterways as well as vacant sites, fragmented, disturbed, neglected or unused areas of land that are under a process of succession and are likely to revert back to a forest ecosystem. The emergent forest is likely to be composed from a unique collection of species - a novel ecosystem - which typically, but not exclusively includes exotic and native species. They are usually the result of human intervention but are not directly or actively managed by people. Areas of native vegetation and natural waterways are typically managed for conservation. Management techniques include noxious plant removal and trapping of pest animals. Selected canopy species can also be pruned and shaped for long term timber production. Management of emergent, novel ecosystems involves working with the natural successional process - a practice that largely involves removal of the unwanted plants and animals and allowing for and encouraging species that increase their ecological, social, and aesthetic values while allowing the natural successional process to play out. Sustainable yields are limited per area of land and are restricted to wild harvest - hunting animals and foraging and harvesting of plants and fungi from land and water as well as selected logging under the right circumstances.

Zone 5 areas can also be included in gardens in urban and suburban areas intentionally designed to increase habitat for birds, insects, lizards and fish and which require very little management once established.

PRODUCTIVE LANDSCAPE ZONE MATRIX

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PRODUCTIVE LANDSCAPE ZONE	SIZE / SCALE	FREQUENCY OF VISIT	EXAMPLE FOOD SYSTEMS	MAINTENANCE TECHNIQUES	INFRASTRUCTURE REQUIREMENTS		INVESTMENT - STARTING UP / RUNNING COSTS ¹	LABOUR REQUIREMENTS ¹	FOOD YIELDS ¹
					STRUCTURES AND ACCESS	WATER SYSTEMS			
ZONE 1 Gardens	1-1,000m ²	Multiple times a day	Kitchen Garden, Balcony Garden, Raised Beds, Home garden, Community Garden, Market Garden, Urban Agriculture	Intensive weeding and mulching; dense stacking, biointensive beds; espalier; propagation	Propagation area - potting bench/shed; tool / garden shed & storage facilities; wash station; packing station; Tunnel/green house; garden beds; wicking beds; refrigeration	Rainwater collection - rain barrels / tanks; small ponds; greywater; terracing; reticulated irrigation	<p>Home Can set up small systems with little to no financial investment if the land and plant stock is available/gifted. However, access to basic tools and equipment are often critical to establishing and maintaining home scale production.</p> <p>Community Can set up community scale systems with little to no financial investment if the land and plant stock is available/gifted. However, basic tools, equipment and infrastructure are all critical to these systems working well. \$1,200.00 for basic tools; \$4-5,000.00 for all the basics; \$9-10,000.00 including water infrastructure.</p> <p>Market \$30-100,000.00 depending on scale and complexity.</p>	<p>Home / Community Scale Depending on the objectives of the growers the time and effort required can vary from an hour or two a week to several hours a day. Also, different plants require different levels or care to produce well.</p> <p>Market Scale 40-60 hours / week / 4,000m²</p> <p>* 4,047m² = 1 acre.</p>	<p>The data obtained through one-on-one interviews varies significantly from one system to another but is intended to provide indicative yields.</p> <p>Home / Community Depending on the time, effort and skill of growers as well as size of the productive landscape yields vary significantly from a few culinary herbs to add to a meal occasionally through to produce from the garden significantly contributing to a family's food supply. However, it is very unlikely that anyone growing food at this scale can be self-sufficient and diets will need to be supplemented from other sources.</p> <p>Market The data below provides a range of organic yields possible at market scale: \$90,000.00 / annum / 400m² 40 x 2kg boxes / week / 400m² \$100,000.00 / annum / 4,047m² 200 food boxes / week / 1,000m²</p>
ZONE 2 Orchards and Forest Gardening	10m ² - 10,000m ² (1 ha)	Once per day / two - three times / week	Orchard, Forest Garden/Food Forest	Regular weeding and care; spot mulch; tree guards; cover crops; seasonal pruning and slashing (chop and drop)	Tool / garden shed; workshop; propagation frames; compost bins, shelter planting; paths and vehicle access	Bore/mains water supply or rainwater collection; large water storage tanks; greywater; reticulated irrigation; bioretention - terracing, swales, rain gardens, infiltration trench	<p>Home / Community Can set up orchard or forest gardens with little to no financial investment if the land and plant stock is available/gifted.</p> <p>Forest gardens are a particularly good system for growing food with little to no investment as one garden becomes plant stock for other forest gardens.</p> <p>Market Commercial orchards require significant investment in tools, equipment and infrastructure to ensure optimal tree health, production/yield, and profitability.</p>	<p>More time is required to establish a forest garden or orchard with less time required over time.</p> <p>Forest gardens and orchards involve pulses of sessional activity such as harvesting and pruning. However, forest gardens require more active management than orchards as they are more complex systems.</p> <p>Community 6 people x 3-5 working bees / annum / 5,000m²</p> <p>Market 2 days / month / 300m² (1 day / month / 300m² is minimal required input to maintain production)</p>	<p>Home A mature and healthy backyard fruit tree can produce 50+kg of fruit / annum depending on the variety.</p> <p>Community 300m² is large enough for a community orchard to provide some food and educational support. 1,200m² - A good size for a community orchard because there is enough area for 55+ fruit trees, or one tree for every week of the year. Community mixed orchard = 25,000kg / annum / 10,000m²</p> <p>Market Commercial apple and pear orchards = 60,000kg / annum / 10,000m²</p> <p>*See footnote for indicative yields of different</p>

1. Most of the information provided in these columns has been provided by expert growers and community food production practitioners in Auckland and across the motu through one-on-one interviews.

PRODUCTIVE LANDSCAPE ZONE MATRIX

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PRODUCTIVE LANDSCAPE ZONE	SIZE / SCALE	FREQUENCY OF VISIT	EXAMPLE FOOD SYSTEMS	MAINTENANCE TECHNIQUES	INFRASTRUCTURE REQUIREMENTS		INVESTMENT - STARTING UP / RUNNING COSTS ¹	LABOUR REQUIREMENTS ²	FOOD YIELDS ¹
					STRUCTURES AND ACCESS	WATER SYSTEMS			
ZONE 3 Farm	1 - 10ha	Two or three times per week or month	Silvopasture, Cropping, Small animals systems (chickens, ducks, quails, pigs etc.)	Grazing, stock rotation and movable fences; cover crops; coppicing; light pruning; spot irrigation and tree guards during establishment	Animal shelters; workshop, barn and other farm structures; vehicle access; farm race	Dams / ponds; bioretention - terracing, swales, rain gardens, wetlands	Not captured as part of this investigation.	Not captured as part of this investigation.	Community/Market 3.5 tonnes of organic kumara / 4,047m ² @ \$4 / kg = \$14,000.00 / annum / 4,047m ²
ZONE 4 Forestry and Grazing	10 - 1000ha	Two / three times per month or less	Conventional Grazing; Carbon Farming; Regenerative Farming; Afforestation; Agroforestry	Grazing; managed forest - agroforestry, native forestry, analog forestry, pruning; selected logging; coppicing fencing and tree guards during establishment	Feeders and troughs; fencing; vehicle access; farm / forest race; bush track	Dams, ponds and lakes; stream / creek; wind pump; bioretention - planted swales, wetlands	Not captured as part of this investigation.	Not captured as part of this investigation.	Not captured as part of this investigation.
ZONE 5 Ecology and Wild Harvest	1 - 100,000ha	Occasionally; Infrequently	Riparian planting/ corridors; Park edges; patches of native bush	Conservation - noxious plant removal and pest control; managed succession; wild harvest - foraging and hunting; selected logging	Bush track; trapping line and/or bait stations	Stream and stream corridor, gulleys, wetlands, parks and reserves, gulleys	Not captured as part of this investigation.	Not captured as part of this investigation.	Not captured as part of this investigation.

* 1 mature feijoa tree = 200kg
 1 mature apple/pear/citrus tree = 180kg
 1 mature plum tree = 100kg
 1 mature avocado tree = 30+kg
 1 banana tree = 25kg
 1 mature persimmon tree = 20kg
 1 mature macadamia tree = 8kg (nut-in-shell)

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As part of this research a series of one-on-one interviews were conducted with expert growers and community food production practitioners in Auckland and across the motu. Those interviewed were:

- Lionel Hotene, Papatuaanuku Kookiri Marae - <https://www.wananga.ac.nz/experience/our-students/papatuanuku-kokiri-marae/>
- Richard Main, Gardens for Health - <https://www.diabetesfoundationaotearoa.nz/our-programmes/gardens4health>
- Niva and Yotam Kay, Pakaraka Permaculture - <https://www.pakaraka.com.nz/>
- Klaus Lotz, Permadynamics - <https://www.permadynamics.net/>
- Levi Brinsdon-Hall, Organic Market Garden - <https://www.fortheloveofbees.co.nz/omg>
- Kelly Francis, Whenua Warriors - <https://whenuawarrior.co.nz/>
- Robyn and Robert Guyton - <https://www.sces.org.nz/forest-garden-tours>
- Rory Harding, George Street Orchard - <https://georgestreetorchard.com/>
- Matt Prockter, Lucinda Community Orchard - <https://www.facebook.com/lucindacommunityorchard/>

These semi-structured interviews explored the importance and relevance of a range of themes involved in establishing and maintaining a range of different types of productive systems (primarily related to community and market scale systems from PLZs 1 and 2) as well as the various yields from these food systems. The information gathered during these interviews has been reviewed, collated and synthesized into a series of key themes, insights and

considerations provided below. The themes have been organised and presented from high level and whole system considerations to more nuanced learnings and insights and include getting started, structure and organisation, time and labour needs, skill, management, financial inputs and sustainability, and common issues and challenges.

Getting Started

- There are a range of factors that should be explored very early in the project, prior to making key decisions:
- Whether or not it is whaanau, friends, community or another type of organisation, assess where the people involved are at in terms of interests, skills, experience, time and energy available and who the leaders are.
- Involve community anchors and connectors who have existing relationships with local communities.
- Invest in building relationships with community and key local growers and activators.
- Talk to the people about what they want to grow - it is good to grow something locals are familiar with.
- Start with a (small) community of interest - work with those who are keen and build a sense of community around local food - don't worry about wide scale buy-in.
- Support early adopters.
- Manage partners and collaborators expectations of early wins and successes.

- Prioritise growing things that locals will eat and feeding families seasonally (all year around). It is often good to start with quick turn around crops (e.g. beans are good initial crop - especially for kids), and staples that are fairly easy to grow, harvest, process and make ready for eating and that could start to provide food for small and large families and different cultures.
- Having access to a skilled grower is really important, especially early on.
- Secure a baseline budget for local community education. This is often critical to catalyze wider involvement and uptake of local food initiatives.
- Different food systems will prioritise different types of yields (which should reflect the key drivers/purpose of the food system).
 - From a broader regenerative development perspective, not all local food production systems need to be about food yields for them to be meaningful and successful. For example, community gardens and orchards can be very effective at fostering wellbeing in the form of social capital and provide social and cultural connection and opportunities for inclusion and participation.
- Increasingly funders are wanting to see metrics to demonstrate value of investment - often focused on food yields and/or financial turn over but can also include qualitative and non-food specific metrics.
- Understanding the relationships between and implications associated with the scale

and complexity of the food system is really important.

- The larger the scale typically the more complex the system is. Typically the more complex the system is the more energy and skilled input it requires.
- Start simple and add more variety and diversity into food systems over time. Consider starting with 6-8 core products/yields.
- Adding complexity such as integrating small animals into orchards and forest gardens, significantly increases the expertise, coordination and resources needed to maintain that system. However, complexity can often increase the productivity and yields of the food system.
- Focus on optimising biological complexity not on design/infrastructure complexity.
- Clarify the scope, principles, goals and objectives of the mahinga kai initiative early (see below).

Be Clear About Your Drivers and Purpose

In order to determine what type of food system is most appropriate or might be successful in a particular place requires clarity of core drivers and purpose for that system - Systems will look quite different depending on whether they are more focused on community or commercial yields.

Consider the primary drivers, purpose and outcomes sought for your initiative - is it to

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grow as much food as possible? Is it to grow a particular type of food or for a particular group of people? Is it to form social connections or build a sense of community? Is it to generate an income/livelihood? A combination of these or something else?

Location

The location of a food system will shape many aspects of the design and operations of the food system.

- Take time to consider the site and its surrounding environment when making key decisions about the type of food system and its purpose/function and operations.
- Investigate and understand site soils, aspect, access to water, orientation etc.
- About 40% of community food systems in Auckland are on council land
- Access is important, considering both functional productive systems as well as social gathering spaces:
- Can people easily find the space?
- Does the location draw people to it for any other reasons?
- Is the space conducive to becoming an attractor for the community?
- A high visibility location and foot traffic are key ingredients to support farm shop retail.
- Consider public gathering spaces, and teaching spaces within the larger food system area.

- Consider long term security/tenure of space and site. For example, marae grounds are desirable because the marae is not going to move or be re-purposed.
- If the food system is going to be profit seeking, you might need to consider good security and fencing.

Resources and Labour

While it is possible for some food systems to operate with minimal resources, it is very important to think about the initial and ongoing resource requirements of your system from the outset:

- Every little aspect of production can be taught/learned and there is almost always room for unskilled labourers to work alongside skilled workers but generally successful food production systems need a vision holder and experienced grower(s) to have oversight at all times. For example, unskilled workers can typically help with harvesting but need upskilling in most other aspects of gardening if they have limited or no experience.
- Market gardening requires constant, dedicated and committed resources to be effective. A minimum of one Full Time Equivalent staff (FTE) is required but two or more experienced growers is better. Consider two part time roles to optimise redundancy and consistency.
- Some community market gardens have been very successful using WWOOFERS¹ to help run the production system.

- Need dedicated resources to manage animal systems in larger food production systems as they take significant additional time and care to be effective, productive and to give adequate consideration to animal welfare. e.g. bees, chickens, pigs).
- Turnover of members is generally high in community food initiatives - you will need to plan for it. Also, community/volunteer commitment and interest typically wane over time.
- Partnerships and support from local community organisations and social enterprises can help food systems maintain productivity.
- Consider doing a local audit to identify who is already working in the area and partner with existing growers, groups and community connectors.
- Incentives such as fuel vouchers have been successful to encourage volunteer support in the garden.
- There are a range of barriers for people getting involved in local food initiatives - these can include but are not limited to social disconnection, addiction, mental health or concern for personal safety.

Financial Viability and Sustainability

Financial viability and sustainability are key factors for all sustainable food production systems.

- Community initiatives often struggle to find

money for tools and basic infrastructure.

- Minimise overheads as much as possible as they put pressure on sustainability of system - typically, the main overhead is wages for labour.
- Non-industrial food production is an economically marginal occupation so there is a need to focus on efficiency to make it profitable.
- If the financial model is based on sales then start up wages need to cover the first 3 - 6 months before significant production kicks in.
- If the food system is focused on food yields you need to secure funding for at least one skilled grower to coordinate operations.
- Collective market gardens² are a good model - whereby the financial risk is held by the collective (not individual gardeners/growers) and roles and responsibilities are shared amongst the collective members.
- Food production is ongoing - needs secure long term funding to keep initiatives going. Time and effort is put into relationship building and new growers/community have increasing expectation about food security.
- Short term investment/funding in social and community capital development is an issue as it takes time to build meaningful relationships and trust. Insecure and short term funding jeopardises the relationships and trust that has been built.
- Funders are more interested in funding projects if there is 'proof of concept' - therefore documentation and developing

1. People who contribute labour in exchange for food and accommodation through Willing Workers on Organic Farms (WWOOF) NZ
 2. A market garden that is 'owned' and operated by several growers and food producers each who share the risks as well as profits from food production.

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useful metrics to measure success and gathering data on those metrics is important for the community food production 'sector'.

- Consider benefits and trade offs of aligning local food system 'deliverables' with the objectives of funders.
- Potential funders and sponsors to consider include: Foundation North (Quick Response Grant), Ministry for Social Development, Te Tari Taiwhenua / Department of Internal Affairs, tool manufacturers (August is a good time of year to ask for tools), and Bunnings.

Clarify your 'market'

Who you are growing for and or selling to is a core consideration when developing a food system.

- Food systems should be designed around their market so need to clarify what/who the market is? For example, box delivery is different from farm gate sales, wholesale, or retail to restaurants.
- The distribution model is very important and needs to be considered as part of the design and development of the food system, not as after the food is being produced - If distribution channels don't exist or break down food quickly becomes a waste issue.
- Local production for local consumption means growing crops for the local diet.
- Governmental food standards legislation/regulations disadvantage local producers selling into local markets - there is lots of red tape (such as food safety standards) that

makes it difficult or prohibitive for small scale growers/producers to sell locally.

- Market your products and services through local channels including schools, churches, body corporates, community organisations, social enterprises and companies.
- Selling retail or value added products are generally good options.
- Consider premium and niche products that you can sell at community scale such as composting and seedling/plants.
- There is a huge market for local organic produce (but locals cannot often afford 'organic' food).
- Typically, the grower is the best person to sell their own food - The seller needs to know a lot about the production.
- Growing for market scale requires consistency in production as consumers expect specified quantities at specific scheduled times.
- You typically need refrigeration if you want to maximise production and market potential.

Organisation and Leadership³

- All systems require a degree of structure and organisation to function well. Food systems are no different.
- Some organisational structure is essential for all food systems and they all benefit from a degree of leadership and coordination.
- A core group is critical to the long term

success/sustainability of the food system.

- The more food systems focus on yield and economic profitability the more essential organisational structure and leadership are.
- Successful community food systems are inclusive and find meaningful and valued work for everyone (based on their skills and capabilities). However, this requires ongoing planning, coordination and supervision/'buddy' support systems.
- Internal communications are quite important to ensure members know what is happening. Some of this is best done on site and some of this can be done electronically/digitally. Keep internal communications as simple as possible so everyone can access and understand.
- Given the seasonal fluctuations in temperature and climate, particular consideration needs to be given to year round production. If food production is focused on yield and feeding local communities ensure the system is producing food all year round. For example, don't just grow one seasonal crop (i.e. apples or corn) and if you are growing large scale kumara what are you growing on that land for the rest of the year?
 - Create seasonal calendar mapping out key activities and tasks through the year.
- Depending on the system and the need for volunteer input and community buy-in/patronage, external communications (i.e. branding and marketing) can be critical to the success of the food system.
- Consider the benefits of integrating the

local food production system with other community support systems.

- Clarification and regular review of goals and objectives, and roles and responsibilities is important.
- Gardens for Health promote the development of a Code of Conduct for community food initiatives to provide ground rules and guiding principles for members.

Expertise and Know How

- All food systems are much more effective when there are knowledgeable and skilled people involved in the day to day operations. For some types of productive systems, like market gardening, it is essential.
- Community food systems need skills in both growing food and working with people - they are complementary and both critical.
- It is important to have at least one skilled person in a paid capacity to coordinate community food systems.
- It is important to have key people who have connections with the local community involved.
- As well as the core skills of growing, harvesting and preparing food, an effective market based food systems needs all the essential skills of a small business including business management, accounting and marketing.
- Building capacity and capability within the

3. Because wild food forage and harvest is quite distinct, the insights below don't apply.

PRACTICAL GUIDANCE, CONSIDERATIONS AND RECOMMENDATIONS

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team is important and impacts significantly on the sustainability of the food system (people come and go).

- Partnerships and support from local community organisations and social enterprises can help community food systems to access expertise, build capacity and provide a range of support services.
- There is often a requirement to educate locals (especially migrants) about what grows and how to process and prepare that food for the dinner table.

Community and Cultural Relevance

- Cultural food norms need to be considered from seed to table. Explore the barriers and opportunities for locals to be involved in growing, processing, and cooking food in their community.
- Use culturally relevant customs and practices to ensure that food production systems and the site it is located is safe, accessible and comfortable for locals. For example, meeting and planning kanohi ki te kanohi versus digitally.
- Te ao Maaori has rich cultural narratives and metaphors to help people reconnect back to kai as well as culture. Example - kakano and whakapapa; tapu and noa; rongooa and kai.
- Consider how to engage the local community through outreach activities/ activations i.e. Community Days, Community planting and harvesting; pop up activations etc.
- Food production (both at household and

community scales) is a form of Mana Motuhake and can help break cycles of dependency and scarcity mindsets.

Safety and Security

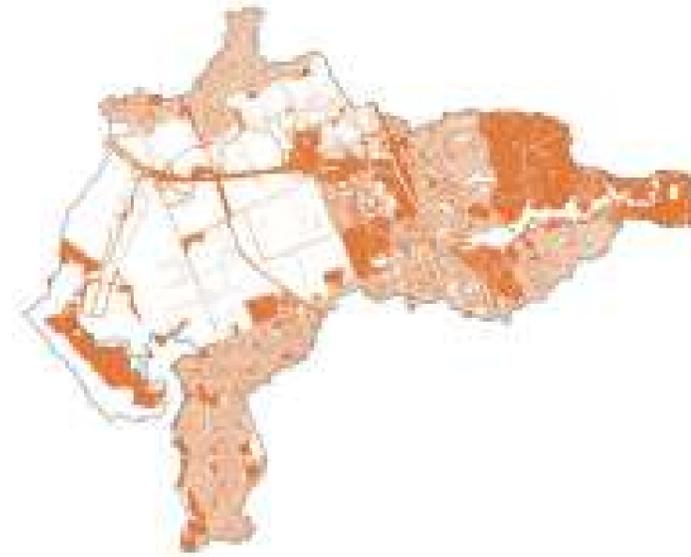
- Health and Safety management is currently very onerous - Templated Health and Safety policies and procedures make it much easier to manage.
- The more formalised and commercial the food system the more stringent the Health and Safety management needs to be.
- Vandalism and theft are real issues. However, there are tradeoffs of trying to 'fortify' the food system area and protect it from the public.
- Consider the safety and comfort of those using the site including local community - where possible, food growing spaces should also be consistent with The Ministry of Justice's Seven Qualities of Safer Spaces: access, surveillance and sightlines, clear and logical layout, a mix of activity, a sense of ownership, high quality environments and active security measures.

Key Ingredients for Successful Local Food Systems - A Summary

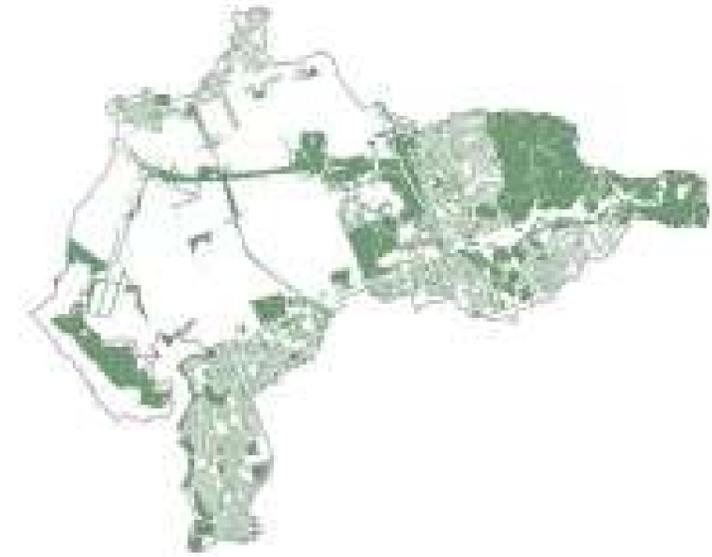
- Be purpose/mission focused and driven.
- Secure land and water.
- Start small and grow incrementally.
- Foster ground up food production - identify and support passionate local individuals and groups to grow people as well as food
- Foster trust between:
 - funders, landowners and growers
 - 'experts', coordinators and local growers
 - growers and consumers
- Involve community anchors and connectors and experienced food producers from the outset.
- Encourage/promote core group governance.
- Grow crops that do well locally.
- Work to remove barriers and obstacles to local food production (government agencies have a particular role to play here).
- Develop the minimal amount of structure and organisation required to make that system work well.
- Focus on prime location and secure medium to long term tenure.
- Make cultural food connections.
- Work with nature - use and mimic natural processes and patterns to grow food sustainably.
- Ensuring everyone gets a 'return on investment' and emphasize learning by doing and having fun
- Documenting experimentation and trialing different methods and systems. Share your learning journey.

These maps demonstrate the areas available in Te Puhinui for each productive zone. The larger the area, the more productive zones are possible, i.e., a zone 4 food system will be large enough to also accommodate zones 1, 2 and 3.

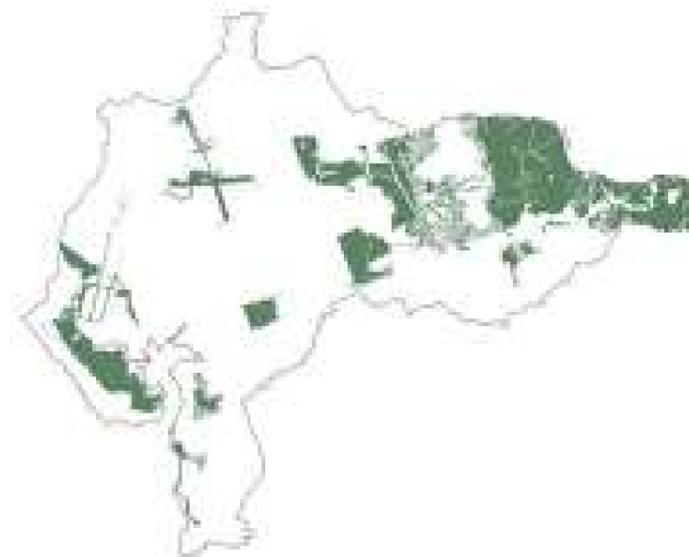
Areas suitable for Zone 1 and 2



Areas suitable for Zone 3



Areas suitable for Zone 4



Zone 5 - Ecological Network



The Ecological Network is based of the followig layers:

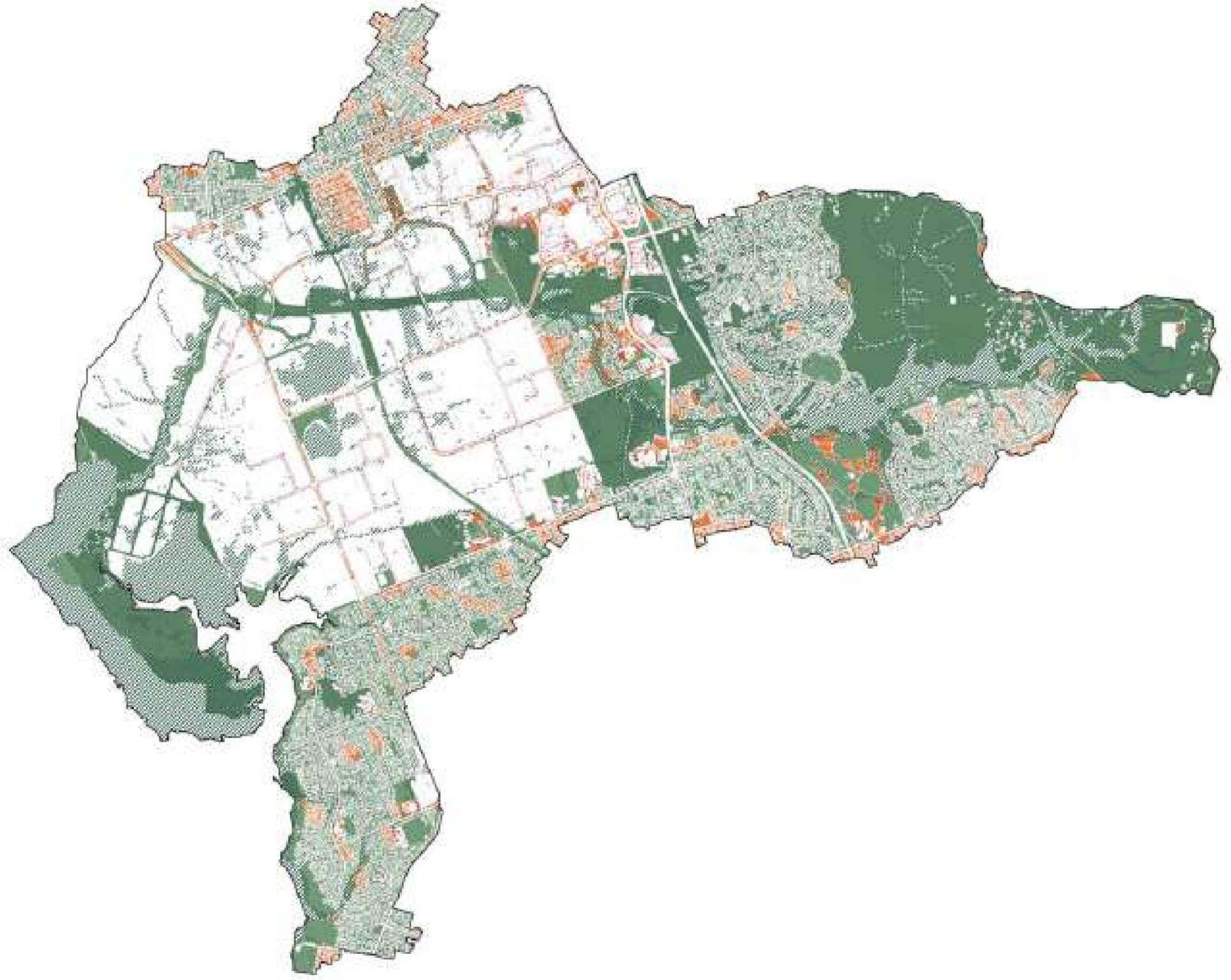
- 20m Riparian Corridor around stream and treatment ponds
- Outstanding Natural Features
- Significant Ecological Areas
- 1/100 Coastal Innundation
- 1/100 Flood Plains



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KEY

- Area suitable for zone 1
- Area suitable for zone 1 and/or 2
- Area suitable for zone 1, 2 and/or 3
- Area suitable for zone 1, 2, 3 and/or 4
- ▨ Area suitable for zone 5



Note: The model is based on Puhinui but is used for diagrammatic purpose only.

STAKEHOLDERS, COLLABORATORS & POTENTIAL PARTNERS

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The Puhinui catchment has a range of connectors, collaborators and activators working directly and indirectly on supporting and strengthening local food initiatives in the catchment area. Below is a table that provides an overview of some of the key stakeholders, collaborators and potential partners that can support both existing and new food initiatives in Puhinui.

NAME OF STAKEHOLDER, COLLABORATOR AND/OR PARTNER	CONTACT DETAILS	DESCRIPTION / NOTES
Auckland Council - Community Facilities	David Stejskal David.Stejskal@aucklandcouncil.govt.nz	Manages council public land including Parks and Reserves. If proposed food initiative is using council Land Owner approval is required from Community Facilities.
Auckland Council - Connected Communities	Petelo Esekielu petelo.esekielu@aucklandcouncil.govt.nz	Supports healthy, vibrant communities and is active in food systems research and development focused in South Auckland. They coordinate the regional Kai Koorero network.
Auckland Council - Sustainable Schools	ross.martin@aucklandcouncil.govt.nz Cate.Jessep@aucklandcouncil.govt.nz	Supports schools across Puhinui catchment (and across the region) with Education for Sustainability. They support interested schools in the catchment to embed Te Whakaoranga o Te Puhinui into school and classroom curriculum.
Auckland University of Technology - School of Future Environments / He Puna Ora	Amanda Yates amanda.yates@aut.ac.nz	As part of the National Science Challenge (NSC) Urban Wellbeing Research Programme, He Puna Ora is a regenerative action lab focused on urban system change. Their NSC research involves working with mana whenua and city communities to test transformative strategies and actions with a focus on food initiatives.
Beautification Trust	Sterling Ruwhiu sterling.ruwhiu@beautification.org.nz	A social enterprise and environment hub in Puhinui connecting and empowering communities to learn, love and look after their environment, offering a range of community services including community development and education.
Eke Panuku Development	Ole Maiava - ole.maiava@ekepanuku.co.nz Rachel Sosene - rachel.sosene@ekepanuku.co.nz Sara Zwart - sara.zwart@ekepanuku.co.nz	Supports the people of Puhinui to play a strong cooperative role in the building of their public places. Coordinates community development and placemaking programme in Transform Manukau area (Ole and Rachel) and coordinates Te Whakaoranga o Te Puhinui/ Puhinui Regeneration programme (Sara).
Gardens4Health	Richard Main richard.m@diabetesfoundationaotearoa.nz	Gardens4Health is an Auckland-wide Ministry of Health funded initiative that supports the establishment of sustainable community gardens, increasing physical activity, growing organic food and improving health to mitigate and avoid lifestyle diseases including diabetes, obesity and cardiovascular issues. They have a regional overview of community food production and provide support for community food initiatives.
Manurewa Local Board	manurewalocalboard@aucklandcouncil.govt.nz	Provides governance at the local level within Auckland Council. They enable democratic decision making by, and on behalf of communities within the local board area. Signs off on Community Facility budgets and land use approvals within their local board area.
Ootara-Papatoetoe Local Board	otarapapatoetoe@localboard@aucklandcouncil.govt.nz	Provides governance at the local level within Auckland Council. They enable democratic decision making by, and on behalf of communities within the local board area. Signs off on Community Facility budgets and land use approvals within their local board area.
Pacific Vision Aotearoa (PVA)	Therese Mangos therese@pva.co.nz	South Auckland based passionate community change agents intent on growing strong communities to care for creation. PVA are committed to advocating and delivering regenerative community-led solutions in harmony with Mother Earth. Expertise in local food systems, food production, nutrient cycling and community education.
Papatoetoe Food Hub	papatoetoe@foodhub@gmail.com	The Papatoetoe Food Hub is operated on a previously underutilised piece of council land and has the aim of making it easier for people to get good kai. This innovative PPCP (public, private, community partnership) aims to nurture and develop new approaches to food which will encourage policy and behaviour change to tackle food insecurity and nutritional inequality.
Papatuanuku Kokiri Marae	Lionel Hotene lionel@pkm.org.nz	An urban marae in Maangere East providing a range of community development and support services with expertise in local food production and distribution. They are national leaders in the Hua Parakore movement (Maaori organics) and run several food initiatives from their site.
Puhinui Empowered Communities Working Group	Alexanda Whitcombe alexandawhitcombe@gmail.com	The Empowered Communities working group is a collective of influential and embedded key stakeholders and organisations within the Puhinui catchment. These organisations have either had on-going involvement and deep connections to community and environmental development in Te Puhinui or have vested interest in improving the wellbeing and quality of life in the catchment.

STAKEHOLDERS, COLLABORATORS & POTENTIAL PARTNERS

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NAME OF STAKEHOLDER, COLLABORATOR AND/OR PARTNER	CONTACT DETAILS	DESCRIPTION / NOTES
Sustainable Business Network	Matthew McClymont matthew@sustainable.org.nz	Sustainable Business Network (SBN) is a social enterprise, a community and a movement. Their network consists of hundreds of progressive organisations and people that collectively invest in and act on system change. SBN is the project manager/umbrella organisation coordinating the Mfe funded Jobs for Nature programme in Puhinui.
Te Pu-A-Nga Maara	Krissy Bishop krissy@tpnm.co.nz	Te Pu-a-nga Maara is a collective of Rangatahi from Makaurau, Papatuanuku and Manurewa Marae that draws on Mataranga Maori, Digital Technology and Science to Engage, Educate and Empower Rangatahi to be Innovative Kaitiaki.
Te Maara Kai o Wirihana		This community-led kaupapa is a collaboration between Manurewa High School, Middlemore Foundation and Counties Manukau Health. The goal is to develop whaanau-led social enterprise to support holistic food systems, health and wellbeing, and foster employment pathways for students into horticulture, environmental sciences and primary industry.
The Roots: Creative Entrepreneurs	Waikare Komene waikare@theroots.org.nz	A south Auckland, kaupapa based, community-led, design practice focusing on reconnecting people to themselves and the environment. Design services include co-creation, education & activation that empowers communities to re-imagine and restore the future for the following generations.
The Southern Initiative	Julio Bin - julio.bin@aucklandcouncil.govt.nz Anne-Marie Mujica - Anne-Marie.Mujica@aucklandcouncil.govt.nz	Champions and enables social innovation by working with local communities to learn and prototype solutions, and then influence the levers that will drive social and economic transformation for south Auckland. Active in local food systems research and prototypes in south Auckland providing conceptual and backbone support for selected food initiatives.
Whenua Warriors	Kelly Francis whenuawarrior@gmail.com	Whenua Warrior specialises in Mahinga Kai, Community Engagement, Environmental Conservation and Preservation, based on hua parakore principles and maatauranga Maaori.

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APPENDICES

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FOOD IN TE PUHINUI

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Food is a prerequisite for all life and yet it is often taken for granted as a key contributor to well-being in our modern globalised food system. A food system includes all processes and infrastructure involved in feeding a population: production, processing, distribution, marketing, consumption, and disposal of organic and food related items. It also includes all inputs needed to support the system such as land and ecosystem services and all outputs generated throughout the system. The food system is influenced by and operates within the environmental, societal and economic context in which it is situated. Complex system dynamics and drivers including energy, environment, economics, equity, governance, health and nutrition, ethics and technology have a huge influence over food systems. Today food systems exist at a range of scales from global to hyper-local with significant interdependencies between them making these systems increasingly complex, intertwined and vulnerable to external system dynamics and drivers.

While there is a wide range of data available relating to the different actors in New Zealand's food system such as agriculture and primary production, transport and environmental health and community health and well-being, there is limited information about how the system works as a whole and limited data is available for local food systems. Unlike other critical infrastructure such as transport or water, food is a global commodity and there is no national or regional body responsible for core system functions. For example Waka Kotahi / NZTA provides national oversight of our roading network and Watercare manages Auckland's drinking water, however no

agency or authority is responsible for ensuring food security, or sustainable and resilient food systems at regional, national or global scales.

Some key concepts and considerations:

- New Zealand's food system was estimated to use 30% of the nation's primary energy demand¹.
- Agriculture accounts for 48% of New Zealand's Greenhouse gas emissions².
- New Zealand's national food system is industrial relying on significant non-renewable energy inputs. Industrial food systems in the United States of America consume 12 calories of energy to produce 1 calorie of food³.
- Increasing pressure on farmers to increase production through intensification of land use, increasing scale of operations to achieve economies of scale, and improved technological efficiency has resulted in negative impacts including loss of soil fertility, loss of biodiversity, dependence on fossil fuels, reduced viability of family farms, and reduced human health and quality of life in rural communities⁴. As Parliamentary Commissioner for the Environment Jan Wright wrote, New Zealand faces a "classic economy versus environment dilemma"⁵.
- 60% of New Zealand's income comes from farms and 87% of New Zealanders live in towns and cities. In addition the connection between producers and consumers of food

is broken in both directions⁶. This dynamic has created misunderstandings between rural and urban New Zealanders that inhibit meaningful dialogue around significant challenges to New Zealand's food system such as water quality and climate change.

- Food insecurity is a daily reality for many New Zealanders including those living in Te Puhinui. Food insecurity is a situation of limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways. Food security exists when a community, family, individual have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life at all times.
 - 20.1% of New Zealand households experience food insecurity.
 - Houses with 7 or more people are more likely to experience food insecurity than households with less people. Te Puhinui is known to have one of the youngest populations in the region as well as particularly large households in parts of the catchment.
- Nationally, New Zealand throws away \$872 million worth of uneaten food per year.
- The average New Zealand family wastes \$563 worth of food each year.
- As a nation we throw 122,547 tonnes of food away every year.
- Unhealthy diet is the leading preventable risk for poor health in New Zealand.
- Over a third of all health loss in New Zealand results from preventable causes, such as poor diet, tobacco and alcohol consumption and not enough exercise.
- Maaori and Pacifica living in areas with high social deprivation such as Te Puhinui suffer from higher rates of food related ill-health and are less likely to meet the daily recommended intakes of the fruit and vegetables. The same group of people also have increased risk of obesity - 17% of Maaori and 20% Pacifica children are considered obese.
- The Auckland region has approximately 2,500 square kilometers of rural land for production. While Te Puhinui was once home to some of New Zealand's most productive soils, they have been highly modified through deforestation, rural land use and urbanisation, significantly impacting the productive potential of Puhinui Catchment.
- Food sovereignty is a situation where the people who produce, distribute, and consume food control the mechanisms and policies of food production and distribution, rather than the private companies and market institutions that characterise industrial food systems.

1. 1983, Energy use in the New Zealand food system by M.G.Patterson

2. Mfe, 2018.

3. In Possible Energy Constraints to Further Urbanization by Richard Heinburg from Canning et al.

4. Growing for Good from the Parliamentary Commissioner for the Environment, 2004.

5. Quoted in <https://www.nzgeo.com/stories/the-future-of-food/>

6. <https://www.nzgeo.com/stories/the-future-of-food/>

FOOD IN TE PUHINUI

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- A regional food system is a description of a geographically localised method of food production, distribution, sales, consumption and nutrient cycling of food waste, rather than nationally and/or internationally based systems.

REGIONAL AND LOCAL TE PUHINUI FOOD SYSTEMS

Production

As noted above, Te Puhinui was once characterised by highly productive soils and rich kai moana resources. Matukuturua Stonefields gardens is a significant cultural landmark reflecting this historic land use. Despite its history, the current Te Puhinui food system is heavily dependent on imported food including produce. With the exception of the rural land uses in Tootara Park and Puhinui Reserve, there is limited productive land use activities in the catchment today. One notable exception to this is the emerging Te Maara Kai o Wirihana. Existing production on the most fertile remaining soils in the lower catchment is zoned for light industrial development under the Unitary Plan.

Processing and Distribution

Currently staple fresh produce is imported into the catchment from production hubs throughout New Zealand, specifically Pukekohe in the Auckland region⁷. Some of these imports are processed through industrial processing hubs in Wiri, before being distributed to supermarkets, restaurants, and community organisations. The

area does support large scale processing factories and distribution centres, such as Griffins Foods, Irvine Pies, Foodstuffs frozen, and Bluebird Foods.

Today, a majority of Te Puhinui is simultaneously a 'food desert' and a 'food swamp'. A food desert is characterised by a lack of access to affordable and nutritious food and convenience stores are more prevalent, which typically have more expensive food with less nutritional value than supermarkets and other specialist food shops. A food swamp is an area with an abundance of convenient, fast food outlets which outnumber healthy food outlets⁸.

Marketing and Consumption

Whilst current food systems processes are convenient and economically efficient by western standards, they have created an environmentally unsustainable, and culturally insufficient food system for many within the catchment⁹. Through urbanisation, convenience and consumer culture as well as social deprivation, fast food and its ubiquitous presence and promotion has led to significant nutrition and diet related health pandemics regionally and more specifically in South Auckland, impacting the health and well-being of many of Te Puhinui's communities. This further compounds social deprivation, especially in the middle and lower catchment. Maaori and Pacifica living in areas with high social deprivation suffer from higher rates of food related ill-health and are less likely to meet the daily recommended intakes of the fruit and vegetables. The same group of people also have increased risk of obesity - 17% of Maaori and 20% Pacifica children are considered obese.

Disposal / cycling of organic and food related items

Organic wastes make up 40% of Aucklanders' domestic waste by weight which typically end up in landfill. There are a number of initiatives across Auckland and within Te Puhinui that are seeking to address challenges relating to food waste.

- WormsRUs is a longstanding company providing residential and commercial scale composting services located right in the middle of the catchment. Auckland Botanic Gardens and Auckland Council's Wastewise programme provide food composting support and education programmes for schools.
- Auckland Botanic Gardens and Auckland Council's Wastewise programme provide food composting support and education programmes for schools.
- The Compost Collective, a regional collaborative project aimed at increasing the number of Auckland households engaged in composting and organic waste reduction, operates in the catchment.
- The app Share Waste provides a platform for peer to peer neighbourhood and residential scale food composting but is not currently being used in the catchment area.
- Local boards, council staff, decision makers and social change agencies in South Auckland are currently working to establish

a southern Community Resource Recovery Centre which will likely include large scale organic nutrient cycling.

PRODUCTIVE POTENTIAL

There are three broad types of food production: intensive small scale production including fresh fruit and vegetables and some live stock; extensive cropping and pastoral systems include grains, legumes, dairy and meat; and wild harvest, which includes hunting and harvesting of plants and animals from both land and water. Urbanisation has significantly limited options for extensive production and wild harvest of terrestrial, freshwater and marine food sources.

Te Puhinui natural capital and land use patterns mean that opportunities for production in Te Puhinui should be focused on intensive, small-scale productive gardens and orchards for fresh fruit and vegetables and some livestock. Small scale intensive systems have larger energy input per square metre than extensive systems and typically have higher yields. Soil fertility is maintained through inputs such as compost, manure, worm castings, fish meal etc. Produce typically doesn't store or transport well. With decreasing access to fossil fuel for transport access to locally grown produce will become increasingly important to the well-being and resilience of local communities. Three intensive food production systems suitable for Te Puhinui include intensive gardens, orchards and perennial crops and food forests.

FOOD IN TE PUHINUI

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Gardens

Intensively managed garden for annual vegetables, salad mixes, and herbs; flowers for cutting and beneficial insects; small fruit-bearing plants and shrubs, dwarf and espalier fruit trees; some small livestock and animal systems such as worms, bees, poultry and rabbits.

Orchards and Perennial Cropping

Annual and perennial vegetables and staple crops with long growing seasons; flowers for cutting and beneficial insects; larger shrubs and fruit-bearing bushes; orchards; some market crops; larger composting areas; mushroom cultivation; animals such as bees, poultry, pigs, goats; and fire retardant and shelter planting.

Forest Gardening

A productive ecosystem based on a forest of diverse species incorporating fruit and nut trees, shrubs, herbs, vines and perennial vegetables which have yields directly useful to humans - opposed to an orchard which is typically limited in the diversity of species, vertical layers and yields. Auckland's unique and highly productive environment is one of very few places in the world where it is possible to grow three different types of orchards – deciduous, mediterranean and subtropical - in the same location. Because a food forest has the form and function of a forest, they have significant biodiversity outcomes in addition to producing useful crops of food, fibre and medicine.

Organic wastes make up 40% of Aucklanders' domestic waste by weight which typically end up in landfill. There are a number of initiatives across Auckland and within Te Puhinui that are seeking to address challenges relating to food waste such as WormsRUs, Auckland Botanic Gardens and Auckland Council's Wastewise programme, The Compost Collective, local boards, council staff, decision makers and social change agencies in South Auckland and the ShareWaste app, and the Beautification Trust.

Maaori and Pacifica living in areas with high social deprivation suffer from higher rates of food related ill-health and are less likely to meet the daily recommended intakes of the fruit and vegetables. The same group of people also have increased risk of obesity - 17% of Maaori and 20% Pacifica children are considered obese.

Over 25 % of the land use in the catchment is industrial. Some of the staple fresh produce imports are processed through industrial processing hubs in Wiri, before being distributed to supermarkets, restaurants, and community organisations. The area does support large scale processing factories and distribution centres, such as Griffins Foods, Irvine Pies, Foodstuffs frozen, and Bluebird Foods.

New Zealand's food system was estimated to use 30% of the nation's primary energy demand.

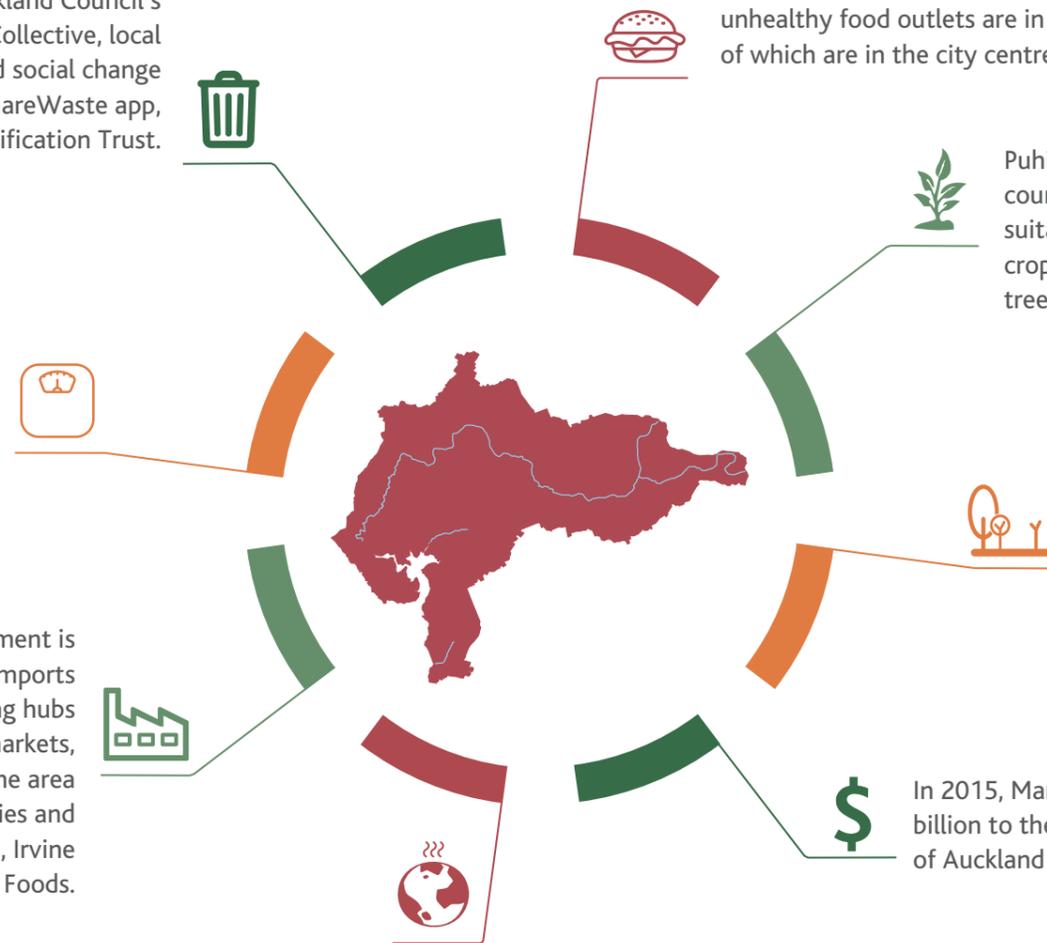
Agriculture accounts for 48% of New Zealand's Greenhouse gas emissions.

Puhinui Catchment presents an absence of locally grown and healthy products and a large amount of unhealthy food outlets, with five supermarket/healthy food providers within the catchment against more than 44 unhealthy food outlets are in Manukau Central (over 24 of which are in the city centre so more easily accessible).

Puhinui Catchment has some of the country's most productive soils which are suitable for a wide range of uses, including cropping, vineyards and berry fields, pasture, tree crops and forestry.

The Auckland region has approximately 2,500 square kilometers of rural land for production. While Te Puhinui was once home to some of New Zealand's most productive soils, they have been highly modified through deforestation, rural land use and urbanisation, significantly impacting the productive potential of Puhinui Catchment.

In 2015, Manukau contributed \$16 billion to the economy or about 20% of Auckland GDP.



From Te Whakaoranga o Te Puhinui: Te Rautaki | Te Puhinui Regeneration Strategy

TE PUHINUI FOOD SOVEREIGNTY

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Support individuals, organisations and institutions of Te Puhinui to develop greater control of the mechanisms, infrastructure and policies of food production, distribution and consumption in order to increase the health and resilience of local communities.

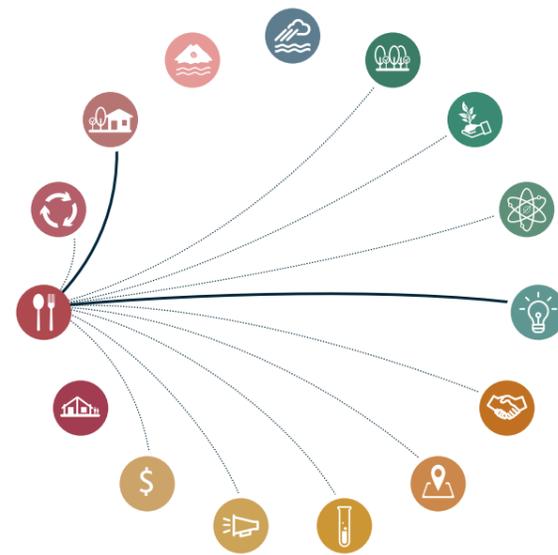
SUB-INITIATIVES

1. Te Puhinui Local Food strategy
2. Te Puhinui Food Commons
3. Ngaa Mahinga Kai o Te Puhinui | Food Gathering Sites

Relationship to other documents

- Aotearoa Food Policy Network
- Proposed National Policy Statement for Highly Productive Land
- A strategy for N.Z Food Safety 2019 - 2024, N.Z. Ministry for Primary Industry
- Auckland's Urban Ngahere (Forest) strategy
- Te Tāruke-a-Tāwhiri: Auckland's Climate Plan

LINK TO OTHER INITIATIVES



Primary Connection

- This initiative is largely dependent on **Te Mana Whakahaere o Te Puhinui / Te Puhinui Leadership and Decision Making** as this initiative requires political will and financial investment to realise.
- Te Wai o Te Puhinui / Waters of Te Puhinui** and **Te Ngahere o Te Puhinui / Te Puhinui Forest** can both amplify this initiative as they provide opportunities to re-integrate food sources back into the landscape through wild harvest and perennial food sources including mahinga kai, maara, rongooa and orchards and other food-bearing plants in public open spaces.
- Restructuring Te Puhinui Built Environment** can amplify this initiative by integrating food production into human-scale communities.
- Te Puungao o Te Puhinui / Te Puhinui Energy strategy** is amplified by this initiative as local food production and distribution contributes significantly to reducing the energy footprint of local diets.
- Te Para Kore i Te Puhinui / Te Puhinui Zero Waste Systems** is synergistic and amplifies this initiative by increasing the local capture and redistribution of nutrients that can be used in local food production.
- Te Whanaketanga Oohanga o Te Puhinui / Te Puhinui Economic Development** is synergistic with both initiatives contributing to the development of a localised food system and economy.
- Te Puhinui Living Lab** can amplify this initiative by providing the platform and resource for ongoing research and learning about urban and regenerative agriculture in the catchment to improve local systems and processes as well as evaluate the effectiveness of this initiative.

From Te Whakaoranga o Te Puhinui: Te Rautaki | Te Puhinui Regeneration Strategy

NGAA MAHINGA KAI O TE PUHINUI / FOOD GATHERING SITES

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Re-establish sites throughout Te Puhinui for traditional wild harvest and food gathering as well as contemporary food, fibre and medicine production and harvest.

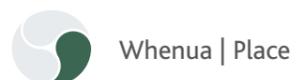
DESIGN GUIDELINES

- Promote and support establishment of sites for land-based Mahinga Kai including but not limited to paa harakeke and maara rongooa/ traditional Maaori medicine including the integration of these sites into public open spaces and new housing developments.
- Work with and support the Auckland Botanic Gardens to continue research into sustainable approaches to gardening and seed collection for threatened and endangered plants.
- Support mana whenua and community aspirations for local wild harvest of sustainable freshwater and marine resources.

NEXT STEPS

- In collaboration with mana whenua, undertake a catchment-wide review of the most feasible and appropriate sites for Mahinga kai. Seek to embed these areas within future project briefs.

AHO/THREAD



Whenua | Place

PARENT INITIATIVE



Te Puhinui Food Sovereignty



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KEY

- Catchment Boundary
- Transform Manukau
- Puhinui Stream

BUILT ENVIRONMENT

- Residential
- Industrial

OPEN SPACE

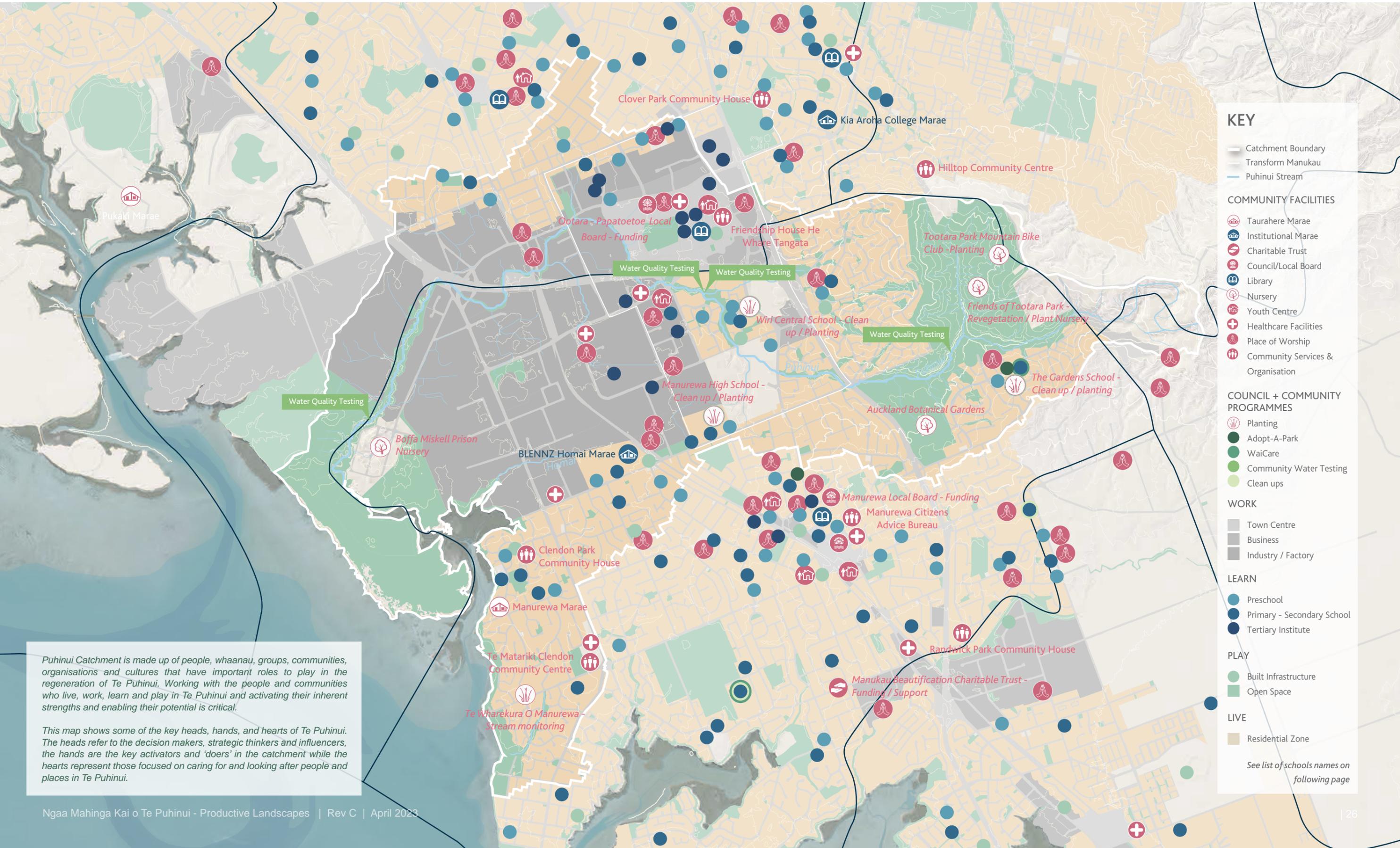
- Conservation
- Informal Recreation
- Sport and Active Rec.
- Community
- 400m from Open Space

AMENITIES

- Suburb Playground
- Neighbourhood Playground
- Destination Playground
- Public Toilets
- Potential Playground
- Potential Public Toilets

See list of reserves on following page

There are fifty-six open spaces within Puhinui Catchment. Puhinui's open space network is concentrated in the east and west of the catchment around three main reserves: Tootara Park and Auckland Botanic Gardens in the upper catchment in the east and Puhinui Reserve along the coastal edge to the west. Other significant open spaces include Hayman Park to the west of Manukau Central, Wiri Reserve, Laurie Gibbons Memorial Park, and Manukau Sports Bowl which is outside of the catchment but within the Transform Manukau Area. There is a significant lack of open space within the industrial area in the middle of the catchment and the remaining open spaces are fragmented across the catchment.



KEY

- Catchment Boundary
- Transform Manukau
- Puhinui Stream

COMMUNITY FACILITIES

- Taurahere Marae
- Institutional Marae
- Charitable Trust
- Council/Local Board
- Library
- Nursery
- Youth Centre
- Healthcare Facilities
- Place of Worship
- Community Services & Organisation

COUNCIL + COMMUNITY PROGRAMMES

- Planting
- Adopt-A-Park
- WaiCare
- Community Water Testing
- Clean ups

WORK

- Town Centre
- Business
- Industry / Factory

LEARN

- Preschool
- Primary - Secondary School
- Tertiary Institute

PLAY

- Built Infrastructure
- Open Space

LIVE

- Residential Zone

See list of schools names on following page

Puhinui Catchment is made up of people, whaanau, groups, communities, organisations and cultures that have important roles to play in the regeneration of Te Puhinui. Working with the people and communities who live, work, learn and play in Te Puhinui and activating their inherent strengths and enabling their potential is critical.

This map shows some of the key heads, hands, and hearts of Te Puhinui. The heads refer to the decision makers, strategic thinkers and influencers, the hands are the key activators and 'doers' in the catchment while the hearts represent those focused on caring for and looking after people and places in Te Puhinui.

IMPERVIOUS SURFACES



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3KM



Te Puhinui consists of a mix of low density urban development stretching across the landscape. The land use pattern is characterised by large, single use blocks serviced by large-scale vehicular corridors, major intersections, and extensive areas of surface car parking. There are limited pedestrian cycle connections through the catchment and those that are provided are often unsafe, of poor quality and require maintenance and repair.

There is a general lack of smaller blocks with a mix of uses supporting interconnected street patterns appropriate for pedestrian permeability, walkability and accessible public space. Successful public spaces in urban places are often defined and framed by the buildings surrounding them where the uses within these buildings contribute significantly to the functionality, vibrancy and safety of the adjacent public spaces.

KEY

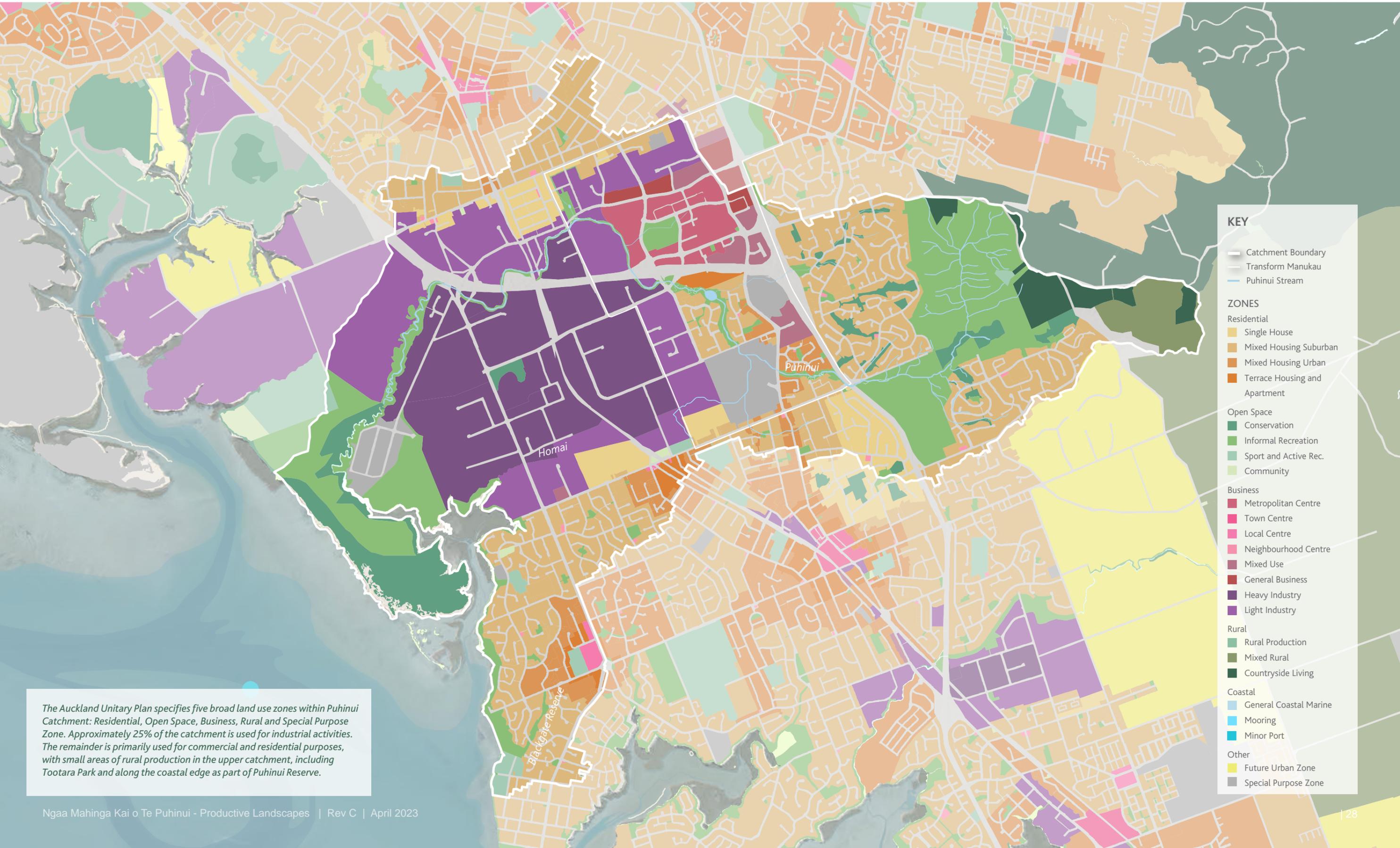
- Catchment Boundary
- Transform Manukau
- Puhinui Stream
- Building Footprints
- Road Network



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3KM



KEY

- Catchment Boundary
- Transform Manukau
- Puhinui Stream

ZONES

Residential

- Single House
- Mixed Housing Suburban
- Mixed Housing Urban
- Terrace Housing and Apartment

Open Space

- Conservation
- Informal Recreation
- Sport and Active Rec.
- Community

Business

- Metropolitan Centre
- Town Centre
- Local Centre
- Neighbourhood Centre
- Mixed Use
- General Business
- Heavy Industry
- Light Industry

Rural

- Rural Production
- Mixed Rural
- Countryside Living

Coastal

- General Coastal Marine
- Mooring
- Minor Port

Other

- Future Urban Zone
- Special Purpose Zone

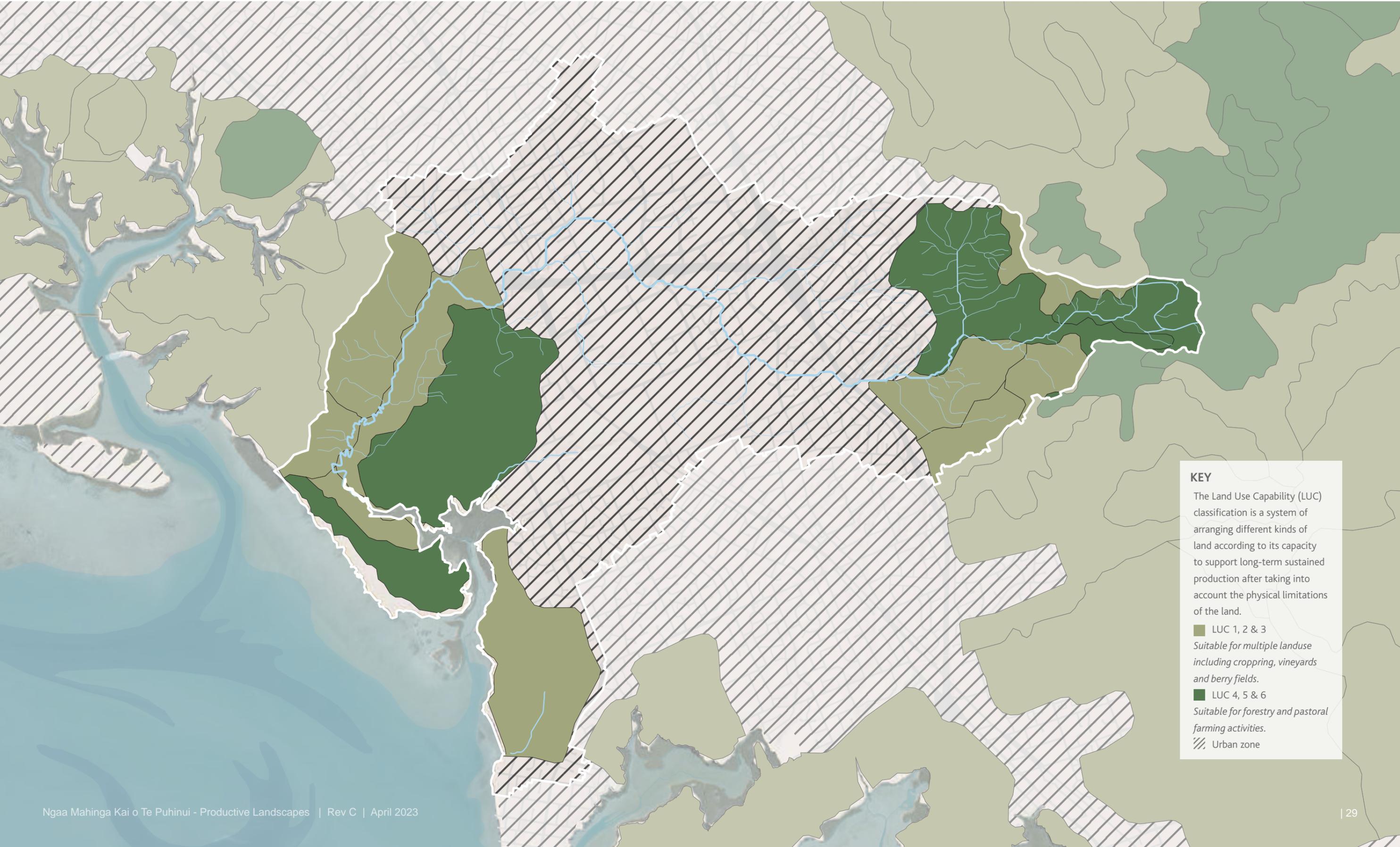
The Auckland Unitary Plan specifies five broad land use zones within Puhinui Catchment: Residential, Open Space, Business, Rural and Special Purpose Zone. Approximately 25% of the catchment is used for industrial activities. The remainder is primarily used for commercial and residential purposes, with small areas of rural production in the upper catchment, including Tootara Park and along the coastal edge as part of Puhinui Reserve.



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KEY

The Land Use Capability (LUC) classification is a system of arranging different kinds of land according to its capacity to support long-term sustained production after taking into account the physical limitations of the land.

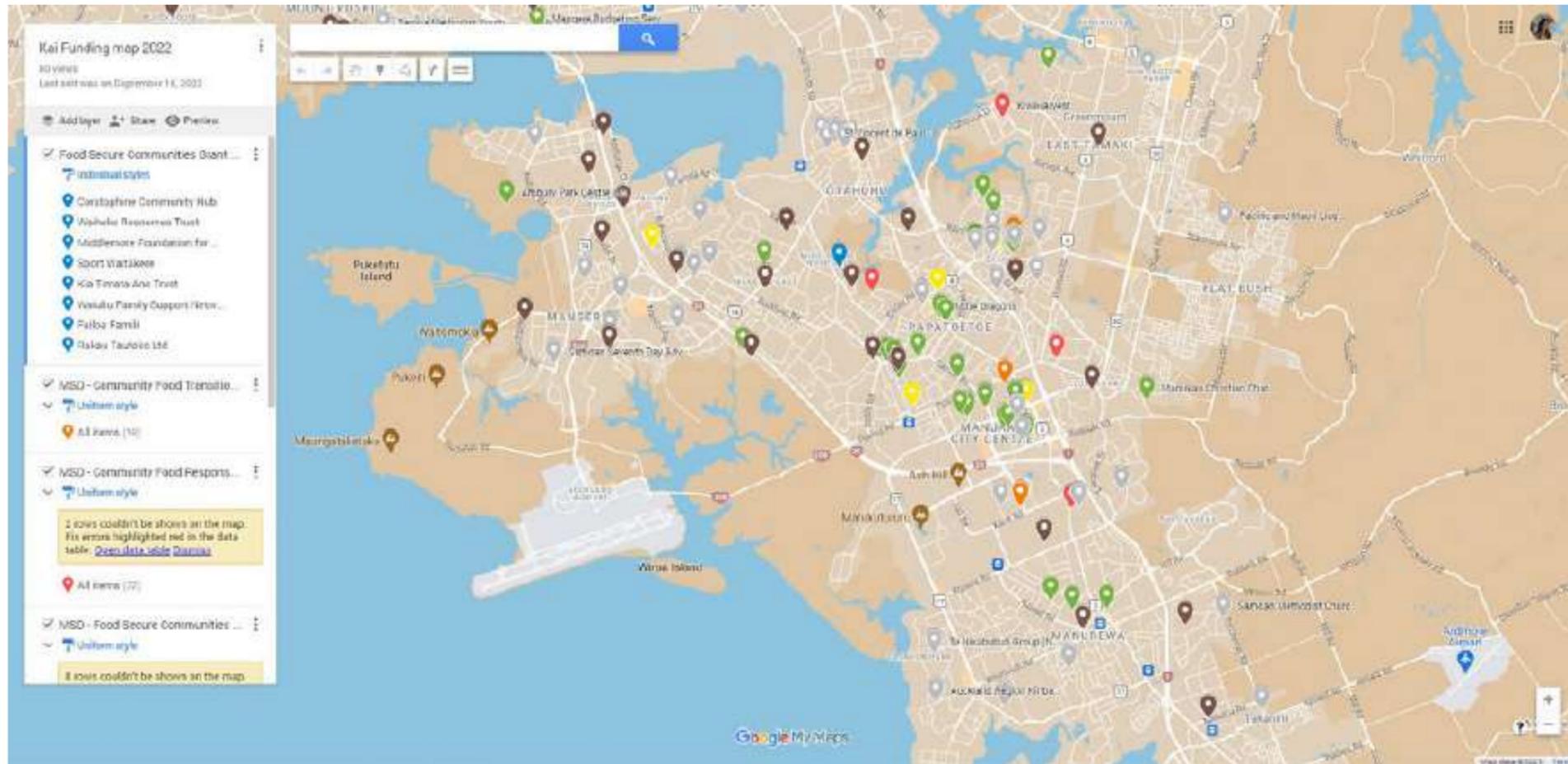
-  LUC 1, 2 & 3
Suitable for multiple landuse including cropping, vineyards and berry fields.
-  LUC 4, 5 & 6
Suitable for forestry and pastoral farming activities.
-  Urban zone

KAI FUNDING MAP

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Auckland Council Connected Communities and others have coordinated establishing and maintaining a regional Kai Funding Map that describes the funders and recipients of food related funding across the region.

<https://www.google.com/maps/d/u/0/edit?mid=1QUq3ilqFY2OwADXsgt3iCc1BqGjO2oVn&ll=-36.96804548809578%2C174.8280768763939&z=13>



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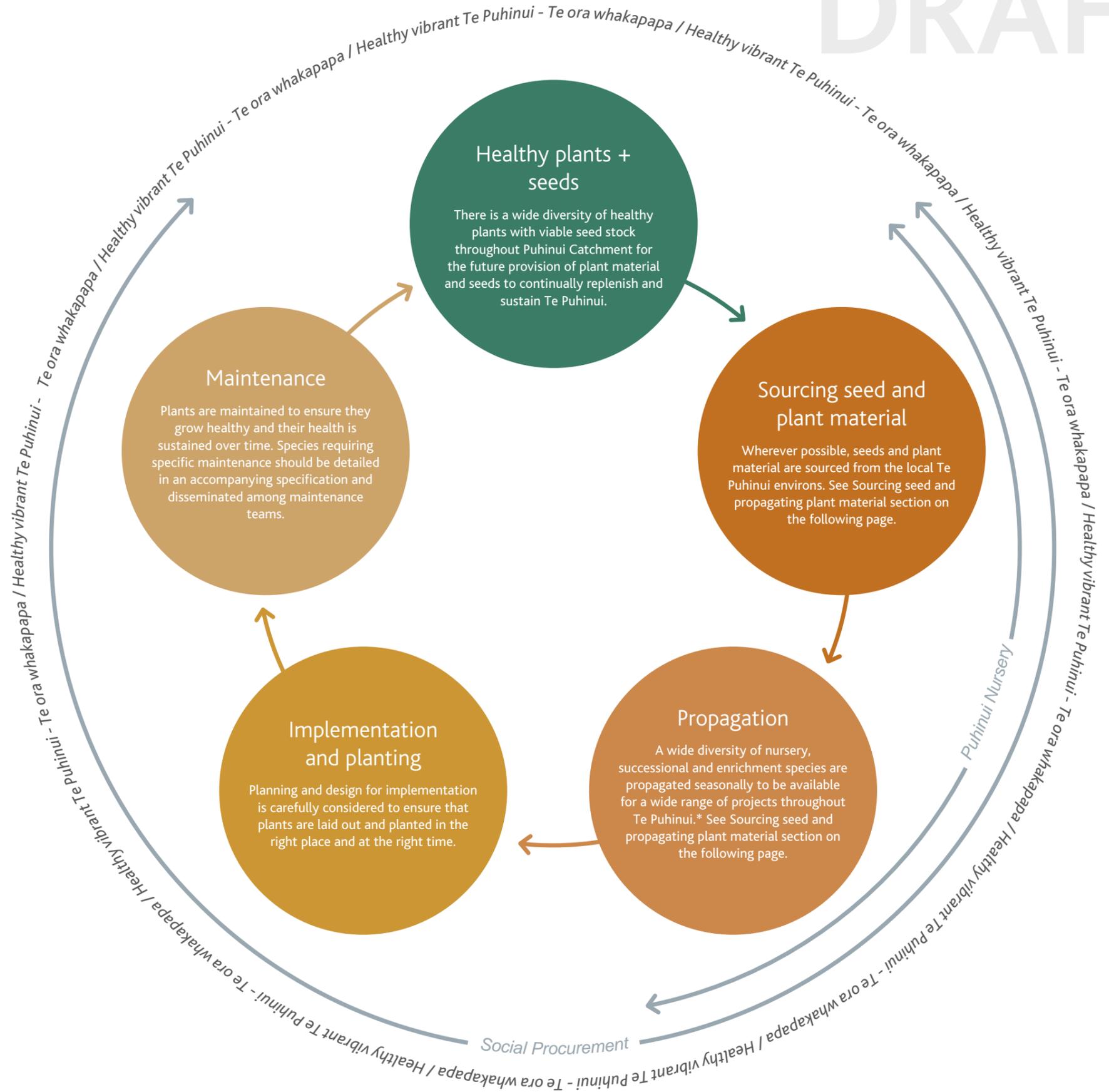
PATHWAYS TO HEALTHY PLANTS AND SEEDS

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This diagram outlines the key features and stages for establishing healthy plants and seeds necessary to effectively revegetate, regenerate and sustain Te Puhinui ecosystems. Opportunities for social procurement and local economic development are also identified.

All stages of the process should follow best practice and recognised industry standards, and where appropriate should be undertaken by a qualified professional.

**Many of the plant species appropriate for regenerating Te Puhinui require future planning if they are going to be available for implementation as they have a long lead in time. For example miro/ Prumnopitys ferruginea can take two or more years before germinating and several more years before it has established enough to plant out. Project forecasting and procurement of specific plant species need careful consideration well in advance to achieve the range of biodiversity required to achieve a healthy Te Puhinui ecosystem.*



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PLANTS FOR REGENERATING TE PUHINUI

DRAFT

Plant lists for regenerating Te Puhinui are organised into three broad ecosystem types that relate to their location within the catchment and the associated land uses. Each ecosystem type is organised into plant communities that relate to specific environments and applications.

Please note that the plant lists provided herein are a guide only. They represent a starting point for individual projects that will require further refinement and enrichment with additional species specific to each project's context and conditions.

Te Ngahere oo Te Puhinui/Te Puhinui Forest

The plant lists for Te Ngahere oo Te Puhinui provide a broad list of forest species suitable for Te Puhinui. The plant lists are organised into six plant communities which cover the broad forest types of Te Puhinui:

- Inland forests including puuriri forest; taraire, tawa, podocarp forest; and kauri, podocarp, broadleaved, beech forest - organised into upper, middle and lower catchment.
- Coastal forests - excluding plant communities within the tidal zone such as mangrove forests and seagrass meadows.
- Stream and aquatic habitats - represented here as a riparian corridor.
- Street trees - a plant community that did not exist prior to urbanisation that is now a significant part of the catchment's ecology.

Te Wai oo Te Puhinui/Waters of Te Puhinui

The plant lists for Te Wai oo Te Puhinui/Waters of Te Puhinui provide guidance for three distinct water sensitive design devices that incorporate natural and constructed elements designed to deliver a wide range of ecological functions.

- Wetlands - large shallow planted ponds incorporating a wide variety of species that allow sediment to settle and the biofiltration of contaminants.
- Rain gardens and urban swales - constructed depressions and drainage courses planted with a variety of indigenous species to filter contaminants and in some cases, infiltration to groundwater.
- Earth roofs - Partially or completely planted roof to filter water and air and provide a degree of stormwater detention.

Productive gardens

The plant lists for productive gardens are organised into forest gardens and medicinal plants. A forest garden is a productive ecosystem based on the structure and function of a forest of diverse species, which can include a range of fruit and nut trees, shrubs, herbs, vines and perennial vegetables which have yields directly useful to people.

¹Plants for intensive gardens are not included in this document. For information on intensive gardens for annual vegetables, salad mixes, and herbs; flowers for cutting and beneficial insects suitable for Te Puhinui see:

- Organic Edible Garden - <https://organicediblegarden.co.nz/>
- Garden Grow: Keep your garden growing - see what to plant right now - <https://www.gardengrow.co.nz/>

Auckland's unique and highly productive environment is one of very few places in the world where it is possible to grow three different types of forest garden in the same location - deciduous, Mediterranean and subtropical.

Medicinal plants outline a range of plants for well-being and include a range of rongoaa Maaori/ traditional Maaori medicinal plants.

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PRODUCTIVE GARDENS | DECIDUOUS FOREST GARDENS

DRAFT

Puhinui’s natural capital and land use patterns mean that opportunities for productive gardens in Puhinui should be focused on intensive, small-scale productive gardens and orchards for fresh fruit and vegetables and some livestock. Small scale intensive systems require more energy input per area of land than extensive systems and typically have higher yields. Three intensive food production systems suitable for Te Puhinui include intensive gardens, orchards, perennial crops and forest gardens.

A deciduous forest garden is characterised by deciduous trees and stone fruit species such as apples, plums and pears, with a shrub layer of seasonal berries and dense herbaceous ground cover of perennial and annual species. Deciduous forest gardens are best suited to well drained soils and with good air circulation to reduce the likelihood of mold and fungal infection caused by still humid air.

Because deciduous plants drop their leaves annually, a deciduous forest garden builds a continual layer of leaf mulch and humus which adds to the soil fertility over time.



MAAORI NAME	BOTANICAL NAME
CANOPY	
Plant varieties, to be selected for pollination requirements, root stocks, soil type, height consideration, compatibility.	
Piki	Ficus carica
Aaporo	Malus domestica
Paramu	Prunus domestica spp.
Piititi	Prunus persica
Pea	Pyrus communis
Haanati	Corylus avellana
SHRUB	
Raahi pere	Rubus idaeus
Karani	Ribes spp
Patatini kikorangi	Vaccinium spp
	Aloysia triphylla
GROUNDCOVER	
Select a seasonal coverage of perennial herbs to encourage beneficial insects and increase soil nutrient content.	
Paanakenake	Pratia angulata
	Dichondra repens
Taataraaamo	Rubus pentalobus
Totara	Fuchsia procumbens
Mokimoki	Mentha spp.
	Symphytum officinale
	Trifolium incarnatum
	Borago officinalis
	Achillea millefolium
	Trifolium hybridum
Hiioi	Mentha cunninghamii

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PRODUCTIVE GARDENS | SUBTROPICAL FOREST GARDENS

DRAFT

A subtropical forest garden is characterised by dense, multi layered foliage with closed canopy cover. Canopy trees can include avocado, bananas, macadamia, cherimoya, and tamarillo, with a shrub and groundcover layers of lush leafy and/or edible plants including guava and taro as well as climbers such as passionfruit. Subtropical forest gardens require sheltered, frost free, warm and humid sites and well drained soils with the exception of bananas and taro which prefer 'wet feet'.

MAAORI NAME	BOTANICAL NAME
CANOPY	
Panana	Musa spp
Huakerepe	Citrus paradisi
Toomato raakau	Solanum betaceum
	Annona cherimola
Rahopuuru	Persea americana
	Macadamia tetraphylla
SHRUB	
	Feijoa sellowiana (syn. Acca sellowiana)
Manarini	Citrus reticulata
	Heliconia psittacorum
GROUNDCOVER	
	Cucumis melo reticulatus
	Cucumis melo inodorus
	Rheum rhabarbarum
	Colocasia spp
	Passiflora edulis



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PRODUCTIVE GARDENS | MEDITERRANEAN FOREST GARDENS

DRAFT

A Mediterranean forest garden is characterised by dry climate trees such as olives, citrus, feijoa and figs with a shrub and ground cover layer of hardy woody perennials including rosemary, oregano, thyme and lavender as well as climbers such as grape. Mediterranean forest gardens are best suited to hot sites with well drained soils but always moist soil conditions.

Because Mediterranean species are tolerant of drought, they are well suited to drier sites than deciduous and subtropical forest gardens.

MAAORI NAME	BOTANICAL NAME
CANOPY	
Kotakota	Citrus aurantifolia
Reemana	Citrus limon
Manarini	Citrus reticulata
Karaka	Citrus sinensis
Piki	Ficus carica
Ooriwa	Olea europaea
SHRUB	
	Psidium cattleianum
	Rosmarinus officinalis
	Feijoa sellowiana (syn. Acca sellowiana)
	Laurus nobilis
	Vitis vinifera spp
	Punica granatum (dwarf)
GROUNDCOVERS	
Taaima	Thymus vulgaris
	Origanum spp.
	Rosmarinus officinalis 'Prostratus'
Taramea	Artemisia dracunculus
	Lavandula spp.
Ruaanuku	Salvia spp.
Piripiri	Acaena dumicola
	Stachys byzantina

Note: In selecting exotic fruit trees check if there will be any neighbouring ecological impacts, avoid near bush blocks.



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PRODUCTIVE GARDENS | MEDICINAL PLANTS

DRAFT

The medicinal plants listed have been chosen for their size and ability to be grown within a household environment. These are suited to most climatic conditions of the area and can be used as a suite of first aid/rongoaa species for home use.

MAAORI NAME	BOTANICAL NAME	NOTES
Karaka	<i>Corynocarpus laevigatus</i>	Leaves
Koowhai	<i>Sophora microphylla</i>	Plant trees in clusters or groupings. Use bark (older than 60 years old)
Tiitoki	<i>Alectryon excelsus</i> subsp. <i>excelsus</i>	Use of fruit for oil
Maanuka	<i>Leptospermum scoparium</i>	Use of flowers and oil
Patete	<i>Schefflera digitata</i>	Requires shade
Kaaramuramu	<i>Coprosma robusta</i>	Use of leaves and fruit
Houhere	<i>Hoheria populnea</i>	Use of leaves
Kawakawa	<i>Piper excelsum</i>	Requires semi shade. Use of leaves and fruit
Kuumarahou	<i>Pomaderris kumeraho</i>	Requires dry poor soils and semi shade. Use of flowers and leaf. Upper catchment to lower catchment location
Harakeke	<i>Phormium tenax</i>	Requires full sun at all times. Use of root and sap.
Piripiri	<i>Acaena anserinifolia</i>	Requires damp soils. Use of leaves
Koromiko	<i>Veronica stricta</i> var. <i>stricta</i>	Requires full sun at all times. Use of leaf and tip of new shoots
Puawaananga	<i>Clematis paniculata</i>	Climbers, Upper catchment to coast
Kaihua	<i>Parsonia heterophylla</i>	Climbers, Mid catchment
Kohia	<i>Passiflora tetrandra</i>	Climbers, Mid catchment to lower catchment
Tataramoa	<i>Rubus cissoides</i>	Leaves and fruit, Mid catchment to lower catchment
Kareao	<i>Ripogonum scandens</i>	Swollen root , Mid catchment to lower catchment
Kootukutuku	<i>Fuchsia excorticata</i>	Mid catchment sheltered gully
Pukatea	<i>Laurelia novae-zelandiae</i>	Leaves, Upper catchment to lower catchment, Wetlands
Kiekie	<i>Freycinetia banksii</i>	Tawhara - Damp semi shade not stand alone. Upper catchment to lower catchment

