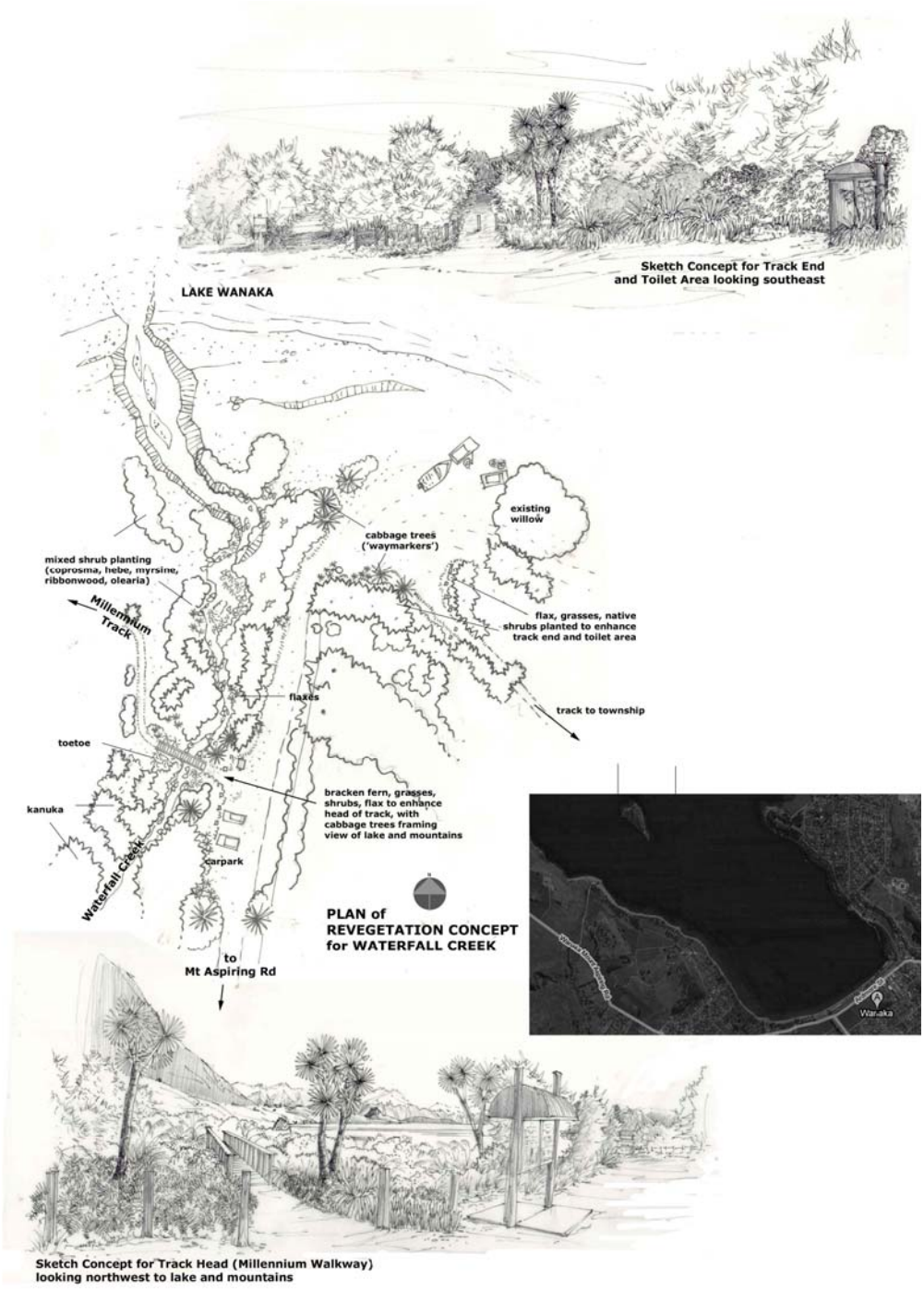
TE KĀKANO
Aotearoa Trust

Waterfall Creek Restoration Project

Implementation & Management Plan



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1 PROJECT VISION

This project aims to re-introduce indigenous species into the Waterfall Creek riparian zone, focusing on the vicinity of the Millennium Walkway bridge and down-stream to Lake Wanaka.

2 PROJECT DURATION

The project is significant in size and scope and will be undertaken in three phases:

1. Phase One: East Bank of Waterfall Creek
   Commenced in autumn 2009 and plantings scheduled to be completed by winter 2010.
2. Phase Two: Access and Amenities Area of Waterfall Creek Track Junction
   Commencing in autumn 2010 and plantings scheduled to be completed by spring 2010.
3. Phase Three: West Bank of Waterfall Creek
   Commencing in autumn 2010 and plantings scheduled to be completed by spring 2011.

3 THE PROJECT AREA

3.1 Location

The area covered by this project comprises approximately 1.5 hectare of land surrounding the Waterfall Creek junction of the Millennium Track on the shore of Lake Wanaka.

A map of the project area and location of each phase can be found in Appendix 11.1.

3.1.1 Phase One: East Bank of Waterfall Creek

Comprises the east bank of Waterfall Creek at the junction with the Millennium Track, from 80m upstream of the walkway bridge to 80m downstream. Phase one has an area of approximately 1600m² (160mx10m).

3.1.2 Phase Two: Access and Amenities Area of Waterfall Creek Junction

Comprises the car park and its vicinity at the outlet of Waterfall Creek. This phase includes the kanuka islands and public toilet site. Phase two has an area of approximately a hectare (100mx100m).

3.1.3 Phase Three: West Bank of Waterfall Creek

Comprises the west bank of Waterfall Creek, opposite the area covered by phase one. Phase three has an area of approximately 3200m² (160mx20m).

3.2 Existing Conditions

There is variation of substrate across the project area (see Plans 1 and 2). West of the active riparian zone is an older and more stable alluvial fan, dry and open

with little topsoil. It is largely populated by sweet brier but has occasional kanuka and coprosma bushes. The lower western margin of the fan has a more continuous grass cover suggesting presence of organic matter and topsoil and moister conditions. The upper part of the delta, above the bridge, also has denser mostly exotic weed cover suggesting moister conditions and perhaps more organic matter.

A terrain of relict storm beach ridges exists to the east of the creek, where there is more topsoil, probably underlain by finer gravels. A strip of this extends into the public lakeside reserve, with a cover of maturing kanuka.

Indigenous species currently present in the project area include a remnant kanuka pocket, scattered Hebe salicifolia, bracken fern, carex spp, and abundant matagouri. Also present are native broom, Coprosma propinqua, raoulia spp, Muehlenbeckia axillaris/complexa,

Elsewhere beech is present higher in the Waterfall Creek Catchment and a wider range of species can be found in the rocky hillside areas further west.

3.3 Habitat Zones

Six different Habitat Zones in the vicinity have been identified as follows:

1. Relict Storm Beach Ridges
2. Hard Rock Hill Slopes
3. Upper River Delta (including active stream zone)
4. Middle River Delta
5. Lower Western River Delta Margin
6. Active Stream Zone

Briar infestation occurs throughout and willows infest the riparian strip.

A map showing the location of each habitat zone can be found in Appendix 11.2.

Details of the existing conditions and suggested planting mix for each habitat zone can be found in Appendix 11.3.

3.4 Existing Planting to be Retained

There are two areas of indigenous planting that will be retained:

1. Approximately 20 individual Hebe (koromiko) plants are scattered along the stream margin where they have escaped sheep grazing in the past.
2. A pocket of maturing kanuka forest (4-5m high) covering an area of approx 2000m². One tree on the western bank is a very old specimen.

3.5 Landowners/Organisations Responsible for Managing the Project Area

The area is currently Recreation Reserve administered by the Department of Conservation (DOC), who are aware of and support the project.

However, this area is soon to be transferred to the management of the Queenstown Lakes District Council (QLDC) as part of the Wanaka Foreshore Reserve. QLDC are also aware of the restoration project and give it their full support and have already supplied some materials for the control of briar.

A nohoanga site is adjacent to the area covered by the restoration project, but is not part of it.

Neither DOC nor QLDC currently have specific management plans covering the project area.

4 RE-VEGETATION

4.1 Re-Vegetation Strategy

A strategy of phased works and careful replanting will be used to make the most efficient use of the available plants and volunteer labour.

4.2 Plant Selection Criteria

The following selection criteria were considered when choosing plants for the project site:

1. All plants will be native to the project site or occurring within the catchment.
2. Plants to include species that will provide adequate canopy to shade out the growth of exotics, i.e. briar and lupin.
3. Other species, e.g. koromiko, will provide ground cover to prevent future establishment of briar and lupin, and to provide shelter and the appropriate growing environment for native forest species e.g. putaputaweta, mahoe, broadleaf.
4. Plants to include species that will provide valuable food and habitat for native birds e.g. flax, mahoe, putaputaweta and kanuka
5. The aim is to re-establish native biodiversity and to reproduce what was found in the vicinity in pre–European times.
6. It is also intended to provide increased habitat value to the aquatic and riparian habitat.
7. Initially hardier species will be used so that most maintenance activities are limited to the first two or three growing seasons.
8. Plants that have been locally eco-sourced and are available from, or can be propagated by Te Kākano's native plant nursery.

4.3 Details of Plants to Be Used

Using the criteria outlined in point 3.2 above and the plants identified in the habitat zones table (*point 2.3 and Appendix 12.3*), fifteen species have been identified as being the most appropriate and readily available plants to use for the initial stages of the project. These are:

1.	Carpodetus serratus	putaputaweta
2.	Coprosma propinqua	mingimingi
3.	Coprosma rigida	
4.	Cordyline australis	Ti/cabbage
5.	Discaria toumatou	matagouri
6.	Griselinia littoralis	broad leaf
7.	Hebe salicifolia	koromiko
8.	Kunzea ericoides	kanuka
9.	Leptospermum scoparium	manuka
10.	Melicytus ramiflorus	Mahoe
11.	Olearia avicenniifolia	Tree daisy
12.	Phormium tenax	Flax
13.	Pittosporum tenuifolium	kohuhu
14.	Plagianthus betulinus	ribbonwood
15.	Sophora microphylla	kowhai

A table showing more detail about the number and location of these plants can be found in Appendix 11.4.

4.4 Planting Plan

The planting plan for each phase is as follows:

4.4.1 Phase One: East Bank of Waterfall Creek

1. To be fenced to exclude rabbits.
2. All briar rose to be removed.
3. Existing kanuka and koromiko to be liberated.
4. Plantings of kanuka, ti, ribbonwood and koromiko to start in spring 2009.
5. Irrigation (sprinkler and dripper) to be installed prior to summer 2009.
6. More plantings of the above and forest species – mahoe, putaputaweta, broadleaf during winter 2010.

4.4.2 Phase Two: Access and Amenities Area of Waterfall Creek Track Junction

1. To be cleared of briar rose outliers.
2. Some large clumps of brair rose retained as shelter.
3. Kanuka liberated and protected from rose.
4. Plantings of ti, kanuka, kowhai and flax during winter 2010.
5. Plantings to be protected by individual rabbit guards.
6. Irrigation via localised system of drippers during spring 2010.

4.4.3 Phase Three: West Bank of Waterfall Creek

1. To be fenced to exclude rabbits in autumn 2010.
2. Briar rose removed and kanuka liberated.
3. Remove rabbits and plant with selection of predominantly kanuka, koromiko, totara, ti, flax and Coprosma in winter/spring 2010.
4. Enrich with further plantings and greater species diversity in winter 2011.
5. Irrigation via sprinkler and dripper.

5 SITE PREPARATION

5.1 Clearance

5.1.1 Pest Plants

1. Remove any exotic pest broom by digging out.
2. Remove willows along stream by cutting and injection poisoning (autumn).
3. Prune and thin sweet brier to enable ready access thru the area and spaces for planting but leave some height and spread to provide shade and wind shelter as much as possible.
4. Weed-eat rank grass and lupins.
5. Mulch all waste green material on site to use as mulch.

5.1.2 Pest Animals

Rabbits are the only grazing pest present and will be dealt with by way of exclusion, by using either rabbit netting around designated areas of intense plantings, and by individual rabbit guards/sleeves in less densely planted areas.

Once the fencing is completed rabbits will be removed by way of drives and where necessary, QLDC shooting operations. Some warrens may also have to be gassed.

5.2 Irrigation

A small scheme, expanding with each phase of the project, will be installed to directly extract water from Waterfall Creek on a temporary basis over the height of summer and at times of drought. As a general principle, irrigation will be kept to a minimum to prevent the plants from becoming dependant on it. Plants will be encouraged to put roots out to seek their own water. It is envisaged that irrigation will be confined to the first few years while the plants are becoming established.

The scheme will consist of a supply line taking water directly from Waterfall Creek and diverting it to the riverbank plantings. The intake will be placed approximately 200 metres upstream to provide enough pressure for the use of sprinklers and drippers. The number of sub branches and actual amount irrigated each time will depend on pressure and coverage achieved. This will require some experimentation.

It should be noted that the best watering system for dense plantings would be a sprinkler system and for more scattered plantings via lateral line and 4L/hr drippers. The system will be operated manually, because power is not available on site but more importantly, to ensure irrigation is applied as required and that the system is functioning properly.

5.2.1 Resources Required

At the height of summer the system would use 1000 x 4l + 4000l/hr, 4 hours a week, 16000 L/week

Phase One
200 m 2inch alkathene
400 m 13mm alkathene
15 tee joint, joiners, clips
300 4L drippers

Phase Two
100 m submain 25mm
300 m 13mm alkathene
20 tee joints, joiners clips
400 4L drippers

Phase Three
200 m 2 inch alkathene
400 m 13mm alkathene
15 tee joints, joiners, clips
300 4L drippers

5.3 Fencing

As noted in point 5.1.2 above, fencing is primarily required to keep out pest animals, predominantly rabbits.

The low, unobtrusive and structurally temporary nature of the proposed fencing does not trigger the resource consent process.

5.3.1 Resources Required

Fencing will be installed with each phase of the project.

Phase One
200m of 900mm rabbit netting
4 strainer posts
20 fence posts
1 roll 3mm high tensile wire
6 permanent wire strainers
2kg staples

Phase Two
100 m 900 mm rabbit netting
20 fence posts
1 roll 3mm high tensile wire
6 permanent wire strainers
2kg staples

Phase Three
200m of 900mm rabbit netting
4 strainer posts
40 fence posts
1 roll 3mm high tensile wire
6 permanent wire strainers
2 kg staples

5.4 Access Routes & Pathways

It is planned to have a low key informal trail up the eastern bank of Waterfall Creek, commencing at the delta and, on completion of phase three, meandering all the way to the top of the reserve, being approximately 500m in length.

A small amount of benching will be required but the trail would mostly follow natural contours so soil disturbance will be minimal.

A very small amount of pruning to create gaps for access through existing kanuka will be required.

5.5 Signage

Unobtrusive but effective signs, yet to be designed, will be placed at two locations:

1. Beside the bridge at the beginning of the northbound Millennium Track.
2. At the bottom corner of the restoration area, adjacent to the Waterfall Creek launching site and facilities.

The text will give a brief outline of the aims and extent of the project and will give prominent acknowledgement of all the generous contributors to the project.

QLDC consent will need to be applied for and is unlikely to be rejected.

6 PLANTING GUIDELINES

6.1 Stock Choice and Pre-Planting Preparation

1. All stock to have moist root-balls and be well grown within its container.
2. Larger grade stock is better for harsher and drier sites.
3. If any plant is found to have a dry root-ball at time of planting immerse fully in a bucket of water until all air bubbles are gone. Lift out and allow to drain before planting.
4. Only enough plants shall be transferred to the planting area as can be planted in 3-4 hours, unless a shaded and sheltered area is available for a full day's planting.
5. Plants shall be set out by project manager or by others on the project manager's instruction. Setting out shall take advantage of shelter and shade offered by existing plants and moister micro-depressions and areas of topsoil; and shall not compromise any existing native plant.

6.2 Planting Method

1. Scrape off all existing vegetation from planting spot to about 1m diameter but avoid damaging any existing native plants as much as possible. Green waste to be mulched per point 5.1.1.
2. Dig holes in a square shape that are twice the width and depth of the plant's root-ball. Loosen sides and bottom of hole and remove any large rocks, debris, etc. Place excavated material in a barrow to mix up backfill, unless of undesirable material.
3. Mix compost with excavated material at a rate of 1:1 unless site material is a reasonable soil. Where excavated material is more bouldery obtain finer gravels and topsoil from closest source for backfill, mixed with compost. Compost should be thoroughly moist before use.
4. Remove plants from containers and check root-balls. Cut off any matted roots at base and slice vertically through any circulating roots. Tease root ball to encourage new growth. When pulling out of container, hold over planting hole to capture any planting mix falling out.
5. Place plant in hole so that collar will be below finished level by 2-3cm, spreading out roots. Place backfill, firming in with fingers. Do not compact. If backfill is fairly dry, backfill half way then fill hole with water and allow to drain away before completing backfill. Leave a depression around the top of the planting to capture water.
6. If planting on a slope exaggerate the depression and form a lip around lower edge so plenty of water is captured; do not have the surface sloping across the planting hole.
7. Water well immediately after planting.

6.3 Mulch / Weed Suppression

1. Place a 100mm minimum layer of local beach gravel around each plant to about 1m diameter.
2. Remove any weedy growth overhanging edges.
3. If available lay down gravel over old carpet, newspaper, sacking, weed mat, etc to further reduce weed invasion.
4. Mulched greenwaste (point 5.1.1) can also be used in thick layers (around 150mm).

7 MAINTENANCE

7.1 Duration

Maintenance will be carried out over and above the work required to plant-out each phase of the project.

Intensive maintenance will be required from 2009 to 2012 to care for the new plants. Ongoing maintenance will be required for a minimum of three further years (i.e. until 2015) to ensure the project is completed successfully.

7.2 Irrigation

1. Plants should be deeply watered one to two times a week for the first few weeks after planting so they can establish well.
2. Smaller plantings (closer to the surface) may need to be watered three to four times a week.
3. During summer undertake irrigation as required (at least once weekly).

It should be noted that watering is best done in the early morning or late evening.

7.3 Feeding

Blood and bone could be mixed with backfill at time of planting, but covered over with unfertilised backfill/mulch. Surface application is not recommended because dogs and other animals might dig up the plants.

1. Apply slow release fertiliser to all plants three months to six months after planting, depending on timing of planting so that it is applied in moister late summer/autumn or spring conditions. Apply just before rain is due.
2. Fertiliser to be applied at least once a year for the first 3 years for each plant.

7.4 Weed & Pest Control

1. Twice weekly visits to monitor site to check for signs of rabbits etc.
2. Hand weeding will be carried out, as required during first 2-3 years of growth. Ideally the 1m diameter mulched area is kept free of competing weed growth especially grass.
3. Briar to be controlled by careful application of Vigilant Gel in spring and summer, by approved handlers.

7.5 Infrastructure

1. Fencing, signage and the irrigation system (accessible from a low key trail along the river bank) to be checked weekly.
2. Maintenance to be carried out as required.

8 PROJECT COMPLETION

On completion of the three project phases (scheduled for 2011) and the post project monitoring (scheduled for 2014) the following temporary structures may need to be removed:

1. Irrigation System
   Eventually the irrigation system may be removed if it is no longer required. This will be determined in consultation with the landowner at the time. The irrigation requirements will be reviewed by Te Kākano, in consultation with DOC/QLDC, once the planting out of Phase Three has been completed.
2. Fencing
   Fencing will be required long term. The fences will remain in place to aid natural regeneration of plants that will occur once rabbit browsing is removed.

9 MONITORING & SUCCESS CRITERIA

9.1 Duration

The project will be formally monitored over a six year period. This incorporates the three years scheduled to complete planting out of the project, plus the three year establishment/maintenance phase.

In addition, as a prominent local landmark which is visited daily by dozens to many hundreds of people, it will be both formally and informally scrutinised on a regular basis for decades to come.

9.2 Success Criteria

The project will be deemed a success once, for each phase of the project, the following criteria have been achieved:

1. A 70-80% survival rate for the plantings.
2. Briar rose has been fully exterminated within the restoration control areas.
3. All other dominant exotic pests have been eradicated e.g. willow, lupin, broom.
4. 100% ground cover in native species, with exotic seedlings shaded out.

9.3 Measuring the Success Criteria

The four success criteria will be measured for each phase of the project by:

1. Establishing a baseline by identifying key photo-points for each of the three phases of the project and creating a digital photograph baseline as viewed from each of these photo-points.
2. On an annual basis taking digital photographs from each key photo-point and reporting the growth patterns against the baseline photograph and success criteria.
3. The progress and the success of the project will be shared with key stakeholders and the general public by making the time-lapse photographs available online.

10 TASKS AND TIMELINE

An overview of the timeline and tasks to be completed can be found in Appendix 11.5.

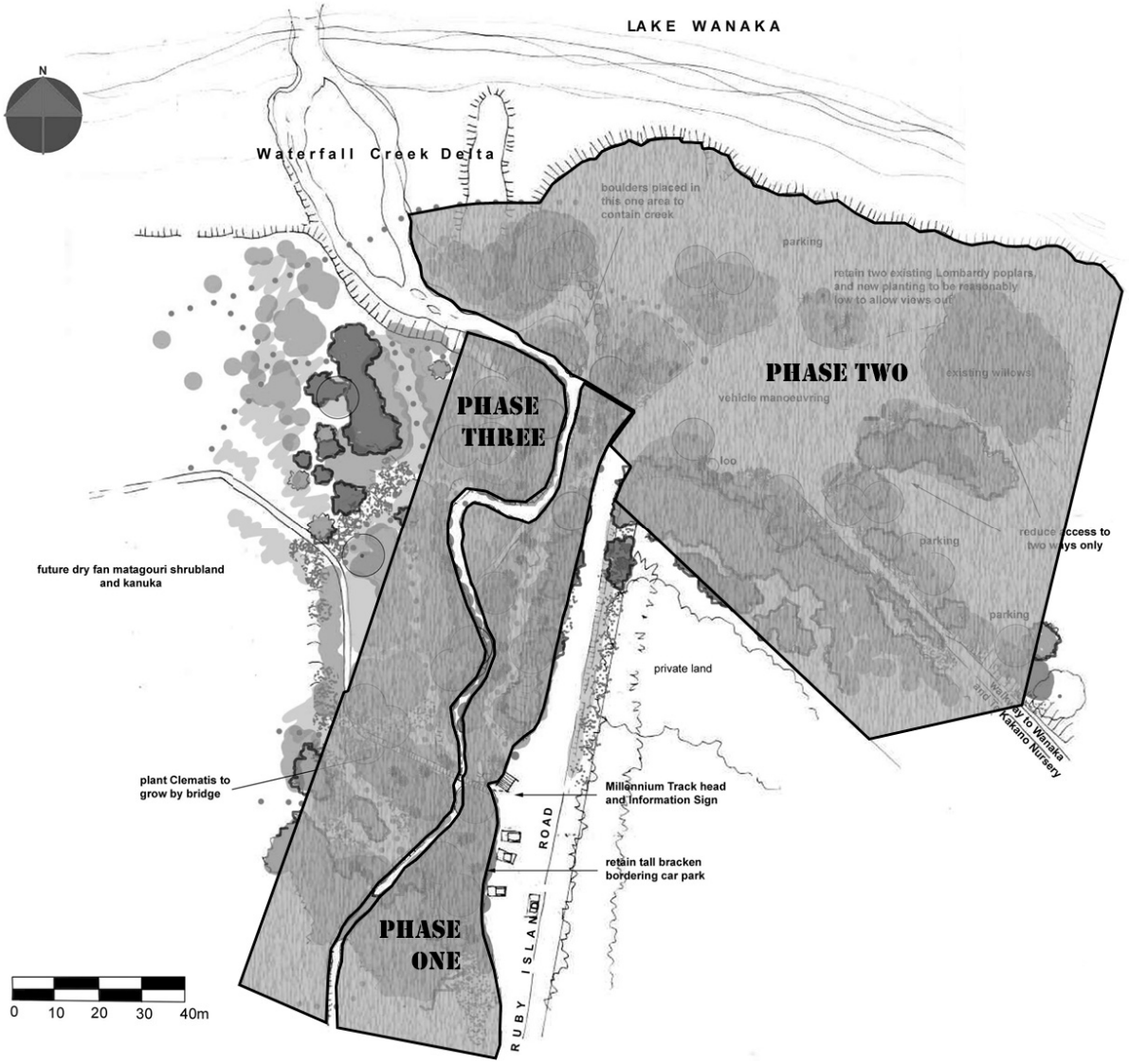
11 APPENDIX

11.1 Map of Project Area

Phase One: East Bank of Waterfall Creek

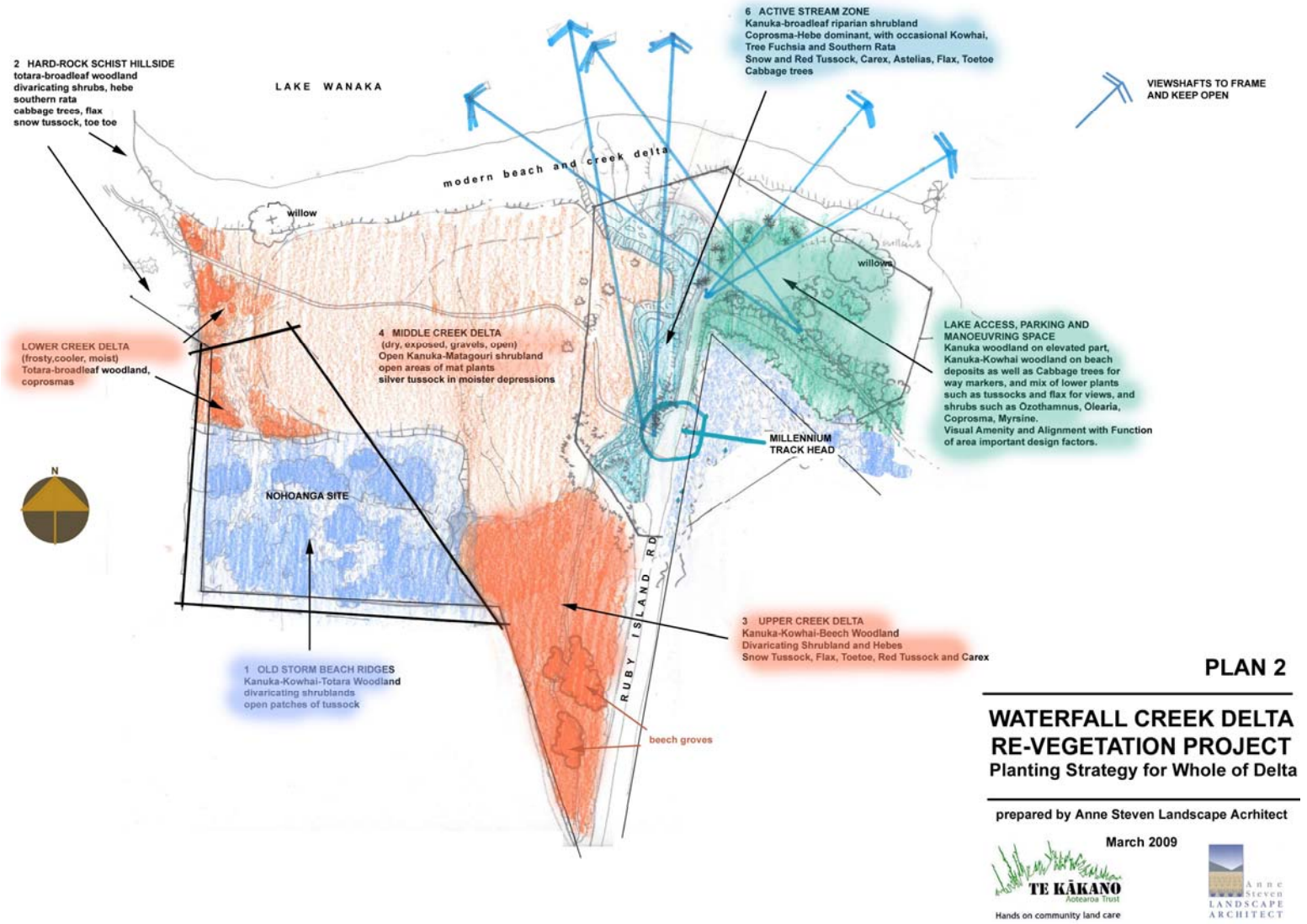
Phase Two: Access and Amenities Area of Waterfall Creek Track Junction

Phase Three: West Bank of Waterfall Creek



Source: Anne Steven Landscape Architect

11.2 Map of Habitat Zones



11.3 Habitat Zones and Suggested Plantings

Zone	Existing Conditions	Community	Suggested Plantings *Species highlighted are considered to be the main structure species to be used.*
1. Relict Storm Beach Ridges	• free draining finer gravels, stable • higher organic content and presence of topsoil, continuous grass cover, more moisture retentive conditions • sunny and open but maybe less exposed to wind due to hill to west • probably gets frosted but less so than lower lying areas	Kanuka, Kowhai, Totara, Broadleaf Woodland	*Trees:* **Kanuka, Kowhai, Totara,** Plagianthus, Cabbage Tree, Southern Rata, Broadleaf *Small Trees and Shrubs:* **Coprosma propinqua, C. rugosa,** C. virescens, C. crassifolia, **Olearia lineata,** O. hectori, Myrsine divaricata, **Corokia cotoneaster**, Carmichaelia petriei, Bog Pine, Hebes, Matagouri *Other:* Snow Tussock, Astelia, Flax, Silver Tussock, Bracken, Ferns *Climbers:* Muehlenbeckia complexa, Clematis marata, Parsonsia, Rubus
2. Hard Rock Hill Slopes	• generally thin soil over hard rock and colluvium, deeper in pockets, loess origin • less frost as air drains to lake, moderated temperatures • dry, sunny, generally exposed; but also sheltered moist gullies and hollows	Mixed Broadleaf Woodland	*Trees:* **Kanuka, Kowhai,** Totara, **Pittosporum spp., Broadleaf, Cabbage Tree, Southern Rata,** Plagianthus, Hoheria angustifolia/lyalli, Marble leaf, Tree Fuchsia *Small Trees and Shrubs:* **Coprosma propinqua, C. lucida, C. rugosa,** C. virescens. C. crassifolia, Myrsine divaricata, **Olearia lineata,** O. hectori, **O.Avicenniaefolia,** Aristotelia serrata/**fruticosa, Corokia cotoneaster**, Carmichaelia petriei, Hebes, Gaultheria *Other:* Snow Tussock, Astelia, Flax, Silver Tussock, Bracken**,** Ferns, Libertia *Climbers:* Muehlenbeckia complexa, Clematis marata, Parsonsia, Rubus

Zone	Existing Conditions	Community	Suggested Plantings *Species highlighted are considered to be the main structure species to be used.*
3. Upper River Delta (including active stream zone)	• free draining gravels and boulders, mostly stable but subject to high energy flood events which can gouge out new channels; bisected by active stream in slotted channel with unstable banks, recent abandoned flood channels and silted or sandy/gravel areas • denser existing cover - including grass – which suggests better moisture retention and presence of more organic matter/topsoil • sunny and open, exposed to wind but existing cover provides shelter • probably gets frosted but less so due to openness, slope and movement of water	Kanuka, Kowhai, Beech, Broadleaf Woodland	*Trees:* **Kanuka, Kowhai, Silver / Mountain Beech** (there is beech higher up in this catchment and conceivably it once extended over a greater part, and seed could get washed downstream and establish), **Broadleaf, Pittosporum tenuifolium / eugenioides,** Plagianthus, Myrsine australis, Hoheria lyalli, H. angustifolia, Cabbage Tree, Southern Rata, Tree Fuchsia, Lancewood (P.ferox) *Small Trees and Shrubs:* **Coprosma propinqua, C. rugosa,** C. virescens, C. taylorae, Aristotelia serrata/**fruticosa**, Myrsine divaricata, Olearia lineata, O. hectori, O. bullata, O. avicenniaefolia, Corokia cotoneaster, Carmichaelia petriei, **Ozothamnus, Hebe salicifolia,** Hebe cupressoides, Matagouri *Other:* **Snow Tussock, Toetoe,** Red Tussock, **Carex grasses**, Silver Tussock, Astelia, **Flax, Bracken,** Ferns, **Coriaria** *Climbers:* **Muehlenbeckia complexa**, Clematis marata, Parsonsia, Rubus *Mat Plants (in bare patches, recently flooded areas):* Acaena, Muehlenbeckia, Raoulias, Pimelea, Blechnum penna-marina
4. Middle River Delta	• free draining sand, gravels and boulders; mostly stable but subject to occasional high energy flood events which can gouge out new channels; undulating terrain with some defined relict channels which are probably more bouldery • drier, sunny and open conditions with sparser existing cover (mostly sweet brier) and less organic matter/topsoil • exposed to wind but existing cover provides shelter • probably gets frosted but less so due to openness and slope	Kanuka, Matagouri Woodland and Gravel Fields	*Trees:* **Kanuka, Kowhai** *Small Trees and Shrubs:* **Matagouri, Coprosma propinqua, C. rigida, C. rugosa, Olearia lineata, O. odorata, Carmichaelia petriei, Ozothamnus,** Aristotelia fruticosa, Corokia cotoneaster, **Melicytus alpinus,** Bog Pine *Other:* Snow Tussock, **Silver Tussock**, Blue Tussock, Coriaria and Blechnum penna-marina (margins of channels, bouldery places) *Gravel Field Mat Plants (in bare open patches):* Acaena, Muehlenbeckia axillaris, Raoulias, Pimeleas, Leucopogon fraseri, prostrate Coprosma, Pernettya nana, Helichrysum intermedia var. selago, Hebe pimelioides, Geranium sessiliflorum, various small sedges and grasses? eg Luzula? Poa spp?

Zone	Existing Conditions	Community	Suggested Plantings *Species highlighted are considered to be the main structure species to be used.*
5. Lower Western River Delta Margin	• stable, underlain by gravels/boulders and probably silts caught in the fan-hillslope angle • more moisture retentive and more organic matter/topsoil, with continuous grass cover and being at lowest point • more frost affected due to air pooling at hill side-fan angle (low point) and slow air drainage down to lake • sunny and open but in lee of hillside so probably more sheltered and shaded in winter • existing scrub cover (mostly brier but also mounds of tall bracken fern) provides some shelter too	Totara, Broadleaf, Coprosma Woodland	*Trees:* **Totara,** Matai, Hoheria angustifolia, Plagianthus, **Lancewood, Broadleaf**, Pittosporum, Kanuka/Manuka, Marble leaf *Small Trees and Shrubs:* **Coprosma propinqua, C. rigida, C. rugosa**, **Aristotelia serrata / fruticosa,** Myrsine divaricata, Olearia hectori, O. bullata, Corokia cotoneaster, Hebe salicifolia, H. cupressoides, Matagouri, Bog Pine *Other:* Snow Tussock, Red Tussock, Carex grasses, Silver Tussock, Astelia, Flax, Bracken, Ferns, Coriaria *Climbers:* Muehlenbeckia complexa, Clematis marata, Parsonsia, Rubus
6. Active Stream Zone	• free draining gravels and boulders, sands and silts in patches • active stream in slotted to more open braided channel with steep unstable banks, subject to high energy flood events which can move channels around and undercut banks • has small islands which must be regarded as epheremal • generally moister to wet with dense mainly exotic weed cover (sweet brier, rank grasses, lupins, bugloss, water cress) but generally low organic matter and little topsoil due to youth • sunny and open, exposed to wind but existing cover provides good shelter • probably gets frosted but less so due to openness, slope and movement of water	Kanuka-Kowhai-Broadleaf Riparian Woodland	*Trees:* **Kanuka, Kowhai, Broadleaf, Pittosporum tenuifolium / eugenioides,** Plagianthus, Hoheria lyalli, H. angustifolia, Cabbage Tree, Southern Rata, Tree Fuchsia, Lancewood (P.ferox) *Small Trees and Shrubs:* Myrsine australis, Coprosma lucida, **Hebe salicifolia, Coprosma propinqua, C. rugosa,** C. taylorae, Aristotelia serrata/**fruticosa**, Myrsine divaricata, Olearia lineata, O. avicenniaefolia, **Corokia cotoneaster,** Carmichaelia petriei, Ozothamnus, Hebe cupressoides, Matagouri *Other:* **Snow Tussock, Toetoe,** Red Tussock, **Carex grasses**, Silver Tussock, Astelia, **Flax, Bracken,** Ferns, **Coriaria,** Libertia *Climbers:* Muehlenbeckia complexa, Clematis marata, Parsonsia, Rubus *Mat Plants (in bare patches, recently flooded areas, on exposed banks):* Acaena, Muehlenbeckia, Raoulias, Pimelea, Blechnum penna-marina

Source: Anne Steven Landscape Architect

11.4 Details of Plants to Be Used

Botanical name	Common name	Source	Size / Age	Density	Planting location	Phase One # Plants	Phase Two # Plants	Phase Three # Plants	Total Plants Required
1. Carpodetus serratus	putaputaweta	Millennium Track	1-2 yr	1-2 m	Forest margin	30	0	20	50
2. Coprosma propinqua	mingimingi	Lake shore - Wanaka	1-2 yr	1 m	Open ground	50	40	40	130
3. Coprosma rigida		Lake shore - Wanaka	1-2 yr	1 m	Open ground	50	40	40	130
4. Cordyline australis	Ti/cabbage	Wanaka foreshore	1 & 2 yr	Several groups at 1-2m internal spacing	River bank and around car park/launching ramp	80	70	60	210
5. Discaria toumatou	matagouri	Millennium Track	2 yr	1 m	Open ground	4	0	0	4
6. Griselinia littoralis	broad leaf	Glendhu Bluffs, Matukituki	2 yr	1-2 m	Forest margin	20	0	20	40
7. Hebe salicifolia	koromiko	Waterfall creek	1y & 2 yr	Several groups at 1.5m internal spacing	streamside	30	0	30	60
8. Kunzea ericoides	kanuka	Lake shore - Wanaka	2 yr	1 m	River bank	50	30	40	120
9. Leptospermum scoparium	manuka	Lake shore Wanaka	1-2 yr	1.5m	Open ground	30	50	30	110
10. Melicytus ramiflorus	Mahoe	Glendhu Bluffs	1-2 yr	1-2 m	Forest margin	10	0	20	30
11. Olearia avicenniifolia	Tree daisy	Wanaka Lake shore	2 yr	1-2 m	River margin	3	0	3	6
12. Phormium tenax	Flax	Matukituki Gorge, Wanaka	2 yr	1 m	Open ground	50	70	50	170
13. Pittosporum tenuifolium	kohuhu	Glendhu Bluffs	1-2 yr	1 – 1.5 m	Forest margin & river bank	30	30	40	100
14. Plagianthus betulinus	ribbonwood	Makarora	3 yr	Two groups of 5, at 1.5m spacing.	Forest margin	10	0	0	10
15. Sophora microphylla	kowhai	Wanaka foreshore	2- 3 yr	1.5m apart in groups	River bank	40	40	30	110

Total Number of Plants = 1280

11.5 Timeline & Overview of Tasks to be Undertaken

#	Task Name	Person Responsible for Task	Resources Required	Labour Required	Expected Duration	Task Start Date	Task End Date	Notes
1.	**Coordinating plan**	Trust Secretary	Computer & phone	Ongoing	3 yr	2009	2012	
1.1.	Prepare plan & budget & sign-off	Trust Secretary/Nursery Manager/Trustees/DOC/QLDC						
1.2.	Fund raising	Trust Secretary						
1.3.	Publicity and promotion	Trust Secretary						
1.4.	Official opening	Trust Secretary						
2.	**Raising stock**							
2.1.	Raising stock	Nursery manager	PB5, root trainers, compost and gravel fertiliser	Ongoing, vast	2 yr	Oct 2008	Oct 2010 ?	
3.	**Site Preparation**							
3.1.	Get consents	Trust Secretary						
3.2.	Coordinate pest	Nursery Manager	People Poison shooters	2-3 days	2 yr	October 2009	2011	Continue to monitor indefinitely
3.3.	Install irrigation	Nursery manager	Pipes and fittings	10 days fitting and installing, maintaining	4 yr	November 2009	2013	
3.4.	Fencing	Nursery manager	Netting Posts etc Tools Post rammer	12 days labour 2 days tractor	2009/2010	September 2009	September 2010	
3.5.	Track creation	Nursery Manager		1 – 2 days				
3.6.	Organise production of signs	Trust Secretary	Text Design Signs posts	2 - 3 days			July 2010	

#	Task Name	Person Responsible for Task	Resources Required	Labour Required	Expected Duration	Task Start Date	Task End Date	Notes
4.	**Planting Out**							
4.1.	Coordinate plantings	Nursery manager	Volunteers tools	Volunteers @ approx 15 days Supervisor a@ 4 days	2 yr	September 2009	2011	
5.	**Maintenance**							
5.1.	Irrigation, weeding, feeding, pests, infrastructure	Nursery Manager	Volunteers	2 days/yr	3 yr			
6.	**Monitoring**							
6.1.	Start monitoring program	Trust secretary/Nursery manager	Digital camera	Establish permanent photo-points 10 hrs total	10 yr	August 2009	2020	Continue indefinitely as historical record
6.2.	Quarterly monitoring	Trust secretary/Nursery manager						
6.3.	Create online time-lapse progress	Trust secretary						