



Plate 5: Planting Area 1b – open area with scattered brush wattle, gorse and Sydney golden wattle amongst scattered planted indigenous species.



Plate 6: Planting Area 1c – rank kikuyu grass.

#### 5.4 Erosion and sediment control

Erosion can become an issue if a large area is cleared of vegetation, requiring sediment control to minimise adverse effects on the local environment. Erosion through flooding and bank scouring is likely to be minimal given the characteristics of the site. Surface runoff and associated sediment load due to weed clearance is likely to be minimal. Erosion risk can be minimised by exercising care to minimise soil disturbance when undertaking weed control/clearance and planting works.

Revegetation of the site should be undertaken as soon as possible following weed control operations.

#### 5.5 Disposal of material

Many weed infestations will be dealt with *in-situ* removing the need for disposal. Any larger weed plants removed (e.g. Sydney golden wattle, loquat) should be mulched and left on site. If any material is required to be removed from the site, this should be taken to an approved disposal site, such as the Recycling Station at The Concourse, Henderson.

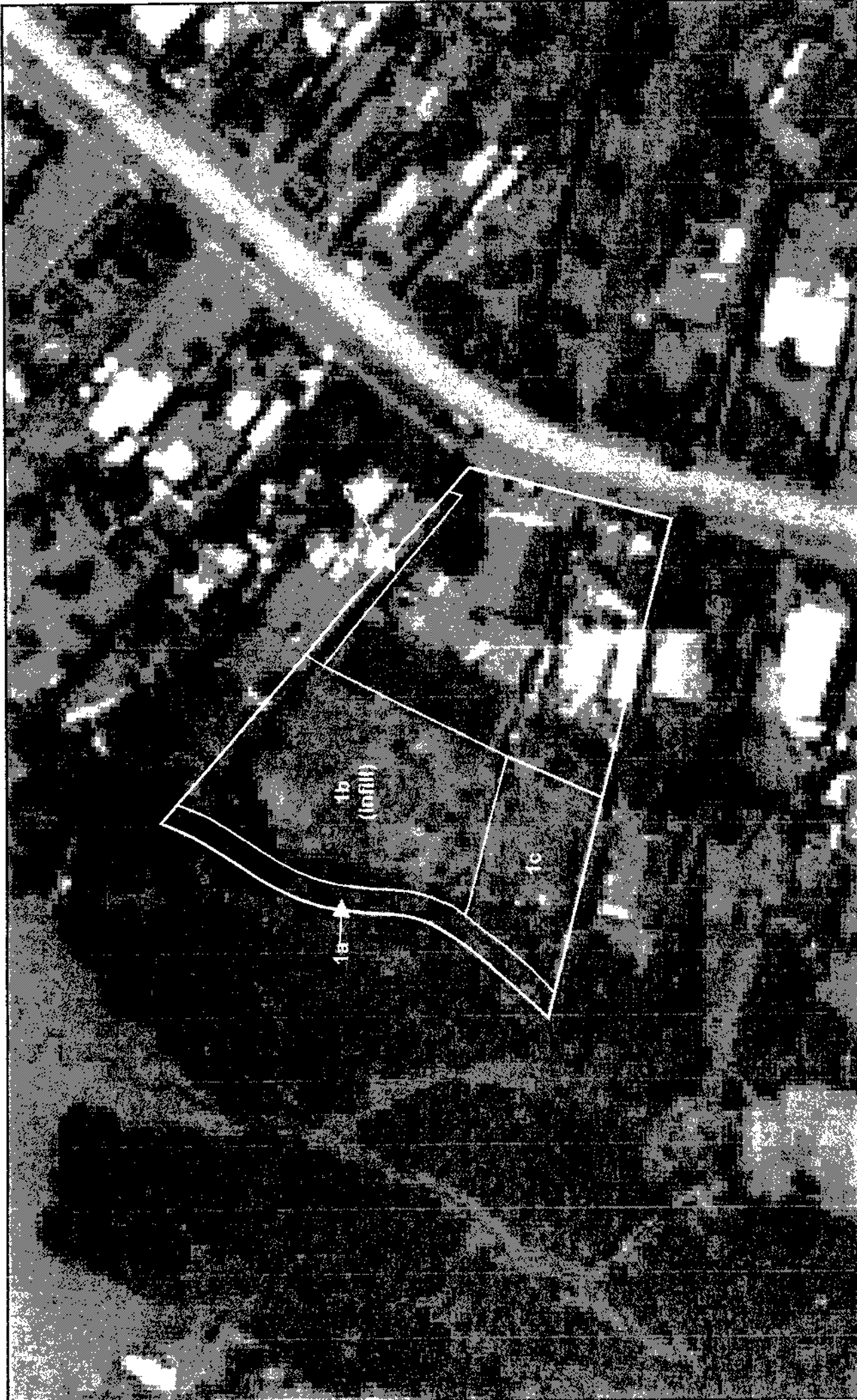
It is essential that plant seeds, tubers, spores and fragments are not dispersed from the current infestation areas. Many species can easily be spread by seed, e.g. Chinese privet, Japanese honeysuckle and pampas. Therefore, it is strongly recommended that all infestations that are unsuitable to mulch, be dealt with *in-situ*. Where cut vegetation is to be left on site, seed heads should be removed wherever possible and disposed of properly to avoid new infestations establishing. The Standard Specifications for Weed Hygiene in Waitakere City should be adhered to at all times.

### 6. PLANTING RECOMMENDATIONS

#### 6.1 Site preparation

Site preparation will be a key factor in the successful implementation of this project. All environmental weeds should be removed prior to undertaking planting. Non-invasive weeds can either be trimmed with a weed eater, or alternatively, sprayed with a Glyphosate based herbicide. Rank kikuyu comprises a thick mat of stems and should be sprayed with Glyphosate at least six months prior to planting to allow dieback and follow up control before planting. Gorse may be left to assist in the natural establishment of indigenous species. Gorse may also be controlled for amenity purposes as required.

All rubbish should also be removed from the site as part of site preparation operations.



Scale: 1:1,000  
 Date: 02/08/05  
 Cartographer: RPB

**Figure 2. Proposed Planting Zones in Whenuapai Hall Reserve**

**Legend**  
 1 - 2 Proposed planting zones  
 Refer to text

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## 6.2 Maintenance

Plantings should be inspected monthly for 12 months following planting operations to identify any management that may be required. Plantings should be released from weed competition a minimum of three times a year for the first two years, with further releases at a reduced frequency as required over the following three years. Some parts of the site may only require releasing for the first year, depending on site conditions.

Blanking (replacement of dead plants) should be undertaken as required (two months after initial planting) to replace those plants that have not survived the initial planting.

Limited infill planting<sup>1</sup> may be required in the second planting season. Infill plants should be of a bagged grade (PB3). Infill planting requirements should be identified in February/March preceding the upcoming planting season.

## 6.3 Plant schedules

Two areas have been identified that would benefit from indigenous planting. The first comprises the area between the tennis courts/playground and the coastal margin. The second is along the northern margin of the reserve adjacent to the fence. Recommended planting locations are presented in Figure 2.

Area 1 has been divided into three zones for planting. Zone 1a comprises the coastal margin, Zone 1b comprises the slope above the coastal margin that has previously been planted (infill planting) and Zone 1c comprises the slope above the coastal margin that is currently unplanted.

Plant schedules have been developed for each area based on physical site characteristics, existing vegetation cover and landscape criteria (view shafts). These are based on species that would occur naturally on sites with these characteristics. Other factors considered include the selection of species that are likely to have a relatively high growth rate and survival rate. These planting schedules are presented in Tables 1-3 below.

### 6.3.1 Coastal margin planting zone

The coastal margin zone is defined as that area immediately adjacent to the mangrove wetland and comprises Zone 1a. This area should be planted with coastal/saltmarsh species such as oioi, and pohuehue.

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<sup>1</sup> Infill planting is required on sites where there are gaps in the planting because of plant mortality or where initial stocking rates were too low.

Table 1: Plant schedule for Zone 1a

Species	Common Name	Grade	Spacing (m)	Number
<i>Apodasmia similis</i>	oioi	PB3	0.5	88
<i>Blechnum novae-zelandiae</i>	kiokio	PB3	0.5	22
<i>Carex geminata</i>		PB3	0.5	176
<i>Carex lambertiana</i>		PB3	0.5	88
<i>Cordyline australis</i>	ti kouka, cabbage tree	PB3	0.75	77
<i>Cortaderia fulvida</i>	toetoe	RT	0.75	116
<i>Cyperus ustulatus</i> <sup>1</sup>	giant umbrella sedge	PB3	0.5	53
<i>Entelea arborescens</i>	whau	PB3	4	19
<i>Gahnia spp.</i>	gahnia	RT	0.75	39
<i>Leucopogon fascicularis</i>	mingimingi	PB3	0.75	8
<i>Macropiper excelsum</i>	kawakawa	PB3	0.75	39
<i>Muehlenbeckia complexa</i>	pohuehue	PB3	0.75	58
<i>Myoporum laetum</i>	ngaio	PB3	0.75	19
<i>Phormium cookianum</i>	wharariki	PB3	0.75	123
<i>Plagianthus divaricatus</i>	saltmarsh ribbonwood	PB3	0.75	77
<i>Pseudopanax crassifolius</i>	lancewood	PB3	0.75	19
<b>TOTAL</b>				<b>1.021</b>

1. Plant in wet hollows

### 6.3.2 Coastal Margin Upper Slope

The coastal margin upper slope zone is defined as that area situated above the immediate coastal margin and comprises Zones 1b and 1c. These areas should be planted with coastal shrub species such as harakeke, kawakawa, kumerahou, taupata and toetoe. Species that when mature are of low height should be planted along the top half of the planting area to maintain view shafts across the upper harbour. Taller species can be planted lower down the slope where they will not impact on views.

Table 2: Plant schedule for Zone 1b

Species	Common Name	Grade	Spacing (m)	Number
<i>Astelia banksii</i>	kakaha	PB3	0.75	25
<i>Blechnum novae-zelandiae</i>	kiokio	PB3	0.5	44
<i>Carex lambertiana</i>		PB3	0.5	200
<i>Clematis paniculata</i>	puawananga	PB3	0.75	20
<i>Coprosma repens</i>	taupata	PB3	0.75	88
<i>Coprosma robusta</i> <sup>1</sup>	karamu	PB3	0.75	88
<i>Cortaderia fulvida</i> <sup>1</sup>	toetoe	RT	0.75	176
<i>Dianella nigra</i>	turutu	PB3	0.75	65
<i>Entelea arborescens</i>	whau	PB3	0.75	9
<i>Gahnia spp.</i>	gahnia	RT	0.75	18
<i>Geniostoma rupestre</i>	hangehange	PB3	0.75	88
<i>Hebe stricta</i> <sup>1</sup>	koromiko	PB3	0.75	88
<i>Leucopogon fascicularis</i>	mingimingi	PB3	0.75	9
<i>Macropiper excelsum</i>	kawakawa	PB3	0.75	132
<i>Myoporum laetum</i>	ngaio	PB3	0.75	18
<i>Olearia solandri</i>	coastal tree daisy	PB3	0.75	35
<i>Phormium tenax</i> <sup>1</sup>	harakeke, flax	PB3	0.75	617
<i>Pomaderris kumerahou</i> <sup>1</sup>	kumerahou	PB3	0.75	220
<i>Pseudopanax crassifolius</i>	lancewood	PB3	0.75	18
<i>Sophora microphylla</i> <sup>2</sup>	kowhai	PB3	8	9
<b>TOTAL</b>				<b>1,967</b>

1. Low - medium height species
2. Tall species

Table 3: Plant schedule for Zone 1c

Species	Common Name	Grade	Spacing (m)	Number
<i>Astelia banksii</i>	kakaha	PB3	0.75	14
<i>Carex lambertiana</i>		PB3	0.5	35
<i>Coprosma repens</i>	taupata	PB3	0.75	68
<i>Coprosma robusta</i> <sup>1</sup>	karamu	PB3	0.75	34
<i>Cordyline australis</i> <sup>1</sup>	ti kouka, cabbage tree	PB3	0.75	68
<i>Cortaderia fulvida</i> <sup>1</sup>	toetoe	RT	0.75	204
<i>Dianella nigra</i>	turutu	PB3	0.75	35
<i>Entelea arborescens</i>	whau	PB3	0.75	7
<i>Gahnia spp.</i>	gahnia	RT	0.75	157
<i>Geniostoma rupestre</i>	hangehange	PB3	0.75	34
<i>Hebe stricta</i> <sup>1</sup>	koromiko	PB3	0.75	68
<i>Macropiper excelsum</i>	kawakawa	PB3	0.75	68
<i>Myoporum laetum</i>	ngaio	PB3	0.75	14
<i>Olearia solandri</i>	coastal tree daisy	PB3	0.75	27
<i>Phormium tenax</i> <sup>1</sup>	harakeke, flax	PB3	0.75	340
<i>Pomaderris kumerahou</i> <sup>1</sup>	kumerahou	PB3	0.75	170
<i>Pseudopanax crassifolius</i>	lancewood	PB3	0.75	14
<i>Sophora microphylla</i> <sup>2</sup>	kowhai	PB3	8	7
<b>TOTAL</b>				<b>1,364</b>

1. Low - medium height species
2. Tall species

### 6.3.3 Area 2 Planting

Area 2 planting zone is located on the northern boundary of the reserve adjacent to the fence. This area is recommended for planting to minimise ongoing weed establishment in this area. Planting should comprise mostly cabbage tree, kanuka, karamu, manuka, and toetoe.

Table 4: Plant schedule for Area 2

Species	Common Name	Grade	Spacing (m)	Number
<i>Astelia banksii</i>	kakaha	PB3	0.75	25
<i>Coprosma repens</i>	taupata	PB3	0.75	8
<i>Coprosma robusta</i>	karamu	PB3	0.75	25
<i>Cordyline australis</i>	ti kouka, cabbage tree	PB3	0.75	16
<i>Cortaderia fulvida</i>	toetoe	RT	0.75	16
<i>Dianella nigra</i>	turutu	PB3	0.75	30
<i>Hebe stricta</i>	koromiko	PB3	0.75	8
<i>Kunzea ericoides</i>	kanuka	RT	0.75	8
<i>Leptospermum scoparium</i>	manuka	RT	0.75	23
<i>Macropiper excelsum</i>	kawakawa	PB3	0.75	9
<i>Meliccytus ramiflorus</i>	mahoe	PB3	0.75	8
<i>Olearia solandri</i>	coastal tree daisy	PB3	0.75	8
<i>Phormium tenax</i>	harakeke, flax	PB3	0.75	23
<b>TOTAL</b>				<b>207</b>

### 6.4 Plant stock and availability

All plants should be sourced from the Waitakere or Tamaki Ecological Districts in line with Waitakere City Councils eco-sourcing Code of Practice.

Waitakere City Council has ordered plants in advance from local nurseries for supply in April 2006, and comprise a mix of root trainer and PB3 grade plants.

### 6.5 Plant spacing

Plant spacing should generally be at 0.75 metre centres, ensuring relatively rapid canopy closure to assist reducing the opportunity for weed establishment. This equates to 17,500 plants per hectare.

Plant spacing for sedges on the immediate coastal margin (Zone 1a) should be at 0.5 m centres (40,000 plants per hectare) as these species are smaller when mature and require larger numbers to minimise the establishment of weed species, than do species that are larger when mature.

## 7. TIMING

Timing is based on the Waitakere City Council financial year of 1 July to 30 June.

### Year 1:

TASK	TIMING
1. Initial weed control	October – December
2. Follow up weed control	March – April
3. Site preparation (weedeating, rubbish clearance etc)	March – April
4. Planting	May – June

### Year 2:

TASK	TIMING
1. Blanking (as required)	September
2. Ongoing follow up weed control and monitoring	October – November March-April

### Years 3, 4 and 5:

TASK	TIMING
1. Ongoing follow up weed control and monitoring	October – November March – April

## 8. CONSENTS

Part of Whenuapai Hall Reserve is designated as Riparian Margins/Coastal Edges Natural Area in the Waitakere District Plan. The following rules apply:

Rule 2.2(a)(ii) states:

“(a) Any clearance of  
 (i) *exotic vegetation* less than 6.0 metres in height and less than 600mm in girth (measured at 1.4 metres above the ground)  
 a. *vegetation* listed in the Environmentally Damaging Plants Appendix,  
 beyond 10% of the Riparian Margin/Coastal Edge on the site”

is a **controlled activity**.

Weed control operations in Whenuapai Hall Reserve are not likely to result in the clearance of > 10% of the vegetation in the 10m Coastal Edge zone. If clearance of >10% of vegetation was required then the works would be deemed a **controlled activity** and an assessment of Criteria 2(a) to 2(p) under the Riparian Margins section of the District Plan would be required.

The removal of some of the larger exotic trees (if over 6m in height) on the site is designated as Limited Discretionary Activities under Rule 2.3(a):

“(a) *clearance of exotic vegetation* greater than 6.0 metres in height or greater than 600mm in girth (as measured at any point higher than 1.4 metres above the ground)”

and will require a resource consent for removal.

## REFERENCES

Agrichemical Users' Code of Practice: NZ Agrichemical Education Trust.

Auckland Regional Council: Pest Facts No.30: Plant Pests of the Auckland Region

Auckland Regional Council. 2002: Regional Pest Management Strategy 2002-2007

Auckland Regional Council: Riparian Zone Management Guidelines (TP148).

New Zealand Standard NZS 8409 2004: The Management of Agrichemicals.

Waitakere City Council, 2001: Eco-sourcing Code of Practice & Ethics

Wildland Consultants Ltd 2002a: Environmental Weed Management Plan for Opanuku Stream – Opanuku Reserve, Henderson Park, Shona Reserve, Vintage Reserve, Plumber Domain, Opanuku Stream Reserve, Border Road Esplanade Reserve, Palomino Reserve, Henderson Valley Park. *Wildland Consultants Ltd Contract Report no. 556*. 10pp plus maps.

Wildland Consultants Ltd 2002b: Environmental Weed Management Plan for Henderson Creek Reserves – Henderson Creek Esplanade Reserve, Flanshaw Esplanade Reserve, Sherwood Park, Colletta Esplanade, Epping Esplanade, Chilcott Brae, Tui Glen Reserve, Cranwell Park, Cranwell Esplanade and Falls Park. *Wildland Consultants Contract Report no. 558*. 12pp plus maps.

Wildland Consultants Ltd 2004: Weed Management Plan for Riparian Restoration Sites – Project Twin Streams. *Wildland Consultants Ltd Contract Report No. 870*. 33pp plus appendices.

LIST OF PEST PLANT SPECIES RECORDED IN  
WHENUAPAI HALL RESERVE

Common name	Species
agapanthus	<i>Agapanthus praecox</i>
arum lily	<i>Zantedeschia aethiopica</i>
bear's breeches	<i>Acanthus mollis</i>
brush wattle	<i>Paraserianthes lophantha</i>
canna lily	<i>Canna indica</i>
Cape gooseberry	<i>Physalis peruviana</i>
Chinese privet	<i>Ligustrum sinense</i>
climbing asparagus	<i>Asparagus scandens</i>
cotoneaster	<i>Cotoneaster glaucophyllus</i>
garden nasturtium	<i>Tropaeolum majus</i>
giant reed	<i>Arundo donax</i>
gorse	<i>Ulex europaeus</i>
hydrangea	<i>Hydrangea macrophylla</i>
ivy	<i>Hedera helix</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
kahili ginger	<i>Hedychium gardnerianum</i>
loquat	<i>Eriobotrya japonica</i>
Mexican devil	<i>Ageratina adenophora</i>
monkey apple	<i>Acmena smithii</i>
montbretia	<i>Crocasmia x crocosmiiflora</i>
pampas	<i>Cortaderia selloana/C. jubata</i>
pencil willow	<i>Salix humboldtiana 'Pyramidalis'</i>
rhododendron	<i>Rhododendron sp.</i>
Sydney golden wattle	<i>Acacia longifolia</i>
three cornered garlic	<i>Allium triquetrum</i>
tradescantia	<i>Tradescantia fluminensis</i>
tree privet	<i>Ligustrum lucidum</i>
willow leaved hakea	<i>Hakea salicifolia</i>
woolly nightshade	<i>Solanum mauritianum</i>

## RECOMMENDED CONTROL TECHNIQUES FOR SELECTED WEED SPECIES

Weed	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Agapanthus ( <i>Agapanthus praecox</i> )	Dig out and dispose off site	-	-	Year round	Only if this can be done without posing a weed hygiene risk
	Knapsack – foliar spray	Grazon	100ml per 10 litres water plus 20ml pulse	October-March	Not when flowering or seeding
	Knapsack – foliar spray	Escort	5g per 10 litres water plus 20ml pulse	October-March	Not when flowering or seeding
Arum lily	Hand pull seedlings/small plants	-	-	Year round	
	Dig out and dispose off site	-	-	Year round	Only if this can be done without posing a weed hygiene risk
	Cut and spray stems of large plants	Escort	5g per 10 litres water	October-March	Monitor for re-growth. Spray immediately following cutting.
Bear's breeches ( <i>Acanthus mollis</i> )	Dig out and dispose off site	-	-	Year round	
	Cut and treat stump	Grazon	1 part Grazon to 20 parts water	October-March	
	Handpull seedlings/small plants	-	-	Year round	
Brush wattle	Cut and treat stumps	Grazon	1 part Grazon to 20 parts water	October-April	
	Drill and inject	Escort	20g Escort per litre water, plus 2 ml pulse	October – April	
	Dig out and dispose off site	-	-	Year round	Monitor for re-growth
Canna lily Calla lily	Hand pull	-	-	Year round	
	Knapsack – foliar spray	Glyphosate	100ml per 10 litres water	Year round	Monitor for re-growth
	Seedlings – hand pull	-	-	November-April	
Cape gooseberry	Trees – drill and inject	Escort	20g Escort per litre water, plus 2ml pulse	November-April	

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Weed	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Climbing asparagus	Saplings - cut and stump treat Knapsack/hand sprayer	Grazon Escort	1 part Grazon to 20 parts water 5g Escort plus per 10 litres water plus 20ml pulse	November-April October-March	Foliar spray both climbing stems up to 1m high and scrambling plants in situ. Brittleness of stems means they cannot effectively be pulled off plants. Ensure no tree fern or kowhai trunks are sprayed.
Cotoneaster ( <i>Cotoneaster glaucophyllus</i> )	Handpull seedlings/small plants Cut and treat stumps	- Grazon	- 1 part Grazon to 20 parts water	Year round October-March	
Garden nasturtium Giant reed	Knapsack – foliar spray Cut and spray stumps Cut and spray re-growth Cut and spray re-growth	Escort Glyphosate Glyphosate Gallant	5g per 10 litres water 1 part Glyphosate to 10 parts water 200ml per 10 litres water 150ml per 10 litres water	November-March November-February November-February November-February	Mulch cut material back onto site, or dispose off site Mulch cut material back onto site, or dispose off site Mulch cut material back onto site, or dispose off site Only foliar spray where non-target species are not present
Gorse	Knapsack – foliar spray Cut and treat stumps	Escort Grazon	5g per 10 litres water plus 10mls pulse 1 part Grazon to 20 parts water	Year round Year round	
Hydrangea ( <i>Hydrangea</i> sp.) Ivy ( <i>Hedera helix</i> )	Dig out and remove Cut stems and treat stumps Knapsack – foliar spray Knapsack – foliar spray	- Grazon Escort Versatill	- 1 part Grazon to 20 parts water 5g per 10 litres water 40-50mls Versatill to 10 litres water	Year round November-March November-March October-March	Leave foliage in host to die off Pull away from non-target species before spraying. Spray to run off. Ensure no epiphytic attachment. Do not pull cut vegetation from host plant
Japanese honeysuckle	Cut and treat stems	Grazon	1 part Grazon to 20 parts water	October-March	

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Weed	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Mexican devil ( <i>Ageratina adenophora</i> )	Knapsack – foliar spray	Glyphosate	100ml per 10 litres water	October-March	
Monkey apple ( <i>Acmena smithii</i> )	Seedlings/small plants – hand pull Tree – drill and inject	- Escort	- 20g per litre water, plus 2ml pulse	Year round October-March	
Monthbretia	Sapling – Cut and stump treat Knapsack – foliar spray	Grazon Grazon	1 part Grazon to 20 parts water 60mls per 10 litres water, 10ml Pulse per 10 litres water	October-March October-February	
Pampas	Knapsack – foliar spray Knapsack – foliar spray	Glyphosate Gallant	10ml per litre water 150ml per 10 litres water plus crop oil	October-March best results October-March	Use clean water and thoroughly soak centre of large plants. Best on smaller plants.
Prickly hakea ( <i>Hakea sericea</i> ) Willow leaved hakea ( <i>Hakea salicifolia</i> )	Handpull seedlings/small plants Cut and stump treat Drill and inject	- Grazon Escort	- 1 part Grazon to 20 parts water 20g Escort per litre water, plus 2ml pulse	Year round Year round Year round	
Three cornered garlic	Knapsack – foliar spray	Grazon	15ml per 10 litres water	September-December	
Tradescantia	Knapsack – foliar spray	Grazon	10ml per litre water + 2ml Pulse per litre water	November-March	Pull away from non-target species before spraying.
Tree privet	Cut and treat stumps Drill and inject	Grazon Escort	1 part Grazon to 20 parts water 20g Escort per litre water, plus 2ml pulse	November-March November-March	
Wild ginger	Hand pull seedlings/small plants. Knapsack – foliar spray Knapsack – foliar spray	- Escort Glyphosate	- 5g/10 litres water + 10ml Pulse 100ml/10 litres water + 10ml Pulse	October to February Spring to late autumn Spring to late autumn	Ensure no tuber left behind. Not for use around native vegetation or waterways.

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Weed	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
	Cut and treat stems/tubers	Escort	20g/10 litres water	Spring to late autumn	For application near waterways and indigenous vegetation.
	Cut and treat stems/tubers	Glyphosate	50:50 mix with water	Spring to late autumn	For application near waterways and indigenous vegetation.
Woolly nightshade	Seedlings/small plants – hand pull Trees – drill and inject	-	-	Year round	
	Saplings - cut and treat stump	Escort	20g Escort per litre water, plus 2ml pulse	Year round	
	Saplings - cut and treat stump	Picloram (Vigilant gel)	Apply gel to cut stems	Year round	
	Saplings - cut and treat stump	Grazon	1 part Grazon to 20 parts water	Year round	

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