



natural solutions
environmental consultants

Port of Brisbane Corporation

Final Report

Plant Survey of Lucinda & Port Gate Drains –

Port of Brisbane

December 2007

“IMPORTANT NOTE”

Apart from fair dealing for the purposes of private study, research, criticism, or review as permitted under the Copyright Act, no part of this report, its attachments or appendices may be reproduced by any process without the written consent of Natural Solutions Environmental Consultants Pty Ltd (“Natural Solutions”). All enquiries should be directed to Natural Solutions.

We have prepared this report for the sole purposes of Port of Brisbane Corporation (“Client”) for the specific purpose only for which it is supplied. This report is strictly limited to the Purpose and the facts and matters stated in it and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter.

In preparing this report we have made certain assumptions. We have assumed that all information and documents provided to us by the Client or as a result of a specific request or enquiry were complete, accurate and up-to-date. Where we have obtained information from a government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. We are not aware of any reason why any of the assumptions are incorrect.

This report is presented without the assumption of a duty of care to any other person (other than the Client) (“Third Party”). The report may not contain sufficient information for the purposes of a Third Party or for other uses. Without the prior written consent of Natural Solutions:

- a) this report may not be relied on by a Third Party; and
- b) Natural Solutions will not be liable to a Third Party for any loss, damage, liability or claim arising out of or incidental to a Third Party publishing, using or relying on the facts, content, opinions or subject matter contained in this report.

If a Third Party uses or relies on the facts, content, opinions or subject matter contained in this report with or without the consent of Natural Solutions, Natural Solutions disclaims all risk and the Third Party assumes all risk and releases and indemnifies and agrees to keep indemnified Natural Solutions from any loss, damage, claim or liability arising directly or indirectly from the use of or reliance on this report.

In this note, a reference to loss and damage includes past and prospective economic loss, loss of profits, damage to property, injury to any person (including death) costs and expenses incurred in taking measures to prevent, mitigate or rectify any harm, loss of opportunity, legal costs, compensation, interest and any other direct, indirect, consequential or financial or other loss.

Quality Assurance Statement				
Revision No.	Author	Reviewer	Approved for Issue	
			Name	Date
0	L Fisher & N Lechner	Rob Friend		
01	L Fisher & N Lechner	Rob Friend	Justin Watson	03 December 2007

NATURAL SOLUTIONS ENVIRONMENTAL CONSULTANTS PTY LTD

Brisbane Office:

Suite 16, Level 2 Central Brunswick,
Cnr Brunswick & Martin Streets
FORTITUDE VALLEY QLD 4006
PO Box 1156, Fortitude Valley Qld 4006
Tel: (07) 3124 9400
Fax: (07) 3124 9499

Cairns Office:

Level 2, 26 Florence Street
CAIRNS QLD 4870
PO Box 6935, Cairns Qld 4870
Tel: (07) 4041 3522
Fax (07) 4051 4141

Sunshine Coast Office

PO Box 1171
TEWANTIN QLD 4565
Tel: (07) 5442 4272
Fax: (07) 5442 4474

Townsville Office

Level 4, Northtown Tower
280 Flinders Mall (access via Ogden Street)
TOWNSVILLE QLD 4810
PO Box 279, Townsville Qld 4810
Tel: (07) 4772 5033
Fax: (07) 4772 5044
Mob: 0418 783 560

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	3
1.1 Site Description.....	3
2.0 METHODOLOGY	7
2.1 AQIS Target Weeds List.....	7
3.0 FINDINGS	8
3.1 Lucinda Drain	8
3.2 Port Gate Drain.....	9
4.0 DISCUSSION	10
4.1 Lucinda Drain	10
4.1.1 Weediness of Plants Observed at Lucinda Drain	10
4.1.2 Comparisons between Lucinda Drain Surveys.....	11
4.2 Port Gate Drain.....	14
4.3 Weather Conditions	16
5.0 RECOMMENDATIONS	18
5.1 Lucinda Drain	18
5.2 Port Gate Drain.....	18
6.0 REFERENCES	20

FIGURES

Figure 1	Site Map – Lucinda Drain, Port of Brisbane	5
Figure 2	Site Map – Port Gate Drain, Port of Brisbane	6
Figure 3	Long-term Climatic Averages compared with the Port of Brisbane Rainfall Data.....	17

TABLES

Table 1	The Class and Abundance of the Declared Weed Species (Under <i>LPR</i> 2003) Recorded During the Lucinda Drain Survey	10
Table 2	Number of Weed Species Recorded Per Survey.....	11
Table 3	Number of Weed Species by Family for Lucinda Drain November 2007 Survey.....	12
Table 4	The Class and Abundance of the Declared Weed Species (Under <i>LPR</i> 2003) Recorded During the Port Gate Drain Survey	15
Table 5	Number of Weed Species by Family for Port Gate Drain November 2007 Survey.....	15

APPENDICES

APPENDIX A	Survey Results of Lucinda Drain	A
APPENDIX B	Lucinda Drain Plant Species List.....	B
APPENDIX C	Port Gate Survey Results	C
APPENDIX D	Weed Target List (AQIS)	D
APPENDIX E	Land Protection Regulations 2003 - Classes.....	E
APPENDIX F	Location of Declared Species	F
APPENDIX G	Plant Survey Data Sheet	G

EXECUTIVE SUMMARY

Natural Solutions Environmental Consultants Pty Ltd was commissioned to undertake a plant survey of Lucinda and Port Gate Drain, Port of Brisbane. This is the first report detailing the level of weed invasion along the Port Gate Drain and the fourteenth report for Lucinda Drain. The primary purpose of the survey and associated reporting is to monitor the occurrence and level of abundance of weed species and make appropriate recommendations with respect to the ongoing management of plants along Lucinda and Port Gate Drain.

Summary of Findings

The following points summarise the findings of the November 2007 plant survey of Lucinda Drain:

1. In comparison to previous surveys, no individuals of Groundsel (*Baccharis halimifolia*), Parthenium Weed (*Parthenium hysterophorus*), Asparagus Fern (*Asparagus aethiopicus* cv. Sprengeri), Singapore Daisy (*Sphagneticola trilobata*) Chinese Celtis (*Celtis sinensis*) or Camphor Laurel (*Cinnamomum camphora*) were located during the current survey;
2. Annual ragweed (*Ambrosia artemisiifolia*), Broad-leaved Pepper Tree (*Schinus terebinthifolia*), Lantana (*Lantana camara*), Creeping Lantana (*Lantana montevidensis*) and Prickly Pear (*Opuntia* sp.) were the declared weeds under the *Land Protection (Pest and Stock Route Management) Regulation 2003* (LPR 2003) recorded during the survey;
3. Glycine (*Neonotonia wightii*), Cobblers Pegs (*Bidens pilosa*) and Rhodes Grass (*Chloris gayana*) dominated certain sections of the transect. However, a dominating group of weed species was not observed throughout the entire transect;
4. A number of saplings and some immature trees were observed during the survey;
5. Abundance levels of Annual Ragweed (*Ambrosia artemisiifolia*) has increased since the last survey;
6. 52 plant species were recorded. This consisted of 19 native / planted species and 33 environmental weed species;
7. Cudweed (*Gamochaeta calviceps*), Lacy Ragweed (*Ambrosia tenuifolia*), Bokhara (*Melilotus albus*), Creeping Oxalis (*Oxalis corniculata*) and Lambs Tongue (*Plantago lanceolata*) were new weed species observed along the drain during the survey; and
8. Species diversity both exotic and native has increase and abundance and coverage of weed species has slightly decreased in comparison to the last survey results.

The following points summarise the findings of the November 2007 plant survey of Port Gate Drain:

1. No individuals of Parthenium Weed (*Parthenium hysterophorus*), Asparagus Fern (*Asparagus aethiopicus* cv. Sprengeri), Prickly Pear (*Opuntia* sp.), Singapore Daisy (*Sphagneticola trilobata*), Camphor Laurel (*Cinnamomum camphora*), Broad-leaved Pepper Tree (*Schinus terebinthifolia*), Chinese Celtis (*Celtis sinensis*) or Creeping Lantana (*Lantana montevidensis*) were located during the survey;
2. Groundsel (*Baccharis halimifolia*), Annual ragweed (*Ambrosia artemisiifolia*), Lantana (*Lantana camara*) were the declared weeds under the *Land Protection (Pest and Stock Route Management) Regulation 2003* (LPR 2003) recorded during the survey;
3. Vegetation along the drain was sparse and mainly confined to southern section of the drain;
4. The drain was dominated by exotic species with a very low abundance of native plants recorded;
5. 34 plant species were recorded. This consisted of 5 native / planted species and 29 environmental weed species; and
6. Exotic species diversity was high but abundance and coverage was low.

No species listed by Australian Quarantine and Inspection Service (AQIS) (see **Appendix C**) was located during the plant survey.

All environmental weed species identified along Lucinda Drain, following the implementation of the plants surveys, are being managed in accordance with a land management schedule.

Recommendations regarding the long-term management of environmental weeds within the Lucinda and Port Gate Drain area are provided in **Section 4.0** of this report. It is recommended that a more integrated and long term management of the weed species along Lucinda Drain is implemented, especially the suggestion to increase the native plant cover. Implementation of a management program is the initial recommendation for Port Gate Drain.

1.0 INTRODUCTION

Natural Solutions Environmental Consultants Pty Ltd was commissioned to undertake a survey of plant species along Lucinda and Port Gate Drain, Port of Brisbane¹ and to produce associated reporting detailing the findings from this survey. This is the first report detailing the level of weed invasion along the Port Gate Drain and the fourteenth report for Lucinda Drain. Previous reports for Lucinda Drain have been prepared from surveys undertaken in:

- February (summer) 2001;
- October – December (spring) 2001;
- February (summer) 2002;
- November (spring) 2002;
- March (summer) 2003;
- November (spring) 2003;
- March (summer) 2004;
- October (spring) 2004;
- April (summer) 2005;
- November (spring) 2005;
- March (summer) 2006;
- October (spring) 2006; and
- March (autumn) 2007.

These plant surveys have been implemented in a response to a request from the Australian Quarantine and Inspection Service (AQIS) to increase surveillance relating to potential pest incursions. The surveys, commissioned by the Port of Brisbane Corporation (PBC), represents a long-term monitoring program at the port to survey for and identify exotic plant species which may enter the country on containers or other materials shipped and unloaded at the Port of Brisbane facility.

The biannual plant survey for Lucinda Drain is undertaken on a six monthly interval, during summer (around February) and spring (around October) of each year. The current survey was undertaken in November 2007. This survey commences the first plant survey for the Port Gate Drain, which will now undergo regular monitoring.

1.1 SITE DESCRIPTION

The plant surveys focus on the Lucinda and Port Gate Drain area at the Port of Brisbane. Lucinda Drain is located along the eastern side of the Port of Brisbane and provides drainage for stormwater run-off from the hardstand areas adjacent to the drain (**Figure 1**).

¹ The Port of Brisbane was originally called Fisherman Islands. Fisherman Islands however no longer exists as a location and is now known officially as Port of Brisbane.

Lucinda Drain is a constructed drainage channel using concrete filled geo-textile sandwich construction some 2.5 kilometres in length. The berms of the channel consist of sand above the geo-textile sandwich.

The channel currently has a regular maintenance schedule that provides for the west bank of the drain (adjacent to Lucinda Drive) to be mowed and sprayed for noxious weeds. The east bank of the drain has an irregular maintenance program with some time between maintenance events.

Port Gate Drain is located in the south-west portion of the Port of Brisbane. The drain also provides drainage for stormwater run-off from the hardstand areas adjacent to the drain as well as partially receiving tidal waters from the mouth of the Brisbane River (**Figure 2**). The drain is separated into two portions by Howard Smith Drive and tidal flow is prevented from entering the part of the drain to the south of this road.

Unlike Lucinda Drain the area either side of Port Gate Drain (especially in the northern portion of the drain) consists of either concrete, gravel or compacted earth, which allows for only sparse vegetation growth with the majority of vegetation located in the southern portion of the drain.



Legend

Approximate Site Boundary

Important Note

Natural Solutions Environmental Consultants accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention of the terms of this clause or clauses (i) of (vi) hereof.

(i) This plan has been produced for exclusive use of the client and Natural Solutions Environmental Consultants.

(ii) The contours shown are suitable only for the purpose of this plan. The accuracy of the contours have not been verified and no reliance should be placed upon such contours for any purpose other than for the original purpose of this plan.


(iii) Aerial photography and mapping has been overlaid as a best fit on the boundaries shown and position is approximate only.

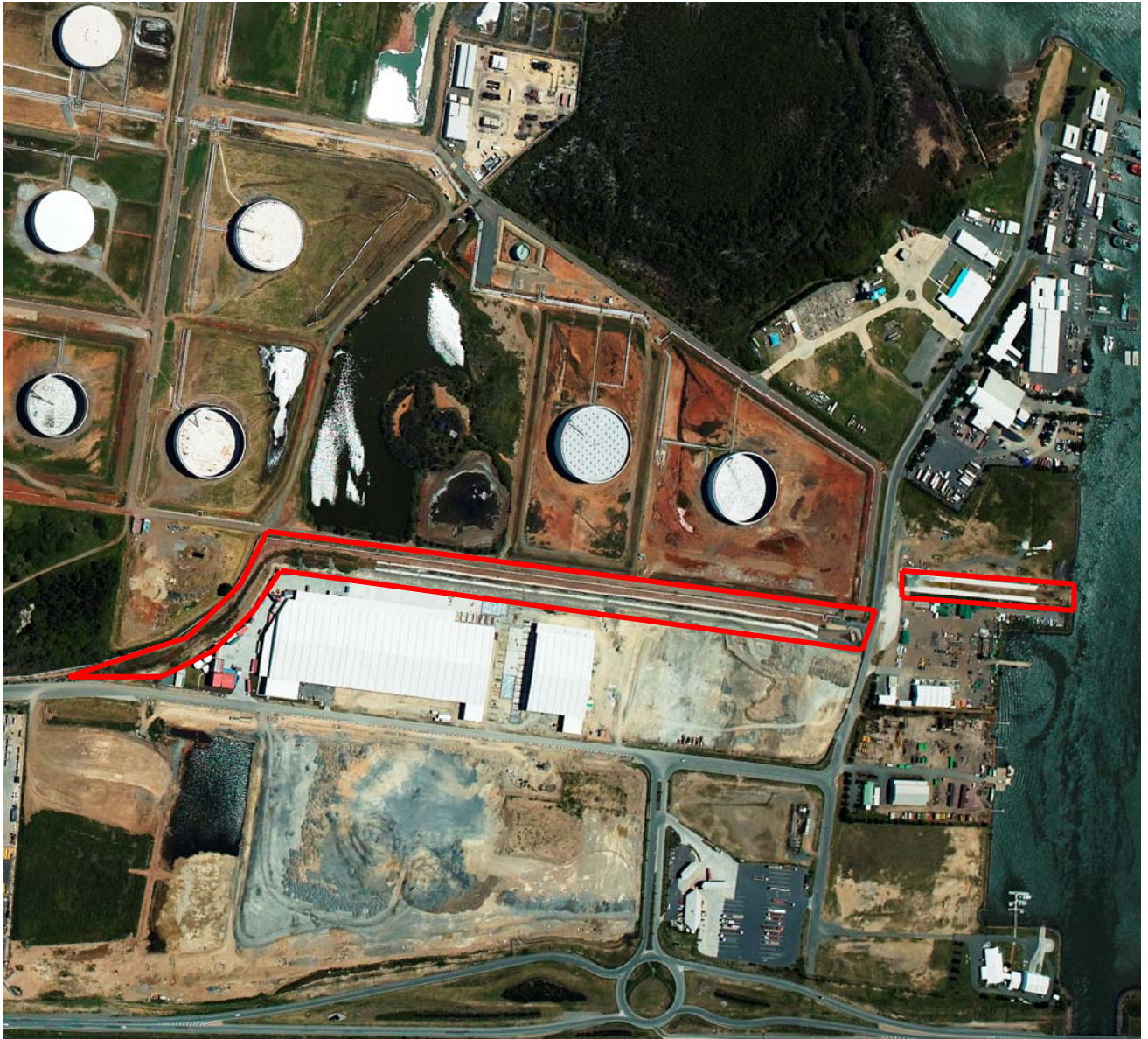
(iv) The dimensions, area, size and location of improvements shown on this plan are approximate only and may vary.

(v) Scale shown is correct for the original plan and any copies of this plan should be verified by checking against the bar scale.

(vi) This plan may not be photocopied unless this note is included.

Figure 1: Lucinda Drain

		 natural solutions <small>environmental consultants</small> NATURAL SOLUTIONS ENVIRONMENTAL CONSULTANTS <small>BRISBANE-CAIRNS-TOOWOOMBA-SUNSHINE COAST</small> <small>ABN: 38 103 132 716</small> <small>Ph: 07 3124 9400</small> <small>Fax: 07 3124 9499</small> <small>www.naturalsolutions.com.au</small>		
Scale	Size			
NTS	A4			
Author	Project Manager			
LF	NL			
Reference	Checked	Date	Issue	Our Reference
PBC 2007	NL	26/11/07	1	J07-0081




Legend

Approximate Site Boundary ———

Important Note

Natural Solutions Environmental Consultants accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention of the terms of this clause or clauses (i) of (vi) hereof.
 (i) This plan has been produced for exclusive use of the client and Natural Solutions Environmental Consultants.
 (ii) The contours shown are suitable only for the purpose of this plan. The accuracy of the contours have not been verified and no reliance should be placed upon such contours for any purpose other than for the original purpose of this plan.
 (iii) Aerial photography and mapping has been overlaid as a best fit on the boundaries shown and position is approximate only.
 (iv) The dimensions, area, size and location of improvements shown on this plan are approximate only and may vary.
 (v) Scale shown is correct for the original plan and any copies of this plan should be verified by checking against the bar scale.
 (vi) This plan may not be photocopied unless this note is included.

Figure 2: Port Gate Drain

<p>Scale NTS</p>		<p>Size A4</p>		 <p>natural solutions environmental consultants NATURAL SOLUTIONS ENVIRONMENTAL CONSULTANTS BRISBANE-CAIRNS-TOOWOOMBA-SUNSHINE COAST ABN: 38 103 132 716 Ph: 07 3124 9400 Fax: 07 3124 9499 www.naturalsolutions.com.au</p>		
<p>Author LF</p>		<p>Project Manager NL</p>				
<p>Reference PCB 2007</p>		<p>Checked NL</p>				

2.0 METHODOLOGY

The plant survey of Lucinda and Port Gate Drain was undertaken on the 14 November 2007. The survey for Port Gate Drain consisted of two transects, which were located along both banks of the drain. All weed species including abundance levels that occurred along both transects were recorded in order to establish baseline data for this drain.

The survey for Lucinda Drain consisted of one transect, which ran along the drain's eastern side. A second transect was not undertaken on the western bank of the drain as the waters edge along this portion of Lucinda Drain is difficult to access in places. Therefore an inspection of this bank was taken visually at regular intervals from the eastern bank of the drain and from Lucinda Drive. This technique was trialled during the November 2003 survey (the third survey) of the Lucinda Drain. An analysis of the data collected following the third survey using this survey methodology revealed that the results are consistent with the previous survey data in terms of the number of plants recorded.

All plant species observed during the survey were recorded on separate survey data sheet for each drain (see **Appendix F**).

2.1 AQIS TARGET WEEDS LIST

AQIS has prepared a list of weed species identified as presenting a threat to natural and agriculture systems. This list is contained in **Appendix D**.

No weed species identified by Australian Quarantine and Inspection Service (AQIS) were located during the plant survey.

3.0 FINDINGS

3.1 LUCINDA DRAIN

Appendix A contains a list of plant species recorded during each survey from the March 2004 survey to date. **Appendix B** contains a schedule of all plant species recorded within the survey site as well as those recorded incidentally during all surveys.

The following points summarise the findings of the November 2007 plant survey of Lucinda Drain:

1. In comparison to previous surveys, no individuals of Groundsel (*Baccharis halimifolia*), Parthenium Weed (*Parthenium hysterophorus*), Asparagus Fern (*Asparagus aethiopicus* cv. *sprengeri*), Singapore Daisy (*Sphagneticola trilobata*) Chinese Celtis (*Celtis sinensis*) or Camphor Laurel (*Cinnamomum camphora*) were located during the current survey;
2. Annual ragweed (*Ambrosia artemisiifolia*), Broad-leaved Pepper Tree (*Schinus terebinthifolia*), Lantana (*Lantana camara*), Creeping Lantana (*Lantana montevidensis*) and Prickly Pear (*Opuntia* sp.) were the declared weeds under the *Land Protection (Pest and Stock Route Management) Regulation 2003* (LPR 2003) recorded during the survey;
3. Glycine (*Neonotonia wightii*), Cobblers Pegs (*Bidens pilosa*) and Rhodes Grass (*Chloris gayana*) dominated certain sections of the transect. However, a dominating group of weed species was not observed throughout the entire transect;
4. A number of saplings and some immature trees were observed during the survey;
5. Abundance levels of Annual Ragweed (*Ambrosia artemisiifolia*) has increased since the last survey;
6. 52 plant species were recorded. This consisted of 19 native / planted species and 33 environmental weed species;
7. Cudweed (*Gamochaeta calviceps*), Lacy Ragweed (*Ambrosia tenuifolia*), Bokhara (*Melilotus albus*), Creeping Oxalis (*Oxalis corniculata*) and Lambs Tongue (*Plantago lanceolata*) were new weed species observed along the drain during the survey; and
8. Species diversity both exotic and native has increase and abundance and coverage of weed species has slightly decreased in comparison to the last survey results.

3.2 PORT GATE DRAIN

Appendix C contains a list of plant species recorded during the first survey for this drain. The following points summarise the findings of the November 2007 plant survey of Port Gate Drain:

1. No individuals of Parthenium Weed (*Parthenium hysterophorus*), Asparagus Fern (*Asparagus aethiopicus* cv. Sprengeri), Prickly Pear (*Opuntia* sp.), Singapore Daisy (*Sphagneticola trilobata*), Camphor Laurel (*Cinnamomum camphora*), Broad-leaved Pepper Tree (*Schinus terebinthifolia*), Chinese Celtis (*Celtis sinensis*) or Creeping Lantana (*Lantana montevidensis*) were located during the survey;
2. Groundsel (*Baccharis halimifolia*), Annual ragweed (*Ambrosia artemisiifolia*), Lantana (*Lantana camara*) were the declared weeds under the *Land Protection (Pest and Stock Route Management) Regulation 2003* (LPR 2003) recorded during the survey;
3. Vegetation along the drain was sparse and mainly confined to southern section of the drain;
4. The drain was dominated by exotic species with a very low abundance of native plants recorded;
5. 34 plant species were recorded. This consisted of 5 native / planted species and 29 environmental weed species; and
6. Exotic species diversity was high but abundance and coverage was low.

4.0 DISCUSSION

4.1 LUCINDA DRAIN

4.1.1 Weediness of Plants Observed at Lucinda Drain

This thirteenth survey of plants occurring along the banks of Lucinda Drain has identified a total number of 52 plant species. Of these 33 are considered weeds.

Five declared weeds listed under the *Land Protection (Pest and Stock Route Management) Regulation 2003* (LPR 2003) were recorded within Lucinda Drain during the survey. The species, their Class under LPR and abundance / location are outlined in **Table 1**. **Appendix D** outlines the LPR (2003) declared weed species recorded during past surveys and **Appendix E** provides GPS co-ordinates of the location of declared weeds.

Of particular concern is Annual Ragweed (*Ambrosia artemisiifolia*). The eastern bank of Lucinda Drain appears to have suffered from an outbreak of the Class 2 declared pest as high abundance levels were recorded. Other declared species were recorded in relatively low abundances.

TABLE 1 THE CLASS AND ABUNDANCE OF THE DECLARED WEED SPECIES (UNDER LPR 2003) RECORDED DURING THE LUCINDA DRAIN SURVEY

CLASS	SPECIES	ABUNDANCE/LOCATION
Class 2 pests	Prickly pear (<i>Opuntia sp.</i>)	One small individual recorded on the eastern bank of the drain
	Annual Ragweed (<i>Ambrosia artemisiifolia</i>)	High abundance located on the eastern bank of the drain
Class 3 pests	Broad-leafed Peppertree (<i>Schinus terebinthifolia</i>)	Low to medium abundance mainly along the eastern bank.
	Creeping Lantana (<i>Lantana camara</i>)	Small patch recorded on the eastern bank
	Lantana (<i>Lantana camara</i>)	Seven individuals recorded on eastern bank

Mile-a-minute (*Ipomoea cairica*) and Stinking Roger (*Tagetes minuta*) are not listed under *Land Protection (Pest and Stock Route Management) Regulation 2003* (LPR 2003) but are listed as environmental/noxious weeds by Brisbane City Council (BCC).

4.1.2 Comparisons between Lucinda Drain Surveys

An analysis of the numbers and species recorded during this survey and compared to the previous surveys indicates that there is a slight variation between both species and the number of species recorded.

Table 2 highlights the numbers of weed species identified in the previous plant surveys of Lucinda Drain while **Table 3** outlines the numbers of weed species within each family that were recorded in the latest survey.

TABLE 2 NUMBER OF WEED SPECIES RECORDED PER SURVEY

SURVEY	NUMBER OF WEED SPECIES RECORDED
February 01	37
October 01	35
February 02	27
November 02	35
May 03	27
November 03	36
March 04	27
October 04	29
April 05	33
November 05	37
March 06	35
October 2006	41
March 2007	24
November 2007	33

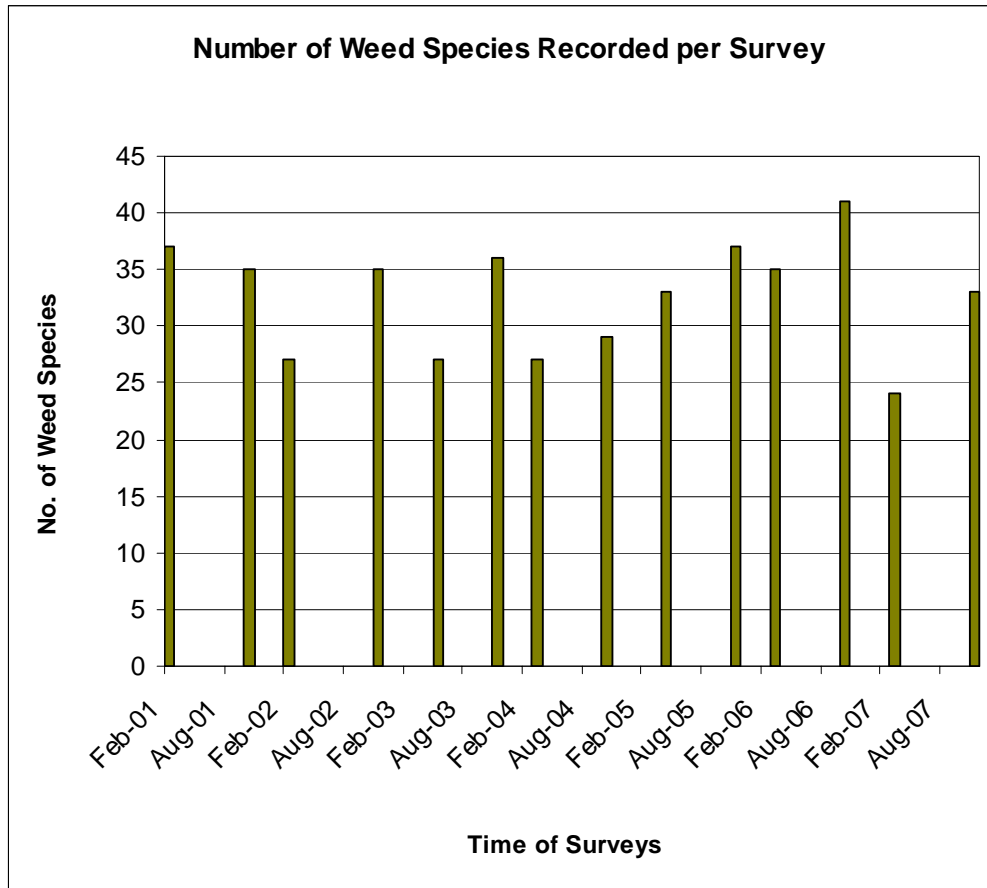
TABLE 3 **NUMBER OF WEED SPECIES BY FAMILY FOR LUCINDA DRAIN NOVEMBER 2007 SURVEY**

FAMILY	NUMBER OF WEED SPECIES
Asteraceae	8
Poaceae	5
Fabaceae	5
Verbenaceae	4
Malvaceae	2
Plantaginaceae	1
Convolvulaceae	1
Solanaceae	1
Anacardiaceae	1
Portulacaceae	1
Cactaceae	1
Oxalidaceae	1
Commelinaceae	1
Primulaceae	1
Asclepiadaceae	0
Lauraceae	0
Passifloraceae	0
Boraginaceae	0
Asparagaceae	0
Amaranthaceae	0
Agavaceae	0
Caesalpinaceae	0
Cyperaceae	0
Ulmaceae	0

The above **Tables 2** and **3** indicate:

- There has been a relatively consistent trend of the number of weed species along the banks of Lucinda Drain in the post summer and post winter surveys. The number of weeds recorded in the current survey falls within the average to higher range of the amount of weed species previously recorded (see **Graph 1**);
- **Graph 1** identifies the survey outcome trend that surveys taken early in the calendar year provides less plant weed species than those conducted in the later half of the calendar year;

- However even with this in mind the number of weed species recorded in this spring survey (33 in November 2007) is lower than the number of weed species recorded the previous spring survey (41 in October 2006). Yet the number of weeds recorded in this latest survey is generally consistent with the numbers previously recorded during spring as well as the average number of weeds recorded over all spring surveys;
- Weedy plant cover/extent throughout the eastern side of the drain was lower compared to the previous survey. This may be contributed to an increase in native species which has shaded the understorey and increased natural mulch (i.e. leaf litter etc) thus reducing the weed levels in such areas. The decrease in weed extent allowed for a greater number of species to be recorded due to the ease in detecting species present and decrease in plant competition allowing for a variety of species to germinate and grow creating a more heterogeneous environment; and
- Dominance in family type reverted back to last springs results with Asteraceae being the most abundant species present, while in the previous survey undertaken in March 2007, pioneer species such as grasses from the Poaceae family was the dominate family along the drain.



Graph 1 Number of Weed Species Recorded per Survey

4.2 PORT GATE DRAIN

The survey of plants occurring along the banks of Port Gate Drain has identified a total number of 34 plant species. Of these 29 are considered weeds.

Three declared weeds listed under the *Land Protection (Pest and Stock Route Management) Regulation 2003* (LPR 2003) were recorded within Lucinda Drain during the survey. The species, their Class under LPR and abundance / location are outlined in **Table 4. Appendix E** provides GPS co-ordinates of the location of declared weeds.

Unlike Lucinda Drain, Annual Ragweed (*Ambrosia artemisiifolia*) was not the main threatening declared weed that occurred along Port Gate Drain. Numerous bushes of Groundsel (*Baccharis halimifolia*) on the other hand were scattered throughout the length of the drain. Other declared species were recorded in relatively low abundances.

TABLE 4 THE CLASS AND ABUNDANCE OF THE DECLARED WEED SPECIES (UNDER LPR 2003) RECORDED DURING THE PORT GATE DRAIN SURVEY

CLASS	SPECIES	ABUNDANCE/LOCATION
Class 2 pests	Groundsel Bush (<i>Baccharis halimifolia</i>)	Seven individuals recorded along the drain
	Annual Ragweed (<i>Ambrosia artemisiifolia</i>)	Low to medium abundance located along the drain
Class 3 pests	Lantana (<i>Lantana camara</i>)	Low abundance recorded along the drain

Mile-a-minute (*Ipomoea cairica*) and Stinking Roger (*Tagetes minuta*) are not listed under *Land Protection (Pest and Stock Route Management) Regulation 2003* (LPR 2003) but are listed as environmental/noxious weeds by Brisbane City Council (BCC).

The number of weed species families recorded along Port Gate Drain is outlined in **Table 5** below.

TABLE 5 NUMBER OF WEED SPECIES BY FAMILY FOR PORT GATE DRAIN NOVEMBER 2007 SURVEY

FAMILY	NUMBER OF WEED SPECIES
Poaceae	7
Fabaceae	6
Asteraceae	5
Verbenaceae	1
Phytolaccaceae	1
Plantaginaceae	1
Convolvulaceae	1
Solanaceae	1
Portulacaceae	1
Primulaceae	1
Asclepiadaceae	1
Passifloraceae	1
Papaveraceae	1
Myrtaceae	1
Lauraceae	0
Passifloraceae	0
Boraginaceae	0

FAMILY	NUMBER OF WEED SPECIES
Asparagaceae	0
Amaranthaceae	0
Agavaceae	0
Caesalpinaceae	0
Cyperaceae	0
Ulaceae	0
Cactaceae	0
Oxalidaceae	0
Commelinaceae	0
Anacardiaceae	0
Malvaceae	0

Table 5 indicates:

- The number of families represented along the Port Gate Drain is the same as Lucinda Drain ($n = 14$);
- There are a number of exotic families and thus weed species that occur along Port Gate Drain, which do not occur along Lucinda Drain. Exotic species from the Myrtaceae, Phytolaccaceae and Papaveraceae Family are associated with highly disturbed and unnatural environments such as road sides and thus similar to the areas surrounding Port Gate Drain, which is in parts concreted, covered in gravel or bare earth. These areas present different environmental conditions and disturbance regimes to that along the banks of Lucinda Drain, which are more natural/vegetated and water availability and nutrients are likely to be higher.
- Although the level of infestation is much lower at the Port Gate Drain, levels of diversity are still very high, which again could be attributed to the low coverage of vegetation and associated low plant competition and ease of detectability; and
- Species from the Poaceae family occur more often along the drain, which could be attributed to the harsh conditions that surround the drain and thus the ability of pioneer grasses to grow successfully. However these species did not dominate and a variety of other exotic species were still recorded.

4.3 WEATHER CONDITIONS

The following graph (**Figure 3**) portrays the rainfall recorded at the Port of Brisbane (PBC) as well as the long term rainfall and temperature averages (taken from the Brisbane Airport).

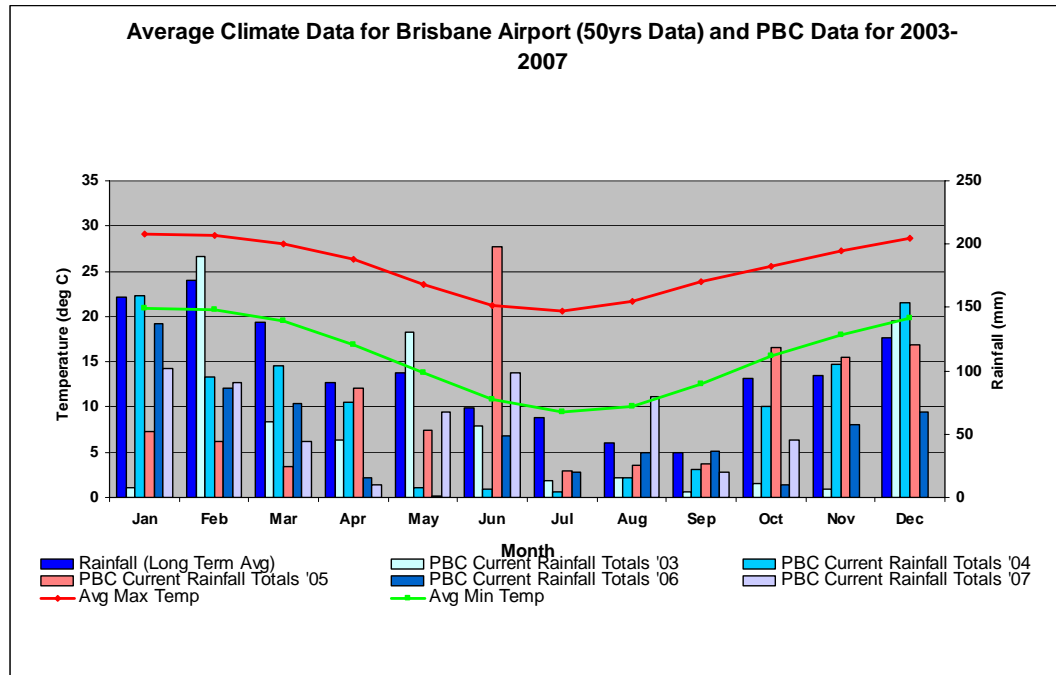


Figure 3 Long-term Climatic Averages compared with the Port of Brisbane Rainfall Data

The following can be derived from this data with respect to the plant growth around Lucinda and Port Gate Drains:

- The extended dry period that South East Queensland is undergoing has assisted in reducing the coverage of exotic vegetation along both drains. Due to the timing of the current survey occurring after significant rainfall in late October, a greater amount of exotic species would have been able to regeminate. This is indicated by the lack of dominating pioneer species, suggesting that ideal growth conditions were present preceding the survey. However the growth of exotic species appears to not have reached the extent where more successful species such as exotic grasses have out grown and out competed other exotic species, which has allowed for greater diversity levels and the lack of one or two weed species dominating the community;
- Continued drought conditions have still maintained lower weed species and abundance levels compared to previous years; and
- Seasonal variation has also influenced the current survey results with spring providing favourable conditions for the germination of exotic and native plants.

5.0 RECOMMENDATIONS

5.1 LUCINDA DRAIN

Recommendations relating to the management of the banks of the Lucinda Drain and of the inflow of stormwater into the drain which may transport and introduce exotic plant material to the drain have been made in previous reports.

It is assumed that either only some of the previous recommendations are being adopted and implemented or they have yet to be implemented.

As there has been no significant alteration in the environmental weed status and there is ongoing management of the banks of the Lucinda Drain, the following recommendations are made:

1. Ensure all existing weed management programs occur along the eastern bank as well as the western bank of the Lucinda Drain. This should include regular mowing and spot spraying/hang pulling along the eastern bank;
2. All Class 2 & 3 pests are to be removed (see **Appendix E** for GPS locations) and are to be included as part of routine maintenance and management of the area; and
3. Continue programmed monitoring of the diversity and status of plant species along the banks of the Lucinda Drain through twice-yearly plant surveys.

The positive effects of native vegetation cover was observed along Lucinda Drain, especially in regards to species from the Casuarinaceae family as canopy shading and dense matting from dropped needles produced conditions which aided in decreasing the amount of understory exotic vegetation. Thus the long-term management of these environmental weed species should be integrated into a program of integrated weed management, including actions such as:

- Weed suppression through mulching and shading via the planting of a canopy and understory; and
- Increasing the native understory diversity to increase competition for resources.

5.2 PORT GATE DRAIN

The Port Gate Drain has different environmental conditions and disturbance regimes, which will require a slightly different management approach. As some areas surrounding the drain are concreted and will remain in this disturbed and unnatural state, the establishment of native plants to shade out exotic vegetation is limited and only possible in certain locations such as the southern end of the drain. In this area it is still recommended that this long-term management approach is adopted and that these areas are successfully rehabilitated.

Therefore other strategies will play an important role for other parts of the drain that have a limited capacity for rehabilitation. The following recommendations for these areas include:

- Preparation of a Weed Management Plan that specifically targets and addresses weed invasion along Port Gate Drain;
- Implementation of weed removal strategies such as mechanical removal through mowing. Chemical weed removal should be kept to a minimum and only used when necessary. It should only involve spot spraying using an environmentally sensitive herbicide during low flow periods;
- All declared weed species are to be removed (see **Appendix E** for GPS locations);
- Scheduled maintenance programs to occur along the drain; and
- Monitoring of the drain's weed status to occur at regular intervals.

6.0 REFERENCES

- Auld, B.A. and Medd, R.W. (1999). *Weeds an illustrated botanical guide to the Weeds of Australia*. Inkata Press, Sydney.
- Blood, K., et al. (2001). *Environmental Weeds – A Field Guide for SE Australia*. C H Jewrram, Victoria.
- Department of Natural Resources (DNR). (2000). *Weed Pocket Guide*. DNR. Brisbane.
- Johns, L. (2006). *Field Guide to Common Saltmarsh Plants of Queensland*. DPI&F, Brisbane.
- Kleinschmidt H., Holland, A. and Simpson, P. (1996). *Suburban Weeds* 3rd ed. DPI. Brisbane.
- Lamp, L. and Collet, C. (1989). *Field Guide to Weeds in Australia*. Inkata Press, Sydney.
- Navie, S., Markwell, B. Playford, J. and Adkins, S. (2002). *Suburban and Environmental Weeds – An Identification and Information – South-east Queensland CD*. University of Queensland.
- Randall, R. P. (2002). *A Global Compendium of Weeds*. RG & FJ Richardson, Victoria.
- Sainty, G.R. and Jacobs, S.W.L. (1994). *Water plants in Australia – A Field Guide*. Sainty & Assoc, Darlinghurst.
- Stanley, T.D. and Ross, E.M. (1983). *Flora of South-eastern Queensland Vol I*. Queensland, QDPI.
- Stanley, T.D. and Ross, E.M. (1986). *Flora of South-eastern Queensland Vol II*, Queensland: QDPI.
- Stanley, T.D. and Ross, E.M. (1989). *Flora of South-eastern Queensland Vol III*, Queensland: QDPI.
- Tohill, J.C. and Hacker, J.B. (1996). *The Grasses of Southern Queensland, Queensland: Tropical Grassland Society of Aust Inc.*
- Wood, P. et al, (2000). *Weeds, The Ute Guide - Northern Grain Belt* Ed. DPI. Brisbane.

APPENDIX A Survey Results of Lucinda Drain

SPECIES	COMMON NAME	LPR CLASS	NOV 07	MAR 07	OCT 06	MAR 06	NOV 05	MAR 05	OCT 04	MAR 04
Aizoaceae										
<i>Carpobrotus glaucescens</i>	Pigface*	-	X	X	X	X	X	X	X	X
<i>Sesuvium portulacastrum</i>	Sea Purslane*	-	X	X	X	X	X	X	X	X
<i>Tetragonia tetragonioides</i>	New Zealand Spinach*	-	X							
Amaranthaceae										
<i>Alternanthera pungens</i>	Khaki Weed	-						X		
<i>Amaranthus quitensis</i>	South American Amaranthus	-					X			
<i>Amaranthus viridis</i>	Green Amaranths	-						X		
<i>Gomphrena celosioides</i>	Gomphrena Weed	-			X	X				
Anacardiaceae										
<i>Schinus terebinthifolius</i>	Broad-leaved Peppertree	3	X	X	X	X	X		X	X
Asclepiadaceae										
<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush	-			X	X				
Asparagaceae										
<i>Asparagus aethiopicus</i> cv. Sprengeri	Asparagus Fern	3			X					
Asteraceae										
<i>Ageratum houstonianum</i>	Blue Billy-Goat	-			X		X			
<i>Ambrosia artemisiifolia</i>	Annual Ragweed	2	X	X	X		X		X	X
<i>Ambrosia tenuifolia</i>	Lacy Ragweed	-	X							
<i>Baccharis halimifolia</i>	Groundsel Bush	2							X	X
<i>Bidens pilosa</i>	Cobblers Pegs	-	X	X	X	X	X	X	X	X
<i>Calyptocarpus vialis</i>	Creeping Cinderella Weed	-		X				X		
<i>Cirsium vulgare</i>	Spear Thistle	-			X		X		X	

SPECIES	COMMON NAME	LPR CLASS	NOV 07	MAR 07	OCT 06	MAR 06	NOV 05	MAR 05	OCT 04	MAR 04
<i>Conyza bonariensis</i>	Faxleaf Fleabane	-				X	X	X		
<i>Conyza pusilla</i>	Canadian Fleabane	-	X	X	X	X	X			
<i>Crassocephalum crepidioides</i>	Thickhead	-					X	X	X	
<i>Gamochaeta calviceps</i>	Cudweed		X							
<i>Emilia sonchifolia</i>	Emilia	-			X	X				
<i>Hypochaeris radicata</i>	Flatweed	-	X	X	X	X			X	
<i>Parthenium hysterophorus</i>	Parthenium Weed	2				X				
<i>Sonchus oleraceus</i>	Rough Sow Thistle	-	X				X	X		
<i>Sphagneticola trilobata</i>	Singapore Daisy	3			X	X			X	X
<i>Tagetes minuta</i>	Stinking Roger	-	X		X	X		X		
Agavaceae										
<i>Agave</i> sp.	Agave	-			X					
Avicenniaceae										
<i>Avicennia marina</i>	Grey Mangrove*	-	X	X	X	X	X	X	X	
Boraginaceae										
<i>Heliotropium amplexicaule</i>	Blue Heliotrope	-			X	X	X			
Cactaceae										
<i>Opuntia</i> sp	Prickly Pear	2	X	X						
Casuarinaceae										
<i>Casuarina equisetifolia</i>	Coastal Sheoak*	-	X	X	X	X	X	X	X	X
<i>Casuarina littoralis</i>	Black Sheoak*	-	X	X	X	X	X	X	X	X
Caesalpiniaceae										
<i>Crotalaria paniculata</i>	Poor Mans Gold	-								
<i>Senna pendula var glabrifolia</i>	Easter Cassia	-								
Commelinaceae										
<i>Commelina diffusa (C. cyanea)</i>	Wandering Jew	-	X			X				
Convolvulaceae										
<i>Cuscuta campestris</i>	Dodder	-			X			X		
<i>Convolvus arvensis</i>	European	-								

SPECIES	COMMON NAME	LPR CLASS	NOV 07	MAR 07	OCT 06	MAR 06	NOV 05	MAR 05	OCT 04	MAR 04
	Bindweed									
<i>Ipomoea</i> sp. (<i>alba</i>)	White Ipomoea	-					X			
<i>Ipomoea cairica</i>	Mile-a-Minute	-	X	X	X	X	X		X	
<i>Ipomoea pes-caprae</i>	Goats Foot Convolvus*	-					X	X	X	X
Cyperaceae										
<i>Carex appressa</i>	Tall Sedge*	-				X				
<i>Cyperus</i> sp.	A sedge									X
<i>Cyperus congestus</i>	Clustered Flatsedge	-					X			
<i>Cyperus eragrostis</i>	Umbrella Sedge	-					X			
<i>Cyperus rotundus</i>	Nut Grass	-				X				
<i>Cyperus polystachyos</i>	Bunchy Sedge	-				X				
Euphorbiaceae										
<i>Chamaesyce maculata</i>	Caustic Weed	-						X		
<i>Euphorbia hirta</i>	Asthma Plant	-							X	
<i>Euphorbia prostrata</i>	Caustic Creeper	-					X			
<i>Euphorbia</i> sp.	Spurge	-								X
<i>Macaranga tanarius</i>	Macaranga*	-	X	X	X	X	X	X	X	X
<i>Phyllanthus virgatus</i>	Creeping Phyllanthus	-						X		
Fabaceae										
<i>Crotalaria pallida</i>	Rattle Pod	-	X	X	X	X	X	X		
<i>Desmodium uncinatum</i>	Silver Leafed Desmodium	-			X			X		X
<i>Macroptilium atropurpureum</i>	Siratro	-	X	X	X	X	X	X	X	X
<i>Macroptilium lathyroides</i>	Phasey Bean	-			X					
<i>Medicago polymorpha</i>	Burr Medic	-	X		X					
<i>Medicago sativa</i>	Lucerne	-				X	X		X	X
<i>Melilotus albus</i>	Bokhara		X							
<i>Melilotus indicus</i>	Sweet Melilotus	-			X		X		X	
<i>Neonotonia wightii</i>	Glycine	-	X	X	X		X			

SPECIES	COMMON NAME	LPR CLASS	NOV 07	MAR 07	OCT 06	MAR 06	NOV 05	MAR 05	OCT 04	MAR 04
<i>Sesbania cannabina</i>	Sesbania Pea	-				X	X	X		X
<i>Trifolium repens</i>	Clover	-		X	X	X				
<i>Vigna marina</i>	Yellow Beach Bean*	-				X				
Lauraceae										
<i>Cinnamomum camphora</i>	Camphor Laurel	3			X				X	
Malvaceae										
<i>Hibiscus tiliaceus</i>	Cotton Tree*	-	X	X		X	X	X	X	X
<i>Modiola caroliniana</i>	Red Flower Mallow*	-								
<i>Sida cornifolia</i>	Flannel Weed	-	X	X		X	X	X	X	X
<i>Sida rhombifolia</i>	Common Sida	-	X			X		X		X
Mimosaceae										
<i>Acacia aulacocarpa</i>	Hickory Wattle*	-		X		X	X		X	X
<i>Acacia leiocalyx</i>	Currahbah*		X							
Myrtaceae										
<i>Eucalyptus robusta</i>	Swamp Mahogany*	-		X	X	X	X	X		
<i>Lophostemon confertus</i>	Brush Box*	-	X	X	X	X	X	X	X	X
<i>Melaleuca linariifolia</i>	Flax-leafed Paperbark*	-	X	X	X	X	X	X	X	X
<i>Melaleuca quinquenervia</i>	Paperbark Teatree*	-	X	X	X	X	X	X	X	X
<i>Callistemon viminalis</i>	Weeping Bottlebrush*		X		X		X			
Onagraceae										
<i>Oenothera drummondii</i>	Beach Evening Primrose*	-	X	X	X	X	X	X	X	X
Oxalidaceae										
<i>Oxalis corniculata</i>	Creeping Oxalis	-	X							
Pandanaceae										
<i>Pandanus tectorius</i>	Screw Pine*	-	X	X	X	X	X	X	X	X
Passifloraceae										
<i>Passiflora cairica</i>	Stinking Passion	-			X				X	

SPECIES	COMMON NAME	LPR CLASS	NOV 07	MAR 07	OCT 06	MAR 06	NOV 05	MAR 05	OCT 04	MAR 04
	Vine									
<i>Passiflora subpeltata</i>	White Passion Flower	-					X		X	X
Plantaginaceae										
<i>Plantago lanceolata</i>	Lamb's Tongue		X							
Poaceae										
<i>Brachiaria decumbens</i>	Signal Grass			X		X		X		
<i>Brachiaria mutica</i>	Para Grass			X				X	X	X
<i>Cenchrus ciliaris</i>	Buffel Grass	-								
<i>Cenchrus echinatus</i>	Mossman River Grass	-			X	X	X	X	X	X
<i>Chloris gayana</i>	Rhodes Grass	-	X	X	X	X	X	X	X	X
<i>Chloris truncata</i>	Windmill Grass	-	X			X		X	X	X
<i>Chloris virgata</i>	Feather-top Rhodes Grass	-				X	X	X		
<i>Cynodon dactylon</i>	Couch Grass	-	X	X	X	X	X	X	X	X
<i>Dichanthium aristatum</i>	Angleton Grass	-								
<i>Digitaria ciliaris</i>	Summer Grass									
<i>Eleusine indica</i>	Crowsfoot Grass	-						X		
<i>Hemarthria uncinata</i>	Mat Grass	-								
<i>Imperata cylindrica</i>	Blady Grass*	-	X	X	X	X				
<i>Melinis repens</i>	Red Natal Grass	-	X	X	X	X	X	X	X	X
<i>Melinis minutiflora</i>	Molasses Grass				X					
<i>Poa annua</i>	Winter Grass	-								
<i>Panicum effusum</i>	Hairy Panic	-					X	X		X
<i>Panicum maximum</i>	Green Panic	-	X	X	X	X	X	X	X	X
<i>Paspalum dilatatum</i>	Paspalum	-				X				X
<i>Phragmites australis</i>	Common Reed*	-	X	X	X		X	X	X	X
<i>Sorghum halepense</i>	Johnson	-			X	X	X	X	X	X

SPECIES	COMMON NAME	LPR CLASS	NOV 07	MAR 07	OCT 06	MAR 06	NOV 05	MAR 05	OCT 04	MAR 04
	Grass									
<i>Typha orientalis</i>	Cumbungi / Typha*	-			X	X	X	X	X	
<i>Urochloa mosambicensis</i>	Sabi Grass	-					X			
Portulacaceae										
<i>Portulaca pilosa</i>	Hairy Pigweed	-	X	X	X		X	X		
Primulaceae										
<i>Anagallis arvensis</i>	Scarlet Pimpernel	-	X		X		X			
Proteaceae										
<i>Banksia integrifolia</i>	Coastal Banksia*	-	X	X	X	X	X	X	X	X
Sapindaceae										
<i>Cardiospermum halicacabum</i>	Balloon Vine	-						X		
<i>Cupaniopsis anacardioides</i>	Tuckeroo*	-	X	X	X	X	X	X	X	X
<i>Dodonaea triquetra</i>	Hop Bush									X
Solanaceae										
<i>Solanum seaforthianum</i>	Brazilian Nightshade	-			X		X	X		X
<i>Solanum nigrum</i>	Blackberry Nightshade		X	X						
Ulmaceae										
<i>Celtis sinensis</i>	Chinese Celtis	3		X		X				
Verbenaceae										
<i>Lantana camara</i>	Lantana	3	X	X	X	X	X	X	X	X
<i>Lantana montevidensis</i>	Creeping Lantana	3	X		X	X				
<i>Verbena bonariensis</i>	Purple Top	-	X	X	X		X			X
<i>Verbena aristigera</i>	Mayne's Pest	-	X		X					
<i>Vitex trifolia</i> var <i>trifolia</i>	Coastal Vitex*	-					X			X

Notes: -

- * designates indigenous species
- LPR – Land Protection (pest and stock route management) Regulations 2003, Schedule 2.

APPENDIX B Lucinda Drain Plant Species List

This species list is a combination of the all plant surveys undertaken along the Lucinda Drain, Fisherman Islands.

Form code: - T = tree; t = small tree; s = shrub; g = grass; h = herb; f = fern; v = vine; w = weed; a = aquatic plant; (p) = planted, n = native or planted. Highlighted species indicate new species recorded during the plant survey. LPA – Land Protection (pest and stock route management) regulations (2003)

FAMILY / SPECIES	COMMON NAME	LPR CLASS
Aizoaceae		
<i>Carpobrotus glaucescens</i>	Pigface*	-
<i>Sesuvium portulacastrum</i>	Sea Purslane*	-
<i>Tetragonia tetragonioides</i>	New Zealand Spinach	-
Anacardiaceae		
<i>Schinus terebinthifolius</i>	Broad-leaved Peppertree	3
Asteraceae		
<i>Ambrosia artemisiifolia</i>	Annual Ragweed	2
<i>Ambrosia tenuifolia</i>	Lacy Ragweed	-
<i>Bidens pilosa</i>	Cobblers Pegs	-
<i>Gamochaeta calviceps</i>	Cudweed	
<i>Hypochaeris radicata</i>	Flatweed	-
<i>Sonchus oleraceus</i>	Rough Sow Thistle	-
<i>Tagetes minuta</i>	Stinking Roger	-
Avicenniaceae		
<i>Avicennia marina</i>	Grey Mangrove*	-
Cactaceae		
<i>Opuntia sp</i>	Prickly Pear	2
Casuarinaceae		
<i>Casuarina equisetifolia</i>	Coastal Sheoak*	-
<i>Casuarina littoralis</i>	Black Sheoak*	-
Commelinaceae		
<i>Commelina diffusa (C. cyanea)</i>	Wandering Jew	-
Convolvulaceae		
<i>Ipomoea cairica</i>	Mile-a-Minute	-
Fabaceae		
<i>Crotalaria pallida</i>	Rattle Pod	-

FAMILY / SPECIES	COMMON NAME	LPR CLASS
<i>Macroptilium atropurpureum</i>	Siratro	-
<i>Medicago polymorpha</i>	Burr Medic	-
<i>Melilotus albus</i>	Bokhara	
<i>Neonotonia wightii</i>	Glycine	-
Malvaceae		
<i>Hibiscus tiliaceus</i>	Cotton Tree*	-
<i>Sida cornifolia</i>	Flannel Weed	-
<i>Sida rhombifolia</i>	Common Sida	-
Mimosaceae		
<i>Acacia leiocalyx</i>	Curracabah	
Myrtaceae		
<i>Lophostemon confertus</i>	Brush Box*	-
<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark*	-
<i>Melaleuca quinquenervia</i>	Paperbark Teatree*	-
<i>Callistemon viminalis</i>	Weeping Bottlebrush	
Onagraceae		
<i>Oenothera drummondii</i>	Beach Evening Primrose*	-
Oxalidaceae		
<i>Oxalis corniculata</i>	Creeping Oxalis	-
Pandanaceae		
<i>Pandanus tectorius</i>	Screw Pine*	-
Plantaginaceae		
<i>Plantago lanceolata</i>	Lamb's Tongue	
Poaceae		
<i>Chloris gayana</i>	Rhodes Grass	-
<i>Chloris truncata</i>	Windmill Grass	-
<i>Cynodon dactylon</i>	Couch Grass	-
<i>Imperata cylindrica</i>	Blady Grass*	-
<i>Melinis repens</i>	Red Natal Grass	-
<i>Panicum maximum</i>	Green Panic	-
<i>Phragmites australis</i>	Common Reed*	-
Portulacaceae		
<i>Portulaca pilosa</i>	Hairy Pigweed	-
Sapindaceae		
<i>Cupaniopsis anacardioides</i>	Tuckeroo*	-
Solanaceae		
<i>Solanum seafortianum</i>	Brazilian Nightshade	-

FAMILY / SPECIES	COMMON NAME	LPR CLASS
Verbenaceae		
<i>Lantana camara</i>	Lantana	3
<i>Lantana montevidensis</i>	Creeping Lantana	3
<i>Verbena bonariensis</i>	Purple Top	-
<i>Verbena aristigera</i>	Mayne's Pest	-

APPENDIX C Port Gate Survey Results

SPECIES	COMMON NAME	LPR CLASS	NOV 07
Aizoaceae			
<i>Carpobrotus glaucescens</i>	Pigface*	-	X
<i>Sesuvium portulacastrum</i>	Sea Purslane*	-	X
Asclepiadaceae			
<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush	-	X
Asteraceae			
<i>Ambrosia artemisiifolia</i>	Annual Ragweed	2	X
<i>Baccharis halimifolia</i>	Groundsel Bush	2	X
<i>Bidens pilosa</i>	Cobblers Pegs	-	X
<i>Conyza pusilla</i>	Canadian Fleabane	-	X
<i>Tagetes minuta</i>	Stinking Roger	-	X
Chenopodiaceae			
<i>Atriplex muelleri</i>	Annual Saltbush*	-	X
Convolvulaceae			
<i>Ipomoea cairica</i>	Mile-a-Minute	-	X
Fabaceae			
<i>Crotalaria pallida</i>	Rattle Pod	-	X
<i>Macroptilium atropurpureum</i>	Siratro	-	X
<i>Macroptilium lathyroides</i>	Phasey Bean	-	X
<i>Medicago polymorpha</i>	Burr Medic	-	X
<i>Neonotonia wightii</i>	Glycine	-	X
<i>Centaurium erythraea</i>	Common Centaury	-	X
Myrtaceae			
<i>Psidium guajava</i>	Yellow Guava	-	X
Papaveraceae			
<i>Argemone ochroleuca</i>	Mexican Poppy	-	X
Passifloraceae			
<i>Passiflora foetida</i>	Stinking Passion Flower	-	X
Phytolaccaceae			
<i>Phytolacca octandra</i>	Ink Weed	-	X
Plantaginaceae			
<i>Plantago lanceolata</i>	Lamb's Tongue	-	X
Poaceae			
<i>Brachiaria mutica</i>	Para Grass	-	X
<i>Chloris gayana</i>	Rhodes Grass	-	X

SPECIES	COMMON NAME	LPR CLASS	NOV 07
<i>Chloris truncata</i>	Windmill Grass	-	X
<i>Chloris virgata</i>	Feather-top Rhodes Grass	-	X
<i>Cynodon dactylon</i>	Couch Grass	-	X
<i>Melinis repens</i>	Red Natal Grass	-	X
<i>Panicum maximum</i>	Green Panic	-	X
<i>Sporobolus virginicus</i>	Salt Cooch*	-	X
<i>Typha orientalis</i>	Cumbungi / Typha*	-	X
Portulacaceae			
<i>Portulaca pilosa</i>	Hairy Pigweed	-	X
Primulaceae			
<i>Anagallis arvensis</i>	Scarlet Pimpernel	-	x
Solanaceae			
<i>Solanum nigrum</i>	Black Nightshade	-	x
Verbenaceae			
<i>Lantana camara</i>	Lantana	3	X

Notes: -

- * designates indigenous species
- LPRA – Land Protection (pest and stock route management) Regulations 2003, Schedule 2.

APPENDIX D Weed Target List (AQIS)

FAMILY	GENUS SPECIES	AUTHOR	COMMON NAME	COMMENTS
Amaranthaceae	<i>Amaranthus dubius</i>	Mart. ex Thell	Chinese Spinach	annual crops, rice, gardens, disturbed sites and secondary vegetation.
Asteraceae	<i>Austroeuatorium inulaefolium</i>	(H.B.K.) King and Robinson		tea, rubber, rosella and other plantation crops; roadsides; environmental weed in secondary forests.
Asteraceae	<i>Chromolaena odorata</i>	(L.) King and Robinson	Siam Weed, Christmas Bush	pastures, oil palm, rubber, coffee, cashew, fruit, maize, forestry. Toxic to livestock. Major environmental weed: secondary forests, roadsides, disturbed sites.
Asteraceae	<i>Mikania cordata</i>	(Burm. f.) B.L. Robinson		rubber, coffee, banana, cocoa and oil palm plantations, pastures; potential environmental weed
Asteraceae	<i>Mikania micrantha</i>	H.B.K.	Mile-a-Minute	cocoa, coconut, orchards, rubber, oil palm, sugarcane, vegetables, upland rice, pastures; serious environmental weed
Capparaceae	<i>Cleome ruidosperma</i>	DC.	Spiderflower	crops including vegetables, bananas, maize, tobacco, watermelons, cocoa, pineapples and coconuts; weed of disturbed ground and immature plantations.
Cyperaceae	<i>Fimbristylis umbellaris</i>	(Lam.) Vahl	Globular Fimbristylis	rice, pastures; swamps.
Cyperaceae	<i>Schoenoplectus juncooides</i>	(Roxb.) Palla		rice, freshwater and tidal swamps.
Cyperaceae	<i>Scirpus maritimus</i>	L.		rice, freshwater and tidal swamps.
Equisetaceae	<i>Equisetum ramosissimum</i>	Desf. subsp. debile (Vauch.) Hauke	Horsetail, Scouring Rush	rice terraces and bunds, tea plantations.
Eriocaulaceae	<i>Eriocaulon truncatum</i>	Buch. - Ham. ex Mart		rice, wetlands, river banks and floodplains
Euphorbiaceae	<i>Croton hirtus</i>	L'Herit		rubber plantations; crops including mung beans, peanuts, soybeans, papaya, vegetables and tobacco.
Fabaceae	<i>Mucuna pruriens</i>	DC.	Velvet Bean, Cow-Itch	weed of pastures and a wide range of dryland crops; smothering habit and ability to

FAMILY	GENUS SPECIES	AUTHOR	COMMON NAME	COMMENTS
				climb to tree tops makes a significant potential environmental weed. Irritant hairs can kill livestock if ingested and cause severe skin reaction if touched.
Haloragaceae	<i>Myriophyllum spicatum</i>	L.	Eurasian Watermilfoil	serious weed of lakes, water-storages, canals and rivers. Affects fish and shellfish production and recreational use of water bodies
Lamiaceae	<i>Hyptis brevipes</i>	Poit.	Lesser Roundweed	plantation crops, orchards, vegetables rice; secondary forest, and disturbed sites in areas of high rainfall.
Limncharitaceae	<i>Limncharis flava</i>	(L.) Buchenau	Yellow Bur-head, Yellow Sawah Lettuce	serious weed of rice and wetlands. Used as a green vegetable.
Lythraceae	<i>Rotala indica</i>	(Willd.) Koehne	Toothcup	rice fields, river banks, ditches and moist environments
Melastomaceae	<i>Clidemia hirta</i>	(L.) D. Don.	Koster's Curse, Soap Bush	cocoa, tea, coconut, oil palm and rubber plantations, cultivated areas, pastures, secondary forest and woodlands; other disturbed sites.
Myrtaceae	<i>Rhodomyrtus tomentosa</i>	(Ait.) Hassk.	Downy Rose Myrtle	environmental weed; pastures, rangelands and untended areas.
Nyctaginaceae	<i>Boerhavia erecta</i>	L.		peanuts, sorghum, rice and other annual crops; weed of cultivated land, pastures and coastal environments.
Piperaceae	<i>Piper aduncum</i>	L.		weed of grazing lands and secondary forest, roadsides; environmental weed.
Poaceae	<i>Brachiaria paspaloides</i>	(Presl.) C.E. Hubb	Common Brachiaria, Thurston Grass	orchards, tea, coffee, rice, lawns, roadsides, disturbed sites.
Poaceae	<i>Coix aquatica</i>	Roxb.	Job's Tears	serious weed of waterways, rice
Poaceae	<i>Digitaria fuscescens</i>	(Presl.) Henr.	Common Crabgrass	tobacco, vegetables, rubber, rice; pastures, disturbed sites, roadsides, coastal dunes, dry forests.
Poaceae	<i>Digitaria insularis</i>	(L.) Mes ex Ekman		pineapples; unpalatable weed of pastures, headlands,
Poaceae	<i>Echinochloa glabrescens</i>	Munro ex Hook. f.	A barnyard grass	rice, maize.

FAMILY	GENUS SPECIES	AUTHOR	COMMON NAME	COMMENTS
Poaceae	<i>Echinochloa stagnina</i>	(Retz) Beauv.		rice; lakes, rivers, wetlands; roadsides, open places. Potential major environmental weed.
Poaceae	<i>Eriochloa polystachya</i>	H.B.K.	Carib Grass	rice, riverbanks, swamps, drains and ditches; suppresses other vegetation.
Poaceae	<i>Ischaemum timorense</i>	Kunth.	Centipede Grass	cloves, cocoa, rubber, coconut, oil palm, sugarcane and rice plantations; weed of roadsides, ditches, forest margins.
Poaceae	<i>Leptochloa chinensis</i>	(L.) Nees.	Red Sprangletop, Feathergrass	rice, cotton, soybean, maize, sugarcane, pineapple, sweet potato, vegetables, peanuts, tea, bananas.
Poaceae	<i>Leptochloa panicea</i>	(Retz.) Ohwi	Sprangletop	rice, cotton, soybeans, peas, sugarcane, maize, peanuts, pastures.
Poaceae	<i>Sacciolepis interrupta</i>	(Willd.) Stapf.		rice, irrigation channels, wetlands. Potential environmental weed.
Rubiaceae	<i>Diodia sarmentosa</i>	Sw.		coffee, tea, leucaena, Stevia sp. plantations.
Rubiaceae	<i>Paederia foetida</i>	L.	Lesser Malayan Stinkwort	sugarcane, secondary forest; climbs over shrubs and trees - potential environmental weed.
Rubiaceae	<i>Spermacoce assurgens</i>	Ruiz & Pav.		rice, maize, coconuts, sugarcane, bananas, pasture, gardens, forest clearings
Rubiaceae	<i>Spermacoce mauritiana</i>	Gideon		invades tracks in primary rainforest; rice, sugarcane, gardens, lawns.
Salviniaceae	<i>Salvinia cucullata</i>	Roxb.	Salvinia	rice, waterways, wetlands.
Salviniaceae	<i>Salvinia natans</i>	(L.) All.	Salvinia	rice, waterways wetlands.
Scrophulariaceae	<i>Striga angustifolia</i>	(D. Don.) C.J. Saldanha	Witchweed	root parasite on rice, sorghum, sugarcane.
Scrophulariaceae	<i>Striga asiatica</i>	(L.) O. Ktze.	Witchweed	serious root parasite on rice, maize, sorghum, sugarcane, millet; also on some broadleaf crops including sunflower, tomatoes, some legumes.
Violaceae	<i>Hybanthus attenuatus</i>	(Humb. & Bonpl.) G.K. Schulze		rice, a wide diversity of annual crops, pastures, waste places.

Source: <http://www.affa.gov.au>

APPENDIX E Land Protection Regulations 2003 - Classes

The following table contains a list of species recorded (during past and present surveys) from Lucinda Drain and which have been listed in Schedule 2 of the *Land Protection (Pest and Stock Route Management) Regulations 2003*.

CLASS	SPECIES
Class 1 pests	<ul style="list-style-type: none">No species recorded.
Class 2 pests	<ul style="list-style-type: none">Groundsel Bush - <i>Baccharis halimifolia</i>;Prickly Pear - <i>Opuntia spp.</i>;Annual Ragweed – <i>Ambrosia artemisiifolia</i>; andParthenium Weed (<i>Parthenium hysterophorus</i>).
Class 3 pests	<ul style="list-style-type: none">Broad-leafed Peppertree – <i>Schinus terebinthifolia</i>;Camphora Laurel – <i>Cinnamomum camphora</i>;Lantana – <i>Lantana camara</i>;Singapore Daisy – <i>Sphagneticola trilobata</i>;Creeping Lantana (<i>Lantana montevidensis</i>); andChinese Celtis (<i>Celtis sinensis</i>).

APPENDIX F Location of Declared Species

The following table lists the GPS location of the declared species listed in Schedule 2 of the *Land Protection (Pest and Stock Route Management) Regulations 2003* that were recorded during the current survey.

Lucinda Drain

CLASS	SPECIES	GPS LOCATION (LATITUDE AND LONGITUDE)
Class 1 pests	<ul style="list-style-type: none"> No species recorded 	-
Class 2 pests	<ul style="list-style-type: none"> Prickly Pear - <i>Opuntia spp.</i> 	27.3909100, 153.1731900
	<ul style="list-style-type: none"> Annual Ragweed – <i>Ambroisa artemisiifolia</i> 	Various locations along the eastern bank of the drain
Class 3 pests	<ul style="list-style-type: none"> Broad-leafed Peppertree - <i>Schinus terebinthifolia</i> 	27.3922200, 153.1705700
		27.3920800, 153.1714400
		27.3917800, 153.1717700
		27.3911200, 153.1728700
		27.3909700, 153.1731600
<ul style="list-style-type: none"> Lantana – <i>Lantana camara</i> 	27.3833100, 153.1777600	
	27.3801200, 153.1804200	
	27.3921300, 153.1709500	
	27.3921300, 153.1709500	
<ul style="list-style-type: none"> Creeping Lantana – <i>Lantana montevidensis</i> 	27.3920500, 153.1712600	
	27.3827000, 153.1781500	
	27.3818500, 153.1787600	
	27.3833100, 153.1777600	
<ul style="list-style-type: none"> Creeping Lantana – <i>Lantana montevidensis</i> 		27.3906100, 153.1735000

Port Gate Drain

CLASS	SPECIES	GPS LOCATION
Class 1 pests	▪ No species recorded	-
Class 2 pests	▪ Groundsel Bush – <i>Baccharis halimifolia</i>	27.4029000, 153.1607300 27.4024400, 153.1608600 27.4057800, 153.1614200 27.4086300, 153.1616500 27.4086500, 153.1617200 27.4089700, 153.1617100 27.4099200, 153.1624600
Class 3 pests	▪ Lantana – <i>Lantana camara</i>	27.4086000, 153.1616600 27.4089700, 153.1617100

APPENDIX G Plant Survey Data Sheet

FAMILY / SPECIES	COMMON NAME	FORM	DECLARATION CATEGORY (LPA)	PRESENCE	ABUNDANCE
Aizoaceae					
<i>Carpobrotus glaucescens</i> _n	Pigface	v	-		
<i>Sesuvium portulacastrum</i> _n	Sea Purslane	h	-		
Amaranthaceae					
<i>Alternanthera pungens</i>	Khaki Weed	h,w	-		
<i>Amaranthus quitensis</i>	South American Amaranthus	h,w	-		
<i>Amaranthus viridis</i>	Green Amaranthus	h,w	-		
<i>Gomphrena celosoides</i>	Gomphrena Weed	h,w	-		
Anacardiaceae					
<i>Schinus terebinthifolia</i>	Broad-leaved Peppertree	s,w	3		
Asclepiadaceae					
<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush	s,w	-		
Asparagaceae					
<i>Asparagus aethiopicus</i> cv. Sprengeri	Asparagus Fern	v,w	3		
Asteraceae					
<i>Ageratum houstonianum</i>	Blue Billy-Goat	h,w	-		
<i>Ambrosia artemisiifolia</i>	Annual Ragweed	h,w	2		
<i>Baccharis halimifolia</i>	Groundsel Bush	s,w	2		
<i>Bidens pilosa</i>	Cobblers Pegs	h,w	-		
<i>Calyptocarpus vialis</i>	Creeping Cinderella Weed	h,w	-		
<i>Cirsium vulgare</i>	Spear Thistle	h,w	-		
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	h,w	-		
<i>Conyza pusilla</i>	Canadian Fleabane	h,w	-		
<i>Crassocephalum crepidioides</i>	Thickhead	h,w	-		
<i>Emilia sonchifolia</i>	Emilia	h,w	-		
<i>Hypochaeris radicata</i>	Flatweed	h,w	-		

FAMILY / SPECIES	COMMON NAME	FORM	DECLARATION CATEGORY (LPA)	PRESENCE	ABUNDANCE
<i>Parthenium hysterophorus</i>	Parthenium Weed	h,w	2		
<i>Senecio sp (lautus)</i>	Fireweed	h	-		
<i>Sonchus oleraceus</i>	Rough Sow Thistle	h,w	-		
<i>Sphagneticola trilobata</i>	Singapore Daisy	h,w	3		
<i>Tagetes minuta</i>	Stinking Roger	h,w	-		
Agavaceae					
<i>Agave sp.</i>	Agave	w,p	-		
Avicenniaceae					
<i>Avicennia marina</i> ⁿ	Grey Mangrove	t	-		
Boraginaceae					
<i>Heliotropium amplexicaule</i>	Blue Heliotrope	h,w	-		
Cactaceae					
<i>Opuntia sp.</i>	Prickly Pear	s,w	2		
Casuarinaceae					
<i>Casuarina equisetifolia</i> *	Coastal Sheoak	t	-		
<i>Allocasuarina littoralis</i> *	Black Sheoak	t	-		
Caesalpiniaceae					
<i>Crotalaria paniculata</i>	Poor Mans Gold	h	-		
<i>Senna pendula var glabrifolia</i>	Easter Cassia	s,w	-		
Convolvulaceae					
<i>Cuscuta campestris</i>	Dodder	v,w	-		
<i>Convolvulus arvensis</i>	European Bindweed	h,w	-		
<i>Ipomoea sp. (alba)</i>		v,w	-		
<i>Ipomoea cairica</i>	Mile-a-Minute	v,w	-		
<i>Ipomoea pes-caprae</i> ⁿ	Goats Foot Convolvus	v	-		
Cyperaceae					
<i>Cyperus congestus</i>	Clustered Flatsedge	a,w	-		
<i>Cyperus eragrostis</i>	Umbrella Sedge	a,w	-		
Euphorbiaceae					
<i>Chamaesyce maculata</i>	Caustic Weed	h,w	-		
<i>Euphorbia hirta</i>	Asthma Plant	h,w	-		
<i>Euphorbia prostrata</i>	Caustic Creeper	h,w			

FAMILY / SPECIES	COMMON NAME	FORM	DECLARATION CATEGORY (LPA)	PRESENCE	ABUNDANCE
<i>Euphorbia sp.</i>	Spurge	h,w	-		
<i>Macaranga tanarius</i> ⁿ	Macaranga	t (p)	-		
<i>Phyllanthus virgatus</i>	Creeping Phyllanthus	h,w	-		
Fabaceae					
<i>Crotalaria pallida</i>	Rattle Pod	h,w	-		
<i>Desmodium uncinatum</i>	Silver-leafed Desmodium	v,w	-		
<i>Macroptilium atropurpureum</i>	Siratro	v,w	-		
<i>Macroptilium lathyroides</i>	Phasey Bean	v,w	-		
<i>Medicago polymorpha</i>	Burr Medic	h,w			
<i>Medicago sativa</i>	Lucerne	h,w	-		
<i>Melilotus indicus</i>	Sweet Melilotus	h,w	-		
<i>Neonotonia wightii</i>	Glycine	v,w	-		
<i>Sesbania cannabina</i>	Sesbania Pea	h,w	-		
<i>Trifolium repens</i>	White Clover	h,w	-		
Lauraceae					
<i>Cinnamomum camphora</i>	Camphor Laurel	t,w	3		
Malvaceae					
<i>Hibiscus tiliaceus</i> ⁿ	Cotton Tree	t	-		
<i>Modiola caroliniana</i> ⁿ	Red Flower Mallow	h,w	-		
<i>Sida cornifolia</i>	Flannel Weed	h,w	-		
<i>Sida rhombifolia</i>	Common Sida	h,w	-		
Mimosaceae					
<i>Acacia aulacocarpa</i> ⁿ	Hickory Wattle	t	-		
Myrtaceae					
<i>Eucalyptus robusta</i> ⁿ	Swamp Mahogany	T,(p)	-		
<i>Lophostemon confertus</i> ⁿ	Brush Box	T,(p)	-		
<i>Melaleuca linariifolia</i> ⁿ	Flax-leafed Paperbark	t,(p)	-		
<i>Melaleuca quinquenervia</i> ⁿ	Paperbark Teatree	T,(p)	-		
Onagraceae					
<i>Oenothera drummondii</i> ⁿ	Beach Evening Primrose	s	-		

FAMILY / SPECIES	COMMON NAME	FORM	DECLARATION CATEGORY (LPA)	PRESENCE	ABUNDANCE
Oxalidaceae					
<i>Oxalis corniculata</i>	Creeping Oxalis	h,w	-		
Pandanaceae					
<i>Pandanus tectorius</i> ⁿ	Screw Pine	t,(p)	-		
Passifloraceae					
<i>Passiflora cairica</i>	Stinking Passion Vine	v,w	-		
<i>Passiflora subpeltata</i>	White Passion Vine	v,w	-		
Plantaginaceae					
<i>Plantago lanceolata</i>	Lamb's Tongue	h,w	-		
<i>Plantago major</i>	Great Plantain	h,w	-		
Poaceae					
<i>Brachiaria decumbens</i>	Signal Grass	g,w	-		
<i>Brachiaria mutica</i>	Para Grass	g,w	-		
<i>Cenchrus ciliaris</i>	Buffel Grass	g,w	-		
<i>Cenchrus echinatus</i>	Mossman River Grass	g,w	-		
<i>Chloris gayana</i>	Rhodes Grass	g,w	-		
<i>Chloris truncata</i>	Windmill Grass	g,w	-		
<i>Chloris virgata</i>	Feather-top Rhodes Grass	g,w	-		
<i>Cynodon dactylon</i>	Couch Grass	g,w	-		
<i>Dichanthium aristatum</i>	Angleton Grass	h,w	-		
<i>Digitaria ciliaris</i>	Summer Grass	g,w	-		
<i>Eleusine indica</i>	Crowsfoot Grass	g,w	-		
<i>Hemarthria uncinata</i>	Mat Grass	g,w	-		
<i>Imperata cylindrica</i> ⁿ	Blady Grass	g	-		
<i>Melinis repens</i>	Red Natal Grass	g,w	-		
<i>Melinis minutifolia</i>	Molasses Grass	g,w	-		
<i>Poa annua</i>	Winter Grass	g,w	-		
<i>Panicum effusum</i>	Hairy Panic	g	-		
<i>Panicum maximum</i>	Green Panic	g,w	-		
<i>Paspalum dilatatum</i>	Paspalum	g,w	-		
<i>Phragmites australis</i> ⁿ	Common reed	g	-		
<i>Sorghum halepense</i> ⁿ	Johnson grass	g,w	-		
<i>Typha orientalis</i> ⁿ	Typha	g	-		
<i>Urochloa mosambicensis</i>	Sabi Grass	g,w	-		

FAMILY / SPECIES	COMMON NAME	FORM	DECLARATION CATEGORY (LPA)	PRESENCE	ABUNDANCE
Portulacaceae					
<i>Portulaca pilosa</i>	Hairy pigweed	h,w	-		
Primulaceae					
<i>Angallis arvensis</i>	Scarlet Pimpernel	h,w	-		
Proteaceae					
<i>Banksia integrifolia</i> ⁿ	Coastal Banksia	t (p)	-		
Sapindaceae					
<i>Cardiospermum halicacabum</i>	Balloon Vine	v,w	-		
<i>Cupaniopsis anacardioides</i> ⁿ	Tuckeroo	T	-		
<i>Dodonaea triquetra</i>	Hop Bush	s	-		
Solanaceae					
<i>Solanum nigrum</i>	Brazilian Nightshade	s,w	-		
Verbenaceae					
<i>Lantana camara</i>	Lantana	s,w	3		
<i>Lantana montevidensis</i>	Creeping Lantana	w	3		
<i>Verbena bonariensis</i>	Purple Top	h,w	-		
<i>Verbena aristigera</i>		h,w	-		
<i>Vitex trifolia</i> var <i>trifolia</i> ⁿ		s	-		