Final Report for
Port of Brisbane Corporation

Plant Survey – T1-3 Overflow & Car Precinct, Port of Brisbane (March 2009)

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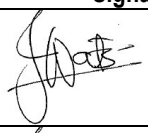
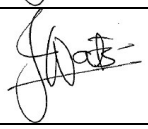
0	L. Fisher	N. Lechner		25th March 2009
1	L. Fisher	-		1st April 2009

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1.0 EXECUTIVE SUMMARY

Natural Solutions (now Conics (Brisbane) Pty Ltd) have been commissioned by the Port of Brisbane Corporation (PBC) to undertake a plant survey along the T1-3 Overflow and Car Precinct areas located within the Port of Brisbane and to produce associated reporting. This is the first bi-annual monitoring report and details the results from the March 2009 survey. Previous surveys and reporting had been undertaken quarterly in 2008 during the months of March, June, September and December.

The primary purpose for the on-going bi-annual surveys is to monitor for any previously unrecorded incursions of weed species listed by the Australian Quarantine and Inspection Services (AQIS) that may arise on the sites (as listed in **Appendix C**). The secondary objective of the on-going bi-annual surveys is to address the long-term management of these areas through continual monitoring of the occurrence and abundance of species considered to be exotic, including species declared under the *Land Protection (Stock Route Management) Regulations 2003* (LPR) and locally occurring weeds. Recommendations with respect to the ongoing management of plants within the T1-3 Overflow and Car Precinct areas are also provided.

Summary of Findings from the March 2009 Bi-annual Survey for the T1-3 Overflow Area

The following points summarise the findings of the March 2009 bi-annual plant survey for the T1-3 Overflow area:

1. Fourty-four plant species were recorded. This consisted of five native species, two AQIS listed weed species and 37 exotic species;
2. The AQIS listed weed species recorded were Red Natal Grass (*Melinis repens*) and Canadian Fleabane (*Conyza canadensis*). Common Reed (*Phragmites australis*), which was recorded during the previous December 2008 quarterly plant survey was not recorded during the recent (March 2009) bi-annual plant survey;
3. The recorded AQIS listed weed species occurred along the majority of the eastern side of the T1-3 Overflow area;
4. No individuals of the AQIS listed Siam Weed (*Chromolaena odorata*) were located during the bi-annual plant survey;
5. Lantana (*Lantana camara*), which is an LPR declared species was recorded in the recent March 2009 bi-annual plant survey. This declared species was not recorded in any of the previous quarterly plant surveys or baseline study;
6. Exotic grasses, herbaceous and vine species such as Cut-leaf Evening Primrose (*Oenothera laciniata*), Verano Stylo (*Stylosanthes hamata*), Red Caustic Creeper (*Chamaesyce prostrata*), Asthma Plant (*Euphorbia hirta*) and Siratro (*Macroptilium atropurpurem*) were the dominant groups of exotic species observed throughout the majority of the T1-3 Overflow area;
7. Species diversity of AQIS listed weed species has decreased in comparison to the previous December 2008 quarterly survey results whilst abundance and coverage have remained constant; and
8. Species diversity, abundance and coverage of exotic species has decreased in comparison to the previous December 2008 quarterly survey results.

Summary of Findings from the March 2009 Bi-annual Survey for the Car Precinct Area

The following points summarise the findings of the March 2009 bi-annual plant survey for the Car Precinct area:

1. Fifty-eight plant species were recorded. This consisted of 12 native species, three AQIS listed weed species and 46 exotic species;
2. The AQIS listed weed species recorded were Common Reed (*Phragmites australis*), Red Natal Grass (*Melinis repens*) and Canadian Fleabane (*Conyza canadensis*). Only one of these species, Canadian Fleabane, was not recorded during the December 2008 quarterly plant survey (i.e. the remaining two species were previously recorded) but has been recorded over past surveys of this area;
3. No individuals of the AQIS listed Siam Weed (*Chromolaena odorata*) were located during the recent bi-annual plant survey;
4. Individuals of Groundsel (*Baccharis halimifolia*), Fireweed (*Senecio madagascariensis*) and Broad-leaved Peppertree (*Schinus terebinthfolia*), which are LPR declared species were recorded in the recent March 2009 bi-annual plant survey;
5. Locally occurring exotic grass species such as Rhodes Grass (*Chloris gayana*) and Green Panic (*Megathyrsus maximus* var. *maximus*) as well as exotic herbaceous and vine species such as Beach Primrose (*Oenothera drummondii* subsp. *drummondii*) and Siratro (*Macroptilium atropurpureum*) were the dominant exotic species observed throughout the majority of the Car Precinct area. Common Reed (*Phragmites australis*) as well as exotic sedge species were the dominant species in the wetter portions of the Car Precinct area such as within the western trench and around the Visitor Lake;
6. Species diversity of AQIS listed weed species has remained consistent in comparison to the previous December 2008 quarterly plant survey results, whereas abundance and coverage has slightly increased; and
7. Exotic species diversity, abundance and coverage has decreased in comparison to the previous December 2008 quarterly plant survey.

Summary of Recommendations

Recommendations regarding the long-term management of exotic species within the T1-3 Overflow and Car Precinct area are provided in this report. No specific recommendations are provided for the 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 LPR 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.

2.0 INTRODUCTION

Natural Solutions (now Conics (Brisbane) Pty Ltd) have been commissioned by the Port of Brisbane Corporation (PBC) to undertake regular surveys for weed species listed by Australian Quarantine and Inspection Service (AQIS) along the T1-3 Overflow and Car Precinct areas, Port of Brisbane[1] and to produce associated reporting detailing the findings from such surveys. In addition, plant species considered to be exotic/invasive, including species declared under *the Land Protection (Stock Route Management) Regulations 2003* (LPR), locally occurring weeds (hereafter collectively referred to as exotic species), and invasive natives are also included in the surveys and reporting.

These plant surveys have been implemented in response to a request from 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 (as listed in **Appendix C**). 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 the 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 weed species which may enter the country on containers or other materials shipped to and unloaded at the Port of Brisbane facility.

The plant surveys for T1-3 Overflow and Car Precinct Areas were previously undertaken on a three monthly interval over the last 12 month monitoring period with the baseline study undertaken in February 2008. The previous reports prepared from the quarterly surveys were undertaken in:

- March 2008;
- June 2008;
- September 2008; and
- December 2008.

Plant surveys are currently planned to be undertaken bi-annually during the post-summer and post-winter months. This is the first report detailing the results from the March 2009 bi-annual plant survey.

2.1 SITE DESCRIPTION

The plant surveys focus 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 these two areas, in the south-western portion of the Port of Brisbane (**Figure 1**).

The T1-3 Overflow area is situated along Port Drive and extends around a large hardstand car parking area, towards and pass the overpass and including a constructed drain located at the very northern end of the area (**Figure 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 Overflow is to facilitate in absorbing and filtering excess stormwater that may

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

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**). It takes in an area extending from the road overpass, situated at the northern end of the site, to around the entire edge of the Visitors Centre Lake (**Figure 1)**. The Car Precinct area is a constructed drainage channel that comprises of 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 and into the trench. 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. During the recent March 2009 bi-annual plant survey it would appear that the western trench of the Car Precinct Area has been re-graded.

Both of these areas currently have a regular maintenance schedule (including mowing and spraying for exotic species) facilitated by the Port of Brisbane Corporation.

Figure 1 - T1-3 Overflow and Car Precinct Survey Areas

Port of Brisbane Corporation

Compiled	Compiled By	Project Manager	Reference	Datum	Scale @ A4	0 75 150 Meters
19-06-2008	AC	NL	J08031_Figure1_overflow	GDA94	1:5,000	

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3.0 METHODOLOGY

The first bi-annual plant survey was undertaken on the 6 March 2009 (hereafter referred to as the March 2009 bi-annual plant survey). The March 2009 bi-annual plant survey for the T1-3 Overflow area consisted of four transects running the entire length of the eastern, northern, western and southern boundaries of the hardstand area and measuring approximately 2m wide. Another transect with the same width dimensions ran along both banks of the constructed drain just north of the hardstand area. Transects were undertaken on foot using the random meander technique to ensure the majority of the overflow area was surveyed. The presence and abundance of any AQIS listed weeds as well as exotic (i.e. species declared under the LPR and locally occurring weeds) or invasive species that occurred along the transects were recorded on data sheets (**Appendix D**).

The March 2009 bi-annual plant survey for Car Precinct area consisted of two transects, which ran along the western and southern boundary of the vehicle storage area and one non-linear transect that ran around the entire edge of the Visitors Centre Lake. Transects were undertaken on foot using the random meander technique to ensure the majority of the drain (including the bed, bank and top of bank areas) and lake banks were surveyed. The presence and abundance of any AQIS listed weeds as well as exotic or invasive species that occurred along the transects were recorded on data sheets (**Appendix D**).

Any plant species from both survey areas that were unable to be immediately identified on the site, were collected and appropriately labelled for further detailed analysis. Plant identifications were carried out by experienced ecologists/botanists using available flora and botanical reference material, where necessary.

It is currently planned for the plant surveys of both the T1-3 Overflow and Car Precinct areas to be undertaken on a six monthly interval, during post-summer months (around March) and post-winter months (around October) of each year.

3.1 AQIS TARGET WEED LIST

AQIS has prepared a list of weed species identified as weeds of interest within the Port of Brisbane area. This list is contained in **Appendix C**.

4.0 FINDINGS

4.1 T1-3 OVERFLOW AREA

Appendix A contains a list of plant species recorded during the March 2009 bi-annual plant survey. The following points summarise the findings of the March 2009 bi-annual plant survey for the T1-3 Overflow area:

1. Fourty-four plant species were recorded. This consisted of five native species, two AQIS listed weed species and 37 exotic species;
2. The AQIS listed weed species recorded were Red Natal Grass (*Melinis repens*) and Canadian Fleabane (*Conyza canadensis*). Common Reed (*Phragmites australis*), which was recorded during the previous December 2008 quarterly plant survey was not recorded during the recent (March 2009) bi-annual plant survey;
3. The recorded AQIS listed weed species occurred along the majority of the eastern side of the T1-3 Overflow area;
4. No individuals of the AQIS listed Siam Weed (*Chromolaena odorata*) were located during the bi-annual plant survey;
5. Lantana (*Lantana camara*), which is an LPR declared species was recorded in the recent March 2009 bi-annual plant survey. This declared species was not recorded in any of the previous quarterly plant surveys or baseline study;
6. Exotic grasses, herbaceous and vine species such as Cut-leaf Evening Primrose (*Oenothera laciniata*), Verano Stylo (*Stylosanthes hamata*), Red Caustic Creeper (*Chamaesyce prostrata*), Asthma Plant (*Euphorbia hirta*) and Siratro (*Macroptilium atropurpurem*) were the dominant groups of exotic species observed throughout the majority of the T1-3 Overflow area;
7. Species diversity of AQIS listed weed species has decreased in comparison to the previous December 2008 quarterly survey results whilst abundance and coverage have remained constant; and
8. Species diversity, abundance and coverage of exotic species has decreased in comparison to the previous December 2008 quarterly survey results.

4.2 CAR PRECINCT AREA

Appendix B contains a list of plant species recorded during the March 2009 bi-annual plant survey for the Car Precinct area. The following points summarises the findings of the March 2009 bi-annual plant survey for the Car Precinct:

1. Fifty-eight plant species were recorded. This consisted of 12 native species, three AQIS listed weed species and 46 exotic species;
2. The AQIS listed weed species recorded were Common Reed (*Phragmites australis*), Red Natal Grass (*Melinis repens*) and Canadian Fleabane (*Conyza canadensis*). Only one of these species, Canadian Fleabane, was not recorded during the December 2008 quarterly plant survey (i.e. the remaining two species were previously recorded) but has been recorded over past surveys of this area;
3. No individuals of the AQIS listed Siam Weed (*Chromolaena odorata*) were located during the recent bi-annual plant survey;

4. Individuals of Groundsel (*Baccharis halimifolia*), Fireweed (*Senecio madagascariensis*) and Broad-leaved Peppertree (*Schinus terebinthfolia*), which are LPR declared species were recorded in the recent March 2009 bi-annual plant survey;
5. Locally occurring exotic grass species such as Rhodes Grass (*Chloris gayana*) and Green Panic (*Megathyrsus maximus* var. *maximus*) as well as exotic herbaceous and vine species such as Beach Primrose (*Oenothera drummondii* subsp. *drummondii*) and Siratro (*Macroptilium atropurpureum*) were the dominant exotic species observed throughout the majority of the Car Precinct area. Common Reed (*Phragmites australis*) as well as exotic sedge species were the dominant species in the wetter portions of the Car Precinct area such as within the western trench and around the Visitor Lake;
6. Species diversity of AQIS listed weed species has remained consistent in comparison to the previous December 2008 quarterly plant survey results, whereas abundance and coverage has slightly increased; and
7. Exotic species diversity, abundance and coverage has decreased in comparison to the previous December 2008 quarterly plant survey.

5.0 DISCUSSION

5.1 T1-3 OVERFLOW AREA

5.1.1 Weed Species Observed at T1-3 Overflow Area

The March 2009 bi-annual plant survey along the T1-3 Overflow area has identified a total number of 44 plant species. Of these, two are AQIS listed weed species and 39 are considered exotic.

The two AQIS listed weed species located within the T1-3 Overflow area during the March 2009 bi-annual plant survey were Red Natal Grass (*Melinis repens*) and Canadian Fleabane (*Conyza canadensis*). These AQIS listed weed species were recorded in previous surveys and generally occur throughout the Port of Brisbane area and are common weeds that are found in most disturbed areas within the Brisbane region. Nonetheless, the removal of these species and gradual replacement with native species is still recommended.

One Class 3 LPR declared species, Lantana, was recorded during the March 2009 bi-annual plant survey. This was not recorded in any of the previous quarterly plant survey or baseline study. The lack of detection of this species could be attributed to general survey limitations that may have produced a false-absence record during the previous survey (i.e. the species is present, but is not detected). The lack of detection could also be a result of the recent establishment of this exotic species within the T1-3 area. Under the LPR landholders are obliged to attempt to remove Class 2 species and encouraged to remove Class 3 species. Therefore consideration should be given to remove this declared species and control further establishment.

Species listed as noxious weeds by Brisbane City Council (BCC) were detected in the March 2009 bi-annual plant survey. These include Wild Aster (*Aster subulatus*) and Johnsons Grass (*Sorghum halepense*). These species have been previously recorded within the T1-3 Overflow Area.

5.1.2 Comparison between T1-3 Overflow Surveys

Two AQIS listed species were recorded during the March 2009 bi-annual plant survey of the T1-3 Overflow area (Red Natal Grass & Canadian Fleabane). Both species have been recorded at some stage of the T1-3 Overflow monitoring surveys (i.e. either from the quarterly plant survey and/or the February 2008 baseline survey). The current (March 2009) abundance and coverage of AQIS listed species within the T1-3 Overflow area has remained relatively consistent since the previous quarterly plant survey (December 2008) whereas diversity of AQIS listed species has decreased.

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 1** and **Figure 2** highlights and compares the number of exotic species identified in each plant survey as well as the February 2008 Baseline Survey of the T1-3 Overflow area.

TABLE 1 NUMBER OF EXOTIC SPECIES RECORDED PER SURVEY FOR THE T1-3 OVERFLOW AREA

SURVEY	NUMBER OF EXOTIC SPECIES RECORDED
Baseline Survey (Feb 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 Bi-annual Plant Survey	**39**

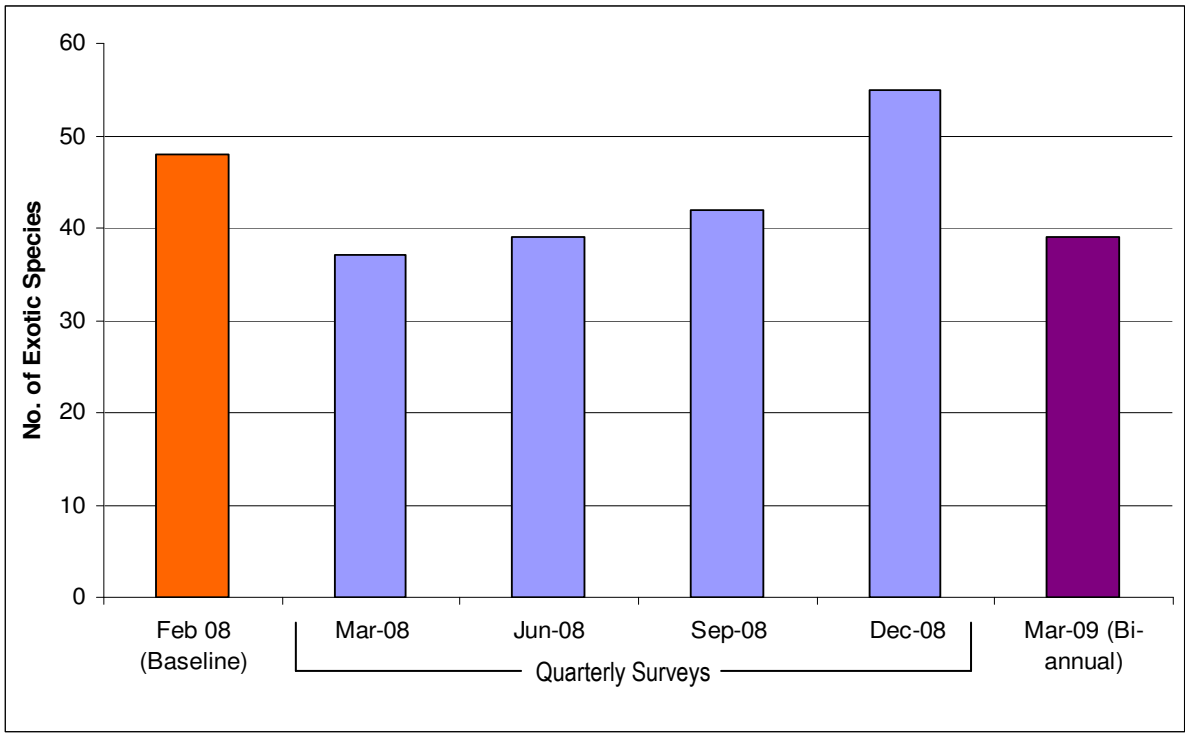

Figure 2 Number of Exotic Species Recorded per Survey along the T1-3 Overflow Area

Table 2 outlines the numbers of exotic species within each family that were recorded in the February 2008 baseline survey and the March, June, September and December 2008 quarterly plant surveys as well as the March 2009 bi-annual plant survey.

TABLE 2 NUMBER OF EXOTIC SPECIES BY FAMILY FOR THE T1-3 OVERFLOW AREA

FAMILY	NUMBER OF EXOTIC SPECIES					
	BASELINE SURVEY	QUARTERLY SUVEYS				BI-ANNUAL SURVEY
	FEB 08	MAR 08	JUNE 08	SEP 08	DEC 08	MAR 09
POACEAE	8	6	7	8	8	**7**
ASTERACEAE	6	**8**	**9**	**12**	9	6
FABACEAE	**11**	**8**	5	5	**10**	5
VERBENACEAE	1	1	1	1	2	3
APIACEAE	1	1	1	1	2	2
EUPHORBIACEAE	2	1	1	0	1	2
ONAGRACEAE	1	1	2	2	3	2
AMARANTHACEAE	2	2	2	2	2	1
BORAGINACEAE	1	0	0	0	1	1
COMMELINACEAE	0	1	1	1	0	1
CYPERACEAE	3	0	1	1	1	1
MALVACEAE	2	1	1	1	1	1
PLANTAGINACEAE	1	1	1	1	1	1
POLYGONACEAE	0	0	0	0	1	1
PORTULACACEAE	2	2	1	1	2	1
PRIMULACEAE	1	1	1	1	1	1
RUBIACEAE	1	1	1	1	1	1
SOLANACEAE	2	1	1	1	1	1
TAMARICACEAE	0	0	0	0	1	1
BRASSICACEAE	1	1	2	2	2	0
CARYOPHYLLACEAE	0	0	0	1	1	0
CHENOPODIACEAE	1	0	1	0	2	0
PAPAVERACEAE	1	0	0	0	0	0
TYPHACEAE	0	0	0	0	0	0

*Shading indicates dominant family group

From the data contained in **Tables 1** and **2** as well as in **Figure 2** the following can be deduced:

1. The number of exotic species recorded within the T1-3 Overflow area during the recent March 2009 bi-annual plant survey has substantially decreased since the previous December 2008 quarterly plant survey. The number of exotic species recorded in the recent survey (March 2009) are similar to the number recorded during the same month last year (March 2008);
2. It can be seen that the previous December 2008 quarterly plant survey species diversity results is not only higher than recent (March 2009) species diversity results but also the highest ever recorded. Although maintenance was undertaken not long before the previous December 2008 quarterly plant survey, coverage and abundance levels were also higher than previously observed;
3. The month of November 2008 received very high rainfall totals that were more than double the long term average for that month (see **Section 5.3**). Such weather is considered favourable to plant growth and is most likely the main contributing factor to the higher abundance, coverage and diversity of exotic species for the previous December 2008 quarterly plant survey (as compared to not only the recent March 2009 surveys results but all other survey results);
4. Maintenance activities appear to have been undertaken not long before the recent March 2009 bi-annual plant survey. Recent maintenance combined with low to average rainfall totals and slightly cooler temperatures (see **Section 5.3**) may have reduced the growth rate of exotic plants and contributed to the low abundance, coverage and diversity of exotic species recorded during the recent March 2009 bi-annual plant survey for the T1-3 Overflow area; and
5. The Poaceae family was the dominant family in the recent March 2009 bi-annual plant survey. This is the first time this family has been dominant. Species from the Poaceae family have pioneer characteristics and can persist during unfavourable growing conditions such as the conditions observed during the March 2009 bi-annual plant survey.

5.2 CAR PRECINCT AREA

5.2.1 Weed Species Observed at Car Precinct Area

The March 2009 bi-annual plant survey along the Car Precinct area identified a total number of 58 plant species. Of these, three are AQIS listed weed species and 46 are considered exotic.

The three AQIS listed weed species that were located within the Car Precinct area during the March 2009 bi-annual plant survey were Common Reed (*Phragmites australis*), Red Natal Grass (*Melinis repens*) and Canadian Fleabane (*Conyza canadensis*). These species were also recorded in previous surveys and generally occur throughout the Port of Brisbane area. These species are common weeds that are found in most disturbed areas within the Brisbane region. Nonetheless, the removal of these weeds and the gradual replacement with native species is still recommended.

Three declared weeds listed under the LPR were recorded within the Car Precinct area during the March 2009 bi-annual plant survey. The species, their Class under the LPR and abundance / indicative locations are outlined in **Table 3**. Under the LPR landholders are obliged to attempt to remove Class 2 species and encouraged to remove

Class 3 species. Therefore consideration should be given to remove these declared species and control further establishment.

TABLE 3 THE CLASS AND ABUNDANCE OF THE LPR DECLARED SPECIES RECORDED DURING THE CAR PRECINCT AREA SURVEY MARCH 2009

CLASS	SPECIES	ABUNDANCE/LOCATION
Class 2 pests	Groundsel Bush (*Baccaris halimifolia*)	Numerous individuals along the western portion of the drain
	Fireweed (*Senecio madagascariensis*)	Few individuals found along the western portion of the drain
Class 3 pests	Broad-leafed Peppertree (*Schinus terebinthifolia)*	Numerous individuals along the banks of the Visitor Centre Lake.

All three species have been detected at some stage during the previous surveys and baseline studies of the Car Precinct area. Furthermore, the abundance of these species has remained relatively consistent since the previous plant surveys.

Giant Parramatta Grass (*Sporobolus fertilis*), which was recorded in the previous December 2008 quarterly plant survey, was not detected in the current March 2009 bi-annual plant survey. The decline or lack of detection of Giant Parramatta Grass during the current survey could be a result of recent maintenance activities, which may have controlled the growth and spread of the exotic species. On the other hand, the lack of detection of this species could also be attributed to general survey limitations that may have produced a false-absence record during the current survey (i.e. the species is present, but is not detected). For example, immature individuals of this species may have been present but were not recorded due to the difficultly in detecting their presence at an immature stage.

Whilst not listed under LPR, Wild Aster (*Aster subulatus*), Caster Oil Plant (*Ricinus communis*) and Purple Morning Glory (*Ipomoea indica*) are listed as a noxious/environmental weed by the BCC and were detected in the recent March 2009 bi-annual plant survey. These species were detected in the previous December 2008 quarterly plant survey.

5.2.2 Comparison between Car Precinct Area Surveys

Three AQIS listed species were recorded during the March 2009 bi-annual plant survey of the Car Precinct area and these same species have been recorded in previous surveys of the area. Species diversity of AQIS listed species recorded during the current survey (March 2009) has remained consistent since the previous survey results (i.e. December 2008), whereas abundance and coverage has slightly increased.

An analysis of the exotic species results recorded during the recent survey (March 2009) compared to the previous surveys indicates that there is a variation between the number of exotic species recorded whereas exotic species type has remained consistent.

Table 4 and **Figure 3** highlights and compares the number of exotic species identified in each of the plant surveys as well as the February 2008 Baseline Survey of the Car Precinct area.

TABLE 4 NUMBER OF EXOTIC SPECIES RECORDED PER SURVEY FOR THE CAR PRECINCT AREA

SURVEY	NUMBER OF EXOTIC SPECIES RECORDED
Baseline Survey (Feb 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 Bi-annual Plant Survey	**46**

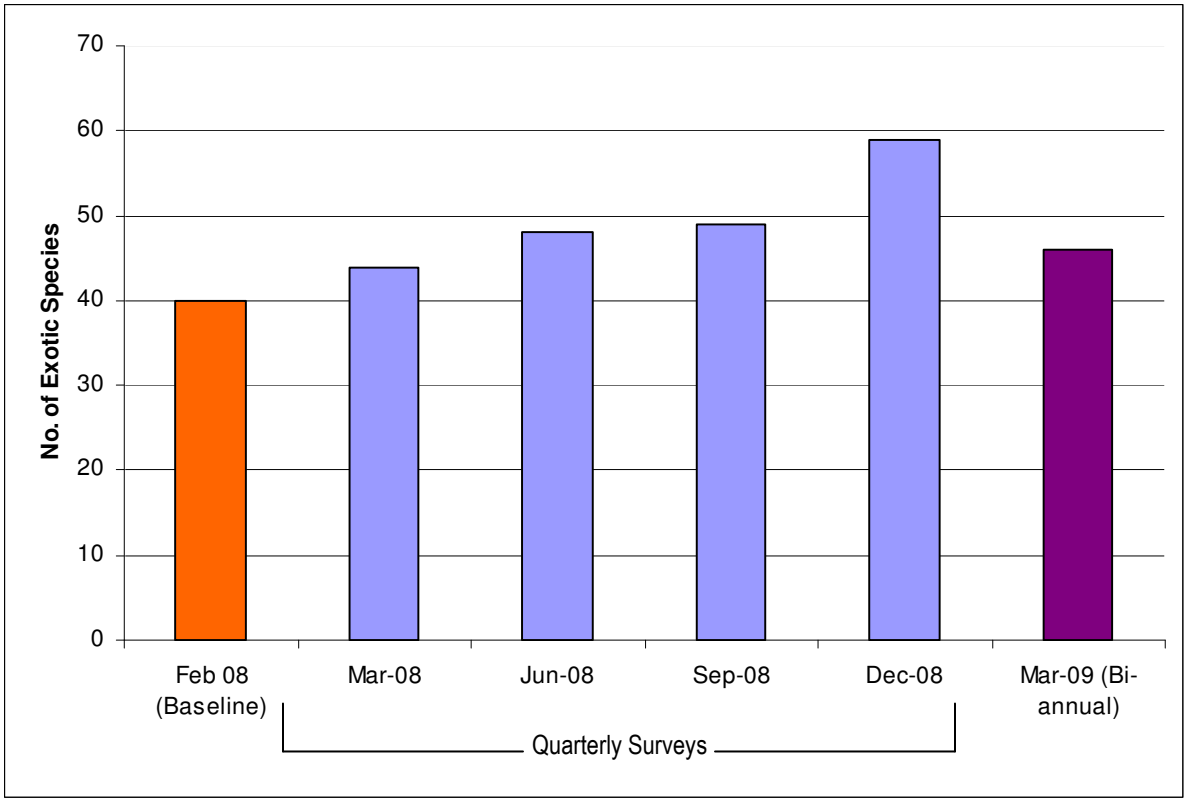

Figure 3 Number of Exotic Species Recorded per Survey along the Car Precinct Area

Table 5 outlines the number of exotic species within each family that were recorded in the February 2008 baseline and the March 2008, June 2008, September 2008 and December 2008 plant surveys as well as the recent March 2009 bi-annual plant survey.

TABLE 5 NUMBER OF EXOTIC SPECIES BY FAMILY FOR THE CAR PRECINCT AREA

FAMILY	NUMBER OF EXOTIC SPECIES					
	BASELINE SURVEY	QUARTERLY SURVEYS				BI-ANNUAL SURVEY
	FEB 08	MAR 08	JUNE 08	SEP 08	DEC 08	MAR 09
ASTERACEAE	**8**	**11**	**13**	**14**	**12**	**9**
POACEAE	6	9	9	10	10	7
FABACEAE	5	7	5	5	9	6
CYPERACEAE	2	2	2	1	4	4
ONAGRACEAE	1	1	1	2	3	3
CONVOLVULACEAE	2	2	2	2	2	2
EUPHORBIACEAE	3	0	3	2	1	2
PORTULACACEAE	2	1	1	0	1	2
SOLANACEAE	1	1	1	1	2	2
VERBENACEAE	0	2	2	3	2	2
AMARANTHACEAE	3	2	1	1	2	1
ANACARDIACEAE	1	1	1	1	1	1
BORAGINACEAE	0	0	0	1	1	1
COMMELINACEAE	0	1	1	1	1	1
MALVACEAE	1	1	1	1	0	1
PLANTAGINACEAE	0	1	1	1	1	1
POLYGONACEAE	0	1	1	0	1	1
APOCYNACEAE	1	0	0	0	0	0
BRASSICACEAE	1	0	2	2	2	0
CHENOPODIACEAE	0	0	0	0	2	0
OXALIDACEAE	1	0	0	0	0	0
PRIMULACEAE	1	1	1	1	1	0
RUBIACEAE	1	0	0	0	0	0
TYPHACEAE	0	0	0	0	0	0

*Shading indicates dominant family group

The above **Tables 4** and **5** as well as **Figure 3** indicate:

1. The number of exotic species recorded within the Car Precint area during the recent March 2009 bi-annual plant survey has substantially decreased since the previous December 2008 quarterly plant survey. The number of exotic species recorded in the recent survey (March 2009) are similar to the number recorded during the same month last year (March 2008);
2. It can be seen that the previous December 2008 quarterly plant survey species diversity results is not only higher than recent (March 2009) species diversity results but also the highest ever recorded. Although maintenance was undertaken not long before the previous December 2008 quarterly plant survey, coverage and abundance levels were also higher than previously observed;
3. The month of November 2008 received very high rainfall totals that were more than double the long term average for that month (see **Section 5.3**). Such weather is considered favourable to plant growth and is most likely the main contributing factor to the higher abundance, coverage and diversity of exotic species for the previous December 2008 quarterly plant survey (as compared to not only the recent March 2009 surveys results but all other survey results);
4. Maintenance activities appear to have been undertaken not long before the recent March 2009 bi-annual plant survey. Recent maintenance combined with low to average rainfall totals and slightly cooler temperatures (see **Section 5.3**) may have reduced the growth rate of exotic plants and contributed to the low abundance, coverage and diversity of exotic species recorded during the recent March 2009 bi-annual plant survey for the Car Precinct area; and
5. Dominance in the Asteraceae family has remained consistent for all surveys.

5.3 WEATHER CONDITIONS

The following graph (**Graph 3**) illustrates the broad climatic conditions from 2006 – 2009 including the rainfall recorded at the Port of Brisbane as well as the long term rainfall and temperature averages (taken from the Brisbane Airport).

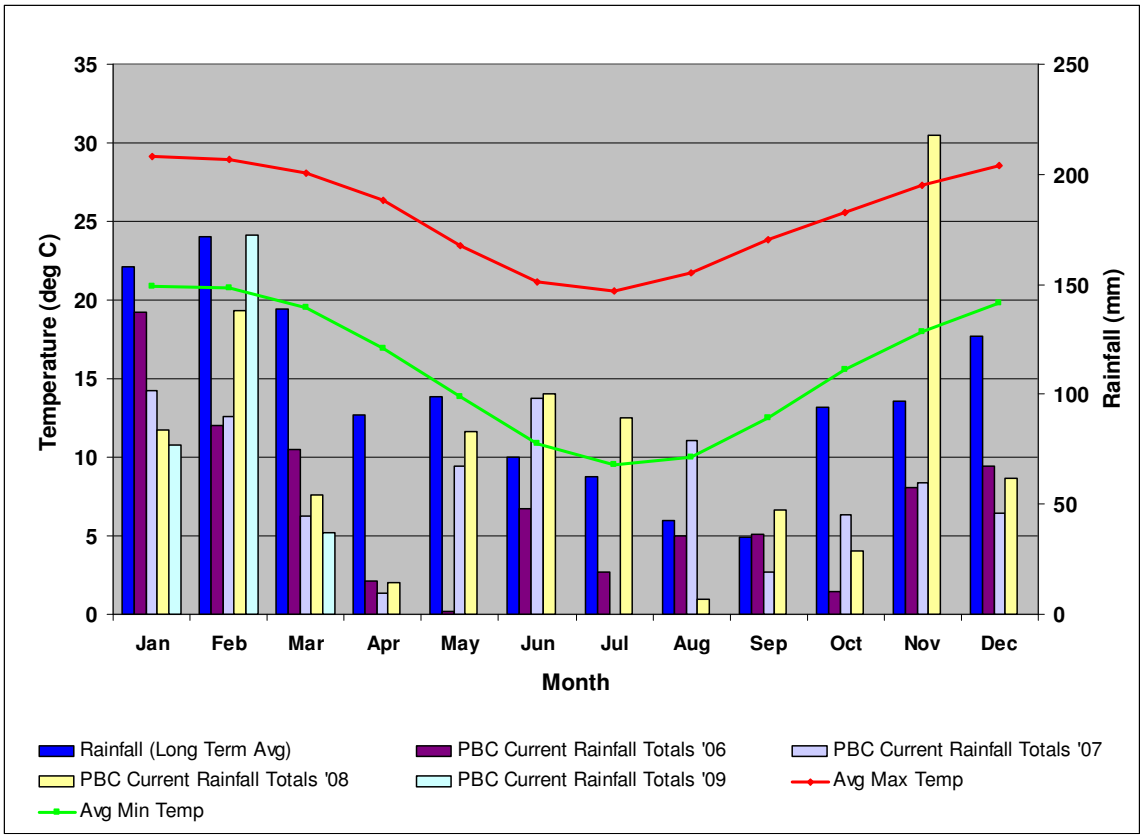

Figure 4 Long- term Climatic Averages (50yrs data) compared with the Port of Brisbane Rainfall Data (2003-2008)

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

- The month of November received very high rainfall totals that were more than double the longer term average for that month (**Figure 4**). This combined with the warmer temperatures of spring may have produced favourable conditions that are usually conducive to plant germination and growth. Such weather conditions are considered to be the main contributing factor to the higher abundance, coverage and diversity of exotic species for the previous December 2008 quarterly plant survey in both the T1-3 and Car Precinct areas;
- Rainfall totals for the months proceeding the recent March 2009 bi-annual survey have either been below average (i.e. January 2009) or average (February 2009) (**Figure 4**). Temperatures also generally decline during the season of Autumn. Such weather conditions can reduce the growth rate of plants and could have contributed to the decline in diversity, abundance and coverage of exotic species for the recent March 2009 bi-annual plant survey in both the T1-3 and Car Precinct areas.

6.0 RECOMMENDATIONS

The current weed management program of the T1-3 Overflow and Car Precinct areas consists of general landscaping maintenance activities such as spot spraying / hand pulling of exotic species, tending to garden beds and mowing of the lawns. This approach appears to be successful in reducing weed coverage and amount of exotic species in some locations of the survey areas, particularly along roadsides. Maintenance of these areas receives the greatest attention as these areas are more visible to the public and there is a maintenance contract in place, which ensures that these areas are maintained on a regular basis. However, other less visible areas, such as along the eastern side of the T1-3 Overflow area as well as the western side of the Car Precinct, are not maintained as often as the more visible areas. Exotic species within areas can grow to a point where they can produce seeds or propagules and thus spread further across the survey area and Port of Brisbane. Measures in these sections need to be implemented to ensure exotic species coverage is kept to a minimum in all areas of the survey at all times / seasons.

The AQIS listed weed species that were located within both the T1-3 Overflow and Car Precinct area are common weeds found throughout the Brisbane region. Current maintenance activities such as slashing and spot spraying are adequate measures to control AQIS listed weeds as demonstrated by the observed decline in abundance and coverage or diversity of AQIS listed species across the T1-3 Overflow and Car Precinct areas.

There appears to be a slight change in the number of LPR declared species that were recorded in the previous December 2008 plant survey. In particular Giant Parramatta Grass, which was recorded during the previous December 2008 plant survey along the Car Precinct area, was not observed during the current bi-annual plant survey. Nonetheless the abundance of coverage of the other LPR declared species recorded during the current survey of the Car Precinct Area is fairly consistent with previous recorded levels. Furthermore, Broad-leaved Peppertree (a LPR declared species), which was recorded in the T1-3 Overflow area in the previous survey (December 2008) was not recorded in the current survey (March 2009). However, Lantana was observed in the current survey along the T1-3 Overflow area, which has not yet been recorded in this area. It is recommended that the identification and removal of LPR declared species should be included as part of the routine maintenance and management of the T1-3 Overflow and Car Precinct areas.

Planting native vegetation is a technique often employed in weed management. Increasing the native understorey diversity increases competition for resources and assists in exotic species suppression. Such measures for the long-term management of exotic species occurring within the survey areas should be integrated into the current weed management programs for both the T1-3 Overflow and Car Precinct Areas.

The following recommendations are therefore made 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;
- An attempt should be made to remove all LPR declared species and their specific identification and removal should be included as part of routine maintenance and management of the areas, particularly for the Visitor 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 bi-annual surveys.

7.0 REFERENCES

AQIS (2008) *Northern Australia Quarantine Strategy Target List for Weeds.* [website] Accessed 26 March 2008. URL http://www.daff.gov.au/aqis/quarantine/naqs/target-lists#weeds

Auld, B.A. & Medd, R.W. (1999) *Weeds an illustrated botanical guide to the Weeds of Australia*. Inkata Press, Sydney.

Department of Natural Resources (DNR)(2000). *Weed Pocket Guide*. DNR. Brisbane.

Johns, L. (2006) *Field Guide to Common Saltmarsh Plants of Queensland*. DPI&F, Brisbane.

Kleinschmidt H., Holland, A. & Simpson, P. (1996) *Suburban Weeds* 3rd ed. DPI. Brisbane.

Lamp, L. & Collet, C. (1999) *Field Guide to Weeds in Australia*. Inkata Press, Sydney.

Navie, S., Markwell, B. Playford, J. & Adkins, S. (2002) *Suburban and Environmental Weeds* – An Identification and Information – South-east Queensland CD. University of Queensland.

Richardson, F.J., Richardson, R.G., Shepherd, R.C.H. (2007) *Weeds of the South-East: An identification guide for Australia.* R.G and F.J Richardson, Australia.

Sainty, G.R. & Jacobs, S.W.L. (1994) *Water plants in Australia* – A Field Guide. Sainty & Assoc, Darlinghurst.

Tothill, J.C. & Hacker, J.B. (1996) *The Grasses of Southern Queensland, Queensland*: Tropical Grassland Society of Aust Inc.

APPENDIX A SURVEY RESULTS OF T1-3 OVERFLOW AREA

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 09	DEC 08	SEP 08	JUNE 08	MAR 08	FEB 08
AIZOACEAE									
*Carpobrotus glaucescens**	Pigface*	-	-			X		X	X
*Sesuvium portulacastrum**	Sea Purslane*	-	-						X
AMARANTHACEAE									
Alternanthera pungens	Khaki Weed	-	-		X				
Amaranthus viridis	Green Amaranths	-	-		X	X	X	X	X
Gomphrena celosioides	Gomphrena Weed	-	-	**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
ASCLEPIADACEAE									
Gomphocarpus physocarpus	Balloon Cotton Bush	-	-						
ASPARAGACEAE									
Asparagus aethiopicus cv. Sprengeri	Asparagus Fern	-	3						
ASTERACEAE									
Ageratum houstonianum	Blue Billy-Goat	-	-	**X**	X	X			
Aster subulatus	Wild Aster	-	-	**X**			X		
Baccharis halimifolia	Groundsel Bush	-	2					X	
Bidens pilosa	Cobblers Pegs	-	-		X	X	X		X
Calyptocarpus vialis	Creeping Cinderella Weed	-	-		X	X	X		
Cirsium vulgare	Spear Thistle		-		X				
Conyza bonariensis	Faxleaf Fleabane	✓	-		X		X	X	X
Conyza canadensis	Canadian Fleabane	✓	-	**X**		X		X	X
Conyza sumatrensis	Tall Fleabane	-	-			X			
Crassocephalum crepidioides	Thickhead	-	-	**X**		X	X	X	
Emilia sonchifolia	Emilia	-	-	**X**	X	X	X		
Gamochaeta sp.	A Cudweed	-	-			X			

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 09	DEC 08	SEP 08	JUNE 08	MAR 08	FEB 08
Hypochaeris radicata	Flatweed	-	-		X	X		X	X
Senecio madagascariensis	Fireweed	-	2			X	X	X	X
Sonchus oleraceus	Rough Sow Thistle	-	-		X	X	X	X	X
Tagetes minuta	Stinking Roger	-	-					X	
Tridax procumbens	Tridax Daisy	-	-	X	X	X	X	X	X
BRASSICACEAE									
Brassica tournefortii	Wild Turnip	-	-			X	X		
Cakile maritime	-	-	-		X				
Lepidium africanum	Common Peppercress	-	-		X	X	X	X	X
BORAGINACEAE									
Heliotropium amplexicaule	Blue Heliotrope	-	-	X	X				X
CACTACEAE									
Opuntia sp.	Prickly Pear	-	2						
CARYOPHYLLACEAE									
Cerastium glomeratum	Sticky Mouse-ear Chickweed	-	-			X			
Polycarpon tetraphyllum	Four-leaved Allseed	-	-		X				
CASUARINACEAE									
*Casuarina littoralis**	Black Sheoak*	-	-						X
CHENOPODIACEAE									
Chenopodium ambrosioides	Mexican Tea	-	-		X				X
Chenopodium sp.	-	-	-		X				
Einadia sp.	-	-	-				X		
COMMELINACEAE									
Commelina benghalensis	-	-	-	X				X	
Commelina diffusa (C. cyanea)	Wandering Jew	-	-			X	X		
CONVOLVULACEAE									
Ipomoea cairica	Mile-a-Minute	-	-						
*Ipomoea pes-caprae**	Goats Foot Convolves*	-	-	X	X	X	X	X	X
CYPERACEAE									
*Bolboschoenus caldwellii**	-	-	-		X				

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 09	DEC 08	SEP 08	JUNE 08	MAR 08	FEB 08
Cyperus difformis	Rice Sedge	-	-						X
Cyperus eragrostis	Umbrella Sedge	-	-			X			X
*Cyperus exaltatus**	Giant Sedge*	-	-						
Cyperus involucratus	-	-	-	X	X		X		X
Cyperus polystachuos	-	-	-						
*Isolepsis cernua**	Nodding Club Rush*	-	-				X		
EUPHORBIACEAE									
Chamaesyce maculata	Caustic Weed	-	-						
Euphorbia hirta	Asthma Plant	-	-	X					
Chamaesyce prostrata	Red Caustic Creeper	-	-	X	X		X	X	X
Euphorbia sp.	Spurge	-	-						
Phyllanthus virgatus	Creeping Phyllanthus	-	-						
Ricinus communis	Castor Oil Bush	-	-						X
FABACEAE									
Crotalaria incana	Woolly Rattle Pod	-	-		X			X	
Crotalaria lanceolata subsp. *lanceolata*	Lance-leaf Rattle Pod	-	-	X	X		X	X	X
Crotalaria pallida	Rattle Pod	-	-						
*Cullen tenax**	Emu Foot*	-	-	X	X	X			
Desmodium uncinatum	Silver Leafed Desmodium	-	-						
Indigofera hirsuta	Hairy Indigo	-	-		X			X	X
*Indigofera linifolia**	-*	-	-	X	X				
Indigofera spicata	-	-	-	X	X				
*Lotus cruentus**	Redflower Lotus*	-	-			X			
Macroptilium atropurpureum	Siratro	-	-	X	X	X	X	X	X
Macroptilium lathyroides	Phasey Bean	-	-	X	X			X	X
Medicago lupulina	Black Medic	-	-		X	X		X	X
Medicago polymorpha	Burr Medic	-	-						
Medicago sativa	Lucerne	-	-						
Melilotus albus	Bokhara	-	-		X				X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 09	DEC 08	SEP 08	JUNE 08	MAR 08	FEB 08
Melilotus indicus	Sweet Melilotus	-	-			X	X		X
Neonotonia wightii	Glycine	-	-						X
Swainsona galegifolia	Smooth Darling Pea	-	-						X
*Sesbania cannabina**	Sesbania Pea*	-	-	X	X	X	X	X	X
Stylosanthes hamata	Verano Stylo	-	-	X	X	X	X	X	X
Trifolium repens	White Clover	-	-		X	X	X	X	X
*Vigna marina**	Yellow Beach Bean*	-	-						
MALVACEAE									
Sida cornifolia	Flannel Weed	-	-						X
Sida rhombifolia	Common Sida	-	-	X	X	X	X	X	X
ONAGRACEAE									
Ludwigia peruviana	-	-	-		X				
Oenothera drummondii subsp. *drummondii*	Beach Primrose	-	-	X	X	X	X	X	X
Oenothera laciniata	Cut-leaf Evening Primrose	-	-	X	X	X	X		
OXALIDACEAE									
Oxalis corniculata	Creeping Oxalis	-	-		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
POACEAE									
Brachiaria decumbens	Signal Grass	-	-			X		X	
Brachiaria mutica	Para Grass	-	-						
Cenchrus ciliaris	Buffel Grass	-	-						
Cenchrus echinatus	Mossman River Grass	-	-	X	X	X	X	X	X
Chloris gayana	Rhodes Grass	-	-	X	X	X	X	X	X
Chloris truncata	Windmill Grass	-	-				X		X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 09	DEC 08	SEP 08	JUNE 08	MAR 08	FEB 08
Chloris virgata	Feather-top Rhodes Grass	-	-				X	X	X
Cynodon dactylon	Couch Grass	-	-		X	X		X	X
Dichanthium aristatum	Angleton Grass	-	-						
Digitaria ciliaris	Summer Grass	-	-						
Eleusine indica	Crowsfoot Grass	-	-						
Eragrostis tenuifolia	Elastic Grass	-	-			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
Melinis minutiflora	Molasses Grass	-	-						
Poa annua	Winter Grass	-	-						
Panicum effusum	Hairy Panic	-	-						
Panicum maximum	Green Panic	-	-	X	X	X	X		X
Paspalum dilatatum	Paspalum	-	-	X	X		X		
*Phragmites australis**	Common Reed*	✓	-		X	X	X		
Setaria sp.	Pigeon Grasses	-	-						X
Sorghum halepense	Johnson Grass	-	-	X	X				
Urochloa mosambicensis	Sabi Grass	-	-						
POLYGONACEAE									
Persicaria lapathifolia	Pale Knotweed	-	-	X	X				
PORTULACACEAE									
Portulaca pilosa	Hairy Pigweed	-	-	X	X	X	X	X	X
Portulaca oleracea	Pigweed	-	-		X			X	X
PRIMULACEAE									
Anagallis arvensis	Scarlet Pimpernel	-	-	X	X	X	X	X	X
RUBIACEAE									
Richardia brasiliensis	Mexican Clover	-	-	X	X	X	X	X	X
SAPINDACEAE									
Cardiospermum halicacabum	Balloon Vine	-	-						
Dodonaea triquetra	Hop Bush	-	-						

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 09	DEC 08	SEP 08	JUNE 08	MAR 08	FEB 08
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
TAMARICACEAE									
Tamarix ramosissima	Tamarisk	-	-	**X**	X				
TYPHACEAE									
Typha orientalis	Cumbungi / Typha*	-	-	**X**	X	X	X		X
ULMACEAE									
Celtis sinensis	Chinese Celtis	-	3						
VERBENACEAE									
Lantana camara	Lantana	-	3	**X**					
Lantana montevidensis	Creeping Lantana	-	3						
Verbena bonariensis	Purple Top	-	-	**X**	X				
Verbena aristigera	Mayne's Pest	-	-	**X**	X	X	X	X	X
Vitex trifolia var *trifolia**	Coastal Vitex*	-	-						

Notes: -

- * designates indigenous species
- LPR – *Land Protection (Pest and Stock Route Management) Regulations* 2003, Schedule 2.

APPENDIX B SURVEY RESULTS OF CAR PRECINCT AREA

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 08	DEC 08	SEP 08	JUINE 08	MAR 08	FEB 08
AIZOACEAE									
*Carpobrotus glaucescens**	Pigface*	-	-					X	X
*Sesuvium portulacastrum**	Sea Purslane*	-	-	X	X	X	X	X	X
*Tetragonia tetragonoides**	New Zealand Spinach*	-	-				X		
AMARANTHACEAE									
Alternanthera pungens	Khaki Weed	-	-						X
Amaranthus viridis	Green Amaranths	-	-	X	X	X	X	X	X
Gomphrena celosioides	Gomphrena Weed	-	-		X			X	X
ANACARDIACEAE									
Schinus terebinthifolius	Broad-leaved Peppertree	-	3	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
Aster subulatus	Wild Aster	-	-	X	X	X	X	X	
Baccharis halimifolia	Groundsel Bush	-	2	X	X	X	X	X	X
Bidens pilosa	Cobblers Pegs	-	-	X	X	X	X	X	X
Conyza bonariensis	Flaxleaf Fleabane	✓	-		X	X	X	X	
Conyza canadensis	Canadian Fleabane	✓	-	X				X	X
Conyza sumatrensis	Tall Fleabane	-	-		X	X			
Crassocephalum crepidioides	Thickhead	-	-	X	X	X	X	X	
Emilia sonchifolia	Emilia	-	-	X	X	X	X		
Hypochaeris radicata	Flatweed	-	-		X	X	X	X	X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 08	DEC 08	SEP 08	JUINE 08	MAR 08	FEB 08
Onopordum acanthium	Scotch Thistle	-	-			X	X		
Pseudognaphalium luteoalbum	Jersey cudweed	-	-		X	X	X		
Senecio madagascariensis	Fireweed	-	2	X	X	X	X	X	X
Sonchus oleraceus	Rough Sow Thistle	-	-			X	X		X
Sphagneticola trilobata	Singapore Daisy	-	3						
Tridax procumbens	Tridax Daisy	-	-	X	X	X	X	X	X
Tagetes minuta	Stinking Roger	-	-					X	
BRASSICACEAE									
Brassica tournefortii	Wild Turnip	-	-		X	X	X		
Lepidium africanum	Common Peppercress	-	-		X	X	X		X
BORAGINACEAE									
Heliotropium amplexicaule	Blue Heliotrope	-	-	X	X	X			
CACTACEAE									
Opuntia sp.	Prickly Pear	-	2						
CAMPANULACEAE									
*Wahlenbergia graniticola**	Granite Bluebell*	-	-		X				
CHENOPODIACEAE									
Chenopodium ambrosioides	Mexican Tea	-	-		X				
Chenopodium sp.	-	-	-		X				
COMMELINACEAE									
Commelina diffusa (C. cyanea)	Wandering Jew	-	-	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
Ipomoea cairica	Mile-a-Minute	-	-	X	X	X	X	X	X
*Ipomoea pes-caprae**	Goats Foot Convolves*	-	-						X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 08	DEC 08	SEP 08	JUINE 08	MAR 08	FEB 08
CYPERACEAE									
*Bolboschoenus caldwellii**	-	-	-	X		X			
*Carex appressa**	Tall Sedge*	-	-						
Cyperus difformis	Rice Sedge	-	-						X
Cyperus congestus	Clustered Flatsedge	-	-						
Cyperus eragrostis	Umbrella Sedge	-	-	X	X	X		X	X
Cyperus involucratus	-	-	-	X	X		X	X	
Cyperus rotundus	Nut Grass	-	-	X	X				
Cyperus polystachyos	Bunchy Sedge	-	-	X	X		X		
*Fimbristylis ferruginea**	Rusty Sedge*	-	-	X	X	X	X	X	
*Isolepis cernua**	Nodding Club Rush*	-	-	X	X	X	X	X	
*Isolepis nodosa**	Knobby Club Rush*	-	-	X	X	X	X	X	
*Schoenoplectus mucronatus**	-	-	-	X		X	X		
EUPHORBIACEAE									
Chamaesyce drummondii	Caustic Creeper	-	-			X			X
Chamaesyce maculata	Eyebane	-	-				X		X
Chamaesyce prostrata	Red Caustic Creeper	-	-	X			X		X
Euphorbia hirta	Asthma Plant	-	-						
Euphorbia sp.	Spurge	-	-						
*Macaranga tanarius**	Macaranga*	-	-				X	X	
Phyllanthus virgatus	Creeping Phyllanthus	-	-						
Ricinus communis	Castor Oil Plant	-	-	X	X	X	X		
FABACEAE									
Crotalaria incana	Woolly Rattle Pod	-	-	X	X			X	
Crotalaria lanceolata subsp. *lanceolata*	Lance-leaf Rattle Pod	-	-	X	X		X	X	X
*Cullen tenax**	Emu Foot*	-	-		X				
Desmodium uncinatum	Silver Leafed Desmodium	-	-						
Indigofera hirsuta	Hairy Indigo	-	-						X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 08	DEC 08	SEP 08	JUINE 08	MAR 08	FEB 08
Indigofera spicata	-	-	-	X					
Macroptilium atropurpureum	Siratro	-	-	X	X	X	X	X	X
Macroptilium lathyroides	Phasey Bean	-	-	X	X	X	X	X	
Medicago lupulina	Black Medic	-	-		X	X			
Medicago polymorpha	Burr Medic	-	-						
Medicago sativa	Lucerne	-	-						
Melilotus albus	Bokhara	-	-		X				
Melilotus indicus	Sweet Melilotus	-	-		X	X	X		
Neonotonia wightii	Glycine	-	-					X	X
*Sesbania cannabina**	Sesbania Pea*	-	-	X	X	X	X	X	X
Stylosanthes hamata	Verano Stylo	-	-	X	X	X	X	X	X
Trifolium repens	Clover	-	-		X			X	
*Vigna marina**	Yellow Beach Bean*		-	X	X	X		X	
GRAMINEA									
*Paspalum distichum**	Water Couch*	-	-	X	X	X	X	X	
JUNCACEAE									
*Juncus kraussii**	Jointed Rush*	-	-	X	X	X	X	X	
MALVACEAE									
Sida cornifolia	Flannel Weed	-	-						
Sida rhombifolia	Common Sida	-	-	X		X	X	X	X
ONAGRACEAE									
Ludwigia peruviana	-	-	-	X	X				
Oenothera drummondii subsp. *drummondii*	Beach Primrose	-	-	X	X	X	X	X	X
Oenothera laciniata	Cut-leaf Evening Primrose	-	-	X	X	X			
OXALIDACEAE									
Oxalis corniculata	Creeping Oxalis	-	-						X
PASSIFLORACEAE									
Passiflora cairica	Stinking Passion Vine	-	-						

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 08	DEC 08	SEP 08	JUINE 08	MAR 08	FEB 08
Passiflora subpeltata	White Passion Flower		-						
PLANTAGINACEAE									
Plantago lanceolata	Lamb's Tongue	-	-	X	X	X	X	X	
POACEAE									
Arundo donax	Giant Reed	-	-				X	X	X
Brachiaria decumbens	Signal Grass	-	-	X	X		X	X	
Brachiaria mutica	Para Grass	-	-						
Cenchrus ciliaris	Buffel Grass	-	-						
Cenchrus echinatus	Mossman River Grass	-	-	X	X	X	X	X	X
Chloris gayana	Rhodes Grass	-	-	X	X	X	X	X	X
Chloris truncata	Windmill Grass	-	-				X		
Chloris virgata	Feather-top Rhodes Grass	-	-		X	X	X		
*Cymbopogon refractus**	Barbed Wire Grass*	-	-		X	X	X	X	
Cynodon dactylon	Couch Grass	-	-			X	X	X	X
Dichanthium aristatum	Angleton Grass	-	-						
*Dichanthium sericeum**	Queensland Bluegrass*	-	-		X				
Digitaria ciliaris	Summer Grass	-	-						
Eleusine indica	Crowsfoot Grass	-	-						
Eragrostis tenuifolia	Elastic Grass	-	-		X	X			
Hemarthria uncinata	Mat Grass	-	-						
*Imperata cylindrical**	Blady Grass*	-	-					X	X
Melinis repens	Red Natal Grass	✓	-	X	X	X	X	X	X
Melinis minutiflora	Molasses Grass	-	-						
Poa annua	Winter Grass	-	-						
Panicum effusum	Hairy Panic	-	-						
Panicum maximum	Green Panic	-	-	X	X	X	X	X	X
Paspalum dilatatum	Paspalum	-	-	X	X	X		X	

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 08	DEC 08	SEP 08	JUINE 08	MAR 08	FEB 08
*Phragmites australis**	Common Reed*	✓	-	X	X	X	X	X	X
Setaria sp.	Pigeon Grasses	-	-	X	X			X	
Sorghum halepense	Johnson Grass	-	-			X			
Sporobolus fertilis	Giant Parramatta Grass	-	2		X	X			
Urochloa mosambicensis	Sabi Grass	-	-						
POLYGONACEAE									
Rumex brownii	Swamp Dock	-	-	X				X	
Rumex crispus	Curled Dock	-	-		X		X		
PORTULACACEAE									
Portulaca pilosa	Hairy Pigweed	-	-	X	X		X	X	X
Portulaca oleracea	Pigweed	-	-	X					X
PRIMULACEAE									
Anagallis arvensis	Scarlet Pimpernel	-	-		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
TYPHACEAE									
Typha orientalis	Cumbungi / Typha*	-	-	X	X		X	X	X
ULMACEAE									
Celtis sinensis	Chinese Celtis	-	3						
VERBENACEAE									

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	Bi-annual Survey	Quarterly Survey				Baseline Survey
				MAR 08	DEC 08	SEP 08	JUINE 08	MAR 08	FEB 08
Lantana camara	Lantana	-	3			X	X		
Lantana montevidensis	Creeping Lantana	-	3						
Verbena bonariensis	Purple Top	-	-	**X**	X	X		X	
Verbena aristigera	Mayne's Pest	-	-	**X**	X	X		X	
Verbena officinalis	Common Verbena	-	-				X		
Vitex trifolia var *trifolia**	Coastal Vitex*	-	-						

APPENDIX C WEED TARGET LIST (AQIS)

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 australia*	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 D PLANT SURVEY DATA SHEET

FAMILY / SPECIES	COMMON NAME	FORM	DECLARED CATEGORY (LPR)	PRESENCE	ABUNDANCE
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 Peppertree	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	-		
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 (LPR)	PRESENCE	ABUNDANCE
AGAVACEAE					
Agave sp.	Agave	w,p	-		
AVICENNIACEAE					
Avicennia marina [n]	Grey Mangrove	t	-		
BORAGINACEAE					
Heliotropium amplexicaule	Blue Heliotrope	h,w	-		
CACTACEAE					
Opuntia sp.	Prickly Pear	s,w	2		
CASUARINACEAE					
*Casuarina equisetifolia**	Coastal Sheoak	t	-		
*Allocasuarina littoralis**	Black Sheoak	t	-		
CAESALPINIACEAE					
Crotalaria paniculata	Poor Mans Gold	h	-		
Senna pendula var *glabrifolia*	Easter Cassia	s,w	-		
CONVOLVULACEAE					
Cuscuta campestris	Dodder	v,w	-		
Convolvulus arvensis	European Bindweed	h,w	-		
Ipomoea cairica	Mile-a-Minute	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	-		

FAMILY / SPECIES	COMMON NAME	FORM	DECLARED CATEGORY (LPR)	PRESENCE	ABUNDANCE
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	-		
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 [n]	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					

FAMILY / SPECIES	COMMON NAME	FORM	DECLARED CATEGORY (LPR)	PRESENCE	ABUNDANCE
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	-		
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					

FAMILY / SPECIES	COMMON NAME	FORM	DECLARED CATEGORY (LPR)	PRESENCE	ABUNDANCE
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	-		

LPR – *Land Protection (Pest and Stock Route Management) Regulations 2003*, Schedule 2.