

Waitakere City Parks



Roadside Five Year Programme



Waitakere City Council
Te Taiao o Waitakere

Waitakere City Parks Five Year Roadside Work Programme

July 2006

Prepared for:
Waitakere City Council

Reviewed by
Te Ngahere

Te Ngahere Ltd
P.O Box 68 407 Newton, Auckland
Ph 09 828 4035
www.te-ngahere.co.nz



Table of Contents

| | Page |
|--|-------------------------------------|
| 1.0 Introductions | Error! Bookmark not defined. |
| 1.1 The Existing Work Programme | Error! Bookmark not defined. |
| 1.1.1 Timeframes | Error! Bookmark not defined. |
| 1.1.2 City Wide Environmental Weed Species Targets | 6 |
| 1.1.3 Total Control Roads | 7 |
| 2.0 Timeframes | 8 |
| 2.1 Targets | 8 |
| 3.0 Prioritisation | 9 |
| 3.1 Weed Led Prioritisation | 9 |
| 3.1.1 Obligation to the Auckland Regional Pest Management Strategy | 9 |
| 3.1.2 Containment Pest Plants (Boundary Control) | 10 |
| 3.1.3 City Wide Environmental Weed Species | 11 |
| 4.0 Site Led Prioritisation | 14 |
| 4.1 Total Control Roads | 14 |
| 5.0 Monitoring/ Auditing | 19 |
| 5.1 Auditing | 19 |
| 5.2 Monitoring | 19 |
| 6.0 Roadside Response | 21 |
| 7.0 Conclusion | 21 |
| 8.0 Reference | 22 |



ROADSIDE FIVE YEAR WORK PROGRAMME

1.0 INTRODUCTION

The goal of the Waitakere City Council Weed Management Strategy and five year work programme is to restore the City's ecosystems to a state where it is self-sustainable, biodiversity is maintained and ecosystem services are retained. One important component of such ecological restoration is the control of environmental weeds. Environmental weeds permanently alter the structure, successional and ecological processes, and organisms present in ecological communities. It is therefore essential to ensure the methodologies used to manage invasive weeds are the most efficient and effective use of resources possible, while utilising the most successful and environmentally sensitive methodologies available. Failure to effectively manage key weed threats, will inevitably lead to loss of biodiversity and the progressive degradation of native ecological communities.

Weed management must also consider the broader landscape context such as why weeds are present, and what actions exacerbate their spread. This can be fulfilled through a holistic approach to the control of weeds throughout Waitakere considering all natural areas regardless of ownership. Connecting such areas and educating the public on weed issues can help achieve the Council's vision of the Green Network.

Roadsides are significant vectors for the spread of environmental weed species so are an important component of the City to manage. Te Ngahere was engaged by the Waitakere City Council (the Council) to develop a five year priority programme to lead the roadside weed control contract. This formed part of a larger review of the current Weed Management Strategy and Roadside Weed Strategy. The two strategies have now become one overriding strategy for the environmental weeds of Waitakere. At all times the principles and objectives of the Strategy must be adhered to when carrying out roadside weed control.

The overriding goal of the Weed Management Strategy and therefore roadside weed control is:

"Protection of the quality, resilience, biodiversity and ecological integrity of Waitakere's natural habitat from the impacts of environmental weeds".

To achieve this goal on roadsides the principle objectives are to:

1. Protect priority (high value) areas from the impacts of weeds.
2. Minimise future costs by adopting Best Practice Guidelines and undertaking surveillance to detect new weed problems at valuable sites before they become unmanageable and expensive.
3. Support and facilitate community understanding and involvement in the management of weed impacts.
4. Eradicate or contain specific weed species wherever they occur, where this is practical and affordable.
5. Address legal responsibilities under the Regional Plant Pest Management Strategy (RPMS).

6. Enhance native roadside habitat to create a significant buffer to adjacent sites, protect threatened species and improve water quality of local streams.
7. Ensure optimum health and safety along roadsides by managing vegetation in a way that will reduce the fire risk and maintain site lines.
8. Manage roadside vegetation to facilitate the protection of roadside assets, flood mitigation and stability enhancement.

Implementation of the reviewed Roadside Strategy and current Roadside Work Programme will help achieve these principle aims.

The roadside work programme is divided into four different components:

- Obligations to the RPMS, as in objective five of the Weed Management Strategy to “address legal responsibilities under the Regional Pest Management Strategy”.
 - A selected list of environmental weed species (generally specified as containment pest plants within the RPMS) are required to be controlled city wide, regardless of infestation size.
 - These weed targets mean Waitakere City Council is fulfilling obligations to the RPMS as a landowner.
- City wide environmental weed targets
 - City wide weed control will help fulfil a target relating to Objective six of the Weed Management Strategy – to “enhance native roadside habitat”.
 - Controlling pampas will also achieve targets within the strategies objective seven which addresses health and safety along roadsides.
 - A selected list of environmental weed species are required to be controlled when the infestation size of a given species is less than 15 m².
 - Control is required city wide.
- Total control roads
 - All environmental weed species (as per Waitakere City Councils invasive and environmental weed species list) are required to be controlled.
 - Weed species are controlled regardless of infestation size along specified roads only.
- Roadside response
 - Ad hoc weed control to meet the concerns of the public, where these are in line with the Strategy and cost effective.

1.1 The existing work programme

The contract number PK05001C requires the control of roadside weeds to be carried out in two cycles. The first cycle runs from mid July to late January. The second cycle commences at the end of January and runs until the beginning of June.

During these control cycles the contractor is required to:

- Control a specified list of 22 weed species (most of which are listed as containment pest plants within the Auckland Regional Pest Management Strategy (RPMS)) throughout all roads regardless of infestation size.

- Control gorse where it borders productive or residential land. There is no control where roadsides are backed by bush.
- An additional list of 54 species are required to be controlled city wide when the infestation is smaller than fifteen square metres (15m²) in size.
- A list of total control roadside areas is given that requires the control of all environmental weed species (as listed in Waitakere City Councils invasive and environmental weed list) regardless of the size of the infestation. Gorse is not to be controlled in areas where it borders bush.
- Finally, the contractor responds to requests made to the Council by residents, ratepayers and other customers for weed control on Council road reserve, when these have been approved by the Council contract manager.

Note that all control along roadsides must include the entire road reserve until a park, private property or similar boundary is met.

On assessment of the current work programme it was decided that the existing work programme as outlined in the contract PK 05001 could remain largely the same. What needs to be ensured, through monitoring and auditing however, is that the works programme is implemented as per contractual requirements and that principles of the Weed Management Strategy are being upheld. At all times Best Practice Guidelines and methodologies must be met.

The current roadside weed control contract has the potential to reduce the threat of environmental weeds along roadsides of Waitakere City Council. Feasible, practical targets are set, and timeframes are reasonable.

1.1.1 Timeframes

The current requirements of two follow up cycles per year allows for Best Practice Methodologies to be followed. With the current timeline requirements, follow up control can be carried out during spring and again in autumn. This timing is ideal as it:

- a) Allows for herbicide to be applied when plants are actively growing in spring (therefore herbicides are more effective)
- b) Revisits sites in autumn before weed regrowth or newly germinated seed has a chance to flower and/or mature.

1.1.2 City wide environmental weed species targets

The current contract fulfils and exceeds obligations of the Waitakere City Council to the Auckland Regional Pest Management Strategy (RPMS) by controlling plant pests classified as Containment Pest Plants within the Strategy. The current contract goes a step further in recognising that the RPMS does not dictate the control of a number of weeds that should be managed to reduce the impact on the natural environment. This specification also aims to control outliers and new infestations, as per the Best Practice Guidelines.

The size limit given to some city wide species (i.e. not to be controlled if the infestations exceed 15m² and a 2m height maximum on woody species) helps decrease the costs of roadside control and reduces the impact of initial control on the environment.

1.1.3 Total control roads

An effective means of achieving the aim of a weed free city, protecting weed free sites and reducing the impact of environmental weeds on native ecosystems within the Waitakere Ranges is the requirement for total control of all environmental weed species within the listed sections of road. The control of all weed species is essential for roadside reserves to form an effective buffer to more significant areas of bush within the ranges and beyond.

As with the aim of the expansion of infestation sizes controlled city wide (see Section 3.1.3), the amount of roads classified as 'total control' should be able to expand by year three of the environmental weed roadside contract. The more roads that are controlled for all weed species the higher the potential for succeeding in achieving the strategies goal, and the protection and buffering of areas beyond the roadside.

The proposed expansion is only feasible if the current scope of works within the current contract is carried out efficiently with Best Practice Guidelines in mind. Unfortunately assessment of the current control along roadsides does not appear to be adhering to the contracted work programme.



2.0 TIMEFRAMES

It is recommended to maintain the current timeline within the 2005/2006 contract for roadside control. Roadsides are under a number of different pressures at much higher levels than parks and reserves; therefore it may take a longer period of time to work through the different restoration phases recommended within the Weed Management Strategy. Roadsides are constantly under stress from edge effects, where there are high levels of exposure to wind, extreme temperatures, salt spray, varying moisture levels, weed invasion and disturbance through earth works and construction. Combinations of these factors contribute to a constant risk of reinvasion into roadside habitats.

The best way to manage these threats is to control weeds along roadsides in two cycles per year as in Best Practice Guidelines detailed within the Weed Management Strategy. To follow the Council financial year, one cycle can run from July to January, and the sites can be revisited during the second cycle from February to June. This loosely follows the optimal Follow-up restoration phase frequency, where sites are visited twice a year, once in spring and again in autumn. Following Best Practice Guidelines will help achieve Objectives one and two of the Weed Management Strategy.

2.1 Targets

- Follow up weed control must be undertaken in two cycles as per Best Practice Guidelines and targets within the Weed Management Strategy (objective one and two). The first cycle runs from July to January and the second cycle must be completed between February and June.



3.0 PRIORITISATION

3.1 Weed led prioritisation

3.1.1 Obligations to the Auckland Regional Pest Management Strategy.

Pest Management Strategies developed in accordance with section 76 of the Biosecurity Act 1993 provide the only avenue for pursuing enforceable plant control in New Zealand. Auckland Regional Council (ARC) has developed an Auckland Regional Pest Management Strategy, 2002-2007 (RPMS). The RPMS is currently undergoing a review process, and the new Strategy will be operative by July 2007. The purpose of the current RPMS is to 'provide a strategic and statutory framework for efficient and effective management of plant and animal pests in the Auckland region.

As a landowner Waitakere City Council are obligated to control Containment Plant Pests within their land.'

For Waitakere City Council to meet its obligations to the RPMS the following Containment plant pests (*), and listed additional species should be controlled along roadsides *throughout the city* regardless of the size of the infestation:

Table of species of environmental weeds to be controlled along all roadsides regardless of infestation size.

| Common Name | Species Name |
|-----------------------|---------------------------------------|
| Australian sedge* | <i>Carex longebrachiata</i> |
| Bathurst bur * | <i>Xanthium spinosum</i> |
| Bushy asparagus* | <i>Asparagus densiflorus</i> |
| Climbing asparagus | <i>Asparagus scandens</i> |
| Evergreen buckthorn* | <i>Rhamnus alaternus</i> |
| Grey willow | <i>Salix cinerea</i> |
| Himalayan honeysuckle | <i>Leycesteria formosa</i> |
| Kahili ginger* | <i>Hedychium gardnerianum</i> |
| Lantana | <i>Lantana camara var. aculeate</i> |
| Mignonette vine* | <i>Anredera cordifolia</i> |
| Montpellier broom* | <i>Teline monspessulana</i> |
| Moth plant* | <i>Araujia sericifera</i> |
| Nodding thistle* | <i>Carduus nutans</i> |
| Nutgrass | <i>Cyperus rotundus</i> |
| Pampas | <i>Cortaderia selloana, C. jubata</i> |
| Queensland poplar | <i>Homalanthus populifolius</i> |
| Smilax* | <i>Asparagus asparagoides</i> |

| Common Name | Species Name |
|---------------------|-----------------------------|
| Sweet pea shrub | <i>Polygala myrtifolia</i> |
| Variegated thistle* | <i>Silybum marianum</i> |
| Woolly nightshade | <i>Solanum mauritianum</i> |
| Yellow ginger | <i>Hedychium flavescens</i> |

Any tree higher than 2m should be reported to the contracting arborist so that removal can be prioritised.

Any total control plants found as listed in the RPMS are to be reported to Waitakere City Council and the Auckland Regional Council.

3.1.2 Containment pest plants (boundary control).

Gorse

Gorse (*Ulex europaeus*) and ragwort (*Senecio jacobaea*) are designated as containment pest plants within the RPMS. Gorse is a successful colonising plant that can live in a wide range of habitats and conditions. The pest plant can rapidly form dense infestations, which severely reduce the stock carrying capacity of pasture. Similar dense infestations can compete with young native trees, but in other cases, gorse can act as a nurse crop and provide shelter for regenerating native species. In very high densities gorse can present a fire hazard during summer and harbour animal pest species such as rabbits and possums (Auckland Regional Council, 2002).

Due to the impact of gorse on pastoral land, the pest should be controlled along roadsides city wide except those infestations that border native bush. Gorse does not require control alongside bush because it is not considered a significant threat to native ecosystems. It does not germinate in shade and as previously mentioned, can facilitate native regeneration.

Ragwort

Ragwort inhabits pasture, waste places, riverbeds, open forests and swamps. The plants aggressive characteristics mean it can quickly invade pastoral land and become the dominant vegetation cover. The main problem with this is that it reduces the productivity of the land, and is toxic to livestock. Primary production from rural areas is an important part of Waitakere's economy. Control of ragwort is required to ensure this industry is not affected.

Ragwort should be controlled along roadsides city wide to prevent the infestation of rural areas. Those infestations that border native bush do not require control, as ragwort does not pose a threat to native ecosystems.

3.1.3 City wide environmental weed species.

The list of weeds below should be prioritised for control *city wide*. They have been identified as some of the more significant weed threats to the native ecosystems within Waitakere City Council. A number of these species are well established within the area therefore a maximum infestation size requiring control needs to be stipulated. The amount of time required for control has been used in the past as a means of assessing when an infestation is too large to warrant control. This has a number of issues, as the time required is dependent on a number of site-specific parameters.

A more objective means of determining whether to control an infestation or not is the size of the weed population **per species**. The weed species in the table below are to be controlled *city wide* if they are 15m² or less. In other words if an infestation of a particular weed species is smaller than 15m² it requires control. In mixed species situations, the distribution of each species should be assessed independently. For example, if two stems of ginger are found amongst a 20m² patch of periwinkle, the periwinkle is not controlled but the ginger will be controlled.

Coordinating weed control along roadsides in this manner ensures that Best Practice Guidelines are followed. Outliers and small infestations are prioritised so that the spread of significant weed species further throughout the City is inhibited if not halted.

Larger infestations (e.g. 25m²) can be prioritised in the future (see target below) as small, outlier infestations are reduced and costs decrease.

Targets

A target for weed control on roadsides should be the expansion of the maximum sized infestation suitable for control to 25m² by the third year of this programme. If this is achievable it would imply that smaller infestations have been successfully controlled, or reduced to a manageable level.

Expanding the size of weed infestations controlled will allow for the achievement of various actions and targets within the Weed Management Strategy. These include:

- Protecting priority sites (objective one)
- Create significant buffers to prevent the reinvasion of weeds (objective 6).
- Improve water quality of local streams.

Table of priority weeds for city wide control

| Common Name | Species Name |
|----------------------------------|----------------------------|
| Agapanthus (in water-table only) | <i>Agapanthus praecox</i> |
| Aristea | <i>Aristea ecklonii</i> |
| Banana passionfruit | <i>Passiflora mixta</i> |
| Bartlettina | <i>Bartlettina sordida</i> |

| Common Name | Species Name |
|--------------------------|---|
| Bear's breeches | <i>Acanthus mollis</i> |
| Blue morning glory | <i>Ipomoea indica</i> |
| Boneseed | <i>Chrysanthemoides monilifera</i> |
| Boxthorn | <i>Lycium ferocissimum</i> |
| Buddleia | <i>Buddleja davidii</i> |
| Cape honey flower | <i>Melianthus major</i> |
| Cape ivy | <i>Senecio angulatus</i> |
| Chinese privet | <i>Ligustrum sinense</i> |
| Christmas lily | <i>Lilium formosanum</i> |
| Climbing dock | <i>Rumex sagittatus</i> |
| Cotoneaster - 2 species | <i>Cotoneaster glauophyllus, C. septum</i> |
| Crack willow | <i>Salix fragilis</i> |
| Montbretia | <i>Crocasmia x crocosmiiflora</i> |
| Elaeagnus | <i>Elaeagnus x reflexa</i> |
| German ivy | <i>Senecio mikanioides</i> |
| Giant reed | <i>Arundo donax</i> |
| Hakea spp - 3 species | <i>Hakea gibbosa, H. sericea, H. salicifolia</i> |
| Heather | <i>Calluna vulgaris</i> |
| English Ivy | <i>Hedera helix</i> |
| Japanese honeysuckle | <i>Lonicera japonica</i> |
| Jasmine | <i>Jasminium polyanthum</i> |
| Ladder fern | <i>Nephrolepis cordifolia</i> |
| Mexican daisy | <i>Erigeron karvinskianus</i> |
| Mile a minute | <i>Dipogon lignosus</i> |
| Monkey apple | <i>Acmena smithii</i> |
| Nodding thistle | <i>Carduus nutans</i> |
| Palm grass | <i>Setaria palmifolia</i> |
| Periwinkle | <i>Vinca major</i> |
| Pine | <i>Pinus spp.</i> |
| Plectranthus – 3 species | <i>Plectranthus ciliatus, P. grandis, P. ecklonii</i> |
| Ragwort | <i>Senecia jacobaea</i> |
| Spanish heath | <i>Erica lusitanica</i> |
| Taiwanese cherry | <i>Prunus campanulata, P. serrulata</i> |



| Common Name | Species Name |
|---------------------|---------------------------------|
| Tree privet | <i>Ligustrum lucidum</i> |
| Tutsan | <i>Hypericum androsaemum</i> |
| Variiegated thistle | <i>Silybum marianum</i> |
| Wandering Jew | <i>Tradescantia fluminensis</i> |
| Watsonia | <i>Watsonia bulbifera</i> |
| Wattle spp | <i>Acacia spp.</i> |
| White poplar | <i>Populus alba</i> |

4.0 SITE LED PRIORITISATION

4.1 Total Control Roads

The long-term goal of roadside weed control is to control all weed species (as per Waitakere City Councils invasive and environmental weed species list), on all roads, however current budgets do not allow for the control of all invasive weed species along the entire stretch of roadsides in Waitakere. This does not mean however, that the long-term aim is not achievable. What it does mean is that weed control must be strategically carried out in a manner that ensures the gradual reduction of weed densities along roadsides, allowing for a transfer of funds to site led programmes.

To achieve the long-term target of controlling all environmental weeds along all roadsides, the following roads (scheduled in the current contract for total control) are recommended as roadsides where all environmental weeds present are controlled regardless of the size of infestations. If Best Practice Guidelines are followed and the most effective and efficient methods of weed control are utilised, the aim of total control sites should be to increase the area each year, or at least every two years.

Table of roads where all environmental weeds present are controlled regardless of the size of infestations.

| Road Name | Section | Length (m) |
|-----------------|--------------------------------|---------------|
| Scenic Dr | From North Way to Te Henga Rd | 15,886 |
| Piha Rd | From Te Ahuahu Rd to Scenic Dr | 11,871 |
| Huia Rd | From Whatipu Rd to Victory Rd | 12,577 |
| Foster Ave | Entire length | 596 |
| Upland Rd | Entire length | 584 |
| Kilgour Tce | Entire length | 150 |
| Ocean View Rd | Entire length | 280 |
| Huia Dam Rd | Entire length | 371 |
| Huia Lookout Rd | Entire length | 463 |
| Rauhuia Cres | Entire length | 753 |
| Staley Rd | Entire length | 107 |
| Armour Rd | Entire length | 530 |
| Shirley Rd | Entire length | 830 |
| Cornwallis Rd | Entire length | 2,430 |
| Firebreak Rd | Entire length | 48 |
| Whatipu Rd | Entire length | 6,910 |
| TOTAL | | 54,386 |

These roads are deemed important as they dissect current bush areas with low to zero densities of weeds and high ecological significance. It is therefore important to maintain

the roadsides relatively weed-free to ensure the adjacent sites are not threatened by the surrounding seed sources on roadsides.

Recommended additions to 'Total Control Roads' for future years are listed below:

Aio Wira Rd
 Falls Rd
 Lone Kauri Rd
 Karekare Rd
 Mountain Rd
 Steamhauler Track
 Turanga Rd
 Opanuku Rd
 Anawhata Rd
 Te Henga Rd
 Te Aute Ridge Rd
 Long Rd
 Bethells Rd
 Pine Ave
 Cyathia Rise
 Lower Nihotupu Dam Rd.

These roads generally extend the scope of control to encompass all roads within the ranges and move out towards the foothills. The length of road that is possible to add with the available budgets can be determined through time with the collection of simple data described in Section 5.0.

Table of environmental weed species to be controlled along Total Control Roads.

| Common Names | Latin Names |
|--------------------------------|--|
| African clubmoss (selaginella) | <i>Selaginella kraussiana</i> |
| African love grass | <i>Eragrostis curvula</i> |
| African olive | <i>Olea europaea subsp. africana</i> |
| Agapanthus | <i>Agapanthus praecox</i> |
| Akebia | <i>Akebia quinata</i> |
| Alligator weed | <i>Alternanthera philoxeroides</i> |
| Apple of Sodom | <i>Solanum linnaeanum</i> |
| Aristea | <i>Aristea ecklonii</i> |
| Arrowhead | <i>Sagittaria montevidensis</i> |
| Artillery plant | <i>Galeobdolon luteum</i> |
| Arum lily | <i>Zantedeschia aethiopica</i> |
| Asparagus fern | <i>Asparagus setaceus</i> syn. <i>A. plumosus</i> |
| Asparagus fern | <i>Asparagus densiflorus</i> |
| Asparagus, climbing | <i>Asparagus scandens</i> |

| Common Names | Latin Names |
|--------------------------------|--|
| Australian maire (Lilly Pilly) | <i>Syzygium paniculatum</i> |
| Australian sedge | <i>Carex longebrachiata</i> |
| Australian tea tree | <i>Leptospermum polyalifolium</i> <i>L. laerigatum</i> L. <i>.petersonii</i> |
| Baccharis | <i>Baccharis halimifolia</i> |
| Balsam | <i>Impatiens sodenii</i> |
| Bamboo | <i>Arundinaria japonica</i> |
| Bamboo | <i>Pseudosasa japonica</i> |
| Bamboo, black | <i>Phyllostachys nigra</i> |
| Bamboo, fishpole | <i>Phyllostachys sp.</i> |
| Banana passionfruit, northern | <i>Passiflora mixta</i> |
| Banana passionfruit | <i>Passiflora mollissima</i> |
| Banksia, coast | <i>Banksia integrifolia</i> |
| Barberry, Darwin's* | <i>Berberis glaucocarpa</i> |
| Bartlettina | <i>Bartlettina sordida</i> |

| Common Names | Latin Names |
|---|---|
| Bathurst bur | <i>Xanthium spinosum</i> |
| Bear's breeches | <i>Acanthus mollis</i> |
| Bindweed (convolvulus) | <i>Calystegia sylvatica</i> <i>C. sepium</i> |
| Blackberry | <i>Rubus fruticosus</i> agg. |
| Black-eyed Susan | <i>Thunbergia alata</i> |
| Bladderwort | <i>Utricularia gibba</i> |
| Blue morning glory | <i>Ipomoea indica</i> |
| Blue passion flower | <i>Passiflora caerulea</i> |
| Blue spur flower | <i>Plectranthus ecklonii</i> <i>P. grandis</i> |
| Bogbean | <i>Menyanthes trifoliata</i> |
| Bomarea | <i>Bomarea caldasii</i> <i>B. multiflora</i> |
| Boneseed | <i>Chrysanthemoides monilifera</i> |
| Boxthorn | <i>Lycium ferocissimum</i> |
| Brazilian fireweed | <i>Erichites valerianafolia</i> |
| Broom | <i>Cytisus scoparius</i> |
| Broom, Montpellier | <i>Teline monspessulana</i> |
| Broom, spiny | <i>Calicotome spinosa</i> |
| Brush cherry (Lilly Pilly) | <i>Syzygium australe</i> |
| Buddleia | <i>Buddleja davidii</i> |
| Buffalo grass | <i>Stenotaphrum secundatum</i> |
| Bur daisy | <i>Calotis lappulacea</i> |
| Bur reed | <i>Sparganium erectum</i> |
| Burdock | <i>Arctium minus</i> |
| Cape honey flower | <i>Melianthus major</i> |
| Cape ivy | <i>Senecio angulatus</i> |
| Castor oil plant | <i>Ricinus communis</i> |
| Cattley's guava | <i>Psidium cattleianum</i> |
| Caulerpa taxifolia | <i>Caulerpa taxifolia</i> |
| Century plant | <i>Agave americana</i> |
| Cestrum – see Green, Red & Queen of the night | <i>Cestrum</i> spp. |
| Chameleon plant | <i>Houttuynia cordata</i> |
| Cherry, Taiwan | <i>Prunus campanulata</i> <i>P. serrulata</i> |
| Chilean flame creeper | <i>Tropaeolum speciosum</i> |
| Chinese pennisetum | <i>Pennisetum alopecuroides</i> |
| Chilean rhubarb | <i>Gunnera tinctoria</i> |
| Christmas berry | <i>Schinus terebinthifolius</i> |
| Clasped pondweed | <i>Potamogeton perfoliatus</i> |

| Common Names | Latin Names |
|---------------------------------|---|
| Climbing dock | <i>Rumex sagittatus</i> |
| Coast banksia | <i>Banksia integrifolia</i> |
| Coltsfoot | <i>Tussilago farfara</i> |
| Cotoneaster | <i>Cotoneaster glaucophyllus</i> <i>C. franchetii</i> |
| Cotyledon | <i>Cotyledon orbiculata</i> |
| Crassula species | <i>Crassula</i> spp. |
| Eel grass | <i>Vallisneria spiralis</i> , Lake Pupuke and Meola Creek varieties |
| Elaeagnus | <i>Elaeagnus x reflexa</i> |
| Elephant grass (Napier grass) | <i>Pennisetum purpureum</i> |
| Eurasian watermilfoil | <i>Myriophyllum spicatum</i> |
| Fairy crassula | <i>Crassula multicava</i> |
| False acacia | <i>Robinia pseudacacia</i> |
| Fire tree (candle-berry myrtle) | <i>Myrica faya</i> |
| Fountain grass | <i>Pennisetum setaceum</i> |
| Fringed water lily | <i>Nymphoides peltata</i> |
| Giant reed (arundo grass) | <i>Arundo donax</i> |
| Ginger, Kahili | <i>Hedychium gardnerianum</i> |
| Ginger, yellow | <i>Hedychium flavescens</i> |
| Ginger, white | <i>H. coronarium</i> |
| Goats rue | <i>Galega officinalis</i> |
| Gorse | <i>Ulex europaeus</i> |
| Grape (wild plants) | <i>Vitis vinifera</i> |
| Great reedmace | <i>Typha latifolia</i> |
| Hakea, downy | <i>Hakea gibbosa</i> |
| Hakea, prickly | <i>Hakea sericea</i> |
| Hakea, willow-leaved | <i>Hakea salicifolia</i> |
| Hawthorn | <i>Crataegus monogyna</i> |
| Heath, Spanish | <i>Erica lusitanica</i> |
| Heather | <i>Calluna vulgaris</i> |
| Hemlock | <i>Conium maculatum</i> |
| Honeysuckle, Himalayan | <i>Leycesteria formosa</i> |
| Honeysuckle, Japanese | <i>Lonicera japonica</i> |
| Hornwort (coon's tail) | <i>Ceratophyllum demersum</i> |
| Horse nettle | <i>Solanum carolinense</i> |
| Horsetail | <i>Equisetum</i> spp. |
| Hydrangea | <i>Hydrangea macrophylla</i> |

| Common Names | Latin Names |
|--------------------------------------|--|
| Hydrilla | <i>Hydrilla verticillata</i> |
| Inkweed | <i>Phytolacca octandra</i> |
| Ivy | <i>Hedera helix</i> spp. <i>Helix</i> |
| Ivy, Cape | <i>Senecio angulatus</i> |
| Ivy, German | <i>Senecio mikanioides</i> |
| Japanese spindle tree | <i>Euonymus japonicus</i> |
| Jasmine | <i>Jasminum polyanthum</i> |
| Jerusalem cherry | <i>Solanum pseudocapsicum</i> <i>S. diflorum</i> |
| Kangaroo acacia | <i>Acacia paradoxa</i> syn. <i>Racosperma paradoxum</i> |
| Kikuyu grass | <i>Pennisetum clandestinum</i> |
| Kiwifruit (wild plants) | <i>Actinidia deliciosa</i> |
| Tuber ladder fern (tuber sword fern) | <i>Nephrolepis cordifolia</i> |
| Lantana | <i>Lantana camara</i> All varieties |
| Loquat | <i>Eriobotrya japonica</i> |
| Madeira vine (mignonette vine) | <i>Anredera cordifolia</i> |
| Mexican daisy | <i>Erigeron karvinskianus</i> |
| Mexican devil | <i>Ageratina adenophora</i> |
| Mexican water lily | <i>Nymphaea mexicana</i> |
| Mile-a-minute | <i>Dipogon lignosus</i> |
| Mistflower | <i>Ageratina riparia</i> |
| Monkey apple (lilypily) | <i>Syzygium smithii</i> |
| Montbretia (crocsmia) | <i>Crocsmia crocosmiiflora</i> x |
| Montpellier broom | <i>Teline monspessulana</i> |
| Moreton Bay fig | <i>Ficus macrophylla</i> |
| Moth plant | <i>Araujia hortorum</i> |
| Mysore thorn | <i>Caesalpinia decapetala</i> |
| Nardoo | <i>Marsilea mutica</i> |
| Ngogoora bur | <i>Xanthium occidentale</i> syn. <i>X. strumarium</i> |
| Nutgrass | <i>Cyperus rotundus</i> |
| Oxygen weed | <i>Egeria densa</i> |
| Oxygen weed | <i>Lagarosiphon major</i> |
| Oxylobium | <i>Oxylobium lanceolatum</i> |
| Palm grass | <i>Setaria palmifolia</i> |
| Pampas, purple | <i>Cortaderia jubata</i> |
| Pampas, white | <i>Cortaderia selloana</i> |

| Common Names | Latin Names |
|---------------------------------------|--|
| Parrot's feather | <i>Myriophyllum aquaticum</i> |
| Perennial nettle | <i>Urtica dioica</i> |
| Periwinkle | <i>Vinca major</i> |
| Phoenix palm | <i>Phoenix canariensis</i> |
| Phragmites | <i>Phragmites australis</i> |
| Pine, lodgepole | <i>Pinus contorta</i> |
| Pine, maritime | <i>Pinus pinaster</i> |
| Pine, Monterey | <i>Pinus radiata</i> |
| Plectranthus | <i>Plectranthus ciliatus</i> |
| Plectranthus | <i>Plectranthus grandis</i> |
| Plectranthus – (blue spur flower) | <i>Plectranthus ecklonii</i> |
| Pyp grass | <i>Ehrharta villosa</i> |
| Poplar, Chinese | <i>Populus yunnanensis</i> |
| Poplar, Lombardy | <i>Populus nigra</i> |
| Poplar, Queensland | <i>Homalanthus populifolius</i> |
| Poplar, white | <i>Populus alba</i> |
| Port Jackson fig | <i>Ficus rubiginosa</i> |
| Primrose willow | <i>Ludwigia peploides</i> |
| Prickly Moses | <i>Acacia verticillata</i> syn. <i>R. verticillatum</i> |
| Privet, Chinese | <i>Ligustrum sinense</i> |
| Privet, southern | <i>Ligustrum vulgare</i> |
| Privet, tree (nuzhen) | <i>Ligustrum lucidum</i> |
| Queen of the night | <i>Cestrum nocturnum</i> |
| Ragwort | <i>Senecio jacobaea</i> |
| Ragwort, pink | <i>Senecio glastifolius</i> |
| Red cestrum | <i>Cestrum elegans</i> <i>C. fasciculatum</i> |
| Rhamnus (Evergreen/Italian buckthorn) | <i>Rhamnus alaternus</i> |
| Rough horsetail | <i>Equisetum hyemale</i> |
| Royal fern | <i>Osmunda regalis</i> |
| Rush, soft | <i>Juncus effisus</i> |
| Sawtooth | <i>Najas marina</i> |
| Sharp rush | <i>Juncus acutus</i> |
| Sheeps bur | <i>Acaena agnipila</i> |
| Skeleton weed | <i>Chondrilla juncea</i> |
| Smilax | <i>Asparagus asparagoides</i> |
| Southern cattail | <i>Typha domingensis</i> |
| Southern naiad | <i>Najas guadalupensis</i> |

| Common Names | Latin Names |
|---------------------------------------|---|
| Spartina | <i>Spartina anglica</i> <i>S. townsendii</i> <i>S. alterniflora</i> |
| St John's Wort | <i>Hypericum perforatum</i> |
| Stinking iris | <i>Iris foetidissima</i> |
| Stipa species (except NZ native ones) | now <i>Austrostipa</i> spp. and <i>Nassella</i> spp. |
| Sweet briar | <i>Rosa rubiginosa</i> |
| Sweet pea shrub | <i>Polygala myrtifolia</i> |
| Tasmanian blackwood | <i>Acacia melanoxylon</i> syn. <i>Racosperma melanoxylon</i> |
| Tecoma | <i>Tecomaria capense</i> |
| Thistle, nodding | <i>Carduus nutans</i> |
| Thistle, plumeless | <i>Carduus acanthoides</i> |
| Thistle, saffron | <i>Carthamus lanatus</i> |
| Thistle, variegated | <i>Silybum marianum</i> |
| Tree lupin | <i>Lupinus arboreus</i> |
| Tutsan | <i>Hypericum androsaemum</i> |
| Veldt grass, perennial | <i>Ehrharta calycina</i> |
| Velvet groundsel | syn. <i>Senecio petasitis</i> |
| Wandering Jew | <i>Tradescantia fluminensis</i> |
| Water chestnut | <i>Trapa natans</i> |
| Water lettuce | <i>Pistia stratiotes</i> |
| Water primrose | <i>Ludwigia peruviana</i> |
| Water soldier | <i>Statotes aloides</i> |
| Watsonia | <i>Watsonia bulbifera</i> |

| Common Names | Latin Names |
|----------------------------------|--|
| Wattle, black | <i>Acacia mearnsii</i> syn. <i>Racosperma mearnsii</i> <i>Acacia decurrens</i> syn. <i>Racosperma decurrens</i> |
| Wattle, brush | <i>Paraserianthes lophantha</i> |
| Wattle, cedar | <i>Acacia elata</i> syn. <i>Racosperma elatum</i> |
| Wattle, kangaroo acacia | <i>Acacia paradoxa</i> syn. <i>Racosperma paradoxum</i> |
| Wattle, prickly Moses | <i>Acacia verticillata</i> syn. <i>R. verticillatum</i> |
| Wattle, silver | <i>Acacia dealbata</i> syn. <i>R. dealbatum</i> |
| Wattle, Sydney golden | <i>Acacia longifolia</i> syn. <i>Racosperma longifolium</i> |
| Wattle, Tasmanian blackwood | <i>Acacia melanoxylon</i> syn. <i>Racosperma melanoxylon</i> |
| Wild gladiolus | <i>Gladiolus undulatus</i> |
| White bryony | <i>Bryonia dioica</i> |
| Willow, crack | <i>Salix fragilis</i> |
| Willow, grey | <i>Salix cinerea</i> |
| Wisteria | <i>Wisteria sinensis</i> |
| Woolly nightshade (tobacco tree) | <i>Solanum mauritianum</i> |
| Yellow flag iris | <i>Iris pseudacorus</i> |
| Yellow water lily | <i>Nuphar lutea</i> |

Any total control plants found as listed in the RPMS are to be reported to Waitakere City Council and the Auckland Regional Council.

Targets:

- All environmental weed species within 'total control' roads should be controlled within the first cycle (i.e. the first six months of the contract).
- After the second year of control (i.e. four cycles of follow up control) the current area of total control roads should be reaching a low density of weeds. This should allow for the expansion of 'total control roads' within the same budget (objective two – minimise future costs).

An expansion within the same budget will be possible as the time taken to control the same stretch of road in year two should be substantially less than the first year when weed infestations were at much higher levels.

5.0 MONITORING/AUDITING

5.1 Auditing

Auditing measures the success of the contractor to meet the contract requirements. Current practice is to randomly audit 10% of the contract works. It is recommended that this continues. It is important to continue using the current performance measures to ensure that Waitakere City Councils responsibilities are met, particularly with health and safety requirements. However audit sites should be chosen and visited before contract works begin so that the auditor is familiar with the site both before and after control operations.

Part of the effectiveness measure used by the auditor could be the success of control on an infestation that meets control requirements that was tagged for auditing before control operations began. The presence/absence of a certain age class or size of target weed species will help the auditor ascertain if control work has been carried out appropriately.

5.2 Monitoring

Thorough monitoring is essential to evaluate the success of the Strategy and work programme targets. Monitoring should be done utilising information provided by the contractor to measure the long-term success of the Strategy and work programme targets. Spray diaries and a record of total hours spent in each reserve provide valuable information that is generally required from contractors but underutilised as a monitoring tool.

This information is normally collected by the contractor during normal work operations and needs to be provided in a common format to Waitakere City Council for analysis and to provide long-term information on the success of the weed control carried out.

To monitor long-term progress of weed control along a roadside reserve, details such as hours worked, herbicide amounts, volume used and targets controlled can be used to build up a picture of effectiveness. Records should be collected for each road and be used to determine:

- Whether work hours are increasing or decreasing within the given area. Successful weed control should cause work hours to drop after initial control and over time down to a level consistent with the searching time required over the length of road.
- Whether herbicide amounts, types and volumes are increasing or decreasing within the given area. Successful weed control should cause herbicide use to drop dramatically after initial control (in a defined area), down to a low level consistent with the seedbank present or level of reinvasion pressure.
- What target species were present at each stage of control? This can show which species are persisting, and any new introductions can be identified.
- Over time this information will greatly assist in estimating and projecting the costs required for weed control in each given area.
- This information can be used to determine when a given area can be reclassified into the next restoration phase.

- Once in forest protection a given area could be monitored as zero weed density by these records (i.e. the annual maintenance records can be used as the monitoring regime, supported by random audits).

Data could be provided either digitally or in paper form, what is important is that the data is collected for a known spatial area so that future comparisons can be made.

6.0 ROADSIDE RESPONSE

Ad hoc weed control is undertaken along roadsides to meet the concerns of the public, in cases where members of the community draw attention to issues that match the priorities set out in the Weed Management Strategy and the request is cost effective. In some instances, it is worthwhile to provide a "one-off" response, for example, to meet good neighbour responsibilities, or to provide a positive response to a public awareness campaign.

For these reasons, roadside response should continue to be part of roadside weed control operations.

Record concerns raised by members of the public in a database for audit and surveillance purposes. If the budget allows, the database could be used to follow up previous control efforts. This would also help increase public awareness of the importance of ongoing weed control as opposed to ad hoc attempts at managing weeds, while increasing the value of one-off attempts.

7.0 CONCLUSION

The four different components of roadside weed control presented in this five year programme should facilitate the restoration of natural areas throughout Waitakere. The four components are:

- Obligations to the RPMS (objective five of the Weed Management Strategy).
 - A selected list of environmental weed species (generally specified as containment pest plants within the RPMS) are required to be controlled city wide, regardless of infestation size.
 - These weed targets mean Waitakere City Council is fulfilling obligations to the RPMS as a landowner.
- City wide environmental weed targets (objective six and seven)
 - A selected list of environmental weed species are required to be controlled when the infestation size of a given species is less than 15 m².
 - Control is required city wide.
- Total control roads (objective one, two and six)
 - All environmental weed species (as per Waitakere City Councils invasive and environmental weed species list) are required to be controlled.
 - Weed species are controlled regardless of infestation size along specified roads only.
- Roadside response (objective three)
 - Ad hoc weed control to meet the concerns of the public, where these are in line with the Strategy and cost effective.

If Best Practice Guidelines are followed, roadside weed control should expand over the next five years to include more areas of total control roads and/or larger areas of control



or selected species. This can be achieved, despite constant reinvasion, through the effective and efficient use of weed control methodologies and native revegetation with healthy and stabilising plants. Over time weed densities should reduce and therefore costs for controlling the same stretch of road should decrease to a, low, stable level.

Control of containment and surveillance pest plants as per the RPMS means Waitakere City Council will exceed its obligations as a landowner. Control of these environmental weed species along conspicuous stretches of road will also help educate the greater community and promote the benefits of ecological restoration.

Following recommended monitoring and auditing practices should ensure control work is being undertaken as per contractual targets to help restore the natural environment and progress towards achieving the Green Network vision to bring the natural landscape to the Waitakere community and connect the Waitakere ranges to the sea.

8.0 REFERENCE

Auckland Regional Council. 2002. Auckland Regional Pest Management Strategy. 2002 – 2007.