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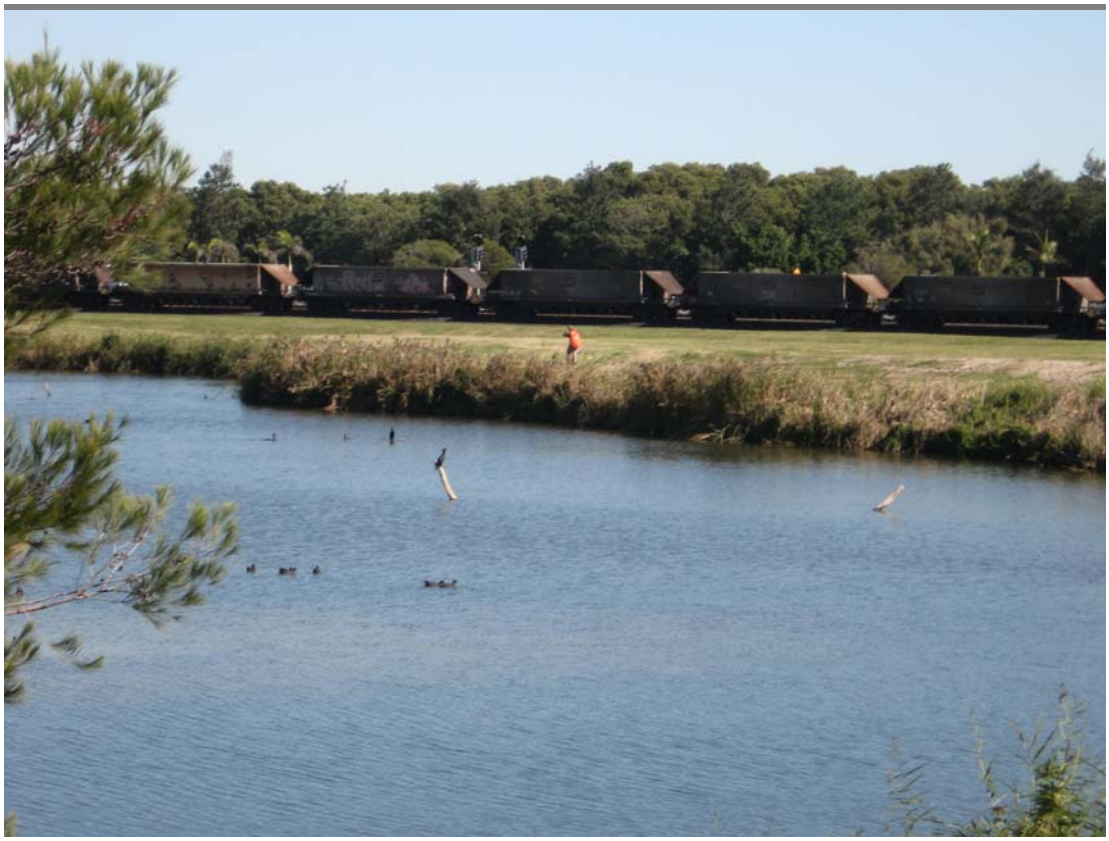

Port of Brisbane Corporation

Final Report

Plant Survey of T1-3 Overflow & Car Precinct – Port of Brisbane (June 2008 Survey)

August 2008

Quality Assurance Statement				
Revision No.	Author	Reviewer	Approved for Issue	
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EXECUTIVE SUMMARY

Natural Solutions Environmental Consultants 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 second monitoring report detailing the results from the June 2008 plant survey, with the first monitoring having been taken in March 2008 following a baseline study in February 2008.

The primary purpose for the on-going quarterly 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. The secondary objective of the on-going quarterly 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 June 2008 Plant Surveys for the T1-3 Overflow Area

The following points summarise the findings of the June 2008 plant survey for the T1-3 Overflow area:

1. 44 plant species were recorded. This consisted of five native species, three AQIS listed weed species and 36 exotic species;
2. The AQIS listed weed species that were recorded included Red Natal Grass (*Melinis repens*), Flax-leaf Fleabane (*Conyza bonariensis*) and Common Reed (*Phragmites australis*). Only one of these species, Common Reed, was not recorded during the previous March 2008 plant survey in this area (i.e. the remaining two species were recorded);
3. The recorded AQIS listed weed species occurred for the majority on the eastern side of the T1-3 Overflow area and within the constructed northern drain;
4. No individuals of the AQIS listed Siam Weed (*Chromolaena odorata*) were located during the plant survey;
5. No LPR declared species were located during the June 2008 plant survey;
6. Locally occurring exotic grasses such as Feather-top Rhodes Grass (*Chloris virgata*), Rhodes Grass (*Chloris gayana*) and Mossman River Grass (*Cenchrus echinatus*) as well as exotic herbaceous species such as Verano Stylo (*Stylosanthes hamata*) and Cut-leaf Evening Primrose (*Oenothera laciniata*) were the dominant group of exotic species observed throughout the majority of the T1-3 Overflow area;
7. Species diversity of AQIS listed weed species have remained consistent in comparison to the previous March 2008 survey results whilst abundance and coverage have slightly declined; and
8. Species diversity of exotic species has slightly increased whilst abundance and coverage has slightly decreased in comparison to the previous March 2008 survey results.

Summary of Findings from the June 2008 Plant Surveys for the Car Precinct Area

The following points summarise the findings of the June 2008 plant survey for the Car Precinct area:

1. 61 plant species were recorded. This consisted of 13 native species, three AQIS listed weed species and 45 exotic species;

2. The AQIS listed weed species recorded included Common Reed (*Phragmites australis*), Red Natal Grass (*Melinis repens*) and Flax-leaf Fleabane (*Conyza bonariensis*). These species were recorded during the previous March 2008 plant survey in this area;
3. No individuals of the AQIS listed Siam Weed (*Chromolaena odorata*) were located during the plant survey;
4. Individuals of Groundsel (*Baccharis halimifolia*), Lantana (*Lantana camera*) and Broad-leaved Peppertree (*Schinus terebinthfolia*), which are LPR declared species were recorded in the June 2008 plant survey. Only one of these species, Lantana, was not recorded during the previous March 2008 plant survey in this area (i.e. the remaining two species were recorded);
5. Locally occurring exotic grass species such as Rhodes Grass (*Chloris gayana*), Johnson Grass (*Sorghum halepense*) and Green Panic (*Megathyrsus maximus* var. *maximus*) as well as exotic herbaceous and vine species such as Mile-a-minute (*Ipomoea cairica*) and Fireweed (*Senecio madagascariensis*) were the dominant exotic species observed throughout the majority of the Car Precinct area;
6. Exotic species diversity has increased in comparison to the March 2008 plant survey results whereas abundance and coverage of exotic species has declined slightly; and
7. Species diversity of AQIS listed weed species has slightly decreased whilst abundance and coverage has remained relatively consistent in comparison to the March 2008 plant survey results.

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, such as 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, such as the roadside verge of Port Drive, are maintained (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

Natural Solutions Environmental Consultants 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, species considered to be exotic/invasive including species declared under the *Land Protection (Stock Route Management) Regulations 2003* (LPR) and 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. Currently, vehicles imported to the Port of Brisbane facility are transported from the wharf areas via a car 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 are currently planned to be undertaken on a three monthly interval over an initial 12 month monitoring period. This is the second report detailing the results from the June 2008 plant survey with the previous plant survey occurring in March 2008 following a baseline study in February 2008.

1.1 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 wraps around a large hardstand car parking area, extending past the car 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. Its main purpose is to facilitate in absorbing and filtering excess stormwater that may potentially overflow from surrounding hardstand areas. On the other hand 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.

[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.

The Car Precinct area occurs 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.

Both of these areas currently have a regular maintenance schedule. This includes mowing and spraying for exotic species.

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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2.0 METHODOLOGY

The second quarterly plant survey was undertaken on the 26 June 2008 (hereafter referred to as the June 2008 plant survey). The June 2008 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 June 2008 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 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 quarterly basis over an initial 12 month period and then on a six monthly interval, during autumn (around March) and spring (around October) of each year.

2.1 AQIS TARGET WEEDS 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.

3.0 FINDINGS

3.1 T1-3 OVERFLOW AREA

Appendix A contains a list of plant species recorded during the June 2008 plant survey. The following points summarise the findings of the June 2008 plant survey for the T1-3 Overflow area:

1. 44 plant species were recorded. This consisted of five native species, three AQIS listed weed species and 36 exotic species;
2. The AQIS listed weed species that were recorded included Red Natal Grass (*Melinis repens*), Flax-leaf Fleabane (*Conyza bonariensis*) and Common Reed (*Phragmites australis*). Only one of these species, Common Reed, was not recorded during the previous March 2008 plant survey in this area (i.e. the remaining two species were recorded);
3. The recorded AQIS listed weed species occurred for the majority on the eastern side of the T1-3 Overflow area and within the constructed northern drain;
4. No individuals of the AQIS listed Siam Weed (*Chromolaena odorata*) were located during the plant survey;
5. No LPR declared species were located during the June 2008 plant survey;
6. Locally occurring exotic grasses such as Feather-top Rhodes Grass (*Chloris virgata*), Rhodes Grass (*Chloris gayana*) and Mossman River Grass (*Cenchrus echinatus*) as well as exotic herbaceous species such as Verano Stylo (*Stylosanthes hamata*) and Cut-leaf Evening Primrose (*Oenothera laciniata*) were the dominant group of exotic species observed throughout the majority of the T1-3 Overflow area;
7. Species diversity of AQIS listed weed species have remained consistent in comparison to the previous March 2008 survey results whilst abundance and coverage have slightly declined; and
8. Species diversity of exotic species has slightly increased whilst abundance and coverage has slightly decreased in comparison to the previous March 2008 survey results.

3.2 CAR PRECINCT AREA

Appendix B contains a list of plant species recorded during the June 2008 plant survey for the Car Precinct area. The following points summarises the findings of the June 2008 plant survey for the Car Precinct:

1. 61 plant species were recorded. This consisted of 13 native species, three AQIS listed weed species and 45 exotic species;
2. The AQIS listed weed species recorded included Common Reed (*Phragmites australis*), Red Natal Grass (*Melinis repens*) and Flax-leaf Fleabane (*Conyza bonariensis*). These species were recorded during the previous March 2008 plant survey in this area;
3. No individuals of the AQIS listed Siam Weed (*Chromolaena odorata*) were located during the plant survey;
4. Individuals of Groundsel (*Baccharis halimifolia*), Lantana (*Lantana camera*) and Broad-leaved Peppertree (*Schinus terebinthfolia*), which are LPR declared species were recorded in the June 2008 plant survey. Only one of these species, Lantana, was not recorded during the previous March 2008 plant survey in this area (i.e. the remaining two species were recorded);
5. Locally occurring exotic grass species such as Rhodes Grass (*Chloris gayana*), Johnson Grass (*Sorghum halepense*) and Green Panic (*Megathyrsus maximus* var. *maximus*) as well as exotic herbaceous and vine species such as Mile-a-minute (*Ipomoea cairica*) and Fireweed (*Senecio madagascariensis*) were the dominant exotic species observed throughout the majority of the Car Precinct area;

6. Exotic species diversity has increased in comparison to the March 2008 plant survey results whereas abundance and coverage of exotic species has declined slightly; and
7. Species diversity of AQIS listed weed species has slightly decreased whilst abundance and coverage has remained relatively consistent in comparison to the March 2008 plant survey results.

4.0 DISCUSSION

4.1 T1-3 OVERFLOW AREA

4.1.1 Weed Species Observed at T1-3 Overflow Area

The June 2008 plant survey along the T1-3 Overflow area has identified a total number of 44 plant species. Of these, three are AQIS listed weed species and 36 are considered exotic.

The three AQIS listed weed species that were located within the T1-3 Overflow area during the June 2008 plant survey included Red Natal Grass (*Melinis repens*), Flax-leaf Fleabane (*Conyza bonariensis*) and Common Reed (*Phragmites australis*). 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 the Brisbane region. Nonetheless, the removal of these species and gradual replacement with native species is still recommended.

No LPR declared species were recorded during the June 2008 plant survey. However Groundsel Bush (*Baccharis halimifolia)*, an LRP Class 2 declared pest, was recorded along eastern side of the T1-3 Overflow area during the previous March 2008 plant survey. The decline in this declared species during the current June 2008 plant survey could be a result of successful removal techniques undertaken during the scheduled maintenance of the area.

Wild Aster (*Aster subulatus*), whilst not listed under LPR, is listed as a noxious weed by Brisbane City Council (BCC) and was detected in the June 2008 plant survey.

4.1.2 Comparisons between T1-3 Overflow Surveys

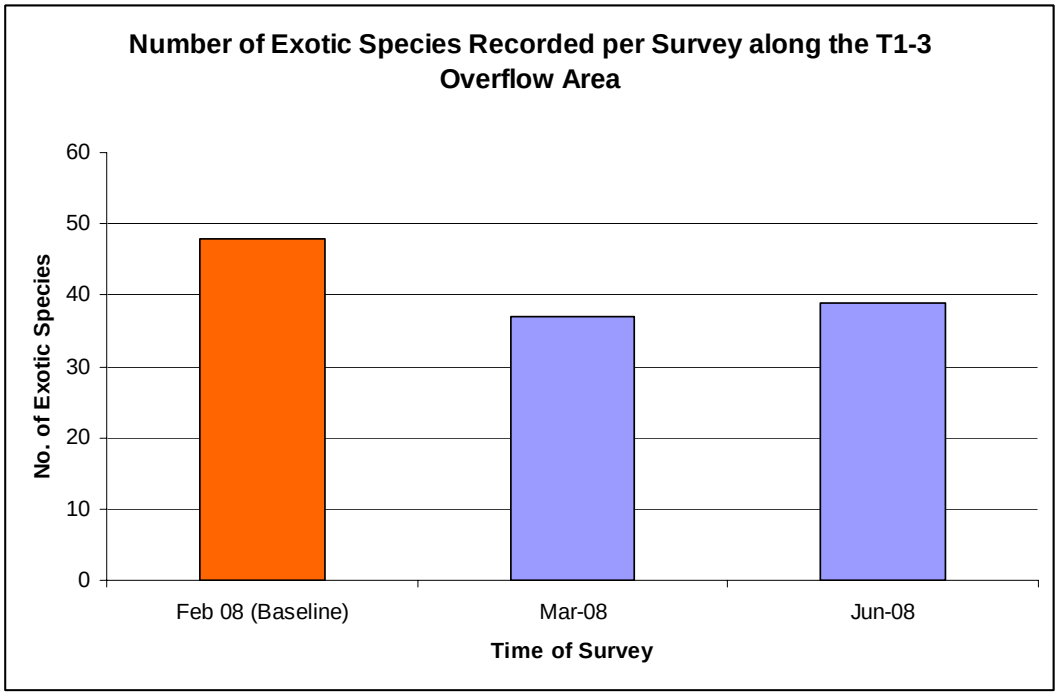
Three AQIS listed species were recorded during the June 2008 plant survey of the T1-3 Overflow area. Two of these species, Red Natal Grass and Flax-leaf Fleabane, were also recorded in previous surveys of the T1-3 Overflow area (i.e. February 2008 baseline survey and March 2008 plant survey). Common Reed, however was not recorded in the previous surveys and was located in the northern drain within the T1-3 Overflow Area during the June 2008 plant survey. Canadian Fleabane (*Conyza canadensis*), which was recorded in the February 2008 baseline survey and March 2008 plant survey, was not recorded in the current June 2008 plant survey. Although a slight variation in the type of AQIS species recorded is evident between the current survey (i.e. June 2008 plant survey) and previous survey results (i.e. February 2008 baseline survey and March 2008 plant survey), the diversity of AQIS listed species has remained consistent between the surveys. Furthermore the abundance and coverage of AQIS listed species within the T1-3 Overflow area has slightly declined since the March 2008 plant survey.

A comparison between the results from the June 2008, the March 2008 plant survey and the February 2008 baseline survey data indicates that there is a slight variation between the number and type of exotic species recorded.

Table 1 and Graph 1 highlights the number of exotic species identified in the February 2008 Baseline Survey and March 2008 plant survey of the T1-3 Overflow area as compared to the latest June 2008 plant survey.

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 Plant Survey	37
June 2008 Plant Survey	39



Graph 1 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, March 2008 and June 2008 plant surveys.

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

FAMILY	NUMBER OF EXOTIC SPECIES FEBRUARY 2008 BASELINE SURVEY	NUMBER OF EXOTIC SPECIES MARCH 2008	NUMBER OF EXOTIC SPECIES JUNE 2008
Asteraceae	6	8	9
Poaceae	8	6	7
Fabaceae	11	8	5
Amaranthaceae	2	2	2
Brassicaceae	1	1	2
Onagraceae	1	1	2
Apiaceae	1	1	1
Chenopodiaceae	1	0	1
Commelinaceae	0	1	1
Cyperaceae	3	0	1
Euphorbiaceae	2	1	1
Malvaceae	2	1	1
Portulacaceae	2	2	1
Plantaginaceae	1	1	1
Primulaceae	1	1	1
Rubiaceae	1	1	1
Solanaceae	2	1	1
Verbenaceae	1	1	1
Boraginaceae	1	0	0
Papaveraceae	1	0	0
Typhaceae	0	0	0

Shading indicates dominant family groups

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

1. There has been a slight increase in the number of exotic species recorded during the June 2008 survey within the T1-3 Overflow area since the March 2008 plant survey, however the number of exotic species recorded during the June 2008 plant survey is still significantly lower than the number of exotic species recorded during baseline survey in February 2008;
2. The significantly higher number of species recorded during the February 2008 baseline survey can most likely be attributed to the favourable weather conditions during the end of 2007 and beginning of 2008 (see Section 4.3) and the timing of the survey occurring just before the scheduled maintenance;

3. Although weather conditions favourable for plant growth continued up until March (see Section 4.3), major maintenance works were undertaken across the majority of the T1-3 Overflow approximately one week proceeding the March 2008 plant survey, which produced low species diversity and abundance recordings for the survey as the majority of the exotic species were completely removed;
4. Within one portion of the T1-3 Overflow area, major maintenance works were undertaken approximately a month prior to the March 2008 survey. This factor combined with favourable weather conditions assisted in maintaining fairly consistent abundance and coverage recordings along this portion only for the March 2008 plant survey (compared with the February 2008 baseline survey). The continuation of high abundance and coverage allows more aggressive and dominant exotic species to out compete other species. This would have assisted in creating the lower diversity levels recorded during the March 2008 plant survey for the T1-3 Overflow area;
5. Scheduled maintenance of the entire T1-3 Overflow area occurred approximately three weeks prior to the June 2008 plant survey;
6. The suspected decline in plant growth rates, probably attributable to the current weather conditions (see Section 4.3), has produced even lower abundance and coverage of exotic species for the June 2008 plant survey compared to the March 2008 plant survey;
7. As maintenance activities were not undertaken immediately prior to the June 2008 plant survey and the abundance and coverage was low, a more diverse community of exotic species has been allowed to grow within the T1-3 Overflow area; and
8. The Asteraceae was the dominant family in the recent June 2008 plant survey, which was also one of the co-dominant families recorded in the March 2008 plant survey for the T1-3 Overflow area. Fabaceae was the previous co-dominant family recorded during both the March 2008 plant survey and the dominant family in the February 2008 baseline survey. The shift in family dominance could be a product of lower rainfall rates and totals over the autumn months. Although species from the Fabaceae family occur across all environments, species from the Asteraceae family are particularly common and suited to dry environments. Furthermore the Asteraceae family is the largest family in terms of the number of species that belong to it, which could also contribute to the dominance of the family.

4.2 CAR PRECINCT AREA

4.2.1 Weed Species Observed at the Car Precinct Area

The June 2008 plant survey along the Car Precinct area identified a total number of 61 plant species and of these three are AQIS listed weed species and 45 are considered exotic.

The three AQIS listed weed species that were located within the Car Precinct area during the June 2008 plant survey included Common Reed (*Phragmites australis*), Red Natal Grass (*Melinis repens*) and Flax-leaf Fleabane (*Conyza bonariensis*). These species were also recorded in the previous surveys (i.e. February 2008 baseline survey and March 2008 plant survey) 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 June 2008 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 JUNE 2008

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

Groundsel Bush and Broad-leafed Peppertree were detected in the previous surveys (i.e. February 2008 baseline survey and March 2008 plant survey). However Lantana has not been previously recorded within the Car Precinct area. Furthermore the abundance of Broad-leafed Peppertree has substantially increased since the March 2008 plant survey with numerous juvenile individuals recorded along the banks of the Visitor Centre Lake.

The lack of previous detection of Lantana could be a result of a recent outbreak occurring after the March 2008 plant survey. 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 previous surveys (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.

This may also be the reason for the lower abundance record of Broad-leafed Pepper Tree. Individuals of this species along the banks of the Visitor Centre Lake may have been immature and hard to detect amongst the long exotic grass and reeds that fringe the waters edge resulting in only the obvious individuals being detected and a low abundance being recorded during the March 2008 plant survey. However the time between the March 2008 and June 2008 plant surveys may have allowed these individuals to grow and become easier to detect resulting in a high abundance record for the current survey.

Caster Oil Plant (*Ricinus communis*), Johnson Grass (*Sorghum halepense*), Wild Aster (*Aster subulatus*), Purple Morning Glory (*Ipomoea indica*) and Mile-a-Minute (*Ipomoea cairica*) whilst not listed under LPR are listed as environmental / noxious weeds by the BCC and were detected in the June 2008 plant survey.

4.2.2 Comparisons between Car Precinct Area Surveys

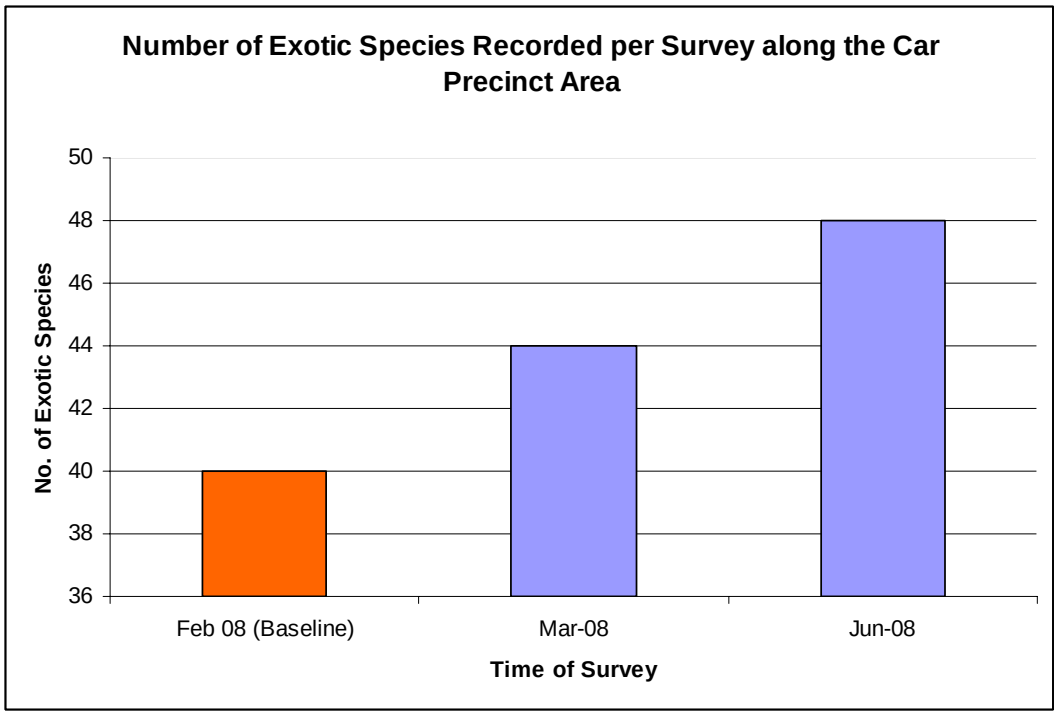
Three AQIS listed species were recorded during the June 2008 plant surveys of the Car Precinct area and these same species were recorded in previous surveys of the area (i.e. February 2008 baseline survey and March 2008 plant survey). However in the previous surveys for the Car Precinct area Canadian Fleabane (*Conyza canadensis*) was also recorded. Therefore there has been a slight decline in the diversity of AQIS listed species recorded during the current survey (June 2008) in comparison to the previous survey results (i.e. March 2008 plant survey and February 2008 baseline survey). Nonetheless abundance and coverage of AQIS listed species has remained relatively consistent with the previous survey results.

An analysis of the June 2008 plant survey results compared to the March 2008 plant survey and February 2008 baseline survey data indicates that there is a variation between the number of exotic species recorded, whilst the type of exotic species recorded remained relatively consistent between the surveys.

Table 4 and Graph 2 highlights the number of exotic species identified in the baseline survey compared to the February 2008 baseline survey and the March 2008 plant 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 Plant Survey	44
June 2008 Plant Survey	48



Graph 2 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, March 2008 and June 2008 plant surveys.

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

FAMILY	NUMBER OF EXOTIC SPECIES		
	FEBRUARY 2008 BASELINE SURVEY	MARCH 2008	JUNE 2008
Asteraceae	8	11	13
Poaceae	6	9	9
Fabaceae	5	7	5
Amaranthaceae	3	2	1
Convolvulaceae	2	2	2
Cyperaceae	2	2	2
Verbenaceae	0	2	2
Anacardiaceae	1	1	1
Commelinaceae	0	1	1
Malvaceae	1	1	1
Onagraceae	1	1	1
Plantaginaceae	0	1	1
Polygonaceae	0	1	1
Portulacaceae	2	1	1
Primulaceae	1	1	1
Solanaceae	1	1	1
Typhaceae	0	0	0
Apocynaceae	1	0	0
Brassicaceae	1	0	2
Euphorbiaceae	3	0	3
Oxalidaceae	1	0	0
Rubiaceae	1	0	0

Shading indicates dominant family group

The above Tables 4 and 5 as well as Graph 2 indicate:

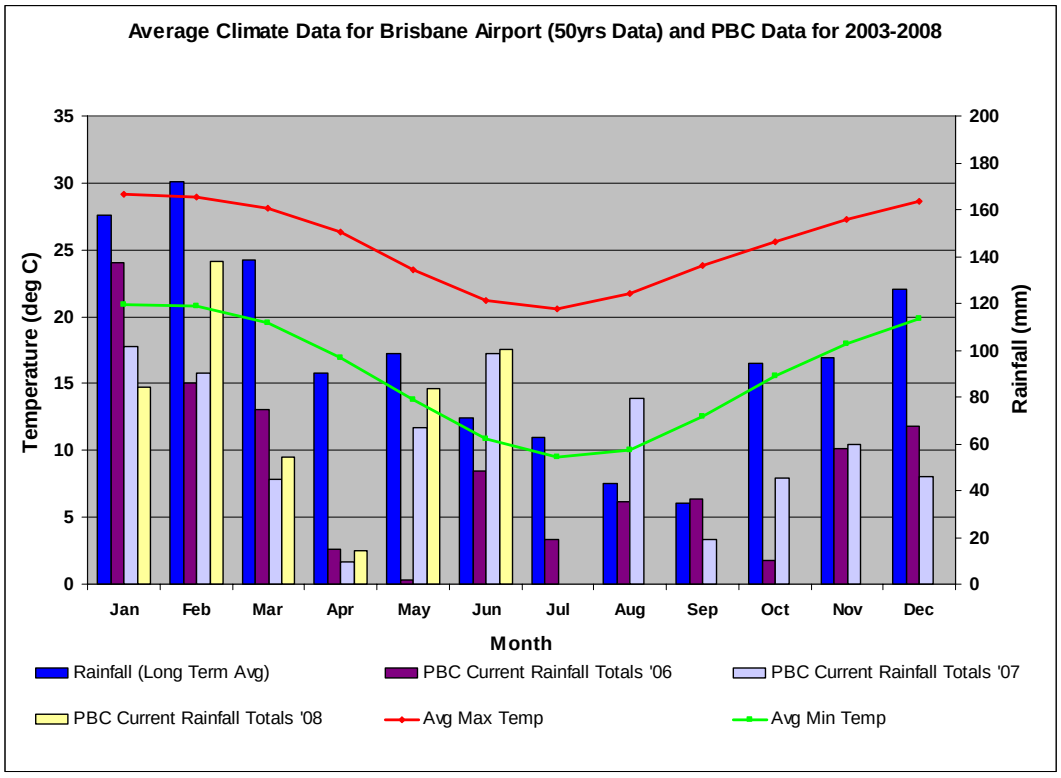
1. There has been a gradual increase in the number of exotic species within the Car Precinct area since the February 2008 baseline survey;
2. The difference in the number of exotic species recorded during the February 2008 baseline survey and the subsequent plant surveys (i.e. March and June 2008) can most likely be attributed to the inclusion of the Visitor Centre Lake into the survey area, which was not included in the February 2008 baseline survey;
3. Weather conditions favourable for plant growth continued up until March (see Section 4.3). This combined with the postponing of major maintenance works (i.e. mowing / slashing) within some portions of the Car

Precinct area assisted in maintaining fairly consistent abundance and coverage recordings along some portions of the area for the March 2008 plant survey. Continuation of high abundance and coverage allows more aggressive and dominant exotic species to out compete other species and create lower diversity levels;

4. Maintenance of the majority of the Car Precinct area occurred approximately three weeks prior to the June 2008 plant survey with the remaining portions (i.e. the western trench) occurring approximately 2 months prior to the survey;
5. The maintenance of the Car Precinct area combined with the perceived decline in growth and germination rates potentially due to the current weather conditions (see Section 4.3) has probably produced the lower abundance and coverage of exotic species allowing a more diverse community of exotic species to grow within the Car Precinct area; and
6. Dominance in the Asteraceae family has remained consistent for all surveys.

4.3 WEATHER CONDITIONS

The following graph (Graph 3) illustrates the broad climatic conditions from 2006 – 2008 including the rainfall recorded at the Port of Brisbane as well as the long term rainfall and temperature averages (taken from the Brisbane Airport).



Graph 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:

- The end of 2007 comprised of a significant period of rainfall, which broke an extended dry period that the South East Queensland region was experiencing (Figure 4). This reprieve in harsh climatic conditions would have allowed a greater amount of exotic species to regerminate and grow extensively throughout both areas. This is indicated by the high exotic species diversity and coverage recorded in the February 2008 baseline survey;
- Weather conditions favourable for plant growth continued up until March (Figure 4). This combined with the postponing of major maintenance works (i.e. mowing / slashing) within some portions of the Car Precinct and T1-3 Overflow areas assisted in maintaining fairly consistent abundance and coverage recordings for some areas during the March 2008 plant survey. Allowing relatively high abundance and coverage to continue in an area generally gives way to more aggressive and dominant exotic species out-competing other species and creating lower diversity levels;
- Rainfall rates and totals as well as temperatures generally decline during the season of autumn. Particularly for the months of April and May in 2008, rainfall totals were well below long term averages (Figure 4). Such weather conditions reduce or halt the growth rate of plants and could have contributed to the decline in abundance and coverage of both exotic and AQIS listed species, which was observed within most areas of the Car Precinct and T1-3 Overflow area during the June 2008 plant survey; and
- Lower coverage and abundance leads to a decrease in species competition and allows a greater number of exotic species to occur in an area and may allow the species that are usually out-competed by more aggressive and dominant exotic species to be recorded / occur. This situation would have contributed to the general higher diversity levels recorded during the June 2008 plant survey.

5.0 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 this means that 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.

This has previously been observed (i.e. during the February 2008 baseline survey and March 2008 plant survey) to allow exotic species abundance and coverage to increase in these portions of the survey area. However with the current weather conditions appearing to reduce the plant growth and germination rates, exotic species are not re-establishing at the previous rate and a change in the level of exotic species incursion since the previous scheduled maintenance is less evident. Under the current weather conditions the existing less frequent maintenance schedule appears to be appropriately managing the exotic species incursion of these less visible areas. Nonetheless, this still highlights the need to implement greater measures in these sections when conditions are favourable for plant growth so as to ensure exotic species coverage is kept to a minimum in all areas of the survey at all times / seasons.

An increase in LPR declared species has been observed in the current survey along the Visitor Centre Lake. This was attributed to either a recent outbreak that potentially occurred in between the surveys (i.e. between March and June 2008) or the inability to detect the individuals prior to the current survey due to their juvenile state. Both factors are a product of the maintenance methods employed along the lake. Maintenance in the form of mowing and slashing occurs around the lake up until the banks where vegetation both native and exotic is left to provide habitat for the waterbirds as well to stabilise the banks. Therefore any exotic species, including LPR declared species located close to the bank can potentially be left untreated. It is therefore recommended that the identification and removal of LPR declared species should be included as part of the routine maintenance and management of the Visitor Centre Lake.

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.

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 quarterly plant surveys for the first year of surveying and then bi-annual surveys following this.

6.0 REFERENCES

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

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

Blood. K., et al. (2001). *Environmental Weeds – A Field Guide for SE Australia*. C H Jewrram, Victoria.

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

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

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

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

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

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

Tothill, J.C. and 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	JUNE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
Aizoaceae						
*Carpobrotus glaucescens**	Pigface*	-	-		X	X
*Sesuvium portulacastrum**	Sea Purslane*	-	-			X
Amaranthaceae						
Alternanthera pungens	Khaki Weed					
Amaranthus viridis	Green Amaranths	-	-	X	X	X
Gomphrena celosioides	Gomphrena Weed	-	-	X	X	X
Anacardiaceae						
Schinus terebinthifolius	Broad-leaved Peppertree	-	3			
Apiaceae						
Hydrocotyle ranunculoides	Pennywort	-	-	X	X	X
Asclepiadaceae						
Gomphocarpus physocarpus	Balloon Cotton Bush	-	-			
Asparagaceae						
Asparagus aethiopicus cv. Sprengeri	Asparagus Fern	-	3			
Asteraceae						
Ageratum houstonianum	Blue Billy-Goat	-	-			
Aster subulatus	Wild Aster	-	-	X		
Baccharis halimifolia	Groundsel Bush	-	2		X	
Bidens pilosa	Cobblers Pegs	-	-	X		X
Calyptocarpus vialis	Creeping Cinderella Weed	-	-	X		
Conyza bonariensis	Faxleaf Fleabane	✓	-	X	X	X
Conyza canadensis	Canadian Fleabane	✓	-		X	X
Crassocephalum crepidioides	Thickhead	-	-	X	X	
Emilia sonchifolia	Emilia	-	-	X		
Hypochaeris radicata	Flatweed	-	-		X	X
Senecio madagascariensis	Fireweed	-	-	X	X	X
Sonchus oleraceus	Rough Sow Thistle	-	-	X	X	X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	JUNE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
Tagetes minuta	Stinking Roger	-	-		X	
Tridax procumbens	Tridax Daisy	-	-	X	X	X
Brassicaceae						
Brassica tournefortii	Wild Turnip	-	-	X		
Lepidium africanum	Common Peppercress	-	-	X	X	X
Boraginaceae						
Heliotropium amplexicaule	Blue Heliotrope	-	-			X
Cactaceae						
Opuntia sp	Prickly Pear	-	2			
Casuarinaceae						
*Casuarina littoralis**	Black Sheoak*	-	-			X
Chenopodiaceae						
Chenopodium ambrosioides	Mexican Tea	-	-			X
Einadia sp.	-	-	-	X		
Commelinaceae						
Commelina benghalensis	-	-	-		X	
Commelina diffusa (C. cyanea)	Wandering Jew	-	-	X		
Convolvulaceae						
Ipomoea so (alba)	White Ipomoea	-	-			
Ipomoea cairica	Mile-a-Minute	-	-			
*Ipomoea pes-caprae**	Goats Foot Convolves*	-	-	X	X	X
Cyperaceae						
Cyperus difformis	Rice Sedge	-	-			X
Cyperus eragrostis	Umbrella Sedge	-	-			X
*Cyperus exaltatus**	Giant Sedge*	-	-			
Cyperus involucratus	-	-	-	X		X
Cyperus polystachuos	-	-	-			
*Isolepsis cernua**	Nodding Club Rush*	-	-	X		
Euphorbiaceae						
Chamaesyce maculata	Caustic Weed	-	-			
Euphorbia hirta	Asthma Plant	-	-			
Chamaesyce prostrata	Red Caustic Creeper	-	-	X	X	X
Euphorbia sp.	Spurge	-	-			
Phyllanthus virgatus	Creeping	-	-			

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	JUNE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
	Phyllanthus					
Ricinus communis	Castor Oil Bush	-	-			X
Fabaceae						
Crotalaria incana	Woolly Rattle Pod	-	-		X	
Crotalaria lanceolata subsp. *lanceolata*	Lance-leaf Rattle Pod	-	-	X	X	X
Crotalaria pallida	Rattle Pod	-	-			
Desmodium uncinatum	Silver Leafed Desmodium	-	-			
Indigofera hirsuta	Hairy Indigo	-	-		X	X
Macroptilium atropurpureum	Siratro	-	-	X	X	X
Macroptilium lathyroides	Phasey Bean	-	-		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
Neonotonia wightii	Glycine	-	-			X
Swainsona galegifolia	Smooth Darling Pea	-	-			X
*Sesbania cannabina**	Sesbania Pea*	-	-	X	X	X
Stylosanthes hamata	Verano Stylo	-	-	X	X	X
Trifolium repens	White Clover	-	-	X	X	X
*Vigna marina**	Yellow Beach Bean*	-	-			
Malvaceae						
Sida cornifolia	Flannel Weed	-	-			X
Sida rhombifolia	Common Sida	-	-	X	X	X
Onagraceae						
Oenothera drummondii subsp. *drummondii*	Beach Primrose	-	-	X	X	X
Oenothera laciniata	Cut-leaf Evening Primrose	-	-	X		
Oxalidaceae						
Oxalis corniculata	Creeping Oxalis	-	-			
Papaveraceae						
Argemone ochroleuca var. *ochroleuca*	Mexican Poppy	-	-			X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	JUNE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
Passifloraceae						
Passiflora cairica	Stinking Passion Vine	-	-			
Passiflora subpeltata	White Passion Flower	-	-			
Plantaginaceae						
Plantago lanceolata	Lamb's Tongue	-	-	X	X	X
Poaceae						
Brachiaria decumbens	Signal Grass	-	-		X	
Brachiaria mutica	Para Grass	-	-			
Cenchrus ciliaris	Buffel Grass	-	-			
Cenchrus echinatus	Mossman River Grass	-	-	X	X	X
Chloris gayana	Rhodes Grass	-	-	X	X	X
Chloris truncata	Windmill Grass	-	-	X		X
Chloris virgata	Feather-top Rhodes Grass	-	-	X	X	X
Cynodon dactylon	Couch Grass	-	-		X	X
Dichanthium aristatum	Angleton Grass	-	-			
Digitaria ciliaris	Summer Grass	-	-			
Eleusine indica	Crowsfoot Grass	-	-			
Hemarthria uncinata	Mat Grass	-	-			
*Imperata cylindrical**	Blady Grass*	-	-		X	X
Melinis repens	Red Natal Grass	✓	-	X	X	X
Melinis minutiflora	Molasses Grass	-	-			
Poa annua	Winter Grass	-	-			
Panicum effusum	Hairy Panic	-	-			
Panicum maximum	Green Panic	-	-	X		X
Paspalum dilatatum	Paspalum	-	-	X		
*Phragmites australis**	Common Reed*	✓	-	X		
Setaria sp.	Pigeon Grasses	-	-			X
Sorghum halepense	Johnson Grass	-	-			
Urochloa mosambicensis	Sabi Grass	-	-			
Portulacaceae						
Portulaca pilosa	Hairy Pigweed	-	-	X	X	X
Portulaca oleracea	Pigweed	-	-		X	X
Primulaceae						

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	JUNE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
Anagallis arvensis	Scarlet Pimpernel	-	-	X	X	X
Rubiaceae						
Richardia brasiliensis	Mexican Clover	-	-	X	X	X
Sapindaceae						
Cardiospermum halicacabum	Balloon Vine	-	-			
Dodonaea triquetra	Hop Bush	-	-			
Solanaceae						
Physalis ixocarpa	Ground Cherry	-	-			X
Solanum seaforthianum	Brazilian Nightshade	-	-	X		
Solanum nigrum	Blackberry Nightshade	-	-		X	X
Typhaceae						
Typha orientalis	Cumbungi / Typha*	-	-	X		X
Ulmaceae						
Celtis sinensis	Chinese Celtis	-	3			
Verbenaceae						
Lantana camara	Lantana	-	3			
Lantana montevidensis	Creeping Lantana	-	3			
Verbena bonariensis	Purple Top	-	-			
Verbena aristigera	Mayne's Pest	-	-	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 Car Precinct Survey Results

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	JUINE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
Aizoaceae						
*Carpobrotus glaucescens**	Pigface*	-	-		X	X
*Sesuvium portulacastrum**	Sea Purslane*	-	-	X	X	X
*Tetragonia tetragonoides**	New Zealand Spinach*	-	-	X		
Amaranthaceae						
Alternanthera pungens	Khaki Weed	-	-			X
Amaranthus viridis	Green Amaranths	-	-	X	X	X
Gomphrena celosioides	Gomphrena Weed	-	-		X	X
Anacardiaceae						
Schinus terebinthifolius	Broad-leaved Peppertree	-	3	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
Aster subulatus	Wild Aster	-	-	X	X	
Baccharis halimifolia	Groundsel Bush	-	2	X	X	X
Bidens pilosa	Cobblers Pegs	-	-	X	X	X
Conyza bonariensis	Flaxleaf Fleabane	✓	-	X	X	
Conyza canadensis	Canadian Fleabane	✓	-		X	X
Crassocephalum crepidioides	Thickhead	-	-	X	X	
Emilia sonchifolia	Emilia	-	-	X		
Hypochaeris radicata	Flatweed	-	-	X	X	X
Onopordum acanthium	Scotch Thistle	-	-	X		
Pseudognaphalium luteoalbum	Jersey cudweed	-	-	X		
Senecio madagascariensis	Fireweed	-	-	X	X	X
Sonchus oleraceus	Rough Sow Thistle	-	-	X		X

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	JUINE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
Sphagneticola trilobata	Singapore Daisy	-	3			
Tridax procumbens	Tridax Daisy	-	-	X	X	X
Tagetes minuta	Stinking Roger	-	-		X	
Brassicaceae						
Brassica tournefortii	Wild Turnip	-	-	X		
Lepidium africanum	Common Peppercress	-	-	X		X
Boraginaceae						
Heliotropium amplexicaule	Blue Heliotrope	-	-			
Cactaceae						
Opuntia sp	Prickly Pear	-	2			
Commelinaceae						
Commelina diffusa (C. cyanea)	Wandering Jew	-	-	X	X	
Commelina benghalensis	-	-	-			
Convolvulaceae						
Cuscuta campestris	Dodder	-	-			
Convolves arvensis	European Bindweed	-	-			
Ipomoea indica	Purple Morning Glory	-	-	X	X	X
Ipomoea cairica	Mile-a-Minute	-	-	X	X	X
*Ipomoea pes-caprae**	Goats Foot Convolves*	-	-			X
Cyperaceae						
*Carex appressa**	Tall Sedge*	-	-			
Cyperus difformis	Rice Sedge	-	-			X
Cyperus congestus	Clustered Flatsedge	-	-			
Cyperus eragrostis	Umbrella Sedge	-	-		X	X
Cyperus involucratus	-	-	-	X	X	
Cyperus rotundus	Nut Grass	-	-			
Cyperus polystachyos	Bunchy Sedge	-	-	X		
*Fimbristylis ferruginea**	Rusty Sedge*	-	-	X	X	
*Isolepis cernua**	Nodding Club Rush*	-	-	X	X	
*Isolepis nodosa**	Knobby Club Rush*	-	-	X	X	
*Schoenoplectus mucronatus**	-	-	-	X		

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	JUINE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
Euphorbiaceae						
Chamaesyce drummondii	Caustic Creeper	-	-			X
Chamaesyce maculata	Eyebane	-	-	X		X
Chamaesyce prostrata	Red Caustic Creeper	-	-	X		X
Euphorbia hirta	Asthma Plant	-	-			
Euphorbia sp.	Spurge	-	-			
*Macaranga tanarius**	Macaranga*	-	-	X	X	
Phyllanthus virgatus	Creeping Phyllanthus	-	-			
Ricinus communis	Castor Oil Plant	-	-	X		
Fabaceae						
Crotalaria incana	Woolly Rattle Pod	-	-		X	
Crotalaria lanceolata subsp. *lanceolata*	Lance-leaf Rattle Pod	-	-	X	X	X
Desmodium uncinatum	Silver Leafed Desmodium	-	-			
Indigofera hirsuta	Hairy Indigo	-	-			X
Macroptilium atropurpureum	Siratro	-	-	X	X	X
Macroptilium lathyroides	Phasey Bean	-	-	X	X	
Medicago polymorpha	Burr Medic	-	-			
Medicago sativa	Lucerne	-	-			
Melilotus albus	Bokhara	-	-			
Melilotus indicus	Sweet Melilotus	-	-	X		
Neonotonia wightii	Glycine	-	-		X	X
*Sesbania cannabina**	Sesbania Pea*	-	-	X	X	X
Stylosanthes hamata	Verano Stylo	-	-	X	X	X
Trifolium repens	Clover	-	-		X	
*Vigna marina**	Yellow Beach Bean*		-		X	
Graminea						
*Paspalum distichum**	Water Couch*	-	-	X	X	
Juncaceae						
*Juncus kraussii**	Jointed Rush*	-	-	X	X	
Malvaceae						
Sida cornifolia	Flannel Weed	-	-			
Sida rhombifolia	Common Sida	-	-	X	X	X
Onagraceae						

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	JUINE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
Oenothera drummondii subsp. *drummondii*	Beach Primrose	-	-	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	
Poaceae						
Arundo donax	Giant Reed	-	-	X	X	X
Brachiaria decumbens	Signal Grass	-	-	X	X	
Brachiaria mutica	Para Grass	-	-			
Cenchrus ciliaris	Buffel Grass	-	-			
Cenchrus echinatus	Mossman River Grass	-	-	X	X	X
Chloris gayana	Rhodes Grass	-	-	X	X	X
Chloris truncata	Windmill Grass	-	-	X		
Chloris virgata	Feather-top Rhodes Grass	-	-	X		
*Cymbopogon refractus**	Barbed Wire Grass*	-	-	X	X	
Cynodon dactylon	Couch Grass	-	-	X	X	X
Dichanthium aristatum	Angleton Grass	-	-			
Digitaria ciliaris	Summer Grass	-	-			
Eleusine indica	Crowsfoot Grass	-	-			
Hemarthria uncinata	Mat Grass	-	-			
*Imperata cylindrical**	Blady Grass*	-	-		X	X
Melinis repens	Red Natal Grass	✓	-	X	X	X
Melinis minutiflora	Molasses Grass	-	-			
Poa annua	Winter Grass	-	-			
Panicum effusum	Hairy Panic	-	-			
Panicum maximum	Green Panic	-	-	X	X	X
Paspalum dilatatum	Paspalum	-	-		X	
*Phragmites australis**	Common Reed*	✓	-	X	X	X
Setaria sp.	Pigeon Grasses	-	-		X	
Sorghum halepense	Johnson Grass	-	-			

SPECIES	COMMON NAME	AQIS LISTED	LPR CLASS	JUINE 08 PLANT SURVEY	MAR 08 PLANT SURVEY	FEB 08 BASELINE SURVEY
Urochloa mosambicensis	Sabi Grass	-	-			
Polygonaceae						
Rumex brownii	Swamp Dock	-	-		X	
Rumex crispus	Curled Dock	-	-	X		
Portulacaceae						
Portulaca pilosa	Hairy Pigweed	-	-	X	X	X
Portulaca oleracea	Pigweed	-	-			X
Primulaceae						
Anagallis arvensis	Scarlet Pimpernel	-	-	X	X	X
Rubiaceae						
Richardia brasiliensis	Mexican Clover	-	-			X
Sapindaceae						
Cardiospermum halicacabum	Balloon Vine	-	-			
*Dodonaea triquetra**	Hop Bush*	-	-			
Solanaceae						
Solanum seaforthianum	Brazilian Nightshade	-	-			
Solanum nigrum	Blackberry Nightshade	-	-	X	X	X
Typhaceae						
Typha orientalis	Cumbungi / Typha*	-	-	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	
Verbena aristigera	Mayne's Pest	-	-		X	
Verbena officinalis	Common Verbena	-	-	X		
Vitex trifolia var *trifolia**	Coastal Vitex*	-	-			

Notes: -

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

APPENDIX C Weed Target List (AQIS)

FAMILY	GENUS SPECIES	AUTHOR	COMMON NAME	COMMENTS
Asteraceae	*Chromolaena odorata*	(L.) King and Robinson	Siam Weed, Christmas Bush	Pastures, oil palm, rubber, coffee, cashew, fruit, maize, forestry. Toxic to livestock. Major environmental weed: secondary forests, roadsides, disturbed sites.
Asteraceae	*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

Source: Lamp & Collet, 1999; Richardson *et al.*, 2007; AQIS, 2008.

APPENDIX D Plant Survey Data Sheet

FAMILY / SPECIES	COMMON NAME	FORM	DECLARATION 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	-		
Agavaceae					
Agave sp.	Agave	w,p	-		

FAMILY / SPECIES	COMMON NAME	FORM	DECLARATION CATEGORY (LPR)	PRESENCE	ABUNDANCE
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 sp. (alba)		v,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	-		
Medicago polymorpha	Burr Medic	h,w			
Medicago sativa	Lucerne	h,w	-		
Melilotus indicus	Sweet Melilotus	h,w	-		
Neonotonia wightii	Glycine	v,w	-		

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

FAMILY / SPECIES	COMMON NAME	FORM	DECLARATION CATEGORY (LPR)	PRESENCE	ABUNDANCE
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					
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.