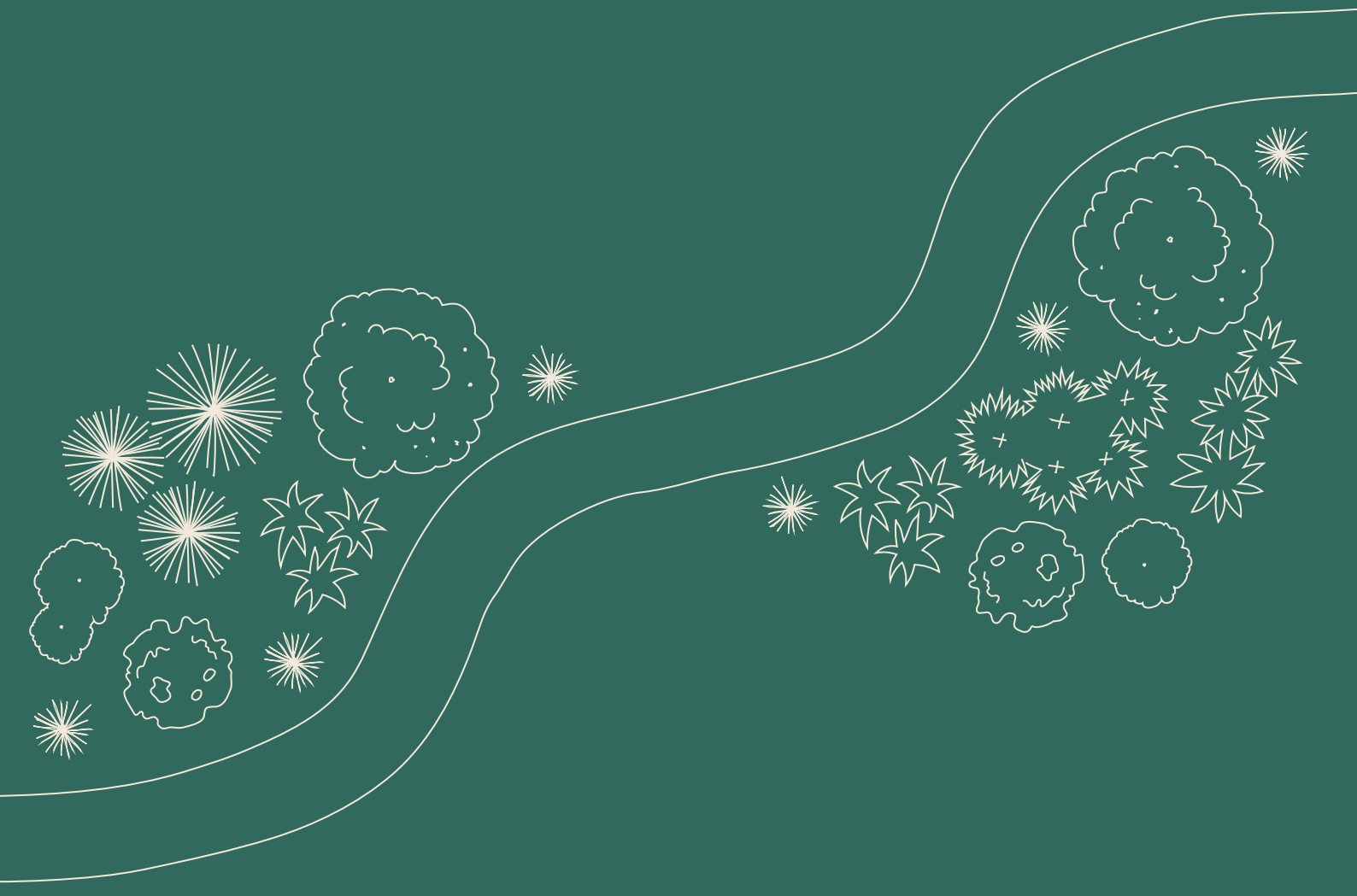
Te whakamahere kaupapa whakatō tipu kia toitū ai
Planning a restoration planting project

Today only 5% of Wellington's original lowland broadleaf-podocarp forest and 1% of original coastal forest remains. Most of our streams and wetland areas have been drained, channelled or piped completely to make way for housing, roading, industry and rail.



The Wellington landscape was once cloaked in a lush and diverse range of plants and animals from hilltops to sea and coast to coast. Northern rata was a common sight emerging through the canopy along with rimu, mataī, kahikatea and tōtara. Below them stood a dense canopy of tawa, kohekohe, kāmahi, tītoki, pukatea and kōwhai. The forest interiors were thick with climbers like kiekie and supplejack, and the forest floor carpeted with ferns. Tīeke, piopio, toutouwai, kōkako, hihi, banded rail, little spotted kiwi, weka, kererū, kākā and huia would have called through the trees and tuatara would have scurried in and out of sea bird burrows feasting on eggs. Dunes were home to dotterels, skinks and an array of moths and insects, and estuaries were spilling with wading birds, fish and vast mats of sedges and rushes.

Community groups, landowners, Council and other organisations are working tirelessly to protect and restore native plants and habitat throughout the city. Collectively, this is an amazing effort that can be built upon every year, in every park and backyard in Wellington.

How to use this planning guide

This planning guide and associated factsheet series provides tools and techniques to help anyone wanting to carry out native restoration planting in Wellington.

Use this guide to plan your project, then choose the relevant sections in this booklet that match the activities you are carrying out (eg site preparation, planting, monitoring etc) and the plant list for the environment you are planting in (eg sand dunes, inland hillslopes, wetlands etc).

Steps to successful restoration planting

Restoration planting in Wellington requires careful plant selection, ground preparation and ongoing management. Before putting plants in the ground, take the time to assess your site, get good advice and make a plan.

Key advice from experienced restoration planters in Wellington

Plan your project well - particularly assessing your site conditions and choosing plant species that can handle those conditions in the first few years.

Be aspirational but start small and really look after your plants in the first three to four years.

Get good advice right at the beginning from other community groups, neighbouring landowners and Council Rangers .

Ask lots of questions first.

Answering some of them may reduce the workload substantially or put you in touch with a community group working in your area already.

"Find your local Park Ranger - they are really helpful. They get things done and can access other resources in Council."

Garth, Highbury, Polhill Reserve planting volunteer

Te whakamahere kaupapa whakatō tipu
Planning your planting project

Restoration planting in Wellington requires careful plant selection, matching plants to site conditions, ground preparation and ongoing management. Before putting plants in the ground, take the time to assess your site, talk to people who could help, and make a plan.

"Right plant in the right place."

1. **What do you want to achieve? Do you want to restore an existing site, encourage birds, create a community project etc?**
   Check out other restoration projects on similar sites and find out how they have been done.
   Tool: Planning your planting project

2. **Where is your site, what are the conditions and what does it look like now?**
   Map out or draw your proposed site. Council Webmaps has downloadable maps that show existing vegetation and property boundaries. Include key features like existing native plants and weeds, animal pests, conditions like shelter, wet/dry areas, prevailing winds, special habitats etc.
   Tools: Planning your planting project - Guide to site assessment, Site Assessment Template

3. **Who can help?**
   Contact your local Wellington City Council Ranger or another community group/landowner doing similar work. Council Rangers can help with selection and sourcing of plants, advice about animal control and weed clearance on public land, communication between other organisations etc. If your project is larger than your own backyard, think about who you could get involved like neighbours, local predator control groups, schools, recreational groups etc. If you are working on public land you need to work with Council to establish a joint work programme and get permission. For example, any weed spraying needs to be done by Council approved contractors. Council will help to develop an MOU (Memorandum of Understanding) with your group that sets out everyone's responsibilities.
   Contact Wellington City Council Rangers
   04 499 4444

4. **What work will you do, when and how?**
   Write a plan that sets out the work that needs to be done and when. This helps to ensure for example that all the weeding and pest control is done before your plants go in the ground. It is useful to have at least a 5 year plan in Wellington because it takes time for plants to grow, particularly on windy and exposed sites. Make your plan 'fit for purpose' - include the information you (and your group) need - it doesn't have to be onerous. Talk your plan over with your Council Ranger, particularly if you need assistance with work on public land as Council needs to plan ahead for contractors and growing plants.
   Tools: Planning your planting project, Project Calendar Template, Site Assessment Template, Wellington City Council Restoration Guides and Plant Lists

5. **Site prep, planting and monitoring - make it happen!**
   Getting the ground ready and getting your plants in is really rewarding. Check out Wellington City Council resources for each stage you are at, talk to others doing restoration planting or your local Council Ranger for advice, assistance and inspiration.
   Tools: Sourcing, growing and selecting good quality native plants for your site, Site preparation for restoration planting projects in Wellington, Restoration Planting Techniques for the Wellington conditions, Maintenance and monitoring your restoration planting in Wellington.

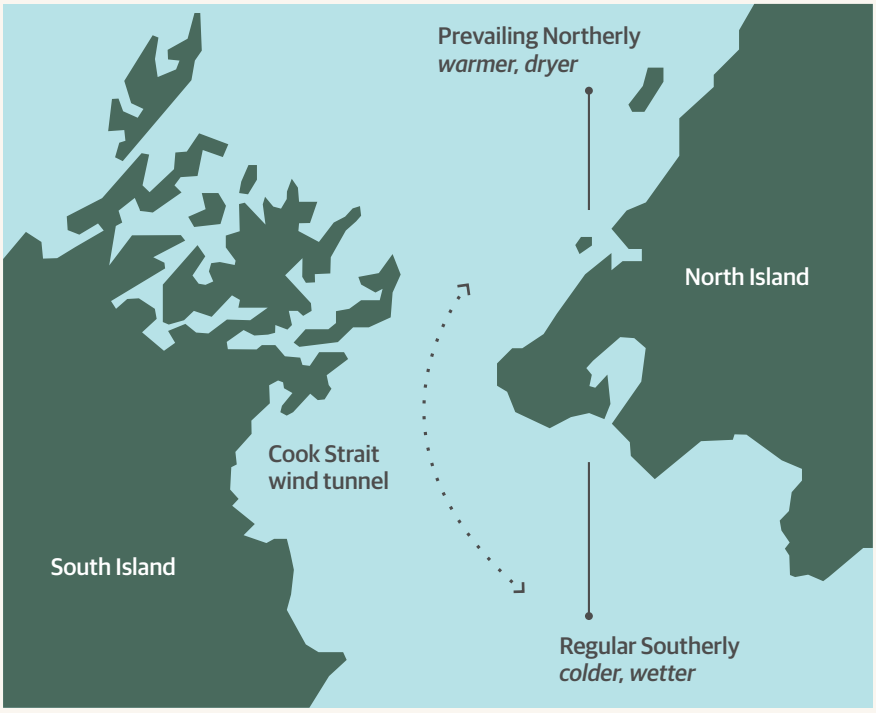
Te pānga o ngā 'Hau o Pōneke' ki ngā wāhi whakatō tipu
Impact of 'Welly Winds' on planting sites

Site conditions in Wellington vary enormously, depending on proximity to the sea, the form of the land, altitude, shelter and drainage.

The Wellington City Council area covers a large peninsula. At a broad scale different parts of the peninsula are characterised by particular combinations of geological, topographical and climatic conditions, as illustrated in image (right).

Strong winds funnel through Cook Strait from both the north and south. Planting sites exposed to the prevailing north-westerlies tend to be warmer and more prone to drying out. Planting sites exposed to south-easterlies are generally cooler and moister. In storms, strong winds can damage your plants and the salt carried onshore may burn young foliage.

When you plan your planting project, knowing the wind direction and frequency will help work out whether you need additional shelter or water for plants as well as how to choose the right plants for your site.

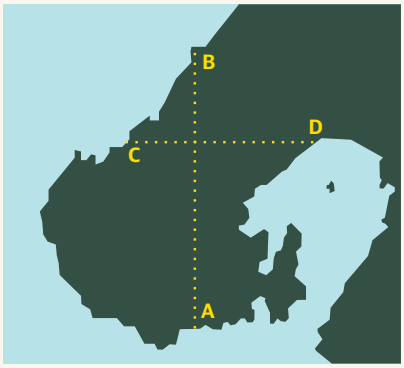


(Above) The Wellington peninsula adjoins Cook Strait

(Below) The Wellington peninsula showing the areas of strongest coastal influence.

Typical types of environmental conditions across the Wellington Peninsula

In very broad terms, there are five types of environments and related conditions that occur across the Wellington peninsula, as indicated by the coloured bands beneath each cross-section.

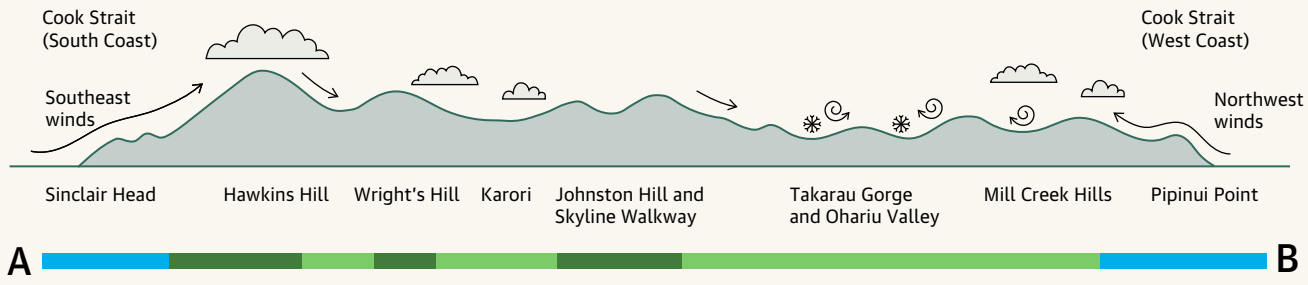


Cross-section lines for diagrams below.

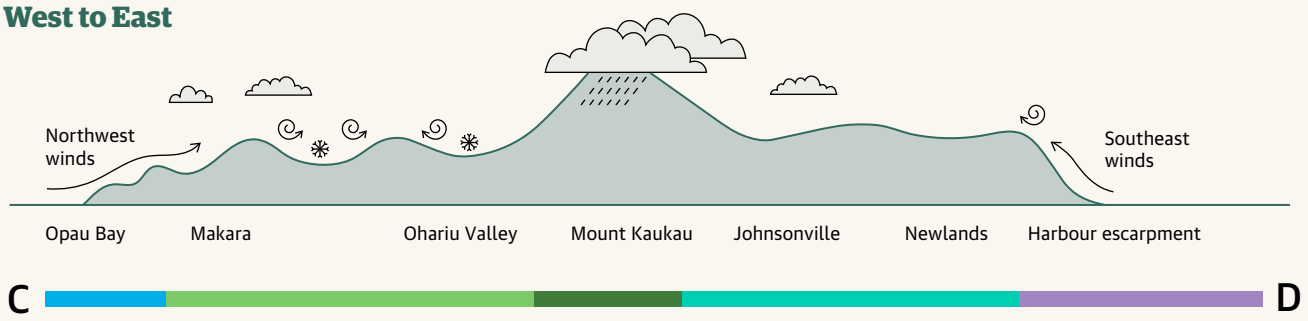
Key	Environment type	Likely conditions
	Coastal fringe - exposed to open sea	Very strong winds with drying effect despite moderately high rainfall; sharply drained steep seaward slopes; low sunshine hours.
	Inland valleys and basins	Turbulent drying winds; rain is seasonal but soils tend to retain moisture; valley and basin bottomlands tend to be moist, cold and prone to frost.
	Ridgelines and hilltops	Strong winds; high rainfall; low sunshine hours; lower year-round temperatures due to higher altitude; poor soils that can be waterlogged or leached of nutrients.
	Inland valleys and basins	Winds moderated by sheltering central ridges; mild and humid; deeper more fertile soils.
	Coastal fringe - harbour	Protected from north-westerly winds; frost-free; tends to dry out due to sharp drainage on steep escarpment.

Cross sections of Wellington Peninsula

South to North



West to East



Ngā whāinga
Goals

"Aim big, start small - be happy with small, it's better than doing nothing! If only one or two landowners are interested in the beginning, start with them and do it well - it will catch on! The mood has changed now in New Zealand and people are keen."

Rebecca, Makara Estuary

What do you want to achieve and why?

Having an idea of what you want to achieve helps to define where to start, what you need and how to plan your work programme.
It is also useful if you are applying for funding and resources. Before you start planting, ask yourself:

- What do I want to achieve? Eg create habitat for birds and other wildlife; clean up the stream; create shelter and stable banks?
- What are the main actions I need to take to do this?
- How much can I realistically get done each year?
- What advice and resources do I need?
- How will I track progress and know I'm succeeding?

If you have a broad idea about what you want to achieve (like creating 'islands' of native bush for birds) but no site, talk to Wellington City Council about possible locations. If you already have a project on public land (like building mountain bike tracks), talk to Council about support you can get to expand this work to include restoration planting.

Community group hard at work clearing around restoration plants, controlling the competing long grass

"We started out planting along the sides of new mountain bike tracks to fill in the bare ground. Then it became about getting a greater diversity of plants and a canopy over the tracks. Then the goal moved to planting the top of Polhill itself. Now my goal is restoring a podocarp forest and planting 1000 nīkau back in Polhill! It's taken a while to get to understand how we can meet this goal but now I'm looking 100-200 years ahead..."

Garth, Highbury, who plants in the Polhill Reserve

Examples of basic draft plan

Private landowner on a lifestyle block in Ohariu Valley	
Goal	Our small bush remnant is flourishing and is connected to our stream with native vegetation that attracts birds.
Work that needs to be done	Fence stock from the bush block and stream to stop impacts of grazing and protect new seedlings - bush block is the priority because there are open patches where wind is blowing through.
	Control the rabbits and possums to stop damage to bush block and new seedlings.
	Spot spray the grass before planting to make weed control more manageable.
	Source plants that are going to survive the winds in the valley.
	Plant a buffer around bush to create shelter and plant stream sides to link it to the bush.
	Keep the plants alive by continued weed and pest control.
Resources and advice	Use existing farm plan and google maps to help map out planting areas.
	Neighbouring farm has already planted streamside, so could have some good advice on what plants survive best.
	Wellington City Council could help us with plant supply and advice.
	Makaracarpa Group might be able to help on planting days.
Measures of success	Plant 500 plants a year for eight years until the entire site has been planted.
	Ninety per cent of plants have survived three years after planting.
	Bird counts show native bird numbers are increasing.
	Seedlings are regenerating in the bush remnant.

Examples of basic draft plan

Residents' group in a new housing area in Churton Park	
Goal	We want native birds frequently seen in our neighbourhood using native plants for food and habitat.
Work that needs to be done	Do some bird counts to see what birds are present now so we have something to measure from.
	Encourage household owners in the neighbourhood to plant native trees that attract birds and would have naturally grown here.
	Find two sites of at least 500m² and densely plant them to provide 'islands' of bird habitat.
	Control weeds and pest animals to protect plantings and birds.
Resources and advice	Information about how to do bird monitoring.
	Information about what trees used to grow here and how to source them – check Council restoration guides for inland planting.
	Wellington City Council could provide plants for our 'islands'.
	Need a contact list of neighbours.
Measures of success	Within two years, at least one tree that provides food for birds has been planted in half of properties in the neighbourhood.
	Within three years, 1000 native plants have been planted in the neighbourhood.
	Annual garden bird counts show increased numbers of native birds after five years.

Wāhi
Place

Where is your site and what are the current conditions?

Once you have a broad idea of what you want to achieve, assess your site to identify the climatic conditions, opportunities, issues and what is feasible over time. Be prepared to adapt your ideas to fit the site conditions and wider context if need be.

Your assessment will help work out which plants are most likely to survive in the various conditions on site and how to stage your planting over time.

Record your site assessment in a way that you can refer to it easily. For example, on a map, aerial photo or table. Check out Wellington City Council's *WebMap* for property, infrastructure and hazard information, as well as contours, aerial photo views and the Wellington City Council reserve track network. You could also use a google map, or existing property information like a farm plan.

Example of a site assessment for bush block and streamside restoration

Site Assessment Paddock B Bush block and gully

Topography	Rolling but some steeper bits in gully area.
Hydrology	Damp through centre of bush block in winter. Good moisture all year around in centre of gully, drier areas in paddocks.
Soil	Good deep rich soil in bush block. Deep but compacted soil around gully, becomes very water logged in winter. Drier soils in paddocks except in winter.
Aspect & wind	Northerlies - dry and warm. Gusty across ridgelines.
Exposure to salt	None.
Temperature	Some frost.
Size and shape	Good sized existing bush block, but exposed on edges. Large open paddock area to plant, might need to do in stages working from bush block outwards, stream heads need protection from grazing.
Current vegetation	Māhoe, kaikomako, matipo, tōtara and mamaka trees in bush block – find out what other plants would have grown here. Canopy cover in bigger bush block. Sparse vegetation and little shelter along stream. Grass in paddocks. Weeds: gorse, blackberry. Small blocks grazed under.
Wildlife	Pests: goats, rabbits etc.
Access	4WD and access to bush block and gully.
Opportunities	Native seed source in bush block, some species missing though so good to reintroduce other plants.
	Good to add bird attracting species.
	Use gorse as shelter for new seedlings.
	Gradually close in ridge area to fence line. Link the bush blocks with stream.
Issues	Investigate the cost of fencing in straight line – pink line or following the stream areas - which would retain grazing on the ridges. Redo fence in block A to exclude sheep. Fencing gully splits paddock, need to sort out access for stock management.

Check list of site conditions to consider

Topography (shape of the land)	What is the altitude range? How much is steep, moderately steep, undulating or flat land? Topography can affect temperature, drainage, shelter and ease of access.
Hydrology	In what stream catchment(s) does your land lie? Is the stream a natural watercourse along its length or has it been channelled or piped above or below your site in ways that could affect water quality and fish access? Are there areas that look drought-prone, damp or poorly drained?
Soil	What is the soil like in different parts of the site? What depth, texture and colour is it? Clay soils can be fertile but prone to waterlogging and compaction; sandy soils are less fertile and sharply drained; humus-rich soils have good texture due to plentiful organic matter.
Aspect & wind	What direction do different parts of your site face? How much is exposed to the warmer but drier prevailing north-westerly wind? How much to the colder but often rain-bearing south-easterly? Is there any exposed ridgetop land that might be exposed to winds from all directions? Are there sheltered spots in gullies and valleys?
Exposure to salt	The salt carried by onshore winds can damage plants, particularly along the shore and coastal escarpments. Plant native in these areas that are adapted to withstand salt exposure.
Temperature	How cold does your site get? Prolonged cold can inhibit plant growth and frosts can damage plants that are not frost-hardy.
Size and shape	How big is the total area you are contemplating? If quite large, are there obvious parts that could be progressively tackled in stages over time? Is the area long and thin or reasonably compact? Shapes with more 'edge' are more exposed to wind and pest invasion.
Current vegetation	What species are present (exotic and native), at what height and stages of succession are they? Are there any rare or threatened species present? Does the existing vegetation already form a complete canopy over any part of the site? (Remember lower-growing herbs and shrubs can also create a canopy in places like foredunes.) If not, is it likely existing plants will form a canopy with time if kept clear of weed competition? What invasive weeds are present? Is your site so weed-prone that you will need to clear it back to bare ground?
Wildlife	What birdlife, reptiles and invertebrates have you observed on site? What wildlife species are known to be or likely to be present (ask Wellington City Council). Are any threatened species amongst these and, if so, what are their habitat requirements?
Access	What is the vehicle and/or foot access like for such activities as bringing in quantities of plants and mulch? Is there a suitable holding area to temporarily store plants and other materials? Will you need to clear or cut any tracks? Is difficult access on any of the planting area likely to deter less physically able volunteers?
Opportunities	For example; using existing vegetation as shelter for new plantings, linking sites across the landscape, working with neighbouring restoration groups, introducing rare species, providing recreational benefits, controlling soil erosion etc.
Challenges	For example; significant weed infestations, flooding, sea level rise, difficult access, large areas, fire risk etc.

Create a planting plan

Draw a planting plan to help picture the spatial dimensions of your project - it doesn't have to be a work of art, just enough to help define the purpose (eg buffer, early stage shelter plants etc), tolerances (eg frost hardy, wind tolerant, riparian plants etc) and quantities of plants needed.

An aerial photograph saved from Wellington City Council *WebMap* can be a very useful base map.

Taking into consideration the information from your site assessment and your objectives, match the plants to these conditions.

It is really useful to talk through this picture with a Wellington City Council Ranger or restoration specialist to help develop and refine your planting programme.

Create a plant list

Plants have different tolerances to different conditions like salt spray, wind, sunlight etc. Look at your site or use the diagram below to identify which broad environment you are restoring eg coastal sand dunes, hilltops, riparian margins etc.

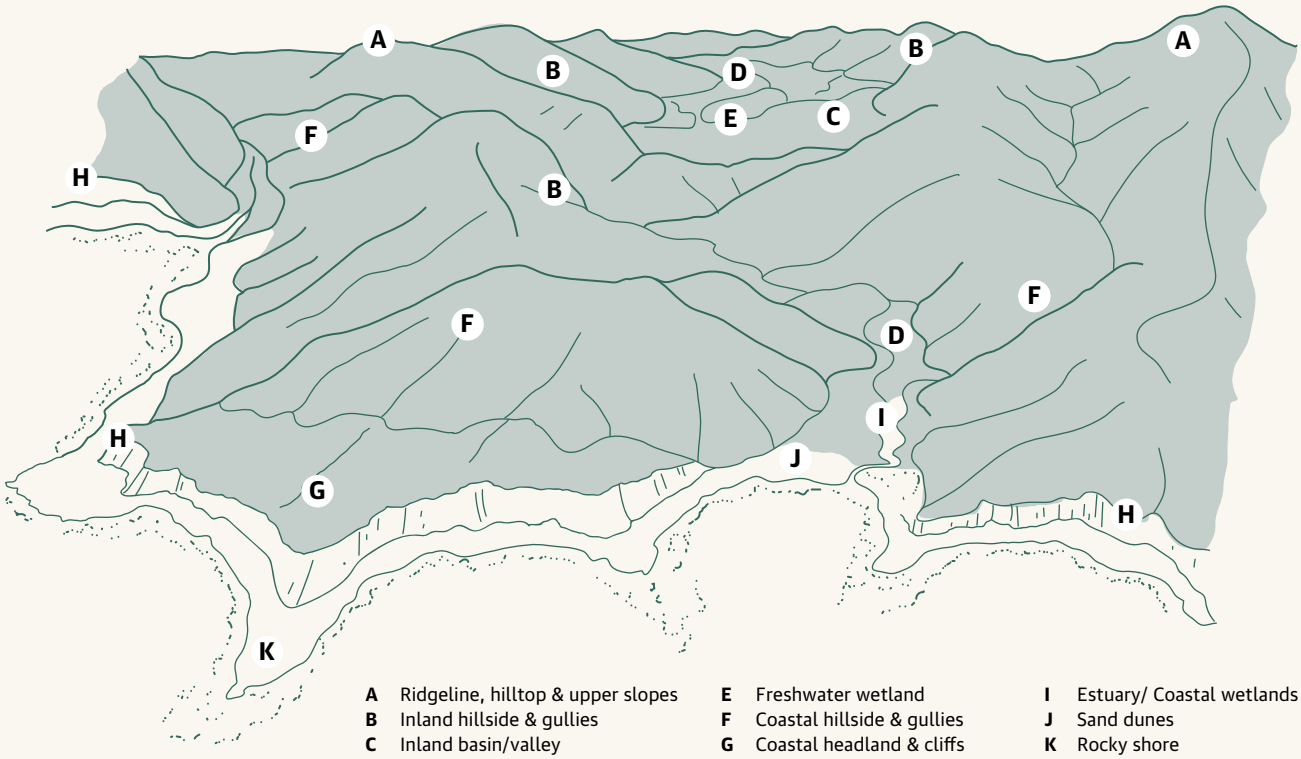
Use this information along with your site assessment to develop your plant list. Wellington City Council factsheets including a plant list for each environment type are listed below.

Identify your stage of planting

Plant succession is a natural process that sees a bare site colonised with early stage or 'primary' species and then gradually overtaken by successive groups of later stage or 'secondary' species until a stable mature community of plants is achieved. A mature community of plants could be, for example tall forests, grasslands, scrub or turf fields, depending on the environment and site conditions.

In restoration planting, we often aim to speed up the successional process through mass planting of seedlings on bare sites (rather than relying on natural seed distribution) and planting tall-growing tree species within established lower vegetation.

Look at your site and identify which stage of succession you are at, there may be areas of bare land and existing vegetation to work with. Use this information when you select your plants. The plant lists in the Wellington City Council Restoration Planting guide categorise the plants into early and later stage planting.



A Ridgeline, hilltop & upper slopes
B Inland hillside & gullies
C Inland basin/valley
D Riparian
E Freshwater wetland
F Coastal hillside & gullies
G Coastal headland & cliffs
H Coastal escarpment
I Estuary/ Coastal wetlands
J Sand dunes
K Rocky shore

Environmental sites

Tāngata
People

"Human infrastructure is key, though there isn't one right answer, as each project has different people involved and a different way of organising things. Start small and build up. Adapt with who is there when you start and the opportunities that then come along. For example, working with the Brooklyn School has been wonderful for us. Now is the right time to be planting trees, people are aware and there is lots of good will."

Garth, Highbury, Polhill Reserve planting volunteer

Who can help?

If your project is larger than your own backyard, think about who you could get involved like neighbours, local pest control groups, schools, recreational groups etc. Having a group of people involved needs some organisation but it shares the load and the reward.

"Find your local Park Ranger – they are really helpful. They get things done and can access other resources in Council."

Garth, Highbury, Polhill Reserve planting volunteer

Council Rangers can help with project planning, selecting and sourcing plants, advice on weed and pest control and linking to other groups and resources.

If you are working on public land you will need permission from Council. Council Rangers can help to develop a joint work programme and a Memorandum of Understanding (MOU) that sets out everyone's responsibilities and expectations.

Whakamahere Plan

"When you are planting in the beginning, start small, really small – I've noticed that even in a small area it takes a lot of time to keep on top of the weeds."

Sue, Owhiro Bay

What work will you do, when and how?

When you are drawing your planting plan, think about the sequence of work that needs to take place to establish your restoration planting. Allow one to two years for site preparation and plant propagation. In Wellington it can take four to six years after planting before the plants are established, ie the canopy has closed over. It can take even longer in really exposed windy areas.

Compile a staged work schedule over several years to keep track of your work. See the example on the next page or download a template restoration planting project tracking spreadsheet to start from.

Remember that planting every year will see a build-up of tasks. In addition, if you are planting more than one site each year (eg a streamside and a bush block) this will multiply the work effort needed.

Make sure it will be manageable – unless you have a lot of volunteers or resources, doing a small area well each year is often more effective than doing a large mass planting.

Joakim ensures plants are establishing well, the community group Te Motu Kairangi is restoring coastal forest at Scorching Bay.

Example 1: General work plan

Year 1	Winter	Spring	Autumn
	Baseline monitoring: gather whatever information you need so you can measure progress as your project develops. Plant supply: allow at least two years for propagation of species. Either: (a) order eco-sourced plants from external supplier, or (b) obtain permits to gather eco-sourced seeds or other propagating material and grow your own plants.	Prepare planting site: spray/start digging out any weed infestations. Talk to Wellington City Council about help with aggressive weeds.	Prepare planting site: follow up control of weed infestations. Talk to Wellington City Council about help with aggressive weeds.
Year 2	**Winter**	**Spring**	**Autumn**
	Prepare planting site: cut and clear sprayed weeds. Planting can start this year if weeds have been well controlled and plants available. Plant supply: order any other eco-sourced plants not being supplied by Wellington City Council for delivery next winter from external supplier.	Plant supply: order plants, tree shelters and mulch from Wellington City Council for planting next winter. Site maintenance, including controlling any regrowth of aggressive weeds.	Site preparation, including controlling any regrowth of aggressive weeds.
Year 3	**Winter**	**Spring**	**Autumn**
	Plant and mulch: make sure that plants are matched to suit conditions. Check plants after 4-6 weeks; firm in any plants that were poorly planted or have been loosened by wind; prune any spindly/wind-vulnerable plants. Stake plants that look vulnerable or if they might be hard to locate through long grass.	'Release' or clear competing weeds from around plants, especially after growth flushes in spring and autumn. If signs of invasive weeds re-growing, dig out or cut and paste with herbicide.	'Release' or clear competing weeds from around plants, especially after growth flushes in spring and autumn. If signs of invasive weeds re-growing, dig out or cut and paste with herbicide.
Year 4	**Winter**	**Spring**	**Autumn**
	Plant and mulch, fill any gaps where plants have died, stake if needed.	Release at least twice during growing season. Assess plant losses in late spring and order replacement plants for infill planting next winter. If more than 15-20% have died, review species choice and site conditions.	Monitor and maintain as required.
Year 5	**Winter**	**Spring**	**Autumn**
	Replacement planting and mulch into gaps where plants have died.	Monitor and maintain as required.	Monitor and maintain as required.
Year 6-8	**Winter**	**Spring**	**Autumn**
		Monitor and maintain as required until plants close over the ground. Watch for re-emergence of weeds and dig out or treat with herbicide, or notify Wellington City Council if further assistance is required. Continue to assess plant losses, especially in drought years, and arrange replacement planting as required.	Monitor and maintain as required.
Canopy closure	**Winter**	**Spring**	**Autumn**
	Enhancement planting: consider potential for planting enhancement species into established planting and order plants.	Enhancement planting: consider potential for planting enhancement species into established planting and order plants.	Monitor and maintain as required.

Te aroturuki me te rikoata kokenga
Monitor and record your progress

"Monitoring is useful to check survival rate, particularly which plants do and don't survive. The important thing is to work out what is the most useful information to collect for your project and for who."

Garth, Highbury, Polhill Reserve planting volunteer

Basic monitoring should be carried out at every restoration planting site. The purpose of monitoring is to track the progress of your project. For restoration planting, a key measure is the survival rate of your plants. Other measures are numbers and diversity of birds present, evidence of natural regeneration, reduction of pest animals or weed infestations. The information you record needs to relate to your overall goal and the work you are doing to achieve that goal.

During your planning phase:

- Decide on what you need to measure to track progress, for example annual plant survival rates, presence of native birds etc.
- Set up a simple record sheet of what is to be measured and when.
- Record any baseline data about your site before you start planting so you have a comparison to work from. For example, if your goal is to increase native bird species at your site, you need to know what the current species are.
- Stake out (or GPS) a fixed location(s) to use as a photo point to show progress.

For more information such as how to assess plant survival rates, check out the Wellington City Council guide: *Restoration Planting Sites*

Monitoring plant growth and checking plant survival within the site.