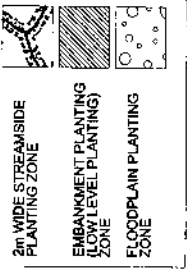


Legend



EMBANKMENT PLANTING ZONE (LOW LEVEL) - REFER TO PLANT SCHEDULE NO.: 7 ON DWG 03289-003/A

4m STRIP OF STREAMSIDE PLANTING - REFER TO PLANT SCHEDULE NO.: 1 ON DWG 03289-003/A

EXISTING STORMWATER DETENTION BASIN WITH SURROUNDING PLANTING - REFER TO PLANT SCHEDULE NO.: 1 ON DWG 03289-003/A

STREAMSIDE PLANTING - REFER TO PLANT SCHEDULE NO.: 1 ON DWG 03289-003/A

EMBANKMENT PLANTING ZONE (LOW LEVEL) - REFER TO PLANT SCHEDULE NO.: 7 ON DWG 03289-003/A

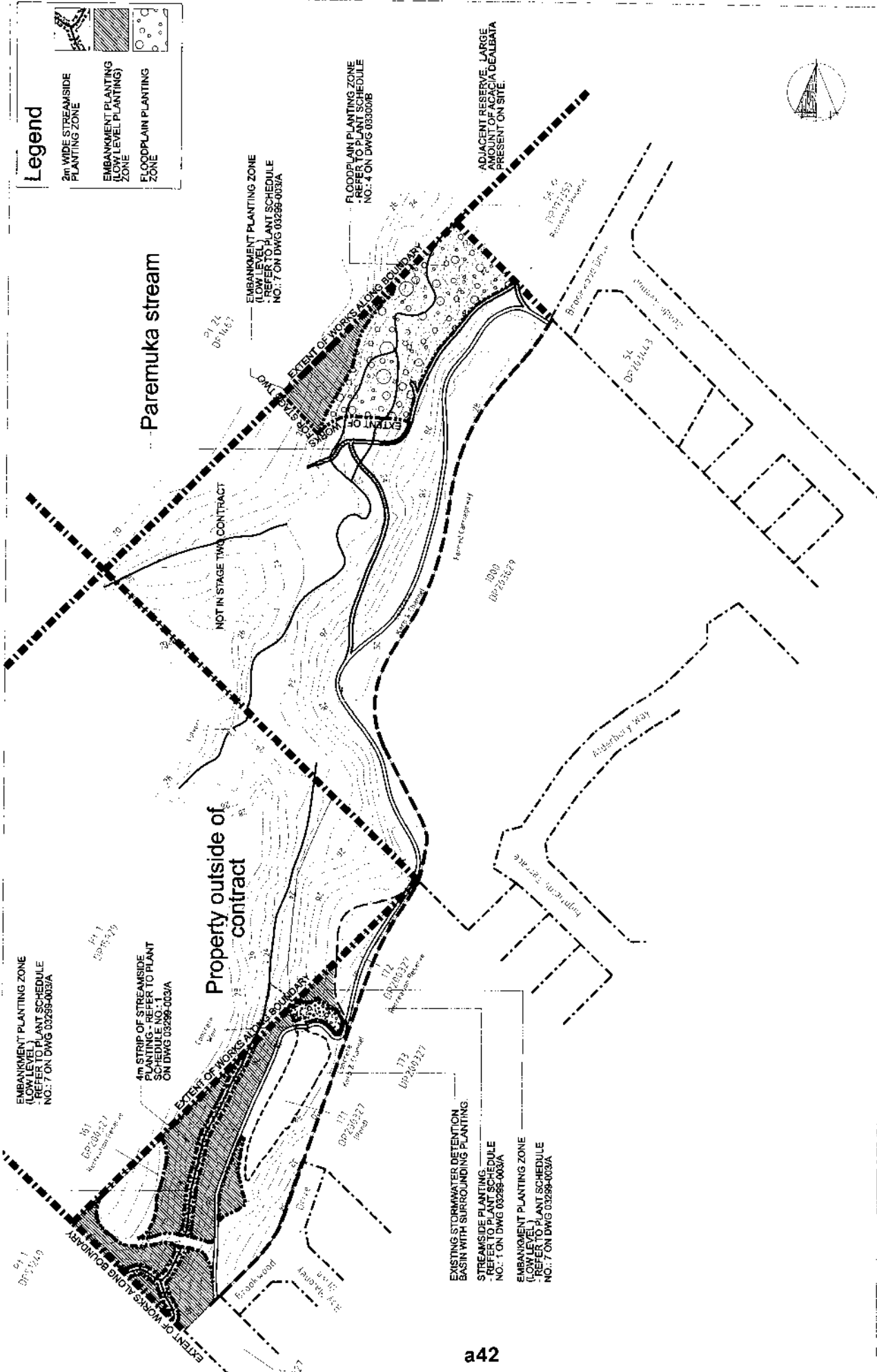
FLOODPLAIN PLANTING ZONE - REFER TO PLANT SCHEDULE NO.: 4 ON DWG 03300/B

EMBANKMENT PLANTING ZONE (LOW LEVEL) - REFER TO PLANT SCHEDULE NO.: 7 ON DWG 03289-003/A

ADJACENT RESERVE LARGE AMOUNT OF ACACIA/CEALATA PRESENT ON SITE.

Paremuka stream

Property outside of contract



N O T E S

1. All dimensions are dimensions on the plan to centimetres unless otherwise stated.
2. Contractors are responsible for confirming the location of all underground services in the site prior to commencing work.
3. All dimensions to be given in preference to scales.

E G E N D

BOFFA MISKELL
planning • design • ecology

PAREMUKA ESPLANADE
Stage Two Planning Plan

03300-006 B

Drawn: []
Checked: []
Scale: 1:500 (A3) 1:1000 (A2)
Date: []

A42

**WEED MANAGEMENT AND
PLANTING PLAN FOR ASTELIA
GRANDIS RESERVE**

OCTOBER 2005

Contract Report No. 1161

Report prepared for

WAITAKERE CITY COUNCIL
PRIVATE BAG 93-109
HENDERSON
WAITAKERE CITY



WILDLAND CONSULTANTS LTD, 15C/2 SATURN PLACE, PO BOX 303 376, NORTH HARBOUR
Ph 09 448 5996, Fax 09 448 5997

99 SALA STREET, P.O. BOX 7137, TE NGAE, ROTORUA
Ph 0508 WILDNZ, Fax 07-343-9018, email ecology@wildlands.co.nz, www.wildlands.co.nz

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1. INTRODUCTION

Wildland Consultants Ltd was engaged to map environmental pest plant distributions and identify areas for planting in Astelia Grandis Reserve, Western Heights, Waitakere City, in preparation for weed control and planting in 2006. Weed species present within the reserve were identified and their distribution and abundance mapped and described.

Recommended areas for planting within the reserve were identified and mapped. Plant schedules of suitable plant species were prepared.

A staged programme of weed control and planting was prepared. Resource consents requirements and any other consents necessary in order to undertake vegetation control and planting preparation were identified.

2. PROJECT OBJECTIVES

- Map the distribution and density of invasive or environmental weeds of Waitakere (Figure 1).
- Identify and recommend areas for planting, including suitable species.
- Compile a staged programme of weed control and planting.
- Identify resource consent requirements or any other consents necessary in order to undertake vegetation control and planting preparation.

3. BACKGROUND

Astelia Grandis Reserve (0.09 ha) is located between Chelmsley Avenue and Gendo Avenue, Western Heights. The reserve comprises a small wetland and associated buffering scrub dominated by Chinese privet. There is a stormwater pond to the north-east of the reserve, which the wetland drains into.

Astelia grandis, a relatively uncommon species within Waitakere City is present in the reserve.

4. METHODOLOGY

4.1 Environmental weed survey

The project area was surveyed for environmental pest plants in October 2005. Areas where revegetation planting should be undertaken were also identified.

Environmental weeds are adventive species that threaten the ecological processes and values within the project area.

Field survey methods were based on previous pest plant inventories undertaken by Wildland Consultants Ltd (2002a&b, 2004). The field survey involved a walk through the project area noting locations and distributions of pest plants. During the survey, particular attention was given to the margins of the reserve, clearings within the reserve and areas of previous weed control operations as these areas are most vulnerable to pest plant invasion/re-invasion.

Environmental weed distributions and densities were mapped in the field onto hard copy prints of digital orthophotographs. The maps were then used for data input into ArcGIS 8.3 (GIS programme). The distribution of each environmental weed species was digitised. Weed species were labelled with their common name and a brief description of the extent of the infestation, either as a percentage cover or as a number of individuals, overlain on the aerial photograph. A map showing weed distribution and density was prepared and is presented in Figure 1.

The relative priority for the control of each environmental pest plant infestation has been assessed based on the Auckland Regional Pest Management Strategy (ARC 2002), the ecological values of the infestation area, the relative vulnerability of the vegetation and habitats present, the level of threat posed by the pest plant species, and the size of the infestation.

Weed species were identified along with their relative priority for control. Weed species were then grouped by priority level (see Section 5.2 below).

4.2 Recommended areas for planting

Areas suitable for planting were identified during the field survey. Areas recommended for planting include areas where weed infestations will be an ongoing problem and open areas within existing plantings/vegetation. A map showing recommended planting locations was prepared and is presented in Figure 2. One area was identified for planting during the survey.

Waitakere City Council has ordered a range of plant species from a local nursery for planting projects throughout the city's parks and reserves in 2006. Planting schedules detailing suitable species from this plant supply list were compiled and are presented in Section 6.3.

5. ENVIRONMENTAL PEST PLANTS

5.1 Distribution and abundance

Nine species were identified as pest plant species and their relative priority for control has been identified. The distribution and abundance of weed infestations in Astelia Grandis Reserve is presented in Figure 1.

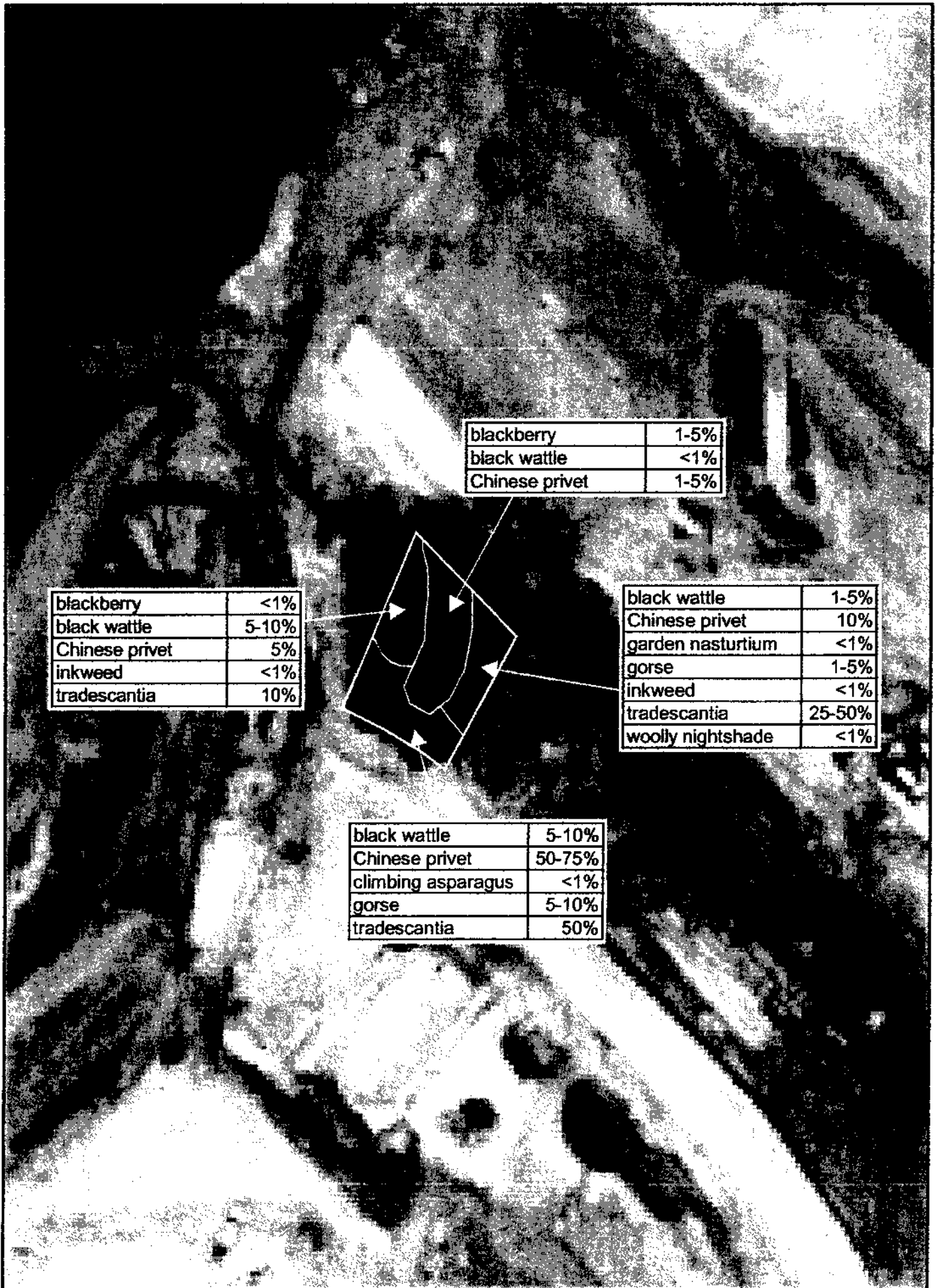


Figure 1. Distribution and Abundance of Pest Plants in Astelia Grandis Reserve

5.2 Pest plant control priorities

Class One

Environmental pest plants that are Total Control pest plant species and Containment pest plant species identified in the Auckland Regional Council's Regional Pest Management Strategy (ARC 2002). Whilst Auckland Regional Council are required to control Total Control pest plant species, landowners have a requirement to control Containment pest plant species.

One Class One pest plant species was recorded in Astelia Grandis Reserve.

- woolly nightshade (*Solanum mauritianum*) (Containment pest plant species – Removal)

Class Two

Environmental pest plant species are those present in low numbers for which total control in the study area is feasible, and those that are potential or actual threats to the ecological processes or values of the reserve. Pest plant species for which there is little or no information on their ecological role(s), but which may pose a threat, have also been included in this class (based on field observations).

- blackberry (*Rubus fruticosus*)
- climbing asparagus (*Asparagus scandens*)

Class Three

These tend to be those larger or more widely spread infestations of pest plant species that are potential or actual threats to the ecological processes or values of the parks. Initial control efforts should concentrate on the prevention of further spread of these species.

- Chinese privet (*Ligustrum sinense*)
- tradescantia (*Tradescantia fluminensis*)

Class Four

Pest plant species that are present in moderate to large infestations around reserve boundaries but pose a lesser threat to the ecological processes or values of the reserves.

No pest plant species present in the study area were assigned to this class.

Class Five

Small infestations of pest plant species that do not threaten ecological processes in these locations, but which might be worthy of control for aesthetic reasons.

- black wattle (*Acacia mearnsii*)
- garden nasturtium (*Tropaeolum majus*)
- gorse (*Ulex europaeus*)
- inkweed (*Phytolacca octandra*)

5.3 Pest plant management recommendations

All Class One and Two and Three environmental pest plant species should be removed from the reserve. Class Five pest plant species should be removed prior to undertaking any plantings.

Recommended control methods are presented in Appendix 2. It is recommended that all weed control operations be undertaken in line with the Agrichemical Users' Code of Practice, NZS 8409 2004: The Management of Agrichemicals, Waitakere City Council's Herbicide Reduction Strategy and the Use of Agrichemicals in Waitakere City.

Ongoing monitoring for environmental weed species should be maintained until plantings have established a significant canopy.

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. Most of the reserve is low profile, dominated by wetland habitat. 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 to minimise potential ongoing erosion problems.

5.5 Disposal of material

Many weed infestations will be dealt with *in-situ* removing the need for disposal. 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, woolly nightshade. 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 carefully to avoid new infestations establishing. The Standard Specifications for Weed Hygiene in Waitakere City should be adhered to at all times.



Plate 1: Chinese privet, gorse and black wattle adjacent to Chelmsley Avenue.



Plate 2: Wetland dominated by *Carex lesssoniana* and *C. virgata* with scattered wheki and cabbage tree. Buffering scrub is dominated by Chinese privet.



Legend

- 1 Proposed planting zones
Refer to text

**Figure 2. Proposed Planting Zones in
Astelia Grandis Reserve**



A52



Scale: 1:1,000
Date: 21/10/05
Cartographer: RPB

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, with the exception of the tree species providing shade over the wetland. Many weed species will require follow up control operations to ensure total removal prior to planting.

Non-invasive weeds can either be trimmed with a weed eater, or alternatively, sprayed with a Glyphosate based herbicide. 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.

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 planting¹ 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

One area has been identified that would benefit from indigenous planting. Area 1 comprises an area buffering the wetland in the reserve. The existing buffer is currently dominated by pest plant species.

A plant schedule has been compiled for the area based on physical site characteristics and existing vegetation cover. 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. The planting schedule is presented in Tables 1 below.

¹ 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.

6.3.1 Wetland margin and buffer

Planting in this area will provide a buffer of indigenous vegetation for the wetland and associated *Astelia grandis* population. This area should be planted with wetland margin species such as cabbage tree, kanuka, karamu, manuka and toetoe. All existing indigenous vegetation should be retained.

Table 1: Plant schedule for Planting Area 1

Species	Common Name	Grade	Spacing (m)	Number
<i>Blechnum novae-zelandiae</i>	kiokio	PB3	0.5	87
<i>Blechnum chambersii</i>		PB3	0.5	87
<i>Carex geminata</i>		PB3	0.5	125
<i>Carex lambertiana</i>		PB3	0.5	137
<i>Carex virgata</i>	purei	PB3	0.5	125
<i>Clematis paniculata</i>	puawananga	PB3	0.75	45
<i>Coprosma propinqua</i>		PB3	0.75	55
<i>Coprosma robusta</i>	karamu	PB3	0.75	82
<i>Cordyline australis</i>	ti kouka, cabbage tree	PB3	0.75	109
<i>Cortaderia fulvida</i>	toetoe	RT	0.75	109
<i>Gahnia xanthocarpa</i>	gahnia	RT	0.75	55
<i>Hedycarya arborea</i>	pigeonwood	PB3	0.75	55
<i>Kunzea ericoides</i>	kanuka	PB3	0.75	55
<i>Leptospermum scoparium</i>	manuka	PB3	0.75	109
<i>Melicytus ramiflorus</i>	mahoe	PB3	0.75	55
<i>Myrsine australis</i>	mapou	PB3	0.75	55
<i>Parsonsia heterophylla</i>	NZ jasmine	PB3	0.75	65
<i>Phormium tenax</i>	harakeke, flax	PB3	0.75	55
<i>Rhopalostylis sapida</i>	nikau	PB3	0.75	65
<i>Sophora microphylla</i>	kowhai	PB3	6	55
TOTAL				1,581

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. These plants comprise a variety of species and a mix of root trainer and PB3 grade plants.

6.5 Plant spacing

Plant spacing should generally be at 0.75 metre centres (including existing indigenous vegetation), 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 wetland margin 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
4. Blanking (as required)	September
5. 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	March – April October – November

8. CONSENTS

No Waitakere City Council resource consent is required for weed control in Astelia Grandis Reserve.

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
ASTELIA GRANDIS RESERVE

Common name	Species
black wattle	<i>Acacia mearnsii</i>
blackberry	<i>Rubus fruticosus</i> agg.
Chinese privet	<i>Ligustrum sinense</i>
climbing asparagus	<i>Asparagus scandens</i>
garden nasturtium	<i>Tropaeolum majus</i>
gorse	<i>Ulex europaeus</i>
inkweed	<i>Phytolacca octandra</i>
tradescantia	<i>Tradescantia fluminensis</i>
woolly nightshade	<i>Solanum mauritianum</i>

APPENDIX 2

RECOMMENDED CONTROL TECHNIQUES FOR SELECTED WEED SPECIES

Weed	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Blackberry (<i>Rubus fruticosus</i> agg.)	Knapsack – foliar spray	Escort	5g per 10 litres water	December-April	
	Knapsack – foliar spray	Grazon	60ml per 10 litres water	December-April	
Black wattle (<i>Acacia mearnsii</i>)	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stumps	Grazon	1 part Grazon to 20 parts water	October-April	
	Drill and inject	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	
Chinese privet (<i>Ligustrum sinense</i>)	Seedlings – hand pull	-	-	November-April	
	Trees – drill and inject	Escort	20g Escort per litre water, plus 2ml pulse	November-April	
	Saplings - cut and stump treat	Grazon	1 part Grazon to 20 parts water	November-April	
Climbing asparagus (<i>Asparagus scandens</i>)	Knapsack/hand sprayer	Escort	5g Escort plus per 10 litres water plus 20ml pulse	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.
	Knapsack – foliar spray	Escort	5g per 10 litres water	November-March	
Garden nasturtium (<i>Tropaeolum majus</i>)	Knapsack – foliar spray	Escort	5g per 10 litres water plus 10mls pulse	Year round	Only foliar spray where non-target species are not present
	Cut and treat stumps	Grazon	1 part Grazon to 20 parts water	Year round	
	Knapsack – foliar spray	Escort	5g per 10 litres water	November-March	

A 58

Weed	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Tradescantia (<i>Tradescantia fluminensis</i>)	Knapsack – foliar spray	Grazon	10ml per litre water + 2ml Puise per litre water	November-March	Pull away from non-target species before spraying.
Woolly nightshade (<i>Solanum mauritianum</i>)	Seedlings/small plants – hand pull Trees – drill and inject	- Escort	- 20g Escort per litre water, plus 2ml puise Apply gel to cut stems	Year round Year round Year round	
	Saplings - cut and treat stump Saplings - cut and treat stump	Picloram (Vigilant gel) Grazon	1 part Grazon to 20 parts water	Year round	

AS9