Plant Assessment Report

T1-3 Overflow & Car Park Precinct

Final Report

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Quality Assurance Statement				
Revision No.	Author	Reviewer	Approved for Issue	
			Signature	Date
0	Kellie Butler	Liz Fisher		15/12/2010
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Executive Summary

RPS has been commissioned by Port of Brisbane Pty Ltd (PBPL) to participate in a biannual weed monitoring program by undertaking a survey of weeds listed by the Australian Quarantine and Inspection Service (AQIS) along T1-3 Overflow and the Car Precinct areas, at the Port of Brisbane.

The monitoring program aims to monitor weed species listed by AQIS, the *Land Protection (Pest and Stock Route Management) Act 2002* (LPA), and Brisbane City Council (BCC). In addition to this, the survey also monitors the occurrence and abundance of species considered to be exotic, including locally occurring weeds. The biannual report provides recommendations with respect to the ongoing management of weeds along the T1-3 Overflow and Car Precinct areas.

The weed monitoring program is currently conducted at six monthly intervals, during post-summer months (February / March) and post-winter months (October / November). A total of nine plant surveys along the T1-3 Overflow and Car Precinct areas have been conducted to date.

Summary of Findings

The following points summarise the findings of the November 2010 biannual plant survey for the T1-3 Overflow area:

- Fifty-three plant species were recorded. This consisted of six native species, and 47 exotic species;
- Three AQIS listed weed species were recorded, namely Red Natal Grass (*Melinis repens*) and Flaxleaf Fleabane (*Conyza bonariensis*), and Common Reed (*Phragmites australis*). All three of these species were recorded in the previous March 2010 survey;
- The recorded AQIS listed weed species occurred along the majority of the eastern side of the T1-3 Overflow area. Common Reed was also detected within the Northern Drain;
- The species diversity of AQIS listed weed species has remained consistent, whilst abundance, and coverage has increased in comparison to the previous March 2010 survey results;
- No species declared under the LPA were recorded during the current survey;
- Two exotic species were recorded for the first time during the current November 2010 survey. These include Jersey Cudweed (*Pseudognaphalium luteoalbum*) and Awnless Barn Grass (*Echinochloa colona*). These species are not declared under AQIS or LPA and are common weeds typical of disturbed areas in the Brisbane region;
- Exotic grasses, herbaceous and vine species were the dominant groups of exotic species observed throughout the majority of the T1-3 Overflow area. Guinea Grass (*Megathysus maximus* var. *maximus*) dominated the eastern areas and the western landscaped areas. Cumbungi (*Typha orientalis*) dominated the northern drain; and
- Exotic species diversity, abundance and coverage have increased, in comparison to the previous March 2010 survey results.

The following points summarise the findings of the November 2010 biannual plant survey for the Car Precinct area:

- Sixty-five plant species were recorded. This consisted of 13 native species, and 52 exotic species;
- Three AQIS listed weed species were recorded, namely Red Natal Grass, Flaxleaf Fleabane, and Common Reed. All three of these species were recorded in the previous March 2010 survey;
- The recorded AQIS listed weed species occurred along the western perimeter of the Car Precinct area. Common Reed was also detected around the lake adjacent to the Visitors Centre;
- The species diversity of AQIS listed weed species has remained consistent in comparison to the previous March 2010 survey results, whilst abundance and coverage has slightly increased;
- Four species listed under the LPA were recorded in the current November 2010 survey, including Broad-leaf Pepper (*Schinus terebinthifolia*) (Class 3), Fireweed (*Senecio madagascariensis*) (Class 2), Groundsel Bush (Class 2) and Giant Parramatta Grass (*Sporobolus fertilis*) (Class 2);
- No incidences of Lantana (LPA Class 3) were recorded during the current November 2010 survey in comparison to the previous March 2010 survey;
- Three exotic species were recorded for the first time during the current November 2010 survey. These include Common Centaury (*Centauirum erythraea*), Ryegrass (*Lolium x hybridium*) and Water Primrose (*Ludwigia peploides*). These species are not declared under AQIS or LPA and are common weeds typical of disturbed areas in the Brisbane region;
- Locally occurring exotic grass species such as Rhodes Grass (*Chloris gayana*) and Beach Evening Primrose (*Oenothera drummondii* subsp. *drummondii*) were the dominant species observed throughout the majority of the Car Precinct area. Common Reed, Bunchy Sedge (*Cyperus polystachyos*) and Umbrella Sedge (*Cyperus eragrostis*) dominated the wetter portions of the Car Precinct area (e.g. within the western trench and around the Visitor Centre Lake); and
- Exotic species diversity, abundance, and coverage have increased in comparison to the previous March 2010 survey results.

Summary of Recommendations

Recommendations regarding the short and long-term management of exotic species within the T1-3 Overflow and Car Precinct areas are provided in this report.

No further specific recommendations are provided for the method of control of AQIS listed weed species that occur within the T1-3 Overflow and Car Precinct areas, as current maintenance activities (i.e. slashing and spot spraying) are adequate measures to control such weeds.

It is recommended that maintenance activities should include the removal of the LPA declared species. In addition, all areas within the T1-3 Overflow and Car Precinct area should be maintained as often as the more visible sections of the survey area, where practical and when necessary. It is also recommended that a more integrated and long-term management of the weed species within the T1-3 Overflow and Car Precinct area is implemented through increasing the native plant cover.

1.0 Introduction

1.1 Background

RPS has been commissioned by Port of Brisbane Pty Ltd (PBPL) to undertake a biannual weed monitoring program along the T1-3 Overflow and Car Precinct areas, at the Port of Brisbane, and produce associated reporting that details the findings of the surveys. The T1-3 Overflow and Car Precinct areas are located on land formally described as Lot 99 on SP238079. The areas are located within the Wynnum-Manly Ward of Brisbane City Council (BCC).

This is the fourth biannual monitoring report that has been prepared for the T1-3 Overflow and Car Precinct areas. The previous monitoring was undertaken in March 2010. Surveys and reporting were originally undertaken quarterly in 2008 during the months of March, June, September and December. A baseline study was also conducted in February 2008. Thus, a total of nine monitoring events have occurred within these areas.

1.2 Scope of Works / Objectives

These surveys have been implemented in response to a request from Australian Quarantine and Inspection Service (AQIS) to increase surveillance for potential incursions of AQIS listed weed species that may be transported to the Port of Brisbane via newly arrived vehicles imported from overseas. Currently, vehicles imported to the Port of Brisbane facility are transported from the wharf areas via a road overpass and stored within the open hardstand areas of the T1-3 Overflow and Car Precinct areas. The potential therefore exists for exotic seeds to spread and propagate in adjacent landscaped or grassy areas. The surveys represent not only an immediate response to a potential weed incursion but are also part of a long-term monitoring program at the Port to survey for and identify exotic species which may enter the country on containers or other materials shipped to and unloaded at the Port of Brisbane facility.

Additionally, the program aims to monitor species considered to be exotic / invasive including species declared under the *Land Protection (Pest & Stock Route Management) Act 2002* (LPA), listed by BCC, and locally occurring weed species (from hereafter collectively referred to as exotic species and invasive natives).

In particular, the scope of work for this weed monitoring program includes:

- Identification of species declared or listed by AQIS, LPA, or BCC;
- Monitor the occurrence and abundance of exotic / invasive species;
- Assess the extent of exotic flora species;
- Report the findings of the current survey;
- Undertake a comparative analysis of the current and previous survey results; and
- Provide recommendations for on-going weed management.

1.3 Site Description

The weed monitoring focuses on the T1-3 Overflow and Car Precinct areas at the Port of Brisbane. The T1-3 Overflow and Car Precinct areas lie parallel to one another, with the Queensland Rail freight line separating the two areas, in the south-western portion of Lot 99 on SP238079 (**Figure 1.1**).

The T1-3 Overflow area is situated along Port Drive, and extends around a large hardstand car parking area, towards and past the overpass. This area includes a constructed drain located in the very northern region (**Figure 1.1**).

The T1-3 Overflow area consists of landscaped gardens and lawn on its western side, and a sandy / gravel area on its eastern side. The primary purpose of the T1-3 Overflow is to facilitate in absorbing and filtering excess stormwater that may potentially flow from surrounding hardstand areas. The constructed drain in the northern section consists of a concrete channel, surrounded by lawn, designed to pipe stormwater runoff that has entered nearby stormwater drains out into the Brisbane River.

The Car Precinct area is directly to the west of a large vehicle storage area (**Figure 1.1**). It includes an area extending from the road overpass (situated at the northern end of the site) and incorporates the edge of the lake adjacent to the Visitors Centre.

The Car Precinct area is a constructed drainage channel that comprises a grass-lined trench, with a series of concreted chutes that channel stormwater runoff from the hardstand vehicle storage facility to the east of the drain. The trench provides drainage for excess water that may overflow from nearby areas, which is distributed either south through a stormwater outlet that flows into the lake or north via a series of underground pipes and open drains and into the mouth of the Brisbane River.

It is understood that both the T1-3 Overflow and Car Precinct areas currently have regular maintenance schedules (including mowing and spraying for exotic species) facilitated by the PBPL.

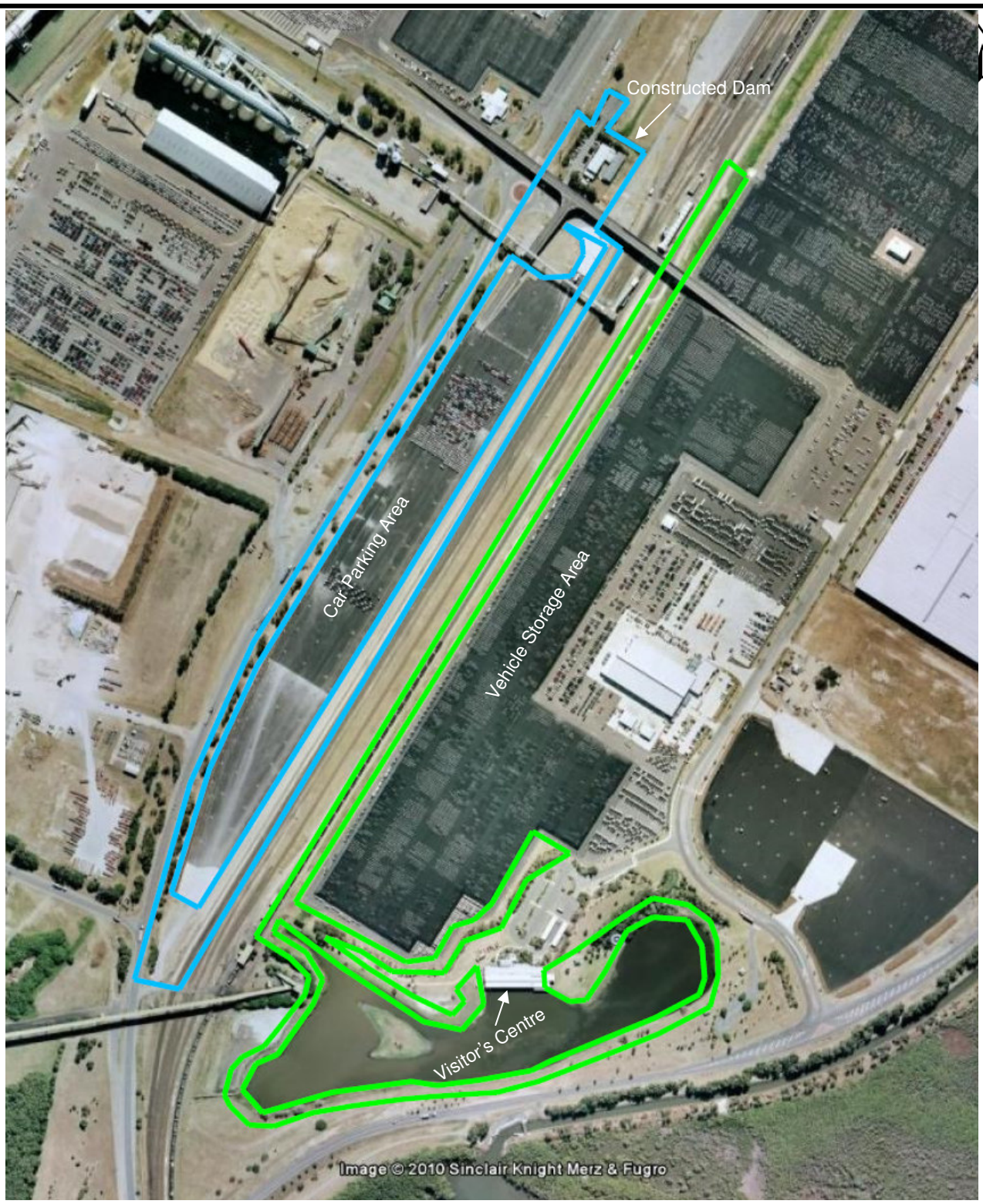

Figure 1.1 – Lucinda Drain Study Area

Client: Port of Brisbane Pty Ltd

Date: 09-04-2010	Compiled by: SS	Project Manager: LF	Scale: Not to scale	Reference: PR102522

RPS

Source: Google 2010

Legend:
Car Precinct Area
T1-3 Overflow Area

2.0 Methodology

2.1 Weed Monitoring Schedule for T1-3 Overflow & Car Park Precinct

The weed monitoring program is currently conducted on a biannual basis, during post-summer months (February / March) and post-winter months (October / November). The plant surveys for T1-3 Overflow and Car Precinct areas were previously undertaken on a three monthly interval during the 2008 monitoring period, with the baseline study conducted in February, 2008. RPS has conducted a total of nine plant surveys along the T1-3 Overflow and Car Precinct (**Table 2.1**).

TABLE 2.1 T1-3 & CAR PARK PRECINCT WEED MONITORING SURVEYS

YEAR	MONTH	SEASON
2008	February	Summer
	March	Autumn
	June	Winter
	September	Spring
	December	Summer
2009	March	Autumn
	November	Spring
2010	March	Autumn
	November	Spring

The latest weed monitoring survey along T1-3 Overflow and Car Precinct areas were conducted by two ecologists on 9th of November 2010, which consisted of verifying the occurrence and abundance of exotic and invasive species.

2.2 Target Species

AQIS has prepared a list of weed species identified as weeds of interest within the Port of Brisbane area. This list is presented in **Appendix A**. Exotic species declared under the LPA, and BCC listed environmental weeds are also targeted.

2.3 Weed Survey

The weed survey conducted along the T1-3 Overflow and Car Precinct areas consisted of establishing survey transects, and use of the random meander methodology for sampling of exotic and invasive species encountered. The survey was conducted on-foot to ensure that extensive coverage of the areas was achieved.

The weed survey along the T1-3 Overflow area consisted sampling of species encountered along two-metre-wide transects, running the entire length of the eastern, northern, western and southern boundaries of the hardstand area. Another transect was established along both banks of the constructed drain just north of the hardstand area.

The weed survey along the Car Precinct area consisted of two transects, which traversed the western and southern boundary of the vehicle storage area, and one non-linear transect that traversed the edge of the lake adjacent to the Visitors Centre.

Weed identifications were carried out utilising available flora and botanical reference material. Samples of weed species unable to be identified *in situ*, or with the assistance of appropriate field guides, were pressed and sent to the Queensland Herbarium for identification. The presence and abundance of any declared AQIS, LPA, and BCC listed weeds, and other exotic species that occurred along the transects were recorded on data sheets (**Appendix B**).

2.4 Survey Limitations

It should be noted that the detectability of plants and the ability to accurately identify plants to species level may vary greatly with the time of year, prevailing climatic conditions and the presence of reproductive material (e.g. flowers, fruit, and seed capsules). Consequently, the survey conducted should not be regarded as conclusive evidence that certain AQIS, LPA, or BCC declared / listed plants do not occur within the areas inspected; however every effort has been made to detect theses species in habitat / areas considered suitable.

3.0 Results

3.1 T1-3 Overflow

Appendix C contains a list of flora species recorded during each T1-3 Overflow plant survey from February 2008 to date.

The following points summarise the findings of the November 2010 survey:

- Fifty-three plant species were recorded. This consisted of six native species, and 47 exotic species;
- Three AQIS listed weed species were recorded, namely Red Natal Grass (*Melinis repens*) and Flaxleaf Fleabane (*Conyza bonariensis*), and Common Reed (*Phragmites australis*). All three of these species were recorded in the previous March 2010 survey;
- The recorded AQIS listed weed species occurred along the majority of the eastern side of the T1-3 Overflow area. Common Reed was also detected within the Northern Drain;
- The species diversity of AQIS listed weed species has remained consistent, whilst abundance, and coverage has increased in comparison to the previous March 2010 survey results;
- No species declared under the LPA were recorded during the current survey;
- Two exotic species were recorded for the first time during the current November 2010 survey. These include Jersey Cudweed (*Pseudognaphalium luteoalbum*) and Awnless Barn Grass (*Echinochloa colona*). These species are not declared under AQIS or LPA and are common weeds typical of disturbed areas in the Brisbane region;
- Exotic grasses, herbaceous and vine species were the dominant groups of exotic species observed throughout the majority of the T1-3 Overflow area. Guinea Grass (*Megathysus maximus* var. *maximus*) dominated the eastern areas and the western landscaped areas. Cumbungi (*Typha orientalis*) dominated the northern drain; and
- Exotic species diversity, abundance and coverage have increased, in comparison to the previous March 2010 survey results.

3.2 Car Park Precinct

Appendix D contains a list of flora species recorded during each Car Precinct survey from February 2008 to date.

The following points summarise the findings of the November 2010 survey:

- Sixty-five plant species were recorded. This consisted of 13 native species, and 52 exotic species;
- Three AQIS listed weed species were recorded, namely Red Natal Grass, Flaxleaf Fleabane, and Common Reed. All three of these species were recorded in the previous March 2010 survey;
- The recorded AQIS listed weed species occurred along the western perimeter of the Car Precinct area. Common Reed was also detected around the lake adjacent to the Visitors Centre;
- The species diversity of AQIS listed weed species has remained consistent in comparison to the previous March 2010 survey results, whilst abundance and coverage has slightly increased;
- Four species listed under the LPA were recorded in the current November 2010 survey, including Broad-leaf Pepper (*Schinus terebinthifolia*) (Class 3), Fireweed (*Senecio madagascariensis*) (Class 2), Groundsel Bush (Class 2) and Giant Parramatta Grass (*Sporobolus fertilis*) (Class 2);

- No incidences of Lantana (LPA Class 3) were recorded during the current November 2010 survey in comparison to the previous March 2010 survey;
- Three exotic species were recorded for the first time during the current November 2010 survey. These include Common Centaury (*Centauirum erythraea*), Ryegrass (*Lolium x hybridium*) and Water Primrose (*Ludwigia peploides*). These species are not declared under AQIS or LPA and are common weeds typical of disturbed areas in the Brisbane region;
- Locally occurring exotic grass species such as Rhodes Grass (*Chloris gayana*) and Beach Evening Primrose (*Oenothera drummondii* subsp. *drummondii*) were the dominant species observed throughout the majority of the Car Precinct area. Common Reed, Bunchy Sedge (*Cyperus polystachyos*) and Umbrella Sedge (*Cyperus eragrostis*) dominated the wetter portions of the Car Precinct area (e.g. within the western trench and around the Visitor Centre Lake); and
- Exotic species diversity, abundance, and coverage have increased in comparison to the previous March 2010 survey results.

4.0 Discussion

4.1 T1-3 Overflow

4.1.1 Weed Species Observed

The ninth weed monitoring survey along the T1-3 Overflow has identified a total number of 53 flora species, of which 47 are considered exotic species.

The three AQIS listed weed species located within the T1-3 Overflow area during the November 2010 plant survey were Red Natal Grass, Flaxleaf Fleabane, and Common Reed. All three of these species were recorded in the previous March 2010 survey. These AQIS listed weed species generally occur throughout the Port of Brisbane area, and are common weeds that are found in most disturbed areas within Brisbane. Nonetheless, the removal of these species and gradual replacement with native species is recommended.

No LPA declared species were recorded during the November 2010 survey. Giant Parramatta Grass (LPA Class 2) was detected in the previous March 2010 survey, but was not detected in the current November 2010 survey. This lack of detection could be attributed to successful weed management, or general survey limitations, i.e. the species is present, but is not detected.

Under the LPA, landholders are obliged to attempt to remove Class 2 species and are encouraged to remove Class 3 species. If any of these LPA declared species are found in this area, consideration should be given to remove individuals and control further establishment. Fact sheets for LPA declared pests identified previously on the site are provided in **Appendix F**.

Several species that are listed as environmental / noxious weeds by BCC, some of which are also listed under the LPA, were identified during the current survey and are provided in **Table 4.1**. These species have been previously recoded in the T1-3 Overflow area.

TABLE 4.1 BCC LISTED EXOTIC FLORA SPECIES RECORDED DURING THE T1-3 OVERFLOW SURVEY

SCIENTIFIC NAME	COMMON NAME	BCC WEED CATEGORY[1]	BCC CLASSIFICATION[2]
Cenchrus echinatus	Mossman River Grass	Environmental Weed	R
Chloris gayana	Rhodes Grass	Environmental Weed	R
Macroptilium atropurpureum	Siratro	Environmental Weed	R
Megathyrsus maximus var. *maximus*	Guinea Grass	Environmental Weed	C
Melinis repens	Red Natal Grass	Special Investigation	-
Solanum nigrum	Blackberry Nightshade	Special Investigation	-

[1]Three BCC weed categories exist:

- **Noxious Weeds:** These species are toxic to animals or humans. Where these plants occur, arrangements must be made to have them removed;
- **Environmental Weeds:** These species are recognised by BCC as having damaging effects on the environment in the Brisbane area; and
- **Special Investigation:** These species have been identified by BCC as potentially invasive and they are being investigated.

[2]BCC noxious / environmental weeds must be managed according to their classification as follows:

- **Class E** (early detection and eradication) – Landholders are encouraged to regularly check properties to detect any early infestations. Where an infestation has occurred, immediate removal is required, followed by continual monitoring of growth;
- **Class C** (containment and reduction) – landholders are urged to remove the parent plant or source of infestation and if removal is not immediately possible, prevent seeding by using the appropriate control method for the species (often not effective with large trees) and schedule for the earliest possible removal. Any small surrounding infestation should also be removed. It is recommended that removal occurs from the top of a catchment downstream and from the outside of a large infestation inwards; and
- **Class R** (reduce population as part of routine maintenance) – landholders are urged to look out for infestations and plan for their removal during routine maintenance.

4.1.2 Comparison between T1-3 Overflow Surveys

The abundance and coverage of AQIS listed species recorded in the T1-3 Overflow area has decreased in comparison to the previous March 2010 survey. The presence of the AQIS listed Red Natal Grass is consistent with all plant surveys to date. Common Reed and Flax-leaf Fleabane were both recorded during the current November 2010 survey and the previous March 2010 survey.

An analysis of exotic species results recorded during the recent survey compared to the previous surveys indicates that there is a variation between the number and type of exotic species recorded. **Table 4.2** highlights the number of exotic species identified in the previous weed surveys of the T1-3 Overflow area since the commencement of the monitoring program in February 2008.

TABLE 4.2 NUMBER OF EXOTIC SPECIES RECORDED PER SURVEY ALONG THE T1-3 OVERFLOW AREA

SURVEY	NUMBER OF EXOTIC SPECIES RECORDED
Baseline Survey (February 08)	48
March 2008 Quarterly Plant Survey	37
June 2008 Quarterly Plant Survey	39
September 2008 Quarterly Plant Survey	42
December 2008 Quarterly Plant Survey	55
March 2009 Biannual Plant Survey	39
November 2009 Biannual Plant Survey	56
March 2010 Biannual Plant Survey	55
November 2010 Biannual Plant Survey	**47**

Figure 4.1 illustrates a trend occurring with regard to the number of post-summer and post-winter exotic species recorded over the entire survey period for T1-3 Overflow.

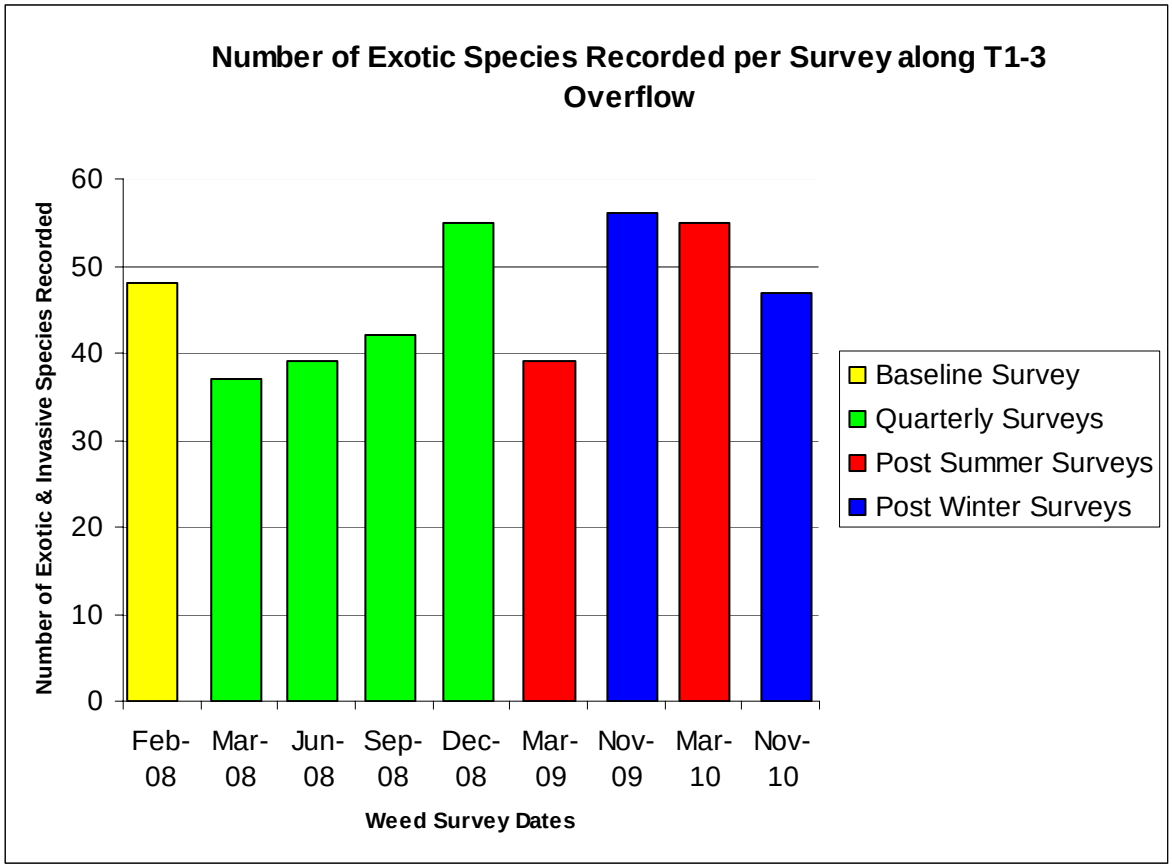

FIGURE 4.1 **NUMBER OF EXOTIC SPECIES RECORDED PER SURVEY ALONG THE T1-3 OVERFLOW AREA**

Table 4.3 outlines the numbers of exotic species within each family that were recorded in the current November 2010 survey, as well as previous surveys.

TABLE 4.3 **NUMBER OF EXOTIC SPECIES BY FAMILY FOR T1-3 OVERFLOW**

FAMILY	NUMBER OF EXOTIC SPECIES								
	BIANNUAL SURVEY				QUARTERLY SUVEYS				BASELINE SURVEY
	NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEPT 2008	JUN 2008	MAR 2008	FEB 2008
AMARANTHACEAE	**2**	3	2	1	2	2	2	2	2
ANACARDIACEAE	**0**	0	0	0	1	0	0	0	0
APIACEAE	**1**	0	0	1	1	1	1	1	1
ASTERACEAE	**10**	8	12	6	9	12	9	8	6
BORAGINACEAE	**0**	1	0	1	1	0	0	0	1
BRASSICACEAE	**2**	2	2	0	2	2	2	1	1

FAMILY	NUMBER OF EXOTIC SPECIES								
	BIANNUAL SURVEY				QUARTERLY SUVEYS				BASELINE SURVEY
	NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEPT 2008	JUN 2008	MAR 2008	FEB 2008
CARYOPHYLLACEAE	**1**	0	1	0	1	1	0	0	0
CHENOPODIACEAE	**2**	1	1	0	2	0	1	0	1
COMMELINACEAE	**1**	1	0	1	0	1	1	1	0
CYPERACEAE	**0**	2	4	1	1	1	1	0	3
EUPHORBIACEAE	**2**	2	2	2	1	0	1	1	2
FABACEAE	**10**	8	10	5	10	5	5	8	11
MALVACEAE	**1**	1	1	1	1	1	1	1	2
ONAGRACEAE	**2**	3	3	2	3	2	2	1	1
OXALIDACEAE	**0**	1	0	0	1	0	0	0	0
PAPAVERACEAE	**0**	0	0	0	0	0	0	0	1
PLANTAGINACEAE	**1**	1	1	1	1	1	1	1	1
POACEAE	**9**	10	8	7	8	8	7	6	8
POLYGONACEAE	**1**	1	1	1	1	0	0	0	0
PORTULACACEAE	**1**	2	2	1	2	1	1	2	2
PRIMULACEAE	**1**	1	1	1	1	1	1	1	1
RUBIACEAE	**1**	1	1	1	1	1	1	1	1
SOLANACEAE	**1**	1	1	1	1	1	1	1	2
TAMARICACEAE	**1**	1	1	1	1	0	0	0	0
VERBENACEAE	**2**	2	2	3	2	1	1	1	1

Note: Shading indicate dominant family group

From the data contained within **Table 4.2** and **Table 4.3** as well as **Figure 4.1**, the following can be deduced:

- Generally, surveys undertaken early in the calendar year (post-summer) detect less exotic species (i.e. species diversity) than those conducted in the later half of the calendar year (post-winter);
- However, current survey results are not consistent with this trend as the number of exotic species recorded in the November 2010 post-winter survey (47 exotic species) is less than the number of exotic species recorded in the March 2010 post-summer survey (55 exotic species). This may be attributed to recent maintenance activities occurring two weeks across the entire T1-3 overflow area prior to conducting the weed survey. Maintenance activities may have completely removed exotic species or features that aid in detection and identification, such as flowers and seeds;
- The species abundance and coverage has decreased since the last March 2010 survey. Again, this may be a result of the recent maintenance activities that occurred in the area; and

- In the previous March 2010 survey, the Poaceae family was dominant. However, the Asteraceae and Fabaceae families were dominant in the recent November 2010 survey. This may be attributed to the ability of these resilient species to grow successfully in disturbed areas. In addition, the Asteraceae family is one of the largest flora families.

4.2 Car Precinct Area

4.2.1 Weed Species Observed

The ninth weed monitoring survey along the Car Precinct has identified a total number of 65 flora species, of which three are AQIS listed species, and 52 are considered exotic.

The three AQIS listed weed species located within the Car Precinct area during the March 2010 plant survey were Red Natal Grass, Flaxleaf Fleabane, and Common Reed. All three species have been previously recorded within the Car Precinct. These AQIS listed weed species generally occur throughout the Port of Brisbane area, and are common weeds that are found in most disturbed areas within Brisbane. Nonetheless, the removal of these species and gradual replacement with native species is recommended.

Four LPA declared species were recorded during the November 2010 plant survey (**Table 4.4**). **Appendix E** lists the GPS co-ordinates of the locations of the LPA declared species identified in the Car Precinct area.

TABLE 4.4 CLASS & ABUNDANCE OF WEED SPECIES (UNDER LPA) RECORDED DURING CAR PRECINCT AREA SURVEY

LPA Class	Botanical Name	Common Name	Abundance & Location
2	*Baccharis halimifolia*	Groundsel Bush	Low abundance near Visitor's Lake
	Senecio madagascariensis	Fireweed	Medium abundance near Visitor's Lake
	Sporobolus fertilis	Giant Parramatta Grass	Low abundance near Visitor's Lake
3	*Schinus terebinthifolia*	Broad-leaf Pepper	Medium abundance near Visitor's Lake

Note: LPA declared plants must be managed according to their classification as follows:

- **Class 1** – landholders are required by law to keep their land free of these species;
- **Class 2** – landholders are required by law to attempt to keep their land free of these species; and
- **Class 3** – landholders may be required to control these species if their land is located adjacent to 'environmentally significant species' such as national parks or reserves.

The abundance and diversity levels of exotic species have increased since the previous March 2010 survey. Under the LPA, landholders are obliged to attempt to remove Class 2 species and encouraged to remove Class 3 species. Therefore, consideration should be given to the removal of these declared species and control further establishment. Fact sheets for declared species are provided in **Appendix F**.

Several species that are listed as environmental / noxious weeds by BCC, some of which are also listed under the LPA, were identified during the current survey and are provided in **Table 4.5**. These species have been previously recorded in the Car Precinct area.

TABLE 4.5 BCC LISTED EXOTIC FLORA SPECIES RECORDED DURING THE CAR PRECINCT SURVEY

SCIENTIFIC NAME	COMMON NAME	BCC WEED CATEGORY[1]	BCC CLASSIFICATION[2]
Cenchrus echinatus	Mossman River Grass	Environmental Weed	R
Chloris gayana	Rhodes Grass	Environmental Weed	R
Ipomoea cairica	Coastal Morning Glory	Environmental Weed	R
Macroptilium atropurpureum	Siratro	Environmental Weed	R
Megathyrsus maximus var. maximus	Guinea Grass	Environmental Weed	C
Melinis repens	Red Natal Grass	Special Investigation	-
Neonotonia wightii	Glycine	Environmental Weed	C
Ricinus communis	Castor Oil Plant	Noxious Weed	C
Schinus terebinthifolius	Broad-leaf Pepper	Environmental Weed	C
Solanum nigrum	Blackberry Nightshade	Special Investigation	-

[1]Three BCC weed categories exist:

- **Noxious Weeds:** These species are toxic to animals or humans. Where these plants occur, arrangements must be made to have them removed;
- **Environmental Weeds:** These species are recognised by BCC as having damaging effects on the environment in the Brisbane area; and
- **Special Investigation:** These species have been identified by BCC as potentially invasive and they are being investigated.

[2]BCC noxious / environmental weeds must be managed according to their classification as follows:

- **Class E** (early detection and eradication) – Landholders are encouraged to regularly check properties to detect any early infestations. Where an infestation has occurred, immediate removal is required, followed by continual monitoring of growth.
- **Class C** (containment and reduction) – landholders are urged to remove the parent plant or source of infestation and if removal is not immediately possible, prevent seeding by using the appropriate control method for the species (often not effective with large trees) and schedule for the earliest possible removal. Any small surrounding infestation should also be removed. It is recommended that removal occurs from the top of a catchment downstream and from the outside of a large infestation inwards; and
- **Class R** (reduce population as part of routine maintenance) – landholders are urged to look out for infestations and plan for their removal during routine maintenance.

4.2.2 Comparison between Car Precinct Area Surveys

The number of AQIS listed species recorded in the Car Precinct area has remained constant in comparison to the previous March 2010 and November 2009 surveys, whilst the abundance and coverage has increased. The presence of the AQIS listed Red Natal Grass, Common Reed and Flax-leaf Fleabane were recorded during the current November 2010 survey and the previous March 2010 and November 2009 surveys.

An analysis of the diversity and abundance of all exotic plants recorded during the current survey, compared to previous surveys, indicates that there is a variation between both exotic species type and the number of exotic species recorded.

Table 4.6 highlights the number of exotic species identified in the previous and current plant surveys of the Car Precinct area since the commencement of the monitoring program in February 2008.

TABLE 4.6 NUMBER OF EXOTIC SPECIES RECORDED PER SURVEY ALONG THE CAR PRECINCT AREA

SURVEY	NUMBER OF EXOTIC SPECIES RECORDED
Baseline Survey (February 08)	40
March 2008 Quarterly Plant Survey	44
June 2008 Quarterly Plant Survey	48
September Quarterly 2008 Plant Survey	49
December 2008 Quarterly Plant Survey	59
March 2009 Biannual Plant Survey	46
November 2009 Biannual Plant Survey	54
March 2010 Biannual Plant Survey	47
November 2010 Biannual Plant Survey	**52**

Figure 4.2 illustrates a trend occurring with regard to the number of post-summer and post-winter exotic species recorded over the entire survey period for Car Precinct area.

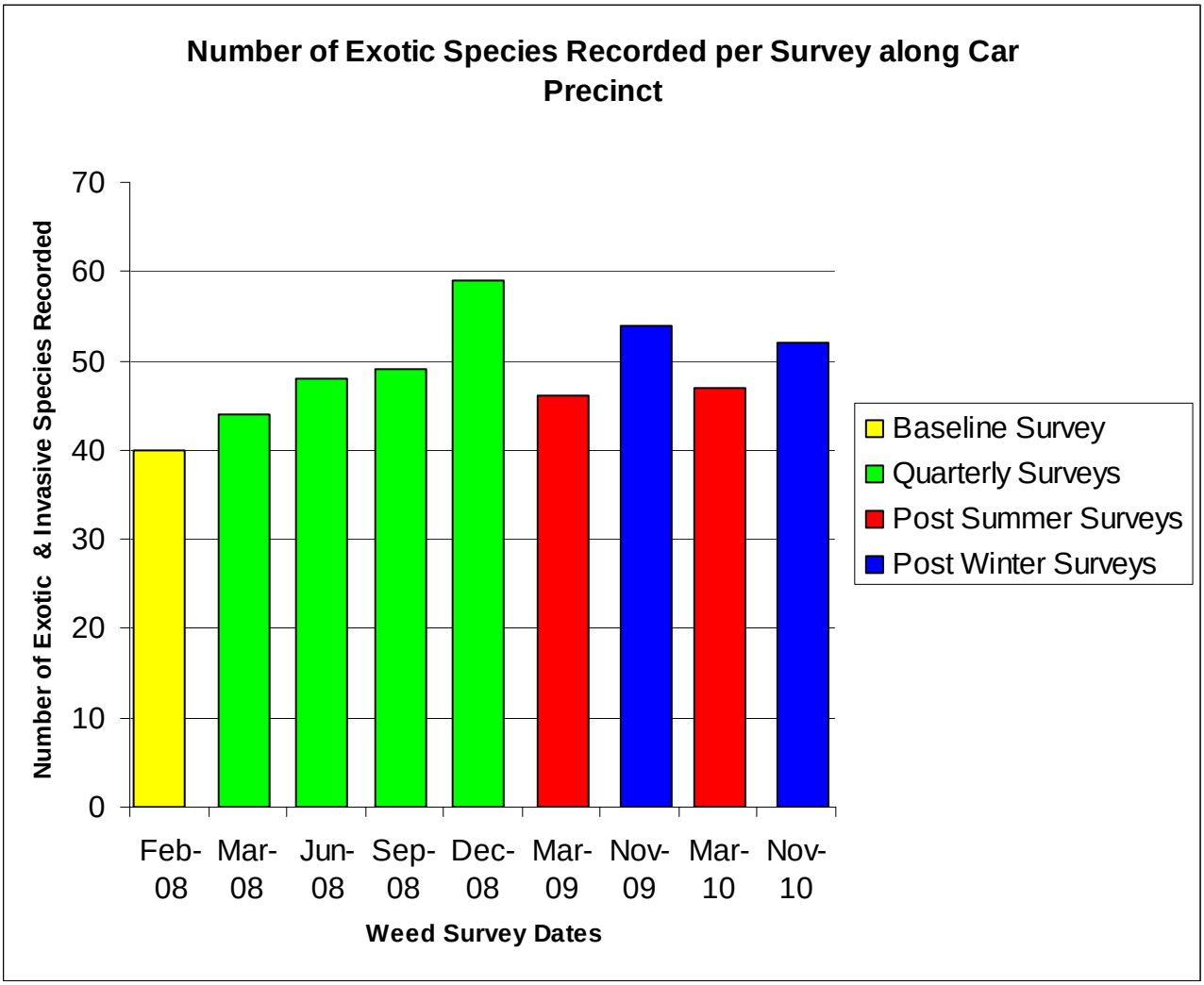

FIGURE 4.2 NUMBER OF EXOTIC SPECIES RECORDED PER SURVEY ALONG THE CAR PRECINCT AREA

Table 4.7 outlines the numbers of exotic species within each family that were recorded in the current November 2010 survey, as well as previous surveys.

TABLE 4.7 NUMBER OF EXOTIC SPECIES BY FAMILY FOR THE CAR PRECINCT AREA

FAMILY	NUMBER OF EXOTIC SPECIES								
	BIANNUAL SURVEY				QUARTERLY SURVEYS				BASELINE SURVEY
	NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEPT 2008	JUN 2008	MAR 2008	FEBRUARY 2008
AMARANTHACEAE	**2**	2	1	1	2	1	1	2	3
ANACARDIACEAE	**1**	1	0	1	1	1	1	1	1
APOCYNACEAE	**0**	0	0	0	0	0	0	0	1
ASTERACEAE	**10**	6	11	9	12	14	13	11	8
BORAGINACEAE	**1**	1	0	1	1	1	0	0	0
BRASSICACEAE	**2**	1	2	0	2	2	2	0	1
CARYOPHYLLACAE	**0**	0	1	0	0	0	0	0	0
CHENOPODIACEAE	**0**	0	0	0	2	0	0	0	0
COMMELINACEAE	**0**	1	1	1	1	1	1	1	0
CONVOLVULACEAE	**2**	2	2	2	2	2	2	2	2
CYPERACEAE	**4**	4	5	4	4	1	2	2	2
EUPHORBIACEAE	**3**	3	1	2	1	2	3	0	3
FABACEAE	**11**	6	8	6	9	5	5	7	5
MALVACEAE	**1**	1	2	1	0	1	1	1	1
ONAGRACEAE	**4**	3	3	3	3	2	1	1	1
OXALIDACEAE	**0**	0	0	0	0	0	0	0	1
PLANTAGINACEAE	**1**	1	1	1	1	1	1	1	0
POACEAE	**12**	9	9	7	10	10	9	9	6
POLYGONACEAE	**1**	1	1	1	1	0	1	1	0
PORTULACACEAE	**1**	2	2	2	1	0	1	1	2
PRIMULACEAE	**1**	0	1	0	1	1	1	1	1
RUBIACEAE	**0**	0	0	0	0	0	0	0	1
SOLANACEAE	**1**	1	1	2	2	1	1	1	1
VERBENACEAE	**2**	2	2	2	2	3	2	2	0

Note: Shading indicates dominant family group

From the data contained within **Table 4.6** and **Table 4.7**, as well as **Figure 4.2**, the following can be deduced:

- Generally, surveys undertaken early in the calendar year (post-summer) detect less exotic species (i.e. species diversity) than those conducted in the later half of the calendar year (post-winter);

- Current survey results are consistent with this trend as the number of exotic species recorded in the November 2010 post-winter survey (52 exotic species) are more than the number of exotic species recorded in the March 2010 post-summer survey (47 exotic species);
- Although maintenance activities around the Visitors Centre Lake occurred recently, the area west of the car storage area has not been maintained for some time. This combined with high rainfall levels in the month of October may have attributed to the increase in coverage and abundance levels. In the previous March 2010 survey, maintenance activities occurred immediately prior, resulting in very low abundance and coverage;
- Although abundance and coverage has increased in comparison to the previous March 2010 survey, levels were still considered to be relatively low;
- Unlike the previous March 2010 weed survey, unusually high rainfall occurred prior to the recent survey. The unusually high rainfall would have produced conditions conducive to plants seeding and flowering. The presence of seeds and flowers often allows for easier detection and identification, which may have attributed to a higher species diversity recorded during the current November 2010 survey;
- Signs of dominant species out-competing other species are usually much lower in areas where abundance and coverage is low. Locating and detecting exotic species is also generally easier in areas where abundance and coverage is low. These factors may have also attributed to the increase in species diversity in the recent November 2010 survey; and
- The Poaceae family was the dominant family in the recent November 2010 survey. This is consistent with the findings from the previous March 2010 survey but inconsistent with all other surveys conducted within the Car Precinct area. Previous surveys have concluded that Asteraceae was the dominant family. Species from the Poaceae family have pioneer characteristics and are generally the first species to grow back following a disturbance (e.g. maintenance activities).

4.3 Weather Conditions

The following graph (**Error! Reference source not found.**) portrays the rainfall recorded at the Port of Brisbane as well as the long-term rainfall and temperature averages (taken from the Brisbane Airport).

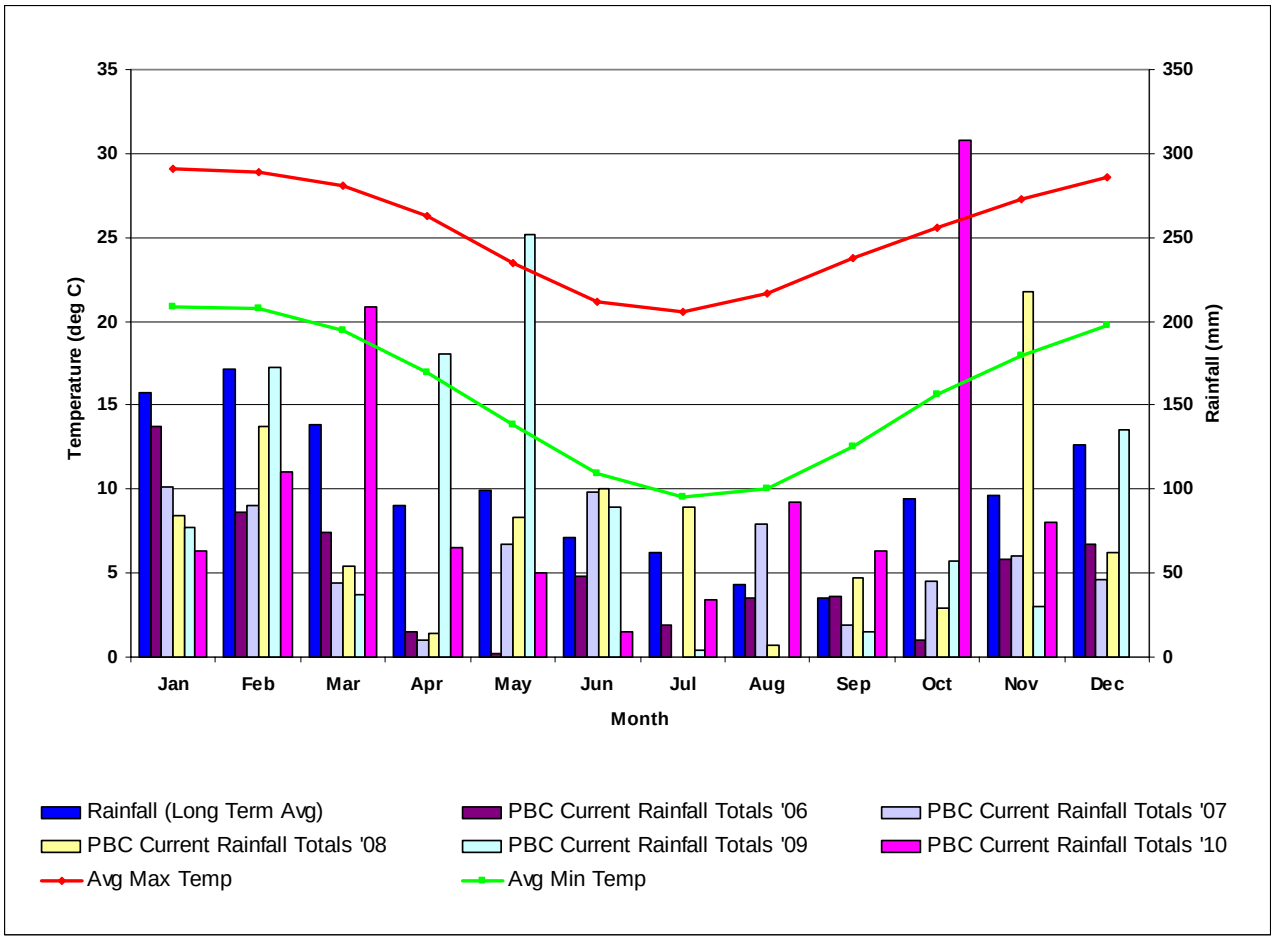

FIGURE 4.3 LONG-TERM CLIMATIC AVERAGES COMPARED WITH THE PORT OF BRISBANE RAINFALL DATA

The following can be derived from this data with respect to the plant growth around T1-3 Overflow and Car Precinct areas:

- Rainfall throughout the previous twelve month period (November 2009 – November 2010) has been highly variable (Error! Reference source not found.). The months of January and February, as well as April through to July have exhibited less than average rainfall. However, August and September received large amounts of rainfall that well exceeded the long-term average rainfall, whilst October 2010 received more than three times the long-term average rainfall;
- Diversity, abundance and coverage levels within the T1-3 area may be attributed to maintenance activities occurring two weeks prior to the weed survey; and
- High levels of rainfall in the month of October, allowed for conditions conducive for flowering and seeding of exotic species at the Car Precinct area, which provided for the ease of exotic species detection and identification that may have contributed to the increase in species diversity observed during the recent November 2010 survey.

5.0 Recommendations

Early detection and intervention is a highly successful (and a cost-effective) method of preventing the establishment of new and emerging weeds, and should be given high priority in weed management programs. The following recommendations pertain to the presence of exotic species occurring along both the T1-3 Overflow and the Car Precinct areas.

Recommendations relating to the management of the T1-3 Overflow and Car Precinct areas have been made in previous reports. The following summarises the recommendations for the T1-3 Overflow and Car Precinct areas:

- All survey areas are to be regularly maintained. Areas less visible i.e. the eastern side of the T1-3 Overflow area and the western side of the Car Precinct should be maintained as often (where practicable) as the other sections of the survey area, when required;
- AQIS listed weed species found within the survey areas are common weeds found in most disturbed areas. These species can be controlled through general weed removal techniques. Regular maintenance of all survey areas should therefore include regular mowing and spot spraying / hand pulling of weeds, as well as other weed removal techniques;
- Climatic conditions (rainfall) should also be a consideration when assessing the frequency of maintenance activities (i.e. increasing the frequency of maintenance activities during favourable growing conditions);
- An attempt should be made to remove all LPA declared species and their specific identification and removal should be included as part of routine maintenance and management of the areas, particularly for the Visitors Centre Lake;
- A recommended planting schedule of native species and appropriate densities should be prepared for the western and southern trench of the Car Precinct area and the northern drain in the T1-3 Overflow area; and
- Continue programmed monitoring of the diversity and abundance levels of exotic species within the T1-3 Overflow and Car Precinct area through biannual surveys.

6.0 References

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Appendix A

AQIS Weed Target Species List

FAMILY	GENUS SPECIES	SOURCE	COMMON NAME	COMMENTS
ASTERACEAE	*Chromolaena odorata*	(L.) King & 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	*Conyza bonariensis*	Lamp & Collet Richardson *et al.*	Flax-leaf Fleabane	Common weed of waste places, particularly in suburban areas
ASTERACEAE	*Conyza canadensis*	Lamp & Collet Richardson *et al.*	Canadian Fleabane	Closely related to *Conyza bonariensis* that has become prolific in urban areas, roadsides, disturbed sites and waterways
POACEAE	*Andropogon virginicus*	Richardson *et al.*	Whisky Grass	A weed of roadsides and disturbed sites
POACEAE	*Danthonia* sp.	Richardson *et al.*	Heath Grass	Found on damp soils, usually with native species in bushland and grassland
POACEAE	*Imperata conferta*	AQIS	Cogongrass	Coconut, roadsides, hillsides, streams and trails in dense or open forest.
POACEAE	*Melinis repens* (previously known as *Rhynchelytrum repens*)	Lamp & Collet Richardson *et al*.	Red Natal Grass	A weed of roadsides, railway lines and wastelands. May also invade rundown, abandoned cultivated paddocks.
POACEAE	*Miscanthus sinensis*	Richardson *et al*.	Eulalia	Commonly cultivated and now escaping along roadsides and railway lines. Does not usually occur in Queensland.
POACEAE	*Phragmites australis*	Lamp & Collet Richardson *et al*.	Common Reed	Most widespread of all grasses
POACEAE	*Saccharum spontaneum*	AQIS	Wild Sugarcane	Waste areas, fallow fields, marshes, banks of streams and ponds, sand dunes, along railways or highways, and in or around fields.
ULMACEAE	*Ulmus* sp.	Richardson *et al.*	Elms	Widely grown as street trees and in parks. Can form dense stands

Appendix B

Plant Survey Data Sheet

FAMILY / SPECIES	COMMON NAME	FORM	DECLARED CATEGORY (LPA)	PRESENCE	ABUNDANCE
AGAVACEAE					
Agave sp.	Agave	w,p	-		
AIZOACEAE					
Carpobrotus glaucescens [n]	Pigface	v	-		
Sesuvium portulacastrum [n]	Sea Purslane	h	-		
AMARANTHACEAE					
Alternanthera pungens	Khaki Weed	h,w	-		
Amaranthus quitensis	South American Amaranthus	h.w	-		
Amaranthus viridis	Green Amaranthus	h,w	-		
Gomphrena celosioides	Gomphrena Weed	h,w	-		
ANACARDIACEAE					
Schinus terebinthifolia	Broad-leaved Pepper	s,w	3		
ASCLEPIADACEAE					
Gomphocarpus physocarpus	Balloon Cotton Bush	s,w	-		
ASPARAGACEAE					
Asparagus aethiopicus cv. Sprengeri	Asparagus Fern	v,w	3		
ASTERACEAE					
Ageratum houstonianum	Blue Billy-goat	h,w	-		
Ambrosia artemisiifolia	Annual Ragweed	h,w	2		
Baccharis halimifolia	Groundsel Bush	s,w	2		
Bidens pilosa	Cobblers Pegs	h,w	-		
Calyptocarpus vialis	Creeping Cinderella Weed	h,w	-		
Cirsium vulgare	Spear Thistle	h,w	-		
Conyza bonariensis	Flaxleaf Fleabane	h,w	-		
Conyza pusilla	Canadian Fleabane	h,w	-		
Crassocephalum crepidioides	Thickhead	h,w	-		
Emilia sonchifolia	Emilia	h,w	-		
Hypochaeris radicata	Flatweed	h.w	-		
Parthenium hysterophorus	Parthenium Weed	h,w	2		
Senecio sp (lautus)	Fireweed	h	-		
Soliva pterosperma	Bindii	h	-		
Sonchus oleraceus	Rough Sow Thistle	h,w	-		
Sphagneticola trilobata	Singapore Daisy	h,w	3		
Tagetes minuta	Stinking Roger	h,w	-		

FAMILY / SPECIES	COMMON NAME	FORM	DECLARED CATEGORY (LPA)	PRESENCE	ABUNDANCE
AVICENNIACEAE					
Avicennia marina [n]	Grey Mangrove	t	-		
BORAGINACEAE					
Heliotropium amplexicaule	Blue Heliotrope	h,w	-		
CACTACEAE					
Opuntia sp.	Prickly Pear	s,w	2		
CAESALPINIACEAE					
Crotalaria paniculata	Poor Mans Gold	h	-		
Senna pendula var *glabrifolia*	Easter Cassia	s,w	-		
CASUARINACEAE					
*Casuarina equisetifolia**	Coastal Sheoak	t	-		
*Allocasuarina littoralis**	Black Sheoak	t	-		
CONVOLVULACEAE					
Cuscuta campestris	Dodder	v,w	-		
Convolvulus arvensis	European Bindweed	h,w	-		
Ipomoea cairica	Coastal Morning Glory	v,w	-		
Ipomoea pes-caprae [n]	Goats Foot Convolves	v	-		
CYPERACEAE					
Cyperus congestus	Clustered Flatsedge	a,w	-		
Cyperus eragrostis	Umbrella Sedge	a,w	-		
EUPHORBIACEAE					
Chamaesyce maculata	Caustic Weed	h,w	-		
Euphorbia hirta	Asthma Plant	h,w	-		
Euphorbia prostrata	Caustic Creeper	h,w	-		
Euphorbia sp.	Spurge	h,w	-		
Macaranga tanarius [n]	Macaranga	t (p)	-		
Phyllanthus virgatus	Creeping Phyllanthus	h,w	-		
FABACEAE					
Crotalaria pallida	Rattle Pod	h,w	-		
Desmodium uncinatum	Silver-leafed Desmodium	v,w	-		
Macroptilium atropurpureum	Siratro	v,w	-		
Macroptilium lathyroides	Phasey Bean	v,w	-		
Medicago polymorpha	Burr Medic	h,w	-		
Medicago sativa	Lucerne	h,w	-		
Melilotus indicus	Sweet Melilotus	h,w	-		
Neonotonia wightii	Glycine	v,w	-		
Sesbania cannabina	Sesbania Pea	h,w	-		
Trifolium repens	White Clover	h,w	-		

FAMILY / SPECIES	COMMON NAME	FORM	DECLARED CATEGORY (LPA)	PRESENCE	ABUNDANCE
LAURACEAE					
Cinnamomum camphora	Camphor Laurel	t,w	3		
MALVACEAE					
Hibiscus tiliaceus [n]	Cotton Tree	t	-		
Modiola caroliniana [n]	Red Flower Mallow	h,w	-		
Sida cornifolia	Flannel Weed	h,w	-		
Sida rhombifolia	Common Sida	h,w	-		
MIMOSACEAE					
Acacia aulacocarpa [n]	Hickory Wattle	t	-		
MYRTACEAE					
Eucalyptus robusta [n]	Swamp Mahogany	T,(p)	-		
Lophostemon confertus [n]	Brush Box	T,(p)	-		
Melaleuca linariifolia [n]	Flax-leafed Paperbark	t,(p)	-		
Melaleuca quinquenervia [n]	Paperbark Teatree	T,(p)	-		
ONAGRACEAE					
Oenothera drummondii subsp. *drummondii*	Beach Evening Primrose	s	-		
OXALIDACEAE					
Oxalis corniculata	Creeping Oxalis	h,w	-		
PANDANACEAE					
Pandanus tectorius [n]	Screw Pine	t,(p)	-		
PASSIFLORACEAE					
Passiflora cairica	Stinking Passion Vine	v,w	-		
Passiflora subpeltata	White Passion Vine	v,w	-		
PLANTAGINACEAE					
Plantago lanceolata	Lamb's Tongue	h,w	-		
Plantago major	Great Plantain	h,w	-		
POACEAE					
Brachiaria decumbens	Signal Grass	g,w	-		
Brachiaria mutica	Para Grass	g,w	-		
Cenchrus ciliaris	Buffel Grass	g,w	-		
Cenchrus echinatus	Mossman River Grass	g,w	-		
Chloris gayana	Rhodes Grass	g,w	-		
Chloris truncata	Windmill Grass	g,w	-		
Chloris virgata	Feather-top Rhodes Grass	g,w	-		
Cynodon dactylon	Couch Grass	g,w	-		
Dichanthium aristatum	Angleton Grass	h,w	-		
Digitaria ciliaris	Summer Grass	g,w	-		

FAMILY / SPECIES	COMMON NAME	FORM	DECLARED CATEGORY (LPA)	PRESENCE	ABUNDANCE
Eleusine indica	Crowsfoot Grass	g,w	-		
Hemarthria uncinata	Mat Grass	g,w	-		
Imperata cylindrica [n]	Blady Grass	g	-		
Melinis repens	Red Natal Grass	g,w	-		
Melinis minutifolium	Molasses Grass	g,w	-		
Poa annua	Winter Grass	g,w	-		
Panicum effusum	Hairy Panic	g	-		
Panicum maximum	Green Panic	g,w	-		
Paspalum dilatatum	Paspalum	g,w	-		
Phragmites australis [n]	Common reed	g	-		
Sorghum halepense [n]	Johnson grass	g,w	-		
Typha orientalis [n]	Typha	g	-		
Urochloa mosambicensis	Sabi Grass	g,w	-		
PORTULACACEAE					
Portulaca pilosa	Hairy pigweed	h,w	-		
PRIMULACEAE					
Anagallis arvensis	Scarlet Pimpernel	h,w	-		
PROTEACEAE					
Banksia integrifolia [n]	Coastal Banksia	t (p)	-		
SAPINDACEAE					
Cardiospermum halicacabum	Balloon Vine	v,w	-		
Cupaniopsis anacardioides [n]	Tuckeroo	T	-		
Dodonaea triquetra	Hop Bush	s	-		
SOLANACEAE					
Solanum nigrum	Brazilian Nightshade	s,w	-		
VERBENACEAE					
Lantana camara	Lantana	s,w	3		
Lantana montevidensis	Creeping Lantana	w	3		
Verbena bonariensis	Purple Top	h,w	-		
Verbena aristigera		h,w	-		
Vitex trifolia var *trifolia* [n]		s	-		

Form: t = tree, **s =** shrub, **h =** herb, **g =** grass, **c =** creeper, **v =** vine, **a =** aquatic

[n] = native

Appendix C

Survey Results for T1-3 Overflow

SPECIES	COMMON NAME	AQIS LISTED	LPA CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUNE 2008	MAR 2008	FEB 2008
AIZOACEAE												
*Carpobrotus glaucescens**	Pigface*	-	-	-	-	-	-	-	X	-	X	X
*Sesuvium portulacastrum**	Sea Purslane*	-	-	-	-	-	-	-	-	-	-	X
AMARANTHACEAE												
Alternanthera pungens	Khaki Weed	-	-	-	X	-	-	X	-	-	-	-
Amaranthus viridis	Green Amaranths	-	-	X	X	X	-	X	X	X	X	X
Gomphrena celosioides	Gomphrena Weed	-	-	X	X	X	X	-	X	X	X	X
ANACARDIACEAE												
Schinus terebinthifolius	Broad-leaved Peppertree	-	3	-	-	-	-	X	-	-	-	-
APIACEAE												
Cyclospermum leptophyllum	Slender Celery	-	-	-	-	-	X	X	-	-	-	-
Hydrocotyle ranunculoides	Pennywort*	-	-	X	X	X	X	X	X	X	X	X
ASTERACEAE												
Ageratum houstonianum	Blue Billy-Goat	-	-	X	-	X	X	X	X	-	-	-
Aster subulatus	Wild Aster	-	-	-	-	-	X	-	-	X	-	-
Baccharis halimifolia	Groundsel Bush	-	2	-	-	X	-	-	-	-	X	-
Bidens pilosa	Cobblers Pegs	-	-	X	X	X	-	X	X	X	-	X
Calyptocarpus vialis	Creeping Cinderella Weed	-	-	-	X	X	-	X	X	X	-	-
Cirsium vulgare	Spear Thistle	-	-	-	-	-	-	X	-	-	-	-
Conyza bonariensis	Flaxleaf Fleabane	✓	-	X	X	X	-	X	-	X	X	X
Conyza canadensis	Canadian Fleabane	✓	-	-	-	-	X	-	X	-	X	X
Conyza sumatrensis	Tall Fleabane	-	-	X	-	X	-	-	X	-	-	-
Crassocephalum crepidioides	Thickhead	-	-	X	X	X	X	-	X	X	X	-
Emilia sonchifolia	Emilia	-	-	X	X	X	X	X	X	X	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPA CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUNE 2008	MAR 2008	FEB 2008
Gamochaeta sp.	A Cudweed	-	-	-	-	X	-	-	X	-	-	-
Hypochaeris radicata	Flatweed	-	-	X	X	X	-	X	X	-	X	X
Pseudognaphalium luteoalbum	Jersey cudweed	-	-	X	-	-	-	-	-	-	-	-
Senecio madagascariensis	Fireweed	-	2	-	-	-	-	-	X	X	X	X
Sonchus oleraceus	Rough Sow Thistle	-	-	X	X	X	-	X	X	X	X	X
Tagetes minuta	Stinking Roger	-	-	-	-	-	-	-	-	-	X	-
Tridax procumbens	Tridax Daisy	-	-	X	X	X	X	X	X	X	X	X
BORAGINACEAE												
Heliotropium amplexicaule	Blue Heliotrope	-	-	-	X	-	X	X	-	-	-	X
BRASSICACEAE												
Brassica tournefortii	Wild Turnip	-	-	X	X	X	-	-	X	X	-	-
Cakile maritime	-	-	-	-	-	-	-	X	-	-	-	-
Lepidium africanum	Common Peppercress	-	-	X	X	X	-	X	X	X	X	X
CACTACEAE												
Opuntia sp.	Prickly Pear	-	2	-	-	-	-	-	-	-	-	-
CARYOPHYLLACEAE												
Cerastium glomeratum	Sticky Mouse-ear Chickweed	-	-	X	-	X	-	-	X	-	-	-
Polycarpon tetraphyllum	Four-leaved Allseed	-	-	-	-	-	-	X	-	-	-	-
CASUARINACEAE												
*Casuarina littoralis**	Black Sheoak*	-	-	-	-	-	-	-	-	-	-	X
CHENOPODIACEAE												
Chenopodium ambrosioides	Mexican Tea / Kerosene Plant	-	-	X	X	X	-	X	-	-	-	X
Chenopodium sp.	-	-	-	-	-	-	-	X	-	-	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPA CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUNE 2008	MAR 2008	FEB 2008
Einadia sp.	-	-	-	**X**	-	-	-	-	-	X	-	-
COMMELINACEAE												
Commelina benghalensis	-	-	-	**-**	-	-	X	-	-	-	X	-
Commelina diffusa (C. cyanea)	Wandering Jew	-	-	**X**	X	-	-	-	X	X	-	-
CONVOLVULACEAE												
Ipomoea cairica	Coastal Morning Glory	-	-	**-**	X	-	-	-	-	-	-	-
Ipomoea indica	Purple Morning Glory	-	-	**-**	X	-	-	-	-	-	-	-
*Ipomoea pes-caprae**	Goats Foot Convolves*	-	-	**-**	-	X	X	X	X	X	X	X
CYPERACEAE												
*Bolboschoenus caldwellii**	-	-	-	**-**	-	-	-	X	-	-	-	-
Cyperus brevifolius	Mullumbimby Couch	-	-	**-**	-	X	-	-	-	-	-	-
Cyperus difformis	Rice Sedge	-	-	**-**	-	-	-	-	-	-	-	X
Cyperus eragrostis	Umbrella Sedge	-	-	**-**	-	X	-	-	X	-	-	X
*Cyperus exaltatus**	Giant Sedge*	-	-	**-**	-	-	-	-	-	-	-	-
Cyperus involucratus	-	-	-	**-**	X	X	X	X	-	X	-	X
Cyperus polystachyos	Bunchy Sedge	-	-	**-**	X	X	-	-	-	-	-	-
*Isolepis cernua**	Nodding Club Rush*	-	-	**-**	-	-	-	-	-	X	-	-
EUPHORBIACEAE												
Chamaesyce hyssopifolia	Hyssop Spurge	-	-	**-**	X	-	-	-	-	-	-	-
Chamaesyce maculata	Caustic Weed	-	-	**-**	-	-	-	-	-	-	-	-
Chamaesyce prostrata	Red Caustic Creeper	-	-	**X**	-	X	X	X		X	X	X
Euphorbia hirta	Asthma Plant	-	-	**X**	X	X	X	-	-	-	-	-
Euphorbia sp.	Spurge	-	-	**-**	-	-	-	-	-	-	-	-
*Macaranga tanarius**	Macaranga*	-	-	**-**	X	X	-	-	-	-	-	-
Phyllanthus virgatus	Creeping Phyllanthus	-	-	**-**	-	-	-	-	-	-	-	-
Ricinus communis	Castor Oil Bush	-	-	**-**	-	-	-	-	-	-	-	X

SPECIES	COMMON NAME	AQIS LISTED	LPA CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUNE 2008	MAR 2008	FEB 2008
FABACEAE												
Crotalaria incana	Woolly Rattle Pod	-	-	-	X	X	-	X	-	-	X	-
Crotalaria lanceolata subsp. *lanceolata*	Lance-leaf Rattle Pod	-	-	-	X	X	X	X	-	X	X	X
*Cullen tenax**	Emu Foot*	-	-	X	-	X	X	X	X	-	-	-
Desmodium uncinatum	Silver Leafed Desmodium	-	-	-	-	X	-	-	-	-	-	-
Indigofera hirsuta	Hairy Indigo	-	-	-	-	-	-	X	-	-	X	X
*Indigofera linifolia**	-*	-	-	X	X	X	X	X	-	-	-	-
Indigofera spicata	Creeping Indigo	-	-	X	X	X	X	X	-	-	-	-
*Lotus cruentus**	Redflower Lotus*	-	-	-	-	-	-	-	X	-	-	-
Macroptilium atropurpureum	Siratro	-	-	X	X	X	X	X	X	X	X	X
Macroptilium lathyroides	Phasey Bean	-	-	X	X	-	X	X	-	-	X	X
Medicago lupulina	Black Medic	-	-	-	-	-	-	X	X	-	X	X
Medicago polymorpha	Burr Medic	-	-	X	-	X	-	-	-	-	-	-
Medicago sativa	Lucerne	-	-	-	-	-	-	-	-	-	-	-
Melilotus albus	Bokhara	-	-	-	-	-	-	X	-	-	-	X
Melilotus indicus	Sweet Melilotus	-	-	X	-	X	-	-	X	X	-	X
Neonotonia wightii	Glycine	-	-	-	X	X	-	-	-	-	-	X
Swainsona galegifolia	Smooth Darling Pea	-	-	-	-	-	-	-	-	-	-	X
*Sesbania cannabina**	Sesbania Pea*	-	-	X	X	X	X	X	X	X	X	X
Stylosanthes hamata	Verano Stylo	-	-	-	-	-	X	X	X	X	X	X
Stylosanthes humilis	Townsville Stylo	-	-	X	X	X	-	-	-	-	-	-
Trifolium repens	White Clover	-	-	X	X	X	-	X	X	X	X	X
*Vigna marina**	Yellow Beach Bean*	-	-	-	-	-	-	-	-	-	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPA CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUNE 2008	MAR 2008	FEB 2008
MALVACEAE												
Sida cornifolia	Flannel Weed	-	-	-	-	-	-	-	-	-	-	X
Sida rhombifolia	Common Sida	-	-	**X**	X	X	X	X	X	X	X	X
ONAGRACEAE												
Ludwigia peruviana	-	-	-	**X**	X	X	-	X	-	-	-	-
Oenothera drummondii subsp. *drummondii**	Beach Evening Primrose	-	-	-	X	X	X	X	X	X	X	X
Oenothera laciniata	Cut-leaf Evening Primrose	-	-	**X**	X	X	X	X	X	X	-	-
OXALIDACEAE												
Oxalis corniculata	Creeping Oxalis	-	-	-	X	-	-	X	-	-	-	-
PAPAVERACEAE												
Argemone ochroleuca var. *ochroleuca*	Mexican Poppy	-	-	-	-	-	-	-	-	-	-	X
PASSIFLORACEAE												
Passiflora cairica	Stinking Passion Vine	-	-	-	-	-	-	-	-	-	-	-
Passiflora subpeltata	White Passion Flower	-	-	-	-	-	-	-	-	-	-	-
PLANTAGINACEAE												
Plantago lanceolata	Lamb's Tongue	-	-	**X**	X	X	X	X	X	X	X	X
POACEAE												
Brachiaria decumbens	Signal Grass	-	-	-	X	-	-	-	X	-	X	-
Brachiaria mutica	Para Grass	-	-	-	-	-	-	-	-	-	-	-
Cenchrus ciliaris	Buffel Grass	-	-	-	-	-	-	-	-	-	-	-
Cenchrus echinatus	Mossman River Grass	-	-	**X**	X	X	X	X	X	X	X	X
Chloris gayana	Rhodes Grass	-	-	**X**	X	X	X	X	X	X	X	X
Chloris truncata	Windmill Grass	-	-	-	-	-	-	-	-	X	-	X

SPECIES	COMMON NAME	AQIS LISTED	LPA CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUNE 2008	MAR 2008	FEB 2008
Chloris virgata	Feather-top Rhodes Grass	-	-	-	X	-	-	-	-	X	X	X
Cynodon dactylon	Couch Grass	-	-	X	X	X	-	X	X	-	X	X
Dichanthium aristatum	Angleton Grass	-	-	-	-	-	-	-	-	-	-	-
Digitaria ciliaris	Summer Grass	-	-	-	-	-	-	-	-	-	-	-
Echinochloa colona	Awnless Barn Grass	-	-	X	-	-	-	-	-	-	-	-
Eleusine indica	Crowsfoot Grass	-	-	-	-	-	-	-	-	-	-	-
Eragrostis tenuifolia	Elastic Grass	-	-	-	X	X	-	-	X	-	-	-
Hemarthria uncinata	Mat Grass	-	-	-	-	-	-	-	-	-	-	-
*Imperata cylindrical**	Blady Grass*	-	-	-	-	-	-	-	-	-	X	X
Lolium x *hybridum*	A Ryegrass	-	-	-	-	-	X	-	X	-	-	-
Melinis repens	Red Natal Grass	✓	-	X	X	X	X	X	X	X	X	X
Melinis minutiflora	Molasses Grass	-	-	-	-	-	-	-	-	-	-	-
Poa annua	Winter Grass	-	-	-	-	-	-	-	-	-	-	-
Polypogon monspeliensis	Annual Beard Grass	-	-	X	-	X	-	-	-	-	-	-
Panicum effusum	Hairy Panic	-	-	-	-	-	-	-	-	-	-	-
Megathyrsus maximus var. *maximus*	Green Panic / Guinea Grass	-	-	X	X	X	X	X	X	X	-	X
Paspalum dilatatum	Paspalum	-	-	X	X	X	X	X	-	X	-	-
*Phragmites australis**	Common Reed*	✓	-	X	X	X	-	X	X	X	-	-
Setaria sp.	Pigeon Grasses	-	-	-	-	-	-	-	-	-	-	X
Sorghum halepense	Johnson Grass	-	-	-	-	-	X	X	-	-	-	-
Sporobolus fertilis	Giant Parramatta Grass	-	2	-	X	-	-	-	-	-	-	-
Urochloa mosambicensis	Sabi Grass	-	-	-	-	-	-	-	-	-	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPA CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUNE 2008	MAR 2008	FEB 2008
POLYGONACEAE												
Persicaria decipiens	Slender Knotweed	-	-	-	X	-	-	-	-	-	-	-
Persicaria lapathifolia	Pale Knotweed	-	-	X	-	X	X	X	-	-	-	-
PORTULACACEAE												
Portulaca pilosa	Hairy Pigweed	-	-	X	X	X	X	X	X	X	X	X
Portulaca oleracea	Pigweed	-	-	-	X	X	-	X	-	-	X	X
PRIMULACEAE												
Anagallis arvensis	Scarlet Pimpernel	-	-	X	X	X	X	X	X	X	X	X
RUBIACEAE												
Richardia brasiliensis	Mexican Clover	-	-	X	X	X	X	X	X	X	X	X
SAPINDACEAE												
Cardiospermum halicacabum	Balloon Vine	-	-	-	-	-	-	-	-	-	-	-
Dodonaea triquetra	Hop Bush	-	-	-	-	-	-	-	-	-	-	-
SCROPHULARIACEAE												
Misopates orontium	Lesser Snapdragon	-	-	-	-	-	-	X	-	-	-	-
SOLANACEAE												
Physalis ixocarpa	Ground Cherry	-	-	-	-	-	-	-	-	-	-	X
Solanum seaforthianum	Brazilian Nightshade	-	-	-	-	-	-	-	-	X	-	-
Solanum nigrum	Blackberry Nightshade	-	-	X	X	X	X	X	X	-	X	X
TAMARICACEAE												
Tamarix ramosissima	Tamarisk	-	-	X	X	X	X	X	-	-	-	-
TYPHACEAE												
Typha orientalis	Cumbungi / Typha*	-	-	X	X	X	X	X	X	X	-	X
ULMACEAE												
Celtis sinensis	Chinese Celtis	-	3	-	-	-	-	-	-	-	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPA CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUNE 2008	MAR 2008	FEB 2008
VERBENACEAE												
Lantana camara	Lantana	-	3	**-**	-	-	X	-	-	-	-	-
Lantana montevidensis	Creeping Lantana	-	3	**-**	-	-	-	-	-	-	-	-
Verbena bonariensis	Purple Top	-	-	**X**	X	X	X	X	-	-	-	-
Verbena aristigera	Mayne's Pest	-	-	**X**	X	X	X	X	X	X	X	X
Vitex trifolia var. *trifolia**	Coastal Vitex*	-	-	**-**	-	-	-	-	-	-	-	-

Note:

* designates indigenous species

LPR Class – *Land Protection (pest and stock route management) Regulations* 2003, Schedule 2.

Appendix D

Survey Results for Car Precinct

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUN 2008	MAR 2008	FEB 08
AIZOACEAE												
*Carpobrotus glaucescens**	Pigface*	-	-	-	-	-	-	-	-	-	X	X
*Sesuvium portulacastrum**	Sea Purslane*	-	-	**X**	X	X	X	X	X	X	X	X
*Tetragonia tetragonioides**	New Zealand Spinach*	-	-	-	-	-	-	-	-	X	-	-
AMARANTHACEAE												
Alternanthera pungens	Khaki Weed	-	-	-	-	-	-	-	-	-		X
Amaranthus viridis	Green Amaranths	-	-	**X**	X	-	X	X	X	X	X	X
Gomphrena celosioides	Gomphrena Weed	-	-	**X**	X	X	-	X	-	-	X	X
ANACARDIACEAE												
Schinus terebinthifolius	Broad-leaved Peppertree	-	3	**X**	X	X	X	X	X	X	X	X
APOCYNACEAE												
Catharanthus roseus	Pink Periwinkle	-	-	-	-	-	-	-	-	-	-	X
ASCLEPIADACEAE												
Gomphocarpus physocarpus	Balloon Cotton Bush	-	-	-	-	-	-	-	-	-	-	-
ASPARAGACEAE												
Asparagus aethiopicus cv. Sprengeri	Asparagus Fern	-	3	-	-	-	-	-	-	-	-	-
ASTERACEAE												
Ageratum houstonianum	Blue Billy-Goat	-	-	**X**	-	-	X	X	X	X	X	X
Aster subulatus	Wild Aster	-	-	-	X	-	X	X	X	X	X	-
Baccharis halimifolia	Groundsel Bush	-	2	**X**	-	X	X	X	X	X	X	X
Bidens pilosa	Cobblers Pegs	-	-	**X**	X	X	X	X	X	X	X	X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUN 2008	MAR 2008	FEB 08
Calyptocarpus vialis	Creeping Cinderella Weed	-	-	-	-	X	-	-	-	-	-	-
Conyza bonariensis	Flaxleaf Fleabane	✓	-	X	X	X	-	X	X	X	X	-
Conyza canadensis	Canadian Fleabane	✓	-	-	-	-	X	-	-	-	X	X
Conyza sumatrensis	Tall Fleabane	-	-	-	-	X		X	X	-	-	-
Crassocephalum crepidioides	Thickhead	-	-	X	-	X	X	X	X	X	X	-
Emilia sonchifolia	Emilia	-	-	X	X	X	X	X	X	X	-	-
Hypochaeris radicata	Flatweed	-	-	-	-	-	-	X	X	X	X	X
Onopordum acanthium	Scotch Thistle	-	-	-	X	-	-	-	X	X	-	-
Pseudognaphalium luteoalbum	Jersey cudweed	-	-	X	-	X	-	X	X	X	-	-
Senecio madagascariensis	Fireweed	-	2	X	-	X	X	X	X	X	X	X
Sonchus oleraceus	Rough Sow Thistle	-	-	X	-	-	-	-	X	X	-	X
Sphagneticola trilobata	Singapore Daisy	-	3	-	-	-	-	-	-	-	-	-
Tridax procumbens	Tridax Daisy	-	-	X	X	X	X	X	X	X	X	X
Tagetes minuta	Stinking Roger	-	-	-	-	-	-	-	-	-	X	-
BORAGINACEAE												
Heliotropium amplexicaule	Blue Heliotrope	-	-	X	X	-	X	X	X	-	-	-
BRASSICACEAE												
Brassica tournefortii	Wild Turnip	-	-	X	-	X	-	X	X	X	-	-
Lepidium africanum	Common Peppercress	-	-	X	X	X	-	X	X	X	-	X
CACTACEAE												
Opuntia sp.	Prickly Pear	-	2	-	-	-	-	-	-	-	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUN 2008	MAR 2008	FEB 08
CAMPANULACEAE												
*Wahlenbergia graniticola**	Granite Bluebell*	-	-	**X**	-	-	-	X	-	-	-	-
CARYOPHYLLACAE												
Cerastium glomeratum	Sticky Mouse-ear Chickweed	-	-	**-**	-	X	-	-	-	-	-	-
CHENOPODIACEAE												
Chenopodium ambrosioides	Mexican Tea	-	-	**-**	-	-	-	X	-	-	-	-
Chenopodium sp.	-	-	-	**-**	-	-	-	X	-	-	-	-
COMMELINACEAE												
Commelina diffusa (C. cyanea)	Wandering Jew	-	-	**-**	X	X	X	X	X	X	X	-
Commelina benghalensis	-	-	-	**-**	-	-	-	-	-	-	-	-
CONVOLVULACEAE												
Cuscuta campestris	Dodder	-	-	**-**	-	-	-	-	-	-	-	-
Convolves arvensis	European Bindweed	-	-	**-**	-	-	-	-	-	-	-	-
Ipomoea indica	Purple Morning Glory	-	-	**-**	X	X	X	X	X	X	X	X
Ipomoea cairica	Coastal Morning Glory	-	-	**X**	X	X	X	X	X	X	X	X
*Ipomoea pes-caprae**	Goats Foot Convolves*	-	-	**X**	-	X	-	-	-	-	-	X
CYPERACEAE												
*Bolboschoenus caldwellii**	-	-	-	**-**	-	-	X	-	X	-	-	-
*Carex appressa**	Tall Sedge*	-	-	**-**	-	-	-	-	-	-	-	-
Cyperus difformis	Rice Sedge	-	-	**-**	-	X	-	-	-	-	-	X
Cyperus congestus	Clustered Flatsedge	-	-	**-**	-	-	-	-	-	-	-	-
Cyperus eragrostis	Umbrella Sedge	-	-	**X**	X	X	X	X	X	-	X	X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUN 2008	MAR 2008	FEB 08
Cyperus involucratus	-	-	-	-	X	X	X	X	-	X	X	-
Cyperus laevigatus	-	-	-	-	X	-	-	-	-	-	-	-
Cyperus rotundus	Nut Grass	-	-	-	X	X	X	X	-	-	-	-
Cyperus polystachyos	Bunchy Sedge	-	-	X	X	X	X	X	-	X	-	-
*Fimbristylis ferruginea**	Rusty Sedge*	-	-	-	-	X	X	X	X	X	X	-
*Isolepis cernua**	Nodding Club Rush*	-	-	X	X	X	X	X	X	X	X	-
*Isolepis nodosa**	Knobby Club Rush*	-	-	X	-	X	X	X	X	X	X	-
*Schoenoplectus mucronatus**	-	-	-	-	-	-	X	-	X	X	-	-
EUPHORBIACEAE												
Chamaesyce drummondii	Caustic Creeper	-	-	-	-	-	-	-	X	-	-	X
Chamaesyce hyssopifolia	Hyssop Spurge	-	-	-	X	-	-	-	-	-	-	-
Chamaesyce maculata	Eyebane	-	-	-	-	-	-	-	-	X	-	X
Chamaesyce prostrata	Red Caustic Creeper	-	-	X	-	-	X	-	-	X	-	X
Euphorbia hirta	Asthma Plant	-	-	-	X	-	-	-	-	-	-	-
Euphorbia sp.	Spurge	-	-	-	-	-	-	-	-	-	-	-
*Macaranga tanarius**	Macaranga*	-	-	X	X	-	-	-	-	X	X	-
Phyllanthus virgatus	Creeping Phyllanthus	-	-	-	-	-	-	-	-	-	-	-
Ricinus communis	Castor Oil Plant	-	-	X	X	X	X	X	X	X	-	-
FABACEAE												
Canavalia rosea	Coastal Jack Bean	-	-	-	-	-	-	-	-	-	-	-
Centaurium erythraea	Common Centaury	-	-	X	-	-	-	-	-	-	-	-
Crotalaria incana	Woolly Rattle Pod	-	-	-	-	X	X	X	-	-	X	-
Crotalaria lanceolata subsp. *lanceolata*	Lance-leaf Rattle Pod	-	-	X	X	-	X	X	-	X	X	X
*Cullen tenax**	Emu Foot*	-	-	X	X	-	-	X	-	-	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUN 2008	MAR 2008	FEB 08
Desmodium uncinatum	Silver Leafed Desmodium	-	-	-	-	-	-	-	-	-	-	-
Indigofera hirsuta	Hairy Indigo	-	-	-	-	X	-	-	-	-	-	X
Indigofera spicata	Creeping Indigo	-	-	X	X	-	X	-	-	-	-	-
Macroptilium atropurpureum	Siratro	-	-	X	X	X	X	X	X	X	X	X
Macroptilium lathyroides	Phasey Bean	-	-	-	X	X	X	X	X	X	X	-
Medicago lupulina	Black Medic	-	-	-	-	-	-	X	X	-	-	-
Medicago polymorpha	Burr Medic	-	-	X	-	X	-	-	-	-	-	-
Medicago sativa	Lucerne	-	-	-	-	-	-	-	-	-	-	-
Melilotus albus	Bokhara	-	-	X	-	-	-	X	-	-	-	-
Melilotus indicus	Sweet Melilotus	-	-	X	-	X	-	X	X	X	-	-
Neonotonia wightii	Glycine	-	-	X	X	X	-	-	-	-	X	X
*Sesbania cannabina**	Sesbania Pea*	-	-	X	X	X	X	X	X	X	X	X
Stylosanthes hamata	Verano Stylo	-	-	-	-	-	X	X	X	X	X	X
Stylosanthes humilis	Townsville Stylo	-	-	-	X	X	-	-	-	-	-	-
Trifolium repens	Clover	-	-	-	-	-	-	X	-	-	X	-
*Vigna marina**	Yellow Beach Bean*		-	X	X	X	X	X	X	-	X	-
GRAMINEA												
*Paspalum distichum**	Water Couch*	-	-	X	X	X	X	X	X	X	X	-
JUNCACEAE												
*Juncus kraussii**	Jointed Rush*	-	-	X	X	X	X	X	X	X	X	-
*Juncas usitatus**	Common Rush*	-	-	-	-	X	-	-	-	-	-	-
MALVACEAE												
Sida cornifolia	Flannel Weed	-	-	-	-	X	-	-	-	-	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUN 2008	MAR 2008	FEB 08
Sida rhombifolia	Common Sida / Paddy's Lucerne	-	-	**X**	X	X	X	-	X	X	X	X
ONAGRACEAE												
Ludwigia peploides	Water Primrose	-	-	**X**	-	-	-	-	-	-	-	-
Ludwigia peruviana	-	-	-	**X**	X	X	X	X	-	-	-	-
Oenothera drummondii subsp. *drummondii*	Beach Primrose	-	-	**X**	X	X	X	X	X	X	X	X
Oenothera laciniata	Cut-leaf Evening Primrose	-	-	**X**	X	X	X	X	X	-	-	-
OXALIDACEAE												
Oxalis corniculata	Creeping Oxalis	-	-	**-**	-	-	-	-	-	-	-	X
PASSIFLORACEAE												
Passiflora cairica	Stinking Passion Vine	-	-	**-**	-	-	-	-	-	-	-	-
Passiflora subpeltata	White Passion Flower	-	-	**-**	-	-	-	-	-	-	-	-
PLANTAGINACEAE												
Plantago lanceolata	Lamb's Tongue	-	-	**X**	X	X	X	X	X	X	X	-
POACEAE												
Arundo donax	Giant Reed	-	-	**-**	-	-	-	-	-	X	X	X
Brachiaria decumbens	Signal Grass	-	-	**X**	-	-	X	X	-	X	X	-
Brachiaria mutica	Para Grass	-	-	**-**	-	-	-	-	-	-	-	-
Cenchrus ciliaris	Buffel Grass	-	-	**-**	-	-	-	-	-	-	-	-
Cenchrus echinatus	Mossman River Grass	-	-	**X**	X	X	X	X	X	X	X	X
Chloris gayana	Rhodes Grass	-	-	**X**	X	X	X	X	X	X	X	X
Chloris truncata	Windmill Grass	-	-	**-**	-	-	-	-	-	X	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUN 2008	MAR 2008	FEB 08
Chloris virgata	Feather-top Rhodes Grass	-	-	-	X	-	-	X	X	X	-	-
*Cymbopogon refractus**	Barbed Wire Grass*	-	-	-	-	-	-	X	X	X	X	-
Cynodon dactylon	Couch Grass	-	-	-	X	-	-	-	X	X	X	X
Dichanthium aristatum	Angleton Grass	-	-	-	-	-	-	-	-	-	-	-
*Dichanthium sericeum**	Queensland Bluegrass*	-	-	-	-	-	-	X	-	-	-	-
Digitaria ciliaris	Summer Grass	-	-	-	-	-	-	-	-	-	-	-
Eleusine indica	Crowsfoot Grass	-	-	-	-	-	-	-	-	-	-	-
Echinochloa colona	Awnless Barn Grass	-	-	X	X	-	-	-	-	-	-	-
Eragrostis tenuifolia	Elastic Grass	-	-	-	-	-	-	X	X	-	-	-
Hemarthria uncinata	Mat Grass	-	-	-	-	-	-	-	-	-	-	-
*Imperata cylindrical**	Blady Grass*	-	-	-	-	-	-	-	-	-	X	X
Lolium x *hybridum*	A Ryegrass	-	-	X		-	-	-	-	-	-	-
Megathyrsus maximus var. *maximus*	Green Panic / Guinea Grass	-	-	X	X	X	X	X	X	X	X	X
Melinis repens	Red Natal Grass	✓	-	X	X	X	X	X	X	X	X	X
Melinis minutiflora	Molasses Grass	-	-	-	-	-	-	-	-	-	-	-
Poa annua	Winter Grass	-	-	-	-	-	-	-	-	-	-	-
Polypogon monspeliensis	Annual Beard Grass	-	-	X	-	X	-	-	-	-	-	-
Panicum effusum	Hairy Panic	-	-	-	-	-	-	-	-	-	-	-
Paspalum dilatatum	Paspalum	-	-	X	X	X	X	X	X	-	X	-
*Phragmites australis**	Common Reed*	✓	-	X	X	X	X	X	X	X	X	X
Setaria sp.	Pigeon Grasses	-	-	-	-	X	X	X	-	-	X	-
Sorghum halepense	Johnson Grass	-	-	-	X	X	-	-	X	-	-	-

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUN 2008	MAR 2008	FEB 08
Sorghum arundinaceum	Wild Sorghum	-	-	**X**	-	X	-	-	-	-	-	-
Sporobolus fertilis	Giant Parramatta Grass	-	2	**X**	-	-	-	X	X	-	-	-
Urochloa mosambicensis	Sabi Grass	-	-	**-**	-	-	-	-	-	-	-	-
POLYGONACEAE												
Rumex brownii	Swamp Dock	-	-	**X**	X	X	X	-	-	-	X	-
Rumex crispus	Curled Dock	-	-	**-**	-	-	-	X	-	X	-	-
PORTULACACEAE												
Portulaca pilosa	Hairy Pigweed	-	-	**X**	X	X	X	X	-	X	X	X
Portulaca oleracea	Pigweed	-	-	**-**	X	X	X	-	-	-	-	X
PRIMULACEAE												
Anagallis arvensis	Scarlet Pimpernel	-	-	**X**	-	X	-	X	X	X	X	X
RUBIACEAE												
Richardia brasiliensis	Mexican Clover	-	-	**-**	-	-	-	-	-	-	-	X
SAPINDACEAE												
Cardiospermum halicacabum	Balloon Vine	-	-	**-**	-	-	-	-	-	-	-	-
*Dodonaea triquetra**	Hop Bush*	-	-	**-**	-	-	-	-	-	-	-	-
SOLANACEAE												
Physalis minima	Wild Gooseberry	-	-	**-**	-	-	X	-	-	-	-	-
Solanum mauritianum	Wild Tobacco Bush	-	-	**-**	-	-	-	X	-	-	-	-
Solanum seaforthianum	Brazilian Nightshade	-	-	**-**	-	-	-		-	-	-	-
Solanum nigrum	Blackberry Nightshade	-	-	**X**	X	X	X	X	X	X	X	X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	BIANNUAL SURVEY				QUARTERLY SURVEY				BASELINE SURVEY
				NOV 2010	MAR 2010	NOV 2009	MAR 2009	DEC 2008	SEP 2008	JUN 2008	MAR 2008	FEB 08
TYPHACEAE												
Typha orientalis	Cumbungi / Typha*	-	-	**X**	-	X	X	X		X	X	X
ULMACEAE												
Celtis sinensis	Chinese Celtis	-	3	**-**	-	-	-	-	-	-	-	-
VERBENACEAE												
Lantana camara	Lantana	-	3	**-**	-	X	-	-	X	X	-	-
Lantana montevidensis	Creeping Lantana	-	3	**-**	-	-	-	-	-	-	-	-
Verbena bonariensis	Purple Top	-	-	**X**	X	X	X	X	X	-	X	-
Verbena aristigera	Mayne's Pest	-	-	**X**	X	-	X	X	X	-	X	-
Verbena officinalis	Common Verbena	-	-	**-**	-	-	-	-	-	X	-	-
Vitex trifolia var *trifolia**	Coastal Vitex*	-	-	**-**	-	-	-	-	-	-	-	-

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

Appendix E

Location of Declared Species

The following table lists the GPS locations 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 for the Car Precinct area. There were no LPA declared species recorded in the T1-3 Overflow area during the November 2010 survey.

LOCATION OF DECLARED SPECIES FOR THE CAR PRECINCT

BOTANICAL NAME	COMMON NAME	GPS LOCATION (LATITUDE AND LONGITUDE)
		NOVEMBER 2010
LPA CLASS 1		
No species recorded	-	
LPA CLASS 2		
Baccharis halimifolia	Groundsel Bush	27.3904, 153.1655 27.3905, 153.1654 27.3912, 153.1698
Senecio madagascariensis	Fireweed	27.3856, 153.1688 27.3858, 153.1687 - 27.3904, 153.1655 27.3915, 153.1691 - 27.3916, 153.1687 27.3911, 153.1665
Sporobolus fertilis	Giant Parramatta Grass	27.3906, 153.1657
LPA CLASS 3		
Schinus terebinthifolia	Broad-leaf Pepper	27.3906, 153.1654 27.3909, 153.1700 27.3913, 153.1696 27.3921, 153.1649 27.3923, 153.1653 27.3922, 153.1657 27.3920, 153.1675 27.3920, 153.1671 27.3917, 153.1653 27.3909, 153.1657

Appendix F

LPA Declared Species Fact Sheets

Broadleaved pepper tree

Schinus terebinthifolius

DECLARED CLASS 3

The problem

The broadleaved pepper tree is invading coastal dune areas, wetlands and along stream banks. It harbours a disease which can kill mangroves. The tree is choking out native plants and is becoming a serious problem. Broadleaved pepper tree is a garden escapee and native to Brazil.

The broadleaved pepper tree can also affect human and animal health as it contains toxic resins. Contact with the sap can cause persistent swelling, rashes, welts, running sores, swollen faces, colic and haemorrhages in the eyes. The pollen can cause respiratory difficulty.

Description

Broadleaved pepper trees can grow into a large spreading tree, up to 10 m high and broad. The leaves consist of 5–9 dark green leaflets and at the ends of the branches are small whitish flowers, followed by bunches of glossy, round red fruits 6 mm across. There are male and female trees, so not all bear fruit.

Management

Birds are attracted to the trees bright red berries and are the main method of spread of this tree. Removal should be done in winter. Revegetation of the cleared area should be pre-planned to ensure that other weeds do not gain a foothold in the disturbed area, and should include mulching to keep weeds down.

Hand pull or chip out young plants.

If the tree is chopped down be prepared for it to regrow and the roots to sucker, sometimes for up to six months. Treat these as they occur. Try cutting 2 inches below the soil, chip away all the bark and nail a tin plate down over the stump. Sometimes the plant won't start to regrow until 18 months after initial chopping.

Broadleaved pepper tree can be put through a wood chipper to make mulch.

Declaration details

Broadleaved pepper tree is a declared Class 3 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. The Act prohibits the supply or sale of Class 3 plants and may require their removal from environmentally significant areas.

Further information

Further information is available from the vegetation management/weed control/environmental staff at your local government.

TABLE 1 – HERBICIDES REGISTERED FOR THE CONTROL OF BROADLEAVED PEPPER TREE

Method	Herbicide	Rate	Registration status	Comments
Basal bark spray	fluroxypyr (200 g/L)	35 mL per 1 L diesel or kerosene	PERMIT 7485	Spray or paint the chemical on the full circumference of each stem.
Cut stump	glyphosate (360 g/L)	1 L per 1 L water	PERMIT 7485	Paint within 15 seconds of cutting
Foliar spray	fluroxypyr (200 g/L)	500 mL per 100 L water	Registered	Winter application or while the tree is in berry, providing that no replanting of desirable broadleaf plants is intended for 6 months.

Read the label carefully before use and always use the herbicide in accordance with label directions.

It is a requirement of a permit that all persons using the products covered by this off-label permit comply with the details and conditions listed in the permit. In addition read the herbicide label carefully before use and always use the herbicide in accordance with label directions. The above permit can be used by pest control operations, members of environmental groups such as Bushcare, Catchment Care, Coast Care and people employed as or working under supervision of local and state government officers.

Fact sheet

DECLARED CLASS 3 PEST PLANT

Camphor laurel

Cinnamomum camphora

Camphor laurel was introduced into Australia from Asia in 1822. It has been promoted and planted as a garden ornamental throughout Queensland.

Camphor laurel is an attractive shade tree, but can be very destructive—it aggressively replaces native vegetation. The long-term consequences of its spread may result in the loss of native wildlife and agricultural productivity over large areas of south-east Queensland.

Camphor laurel invades pastures and disturbed riparian systems. It tends to germinate under fences and power lines (wherever birds rest and deposit the seed). As a result, it can push fences over and disrupt power facilities. It is a troublesome weed on dairy farms throughout south-east Queensland and northern New South Wales.

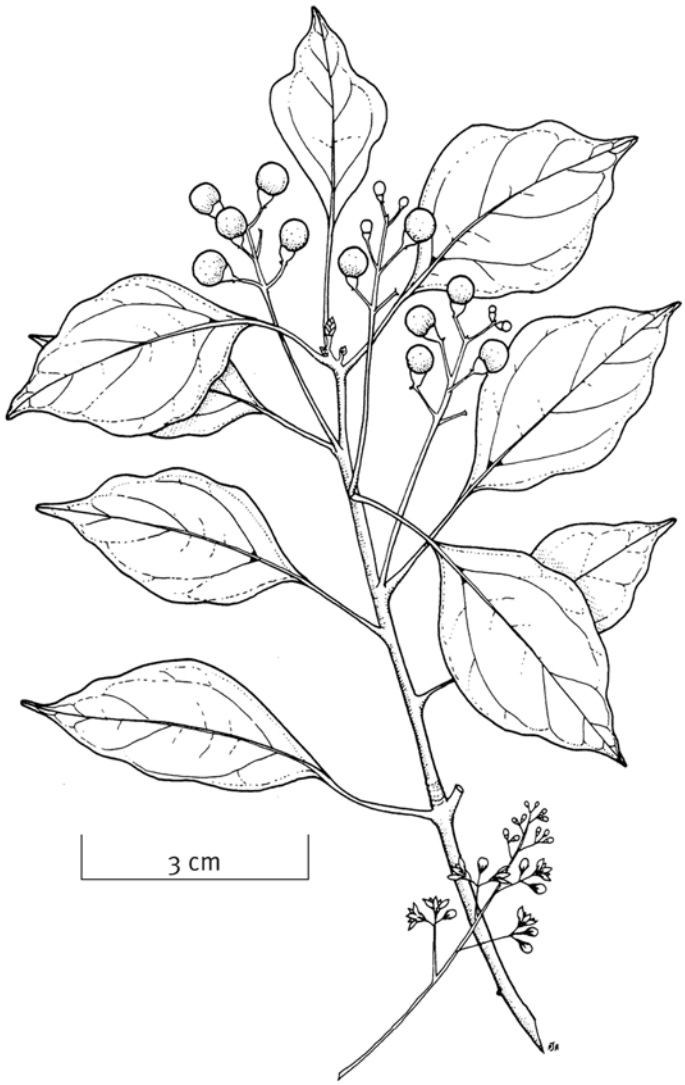
Along the waterways of south-east Queensland, camphor laurels are replacing the native blue gums threatening koala populations.

Old camphor laurel trees develop a massive root system that can block drains and crack concrete structures. The average suburban backyard is far too small to accommodate a mature camphor laurel without problems. Removal of a mature tree can cost hundreds of dollars.

WEEDBUSTERS

Queensland Government

PP46 September 2009



Declaration details

Camphor laurel is a declared Class 3 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. Class 3 plants cannot be sold in Queensland and their removal in Queensland is recommended. Landholders can be required to remove Class 3 plants if they live next to environmentally significant areas such as national parks or reserves.

Description and general information

Camphor laurel is a large evergreen tree, growing up to 20 m tall. The leaves have a glossy, waxy appearance and smell of camphor when crushed. In spring it produces lush, bright-green foliage and masses of small white flowers. The spherical fruits are green (changing to black when ripe) and 10 mm in diameter.

Habitat and distribution

Camphor laurel is native to Taiwan, Japan and some parts of China. Since it was introduced in 1822, it has spread along eastern Australia from the Atherton Tablelands down to Victoria. It is particularly common along watercourses and in soil types that once supported rainforest.

In south-east Queensland, it has the potential to develop dense infestations similar to older infestations that exist in northern New South Wales.

A large camphor laurel tree may produce over 100 000 seeds every year. The seeds are readily spread by a few species of birds.

Control

Mechanical control

Removal of newly established or isolated seedlings by hand pulling or grubbing is effective.

Bulldozing is only suitable for young trees that can be removed crowns and all. Failure to remove roots of mature trees will result in regrowth.

Fire kills plant tops but produces regrowth from the base.

Herbicide control

Selection of a suitable method depends on the size of the target tree and its situation. A standing tree that has been treated may be a serious hazard to human safety or other structures when it falls. Removal of the bulk of the tree before treating the stump is preferred in such situations.

Table 1 details the herbicides registered for camphor laurel control. Before using any herbicide always read the label carefully. All herbicides must be applied strictly in accordance with the label.

Foliar spray

Foliar sprays can be used for young trees up to 3 m tall.

Basal bark spray

Trees up to 6 m tall with a basal stem diameter up to 30 cm and no multi-stems can be treated using basal bark or cut stump methods, although basal bark is the preferred method.

When using the basal bark method, spray from ground level up to a height of 30 cm or higher than where multi-stems branch.

Stem injection

For trees taller than 6 m, stem injection using a modified axe is the most practical method—leave no more than 2 cm between cuts.

Axe cuts for stem injection of herbicides should be made at regular intervals all around the stem (or stems). Care should be taken to ensure the axe leaves a 'pocket' in the stem, into which the chemical is immediately injected. Cuts should penetrate the sapwood (just under the bark), but not the hard central wood. Cuts made too shallow into the bark or too deep into the stem will result in regrowth. The practice of drilling holes in the stem prior to herbicide application is not recommended.

Further information

Further information is available from your local government office, or from your local primary industries and fisheries biosecurity officer: contact details are available through 13 25 23.

Table 1 Herbicides registered for the control of camphor laurel

Situation	Herbicide	Rate	Comments
Foliar spray	Triclopyr-butotyl + picloram (e.g. Grazon DS®)	350–500 ml/100 L water	High-volume spray for trees up to 3 m tall; higher rate for › 2 m tall (For pasture, non-crop, forestry, right-of-way and aquatic areas)
Foliar spray	Triclopyr-butotyl + picloram (e.g. Grazon DS®)	2.5 L/100 L water	Air blast/mister; foliar spray (For pasture, non-crop, forestry, right-of-way and aquatic areas)
Foliar spray	Triclopyr-butotyl + picloram (e.g. Grazon DS®)	1:20 water	Gas gun or sprinkler sprayer; foliar spray (For pasture, non-crop, forestry, right-of-way and aquatic areas)
Foliar spray	Triclopyr-butotyl (e.g. Garlon$^{600®}$)	170 ml/100 L water	High-volume foliar spray for trees up to 3 m tall (For pasture, non-crop, forestry, right-of-way and aquatic areas)
Basal bark spray	Triclopyr-butotyl (e.g. Garlon$^{600®}$)	1 L in 60 L diesel	Basal bark for trees up to 6 m tall and 30 cm stem diameter or cut stump (For pasture, non-crop, forestry, right-of-way and aquatic areas)
Stem injection	Glyphosate-IPA	2 ml of 1:1 mix with water	Stem injection for trees up to 25 cm in diameter (For pasture, non-crop, forestry, right-of-way and aquatic areas)
Stem injection	Glyphosate-IPA	2 ml undiluted	Stem injection for trees 25–60 cm in diameter (For pasture, non-crop, forestry, right-of-way and aquatic areas)

PR09_4282

Fact sheet

DECLARED CLASS 2 PEST PLANT

Giant rat's tail grass

and other weedy *Sporobolus* species

Sporobolus pyramidalis, S. natalensis, S. jacquemontii, S. fertilis and *S. africanus*

Weedy *Sporobolus* can out-compete desirable pasture grasses.

Giant rat's tail grass is capable of producing up to 85 000 seeds/m^2/year with initial seed viability of about 90%.

Giant rat's tail grass and other weedy *Sporobolus* grasses are invasive grasses that can reduce pasture productivity, out-compete desirable pasture grasses, and cause significant degradation of natural areas.

These species were originally introduced as contaminants in pasture seed and have now adapted well to large areas of eastern Australia.

Five species of introduced *Sporobolus* grasses are declared Class 2 plants in Queensland:

- giant rat's tail grass (*S. pyradmidalis* and *S. natalensis*)
- American rat's tail grass (*S. jacquemontii*)
- giant Parramatta grass (*S. fertilis*)
- Parramatta grass (*S. africanus*).

Declaration details

Under Queensland's *Land Protection (Pest and Stock Route Management) Act 2002*, landholders are required to control Class 2 declared pests on land and waters under their control. Local government may serve a notice upon landholders requiring control of declared pests.

Description and general information

Weedy *Sporobolus* grasses are robust, tufted, perennial grasses growing up to 2 m tall. They are difficult to distinguish from other pasture grasses before maturity. However, the leaves are noticeably tougher than any other species.

They can also be difficult to identify from the other native *Sporobolus* grasses. Native *Sporobolus* grasses tend to be shorter, softer and have less dense seed heads than giant rat's tail grass. The seeds of all species are indistinguishable in pasture seed samples using current seed sample identification techniques.

Weedy *Sporobolus* seeds are spread:

- by livestock (up to 30 000 viable seeds/beast/day) in manure and on fur and hooves
- by both feral and native animals
- on vehicles and machinery (especially slashers and earth moving equipment)
- in hay and untested pasture seed
- by fast flowing water with turf.

PP48 February 2010

Queensland Government

Giant rat's tail grass

Giant rat's tail grass grows to 0.6–1.7 m high, with a seed head of up to 45 cm long and 3 cm wide. Seed heads change shape from a 'rat's tail' when young, to an elongated pyramid shape at maturity. Unlike Parramatta grass and giant Parramatta grass, giant rat's tail grass does not develop 'sooty spike' on its seed heads.

Distribution *S. natalensis*—Rockhampton (Queensland) to Port Macquarie (New South Wales).

Distribution *S. pyramidalis*—Cooktown (Queensland) to Central Coast (New South Wales).

American rat's tail grass

American rat's tail grass grows to 50–75 cm high, with a seed head of up to 25 cm long and 0.5–3 cm wide.

Distribution—Cape York (Queensland and Northern Territory) to South East Queensland.

Giant Parramatta grass

Giant Parramatta grass grows to 0.8–1.6 m high, with a seed head of up to 50 cm long and 1–2 cm wide. The branches of the seed head are pressed against the axis and overlap, although lower ones generally spread at maturity.

Distribution—Mossman (Queensland) to Central Coast (New South Wales).

Parramatta grass

Parramatta grass grows to 0.15–1.1 m high, with a seed head of up to 50 cm long and 1–2 cm wide. The leaves of mature plants are slender and erect, 6–18 cm long. Parramatta grass is not as invasive as giant Parramatta grass.

Distribution—Brisbane (Queensland) to Adelaide (South Australia).

Potential damage

Why are weedy *Sporobolus* grasses bad?

- Have low palatability when mature, and are difficult to control.
- Can quickly dominate a pasture, especially following overgrazing or soil disturbance.
- Can affect cattle health and productivity including finishing times, weaning percentages and a reduction of weights.
- Can set seed throughout frost-free periods with a significant proportion of seed remaining viable for up to 10 years.
- Can become a serious fire hazard in spring months.

Habitat and distribution

Giant rat's tail grass has adapted to a wide range of soils and conditions.

Ecoclimatic modelling suggests giant rat's tail grass is suited to conditions present in 30% of Australia (223 million ha) and 60% of Queensland (108 million ha), including areas receiving as little as 500 mm average annual rainfall.

Control

Prevention

Maintaining pastures in a vigorous and dense condition reduces the chance of invasion and increases competition against weedy *Sporobolus* seed establishment. Heavy grazing will not control weedy *Sporobolus* grasses—research indicates that grazing may actually favour its spread.

Stock movement from infested areas into clean areas is not recommended unless stock are spelled for at least five days in yards. Similarly, purchased stock from known or suspected infested areas should be spelled in the yards before release into larger paddocks. New stock can also be quarantined in a densely pastured, well-monitored holding paddock. Moving stock when there is no dew or rain will decrease the amount of seed sticking to their coats (see Table 1).

Establishment of weed-free buffer strips along boundary or perimeter fences, drainage lines and roadsides will restrict the spread of weedy *Sporobolus* grasses. It is important to clean machinery thoroughly after working in infested areas. Integrated control strategies using herbicides and other control methods, combined with good property hygiene, are essential. Research is underway to find suitable alternative pasture grasses that will restrict the establishment of weedy *Sporobolus* grasses under a range of environmental conditions. The use of higher grass seed sowing rates will increase seedling competition.

The attributes of replacement pasture grasses need to be considered when deciding what to sow. The following attributes are preferred and will increase the likelihood of success:

- well adapted to the local environmental conditions and soil type
- stoloniferous or rhizomatous growth habit
- resistant to heavy grazing
- palatable and productive
- provides competition year round (i.e. does not open up in late winter/spring)
- does not decline as soil fertility decreases
- fast to establish.

If a sown pasture species does not contain most of these attributes it is unlikely to be successful as part of a weedy *Sporobolus* grass control program.

Some pasture species, while providing strong competition once established, are weak competitors with weedy *Sporobolus* grasses in their early stages of establishment (e.g. Koronivia grass or Bisset creeping blue grass). These grasses are most successful against weedy *Sporobolus* when sown with other grasses that are vigorous when young and provide early competition against weedy *Sporobolus* grasses (e.g. Rhodes grass).

A supplier must not supply anything containing reproductive material of a plant that is a Class 1 or Class 2 pest prescribed under the Land Protection (Pest and Stock Route Management) Regulation 2003.

Management strategies

Always commence control programs in areas of light infestation, and work towards the denser infestations. **Apply all herbicides strictly in accordance with the directions on the label.**

Some details of management options are provided below.

1. Scattered plants and light infestations

Either:

- Spot spray with glyphosate.

or

- Spot spray with flupropanate.

or

- Use glyphosate through a pressurised wick wiper.

or

- Hand chip, bag and remove stools from the paddock and burn them.

2. Dense infestations on arable land

(a) Cropping option

First early summer

1. Boom spray with glyphosate @ 6 L/ha and burn prior to ploughing.
2. Spot spray or hand chip fence lines, headlands, drainage lines, shelter belts etc. for weedy *Sporobolus* grasses missed in cultivation. Plant a long season forage sorghum variety using a recommended pre-emergent herbicide.
3. Spot spray or hand chip any surviving weedy *Sporobolus* grasses to prevent reseeding.

Second summer

1. Boom spray with glyphosate to control new seedlings and crop regrowth prior to cultivation.
2. Follow the same procedures and similar cropping as for the first summer.

Third summer

1. Boom spray with glyphosate to control crop regrowth and any weedy *Sporobolus* seedlings.
2. Plant paddock with improved pastures using minimum tillage techniques to restrict bringing buried seed to the surface. Use a direct drill planter or surface broadcasting and rolling techniques. Plant fast growing pasture grasses at triple the standard sowing rates to compete with weedy *Sporobolus* seedlings.
3. Fertilise the pasture for fast pasture establishment.
4. Spot spray or hand chip weedy *Sporobolus* seedlings.

(b) Pressurised wick wiper option

The effective use of a pressurised wick wiper requires a package of three treatments over an 18-month period (Christmas/Easter/Christmas).

First treatment (mid-summer)

1. Make sure there is a 30 cm height difference between weedy *Sporobolus* and other pasture plants by selective grazing of the 'good' pasture.
2. Wick wipe weedy *Sporobolus* grass using glyphosate @ 1 part glyphosate to 2 parts water.
3. Graze using increased stocking rates after wick wiping.

Second treatment (late summer/autumn)

1. Wick wipe weedy *Sporobolus* grass using glyphosate @ 1 part glyphosate to 2 parts water.

Third treatment (next summer)

1. Wick wipe weedy *Sporobolus* grass using glyphosate @ 1 part glyphosate to 2 parts water.

3. Dense infestations on non-arable land

In summer

Either:

- Apply glyphosate through a pressurised wick wiper if terrain and timber allow.

or

- Boom or blanket spray with glyphosate in split applications of 3 L/ha (see Table 2) and replant the pasture using fast-growing pasture grasses at double the standard sowing rates.

or in winter/spring

- Boom or blanket spray with flupropanate at recommended rates. Consult the label for withholding periods.

Further information

Further information is available from your local government office, or from your local Biosecurity Queensland officer: contact details are available through 13 25 23.

Also refer to the *Weedy* Sporobolus *grasses best practice manual* (Queensland Department of Primary Industries, 2001).

Table 1. Best practices for management of weedy *Sporobolus* infested paddocks

Do's	Don'ts
Cattle	
• Manage grazing and stocking rate to maintain good ground cover of pasture.	• Don't overgraze as this will create bare patches that allow weedy *Sporobolus* grass seedlings to emerge.
• Muster only in the afternoon when plant and seed is dry.	• Don't muster on wet days or in muddy soil conditions.
• Restrict cattle to a small paddock or a laneway (on hay) for five days after grazing the weedy *Sporobolus* paddock.	• Don't deliberately overstock weedy *Sporobolus* infested paddocks.
• Muster on foot or on horseback to prevent seed contamination of machinery.	• Avoid creating bare ground from trampling around mineral licks etc.
Machinery	
• Provide a specific hose-down tarmac to clean contaminated machinery.	• Don't slash infested paddocks unless they are part of a wick wiping program.
• Keep roadways, laneways, stock routes and machinery corridors free of weedy *Sporobolus*.	• Don't drive vehicles through infested paddocks.
General hygiene	
• Enclose specimens for identification in a tied fertiliser bag.	• Don't drive around the farm with a suspected weedy *Sporobolus* specimen in the cabin or in the back of the ute.
Pasture management	
• Maintain pasture vigour with maintenance fertiliser program.	• Don't allow soil fertility run-down as this favours weedy *Sporobolus* establishment.
• Band seeding is the 'safest' method to plant legumes into an infested pasture.	• Don't renovate an infested pasture.
• Plant the recommended competitive pasture grasses.	• Don't burn the pasture unless it is part of a wick wiping, pre-cropping pasture replacement strategy.
Hay and pasture seed	
• Determine the origin of hay and ask for a weed hygiene declaration.	• Don't knowingly purchase hay contaminated with weedy *Sporobolus*.
• Feed hay in a yard, feedlot or small holding paddock.	• Don't buy seed without knowing its origin.
• Only purchase seed from a reputable seed merchant.	• Don't buy seed without a Weed Hygiene Declaration.
Control strategies	
• Choose the best control strategy based on the paddock situation and the weedy *Sporobolus* population before starting the job.	• Don't spot spray with glyphosate using a high-pressure gun from the cabin of the ute.
• If spot spraying with glyphosate, operate close enough to step on the plant and spray downwards.	• Don't wave the spray gun around—if the weedy *Sporobolus* is that dense, you should not be spot spraying.
• Low-pressure spray equipment reduces the risk of over spraying.	• Don't over-spray with glyphosate past the point of spray run-off.
• Always spot spray the single 'scout' plants around the perimeter of the infestation first, then work inwards.	

Table 2. Herbicides registered for control of giant rat's tail grass and other weedy *Sporobolus* grasses

(Always read the label thoroughly before using chemical)

Situation	Herbicide	Rate	Comments
Scattered plants/small clumps	Flupropanate[1]	2 ml/L water	**Spot spraying.** Spraying follow-up needed for 'missed' weedy *Sporobolus* grasses and new seedlings. A dye can be added to act as a spray marker. Minimise spray overlap as double application has been known to kill patches of sown pasture.
Scattered plants/small clumps	Glyphosate (360 g/L)	15 ml/L water	**Spot spraying.** Spraying follow-up needed for 'missed' weedy *Sporobolus* grasses and new seedlings. Crystalline ammonium sulphate @ 20 g/L water can be added to improve uptake.
Light and dense infestations	Glyphosate (360 g/L)	1:2 water in wick wiper[2]	**Pressurised wick wiper.** Ensure 30 cm height differential above the other pasture plants. Use increased stocking to ensure this.
Dense infestations	Glyphosate (360 g/L)	two split applications of 3 L/ha	**Blanket spraying.** Split applications a few months apart during summer give good control.
Dense infestations	Flupropanate	2 L/ha	**Boom spraying.** Slow acting (6–12 months). four-month withholding period for stock.

Notes

1. Flupropanate is residual, slow to act, does not adversely affect pasture legumes and most pasture grasses (e.g. Callide Rhodes and paspalum) if used at the recommended application rates. There is a 14-day withholding period for stock after spot spraying. Flupropanate cannot be used where lactating dairy cows and goats are grazing (refer to label).

2. Use of a pressurised wick wiper makes it possible to treat large areas quickly, selectively and most economically. Effective wick wiping entails a package of three treatments over an 18-month period.

Table 3. Giant rat's tail grass and other weedy *Sporobolus* grass control strategies

<table>
<tr><th>Density of weedy Sporobolus grass infestation</th><th colspan="2">Land accessible by tractor</th><th>Land not accessible by tractor</th></tr>
<tr><td>Occasional plants only</td><td colspan="2">Spot spray
Chip out/bag up</td><td>• Spot spray
• Chip out/bag up</td></tr>
<tr><td>Scattered plants/ small clumps</td><td colspan="2">Spot spray (<2000 stools/ha)</td><td>• Spot spray</td></tr>
<tr><td rowspan="2">Dense infestations</td><td>Arable land</td><td>Non-arable land</td><td rowspan="2">• Fence off and restrict stock movement to clean country
• Helicopter spray with glyphosate herbicide and aerially re-sow the pasture</td></tr>
<tr><td>• Fodder pre-crop before pasture replanting
• Direct pasture replacement
• Pressurised wick wiper
• Boom spray—Rhodes grass</td><td>• Pressurised wick wiper
• Direct pasture replacement</td></tr>
</table>

Source: Adapted from the joint DNR/DPI Giant Rat's Tail Grass Project, March 1999.

PR10–4849

Fact sheet

DECLARED CLASS 3 PEST PLANT

Lantana

Lantana camara

Currently, lantana covers more than 5 million ha of the east coast from southern New South Wales to Far North Queensland. Small infestations of lantana have also been found in central west Queensland, the Northern Territory, Western Australia, South Australia and Victoria. Efforts are under way to control these.

Lantana is mainly spread by people (as ornamental plants) and fruit-eating birds. It forms dense thickets that smother and kill native vegetation and are impenetrable to animals, people and vehicles.

Research indicates more than 1400 native species are negatively affected by lantana invasion, including many endangered and threatened species. As lantana is a woody shrub that has thin, combustible canes, its presence can also create hotter bushfires.

Declaration details

All lantana species are declared Class 3 plants under the *Land Protection (Pest and Stock Route Management) Act 2002*. Lantana species cannot be sold or distributed and landholders may be required to control these plants if they pose a threat to an environmentally significant area.

Description and general information

Lantana is a heavily branched shrub that can grow in compact clumps, dense thickets or as a climbing vine.

The stems are square in cross section, with small, recurved prickles. Most leaves are about 6 cm long and are covered in fine hairs. They are bright green above, paler beneath and have round-toothed edges. Leaves grow opposite one another along the stem. When crushed the leaves produce a distinctive odour.

Flowers appear throughout most of the year in clustered, compact heads about 2.5 cm in diameter. Flower colours vary from pale cream to yellow, white, pink, orange and red. Lantana produces round, berry-like fruit that turn from glossy green to purplish-black when ripe.

For rural producers, lantana poses problems of stock poisoning and invasion of desirable pasture. An economic impact assessment indicated lantana costs the Queensland grazing sector in excess of $70 million (2005–06 values) per year.

PP34 March 2010

Queensland Government

It is now illegal to sell or distribute any variety of lantana in Queensland. However, garden plantings are still common in many areas and have the potential to cause problems of their own.

Despite being sold and marketed as 'sterile' plants, research indicates some ornamental lantana varieties have the ability to set seed and can spread vegetatively. They also produce some viable pollen and have the potential to cross-pollinate with wild forms, creating new varieties that could naturalise in the environment.

If the number of naturalised varieties increases due to genetic drift from ornamental varieties it will make finding effective biological control agents even more difficult, and potentially extend the climatic tolerances and range of the weed's spread.

Habitat and distribution

Lantana is native to the tropical and subtropical regions of Central and South America.

It is found throughout most coastal and subcoastal areas of eastern Australia, from Far North Queensland to southern New South Wales. It grows in a wide variety of habitats, from exposed dry hillsides to wet, heavily shaded gullies.

Toxicity

Many lantana varieties are poisonous to stock. It is difficult to tell which varieties are toxic so it is better to treat all forms as potentially poisonous. The toxins in lantana include the triterpene acids, lantadene A (rehmannic acid), lantadene B, and their reduced forms.

Most cases of lantana poisoning occur when new stock are introduced into lantana-infested areas. Stock bred on lantana-infested country avoid lantana unless forced to eat it due to lack of other fodder. Young animals introduced to lantana areas are most at risk.

Symptoms of lantana poisoning depend on the quantity and type of lantana consumed and, under some circumstances, the intensity of light to which the animals are exposed.

Early symptoms of depression are noticeable, with head swaying, loss of appetite, constipation and frequent urination. After a day or two the eyes and the skin of the nose and mouth start yellowing with jaundice, and the muzzle becomes dry and warm. The eyes may become inflamed and have a slight discharge. The animal also becomes increasingly sensitive to light. Finally, the muzzle becomes inflamed, moist and very painful ('pink nose'). Areas of skin may peel and slough off. Death commonly occurs 1–4 weeks after symptoms occur. Death from acute poisoning can occur 3–4 days after eating the plant.

If animals show any of the early symptoms, they should be moved to lantana-free areas, kept in the shade and monitored. Veterinary treatment should be sought immediately. Some remedies may include intravenous fluids, treating skin damage with antibiotics, or drenching with an activated charcoal slurry.

Care should be taken when introducing new or young animals into a paddock if lantana is present. Ensure they have enough fodder to stop them eating lantana in quantities sufficient to result in poisoning. During drought, animals should not be placed in lantana-infested areas without alternative food.

Control

Using a mix (integration) of control methods gives the best results. Size, density and geographic location of infestations are important considerations for choosing which control methods to use. A general principle is to commence control programs in areas of light infestations and work towards the denser infestations.

For large lantana infestations, treatment with herbicides by foliar spraying is usually not economically feasible. However, fire, dozing/stick raking, slashing/cutting, aerial helicopter spraying can reduce dense infestations, making follow-up spot treatments with chemicals more economically viable.

Lantana seed banks remain viable for at *least* four years, so follow-up control to kill seedlings before they mature is vital to ensure initial management efforts to control the parent bush are not wasted.

Appropriate fire regimes may become part of a management program to ensure lantana invasiveness is reduced and pasture is maintained.

Removal of lantana within areas of remnant vegetation may require a permit under the *Vegetation Management Act 1999*. Further information should be sought from the Department of Environment and Resource Management before works commence.

Mechanical control

Stick raking or ploughing can be effective in removing standing plants. However, regrowth from stumps and/or increased seedling germination in disturbed soil is common and the site will require follow-up treatment.

Grubbing of small infestations—for example, along fence lines—can be a useful and effective method of removing plants, though this is time consuming.

Repeated slashing can also reduce the vigour of lantana, exhausting its stored resources and reducing its likelihood of re-shooting.

Some locations—for example, very steep inclines or gullies—are not suitable for mechanical control options because of the danger of overturning machinery and soil erosion.

Fire

Regular burning will reduce the capacity of plants to survive; however, initial kill rates are variable.

The effectiveness of this method will depend on the suitability of available fuel loads, fire intensity, temperature, relative humidity, soil moisture and season. Pasture re-establishment can then provide competition to inhibit lantana seed germination.

Fire is not recommended in non–fire tolerant vegetated areas such as rainforest, or wooded or plantation areas.

A typical control program for fire may include:

- exclude stock to establish a pasture fuel load
- burning (may require a permit)
- sow improved pastures—consult your local Biosecurity Queensland officer for advice
- continue to exclude stock until pasture has established and seeded
- burn again in summer before rain and spot spray lantana regrowth when › 0.5 m high and when it is actively growing (see Table 1).

Herbicide control

Herbicide recommendations for lantana are shown in Table 1. Users of herbicides have a legal obligation to read herbicide labels and use only the registered rates. Always use herbicides responsibly; adhere to legislation and safety requirements.

Variation in results can be a result of inconsistent application methods, mix rates or seasonal variation. Red-flowered and pink-edged red-flowered lantana are often considered the most difficult to control because their leaves are often smaller and tougher. However, herbicides can kill these varieties if you carefully follow application procedures.

For single-stemmed lantana, basal bark spraying and cut stump methods also give good results at any time of year (but best when the plant is actively growing). On multi-stemmed varieties, you will obtain best results by carefully applying herbicide to each stem.

When treating actively growing plants less than 2 m high, overall spraying of foliage to the point of run-off is recommended. Splatter gun techniques are also effective and particularly useful in hard-to-access areas. This is best done in autumn—when sap flows draw the poison down into the root stock, but before night temperatures get too cold.

Remove grazing animals from spray areas during and soon after treatment. Stress can cause increased sugar levels in the leaves of lantana plants, making them more palatable.

Landholders and contractors should check if the property is situated in a hazardous area. This prevents the use of some chemicals, as defined in the *Agricultural Chemicals Distribution Control Act 1966*.

Biological control

Since 1914, 31 biological control agents have been introduced into Australia in an attempt to control lantana. Seventeen have established, of which several insect species cause seasonal damage, reducing the vigour and competitiveness of lantana in some areas.

Biosecurity Queensland research programs continue to investigate agents suitable for release in Australia, and test the viability of these agents in an effort to identify more effective biological control agents.

It is important to remember that biological control alone should not be relied upon for managing lantana infestations. Consideration should be given to other available control techniques.

The four most important biological control agents are:

- **sap-sucking bug (*Teleonemia scrupulosa*)**
  Found in dry areas from Cooktown to Wollongong, this small, mottled, bug feeds on the underside of leaves, growing tips and flower buds, causing the leaves to drop early and stopping the plant from flowering.
- **leaf-mining beetle (*Uroplata girardi*)**
  Found in most lantana infestations from Cape Tribulation to Sydney as well as around Darwin, except in very dry or high altitude areas. The adult beetles are dark brown. They shelter in curled leaves and feed on the upper leaf surfaces. Larvae feed in leaves causing blotches to spread across the leaf. This beetle reduces plant vigour and can suppress flowering.
- **leaf-mining beetle (*Octotoma scabripennis*)**
  Found in most lantana infestations from Atherton to Wollongong. Adults of this species feed on the upper leaf surface, while larvae feed and mine the centre of the leaf and cause blotches. This activity reduces plant vigour and can suppress flowering.
- **seed-feeding fly (*Ophiomyia lantanae*)**
  Found from Cape Tribulation to Eden in New South Wales and also around Darwin and Perth. *Ophiomyia* is a small black fly that feeds on flowers and lays eggs on the green fruits. The maggots of the fly eat the seed and make the fruit unattractive to birds, reducing seed spread.

Other agents such as *Aconophora compressa* (a stem-sucking bug) and *Leptobyrsa decora* (a sap-sucking bug) have caused some damage in specific geographic areas.

Note: Landholders are advised not to consume their time collecting established insects for distribution. Due to their own ability to disperse, these insects will be periodically/seasonally present in areas that are climatically suitable for them.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland (call 13 25 23 or visit our website at www.deedi.qld.gov.au).

Table 1. Herbicides for control of lantana

Method of application: active ingredient (trade name)[a]	Rate	Optimum time[b]	Remarks
Foliar (overall) spray			
Fluroxypyr (Starane® 200)	0.5 L to 1 L/100 L water	December to April	Thorough wetting of plants is required, higher rate should be used for larger plants
Glyphosate (Roundup® 360, Glyphosate 360®)	1 L/100 L water	October to April	Wet plant thoroughly. Glyphosate affects any green plant it comes into contact with. Glyphosate is available in a range of strengths
Picloram + 2,4-D (Tordon® 75-D)	0.65 L/100 L water	February to April	Wet plant thoroughly. Legumes are affected if sprayed
Dichlorprop (Lantana® 600)	0.5 L/100 L water	December to April	Must thoroughly wet all leaves. Please refer to product label for situation details
Picloram + triclopyr + aminopyralid (Grazon Extra®)	0.35 L to 0.5 L/100 L water	February to April	Wet plant thoroughly. Use the higher rate on larger plants. Legumes may be affected if sprayed
2,4-D amine (Amicide® 625)	0.32 L/100 L water	March to May	Red-flowered lantanas are more resistant to 2,4-D. Will kill young legumes
Metsulfuron methyl, (Brush-off®, Brushkiller® 600,Lynx® 600)	10 g/100 L water[b]	March to May	Results variable. Not found effective in tropics. Follow-up sprays are necessary
Metsulfuron methyl + glyphosate (Cutout®)	95 g/100 L water	March to May	Apply to bushes up to 2 m tall. Spray to thoroughly wet all foliage and stems. Spray to penetrate throughout the bush
Metsulfuron methyl + glyphosate (Trounce®)	173 g/100 L water	March to May	Apply when actively growing. Do not apply during periods of stress
Aminopyralid + fluroxypyr (Hotshot®)	0.5 L to 0.7 L/100 L water	October to April	Spray all foliage, including stems, to the point of run-off
(i) Basal bark (ii) Cut stump			
Triclopyr (Garlon 600®)	1 L/60 L diesel	Any time. Best results when actively growing	(i) Apply to lower 40 cm of every stem. Must ensure complete coverage around stem (ii) Cut close to ground level. Immediately apply herbicide
2,4-D ester (AF Rubber Vine Spray®)	2.5 L/100 L diesel	Any time. Best results when actively growing	As above
Picloram + Triclopyr (Access®)	1 L/60 L diesel	Any time. Best results when actively growing	As above
Picloram (Vigilant® Herbicide Gel)	3 mm to 5 mm gel	Any time. Best results when actively growing	(ii) If diameter of stump is › 20 mm, use a minimum of 5 mm gel thickness
Glyphosate (Roundup®, Weedmaster Duo®)	Neat	Any time. Best results when actively growing	Off-label permit
Splatter gun			
Glyphosate (Roundup® 360)	1:9 glyphosate +water	October to April	2 x 2 ml dose per 0.5 m height of lantana
Metsulfuron methyl (Brushkiller® 600, Lynx® 600)	2 g/L water	March to May	As above
Aerial			
Picloram + triclopyr + 2,4-D (Grazon® DS + 2,4-D amine 625 g/L)	1.5 L + 6 L/ha or 10 L/ha (Grazon®)	When plant actively growing	Helicopter only. Minimum of 200 L water per hectare. Follow-up re-spray will be required. Do not burn within six months of treatment
Dichlorprop(Lantana® 600)	6 L to 8 L L/ha	When plant actively growing	As above

a Only some common trade names provided.
b Optimum times are only a guide. Lantana must be actively growing for the herbicide to work.
® = Registered trade name.
Labels often recommend the additional use of a wetting agent or surfactant within the mix. Herbicides types vary in their selectivity against other species and soil residual.

Fact sheets are available from Department of Employment, Economic Development and Innovation (DEEDI) service centres and our Business Information Centre (telephone 13 25 23). Check our website at www.deedi.qld.gov.au ‹file://www.deedi.qld.gov.au› to ensure you have the latest version of this fact sheet. The control methods referred to in this fact sheet should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, DEEDI does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.