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Port of Brisbane Annual Weed Survey - 2015

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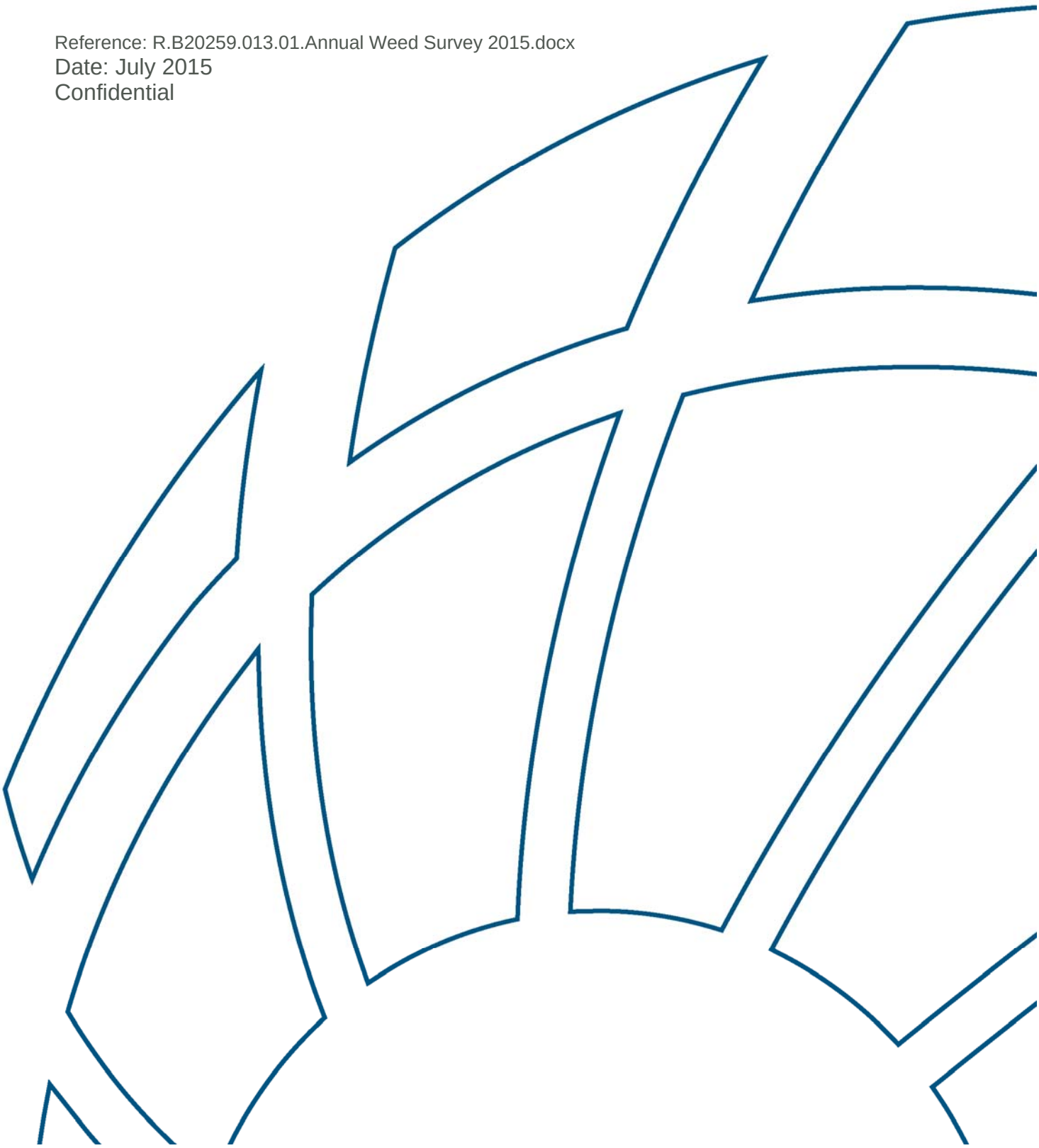

Port of Brisbane Annual Weed Survey - 2015

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Synopsis: **This report provides the results of the 2015 Annual Weed Monitoring conducted at the Port of Brisbane.**

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Executive Summary

Weed monitoring has been undertaken on PBPL lands from 2001 to 2015 targeting exotic species listed by the Australian Quarantine Inspection Service, declared species listed under the *Land Protection (Pest and Stock Route Management) Act 2002* and environmental weeds listed by the Brisbane City Council. This report provides the results for the 2015 monitoring program for Lucinda Drain, Port Gate Drain, Port West Drain and the constructed lake.

In terms of weed composition and distribution all survey sites have remained relatively stable over the past decade. Any species fluctuations recorded over the monitoring period are likely to be a result of seasonal effects and the random meander survey technique rather than significant range expansions for weed species. Whilst there has been minor recruitment of woody weeds in some areas, particularly Broad-leaved pepper tree (*Schinus terebinthifolius*), Groundsel (*Baccharis halimifolia*) and Easter cassia (*Senna pendula* var. *glabrata*), and several species were newly recorded in 2015, all weeds recorded in the survey areas are widespread in the Brisbane region and will be difficult to control on PBPL lands. Although approximately 27 new plant species arrive in the south-east Queensland region each year, no new weed species to the region were recorded in the current survey.

It is recommended that PBPL continue weed control efforts to fulfil landholder obligations under the LP Act and within BCC. Ongoing management will also reduce potential future costs associated with delaying weed control, particularly the removal of mature woody shrubs and trees, and the removal of vines which can be detrimental to native canopy cover and may lead to additional revegetation costs, particularly in riparian areas. Expanding weed monitoring efforts into potentially high risk areas, such as rail and road corridors, would also enable PBPL to track the spread of weeds, including newly introduced species, to and from Port lands more widely. Monitoring freshwater pools and drainage lines may provide more conclusive data on the extent and composition of aquatic weeds, if any, on PBPL lands. In addition, environmentally-significant areas on PBPL lands which are sensitive to weed invasion may benefit from regular weed monitoring and targeted weed control and ongoing management could reduce potential future costs.

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1 Introduction

1.1 Background

Annual weed monitoring surveys have been conducted at the Port of Brisbane (PBPL) since 2001. The aims of the surveys are to monitor the introduction and spread of priority weed species on PBPL lands and to recommend management and control measures as required. Priority weeds targeted in the surveys include plant species considered to be exotic or invasive particularly those listed by the Australian Quarantine Inspection Service, Department of Agriculture (DoA), declared species listed under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) and environmental weeds listed by the Brisbane City Council (BCC). DoA listed weed species are specifically targeted because of their potential to enter the country via containers and other materials shipped and unloaded at the PBPL.

Weed monitoring has been undertaken on PBPL lands from 2001 to 2014. Surveys were conducted at Lucinda Drain from 2001-2014, with surveys at Port Gate Drain commencing in 2007. In 2013 Port West was included in the survey area due to the identification of pest species by stakeholders. In response to a potential weed incursion threat from imported vehicles, weed survey sites at the Car Precinct and T1-3 Overflow Area were included in the monitoring program in 2008. However, given regular maintenance of the Car Precinct and Overflow Areas the risk of weed invasion and spread is considered low. This is supported by the monitoring results since 2008, and on that basis monitoring of these areas was not required in 2015.

No DoA-listed weed species have previously been recorded at PBPL. Eight declared pests (listed as class 2 or 3 under the LP Act) have previously been recorded including: Broad-leaf Pepper Tree (*Schinus terebinthifolius*), Lantana (*Lantana camara*), Groundsel (*Baccharis halimifolia*), Prickly Pear (*Opuntia stricta*), Chinese Elm (*Celtis sinensis*), Camphor laurel (*Cinnamomum camphora*), Fireweed (*Senecio madagascariensis*) and Giant Parramatta Grass (*Sporobolus fertilis*). A further 13 species listed under BCC weed categories have also been recorded in the survey sites. All weed species recorded at PBPL are widespread in degraded sites and coastal habitats of south-east Queensland.

BMT WBM Pty Ltd was commissioned to undertake the weed monitoring program of PBPL lands for 2015. This report details the results of the 2015 weed survey for Lucinda Drain, Port Gate Drain, Port West Drain and the constructed lake.

1.2 Scope of Works

Weed surveys were conducted in April 2015 at Lucinda Drain, Port Gate Drain, Port West Drain and the constructed lake. The scope of works for the weed survey included the following:

- Identify species declared or listed by DoA, LP Act or BCC
- Monitor the location and abundance of exotic invasive species
- Assess the extent of exotic invasive species
- Report the findings of the current survey

- Undertake a comparative analysis of the 2014 and 2015 survey results
- Provide recommendations for on-going weed management.

2 Methodology

In accordance with previous monitoring surveys, weed inspections along the Lucinda, Port Gate and Port West Drains and constructed lake were undertaken in the post-summer months in April, 2015. The survey was conducted by a BMT WBM botanist and an environmental scientist.

2.1 Targeted Weed Species

Targeted species included the following:

- DoA identified 'weeds of interest' within the Port of Brisbane area, based on potential threats to both natural and agricultural systems (refer to Appendix A)
- Exotic species declared under the LP Act
- Species listed by BCC as environmental pests.

2.2 Techniques

The weed survey used the random meander technique for recording all exotic and invasive species within the survey sites. All surveys were conducted on-foot to ensure that extensive coverage of the survey site was achieved. Incidental observations of targeted weed species outside the survey sites were also recorded. The location of all targeted weed species observed were recorded on handheld GPS and visual assessments of weed density and/or percentage vegetation cover were recorded. Weed identification was undertaken on site. Samples of weed species unable to be identified *in situ* were pressed for later verification.

2.3 Survey Sites

The weed survey along Lucinda Drain consisted of recording exotic and invasive species within a 2 m wide transect along the entire length of the drain's eastern bank. A visual inspection of the western bank was taken from the eastern bank.

The weed survey along Port West Drain consisted of recording exotic and invasive species within a 2 m wide transect along the entire length of the drain's eastern bank. A visual inspection of the western bank was taken from the eastern bank.

The weed survey along the southern section of the Port Gate Drain south of Howard Smith Drive consisted of recording exotic and invasive species within a 2 m wide transect along the entire length of the drain's eastern bank. A visual inspection of the western bank was performed from the eastern bank. The plant survey along the northern section of the Port Gate Drain consisted of recording exotic and invasive species within a 2 m wide transect that traversed the entire length of the drain's western bank. A visual inspection of the eastern bank was performed from the western bank.

2.4 Survey Limitations

Whilst every effort has been made to identify targeted weed species in the PBPL survey sites, the detectability of plant species and the ability to accurately identify these in the field varies with seasonal and climatic conditions which influence the presence of reproductive features (flowers,

fruits and seeds) which are useful, and in some cases essential, for species identification. Consequently, the survey conducted should not be regarded as conclusive that targeted DoA, LP Act, or BCC targeted weeds do not occur within the survey sites or surrounding lands.

3 Results

The following sections provide detailed descriptions of weed composition and distribution recorded at Lucinda Drain, Port Gate Drain, Port West Drain and the constructed lake.

Appendix B lists the dominant weed species recorded in the study area in 2015 with their common name and lifeform. Appendix C lists the weed species recorded in 2015 at geo-referenced survey sites represented in Figures 3-2a, 3-3b, 3-5 and 3-7. Appendix D summarises weed species recorded at each survey site from 2013 to 2015.

3.1 Lucinda Drain

3.1.1 Site Description

Lucinda Drain is a constructed channel located east of Lucinda Drive on the eastern edge of the Port. It provides drainage for stormwater run-off from hardstand areas to the north and discharges through the Lucinda Weir into Boat Passage.

The channel banks support planted and naturally recruited shrubs and trees comprised of a mix of local terrestrial species such as She-oaks (*Casuarina* spp.), Figs (*Ficus* spp.), Cotton tree (*Hibiscus tiliaceus*), *Melaleuca* spp. and *Macaranga tanarius*. Introduced shrubs are also widespread and the groundcover is dominated by exotic grasses (refer below). The tidal channel does not contain any extensive aquatic macrophytic cover but supports a low, discontinuous fringe of Grey mangrove (*Avicennia marina*) mangroves. Extensive mangroves and saltpan lie to the east of the drain associated with the intertidal flats of Boat Passage.

The western bank of the drain adjacent to Lucinda Drive undergoes regular maintenance involving mowing and weed spraying. Poor access along the eastern bank of Lucinda Drain limits regular maintenance but weeds are reportedly removed on an annual basis (RPS, 2013).

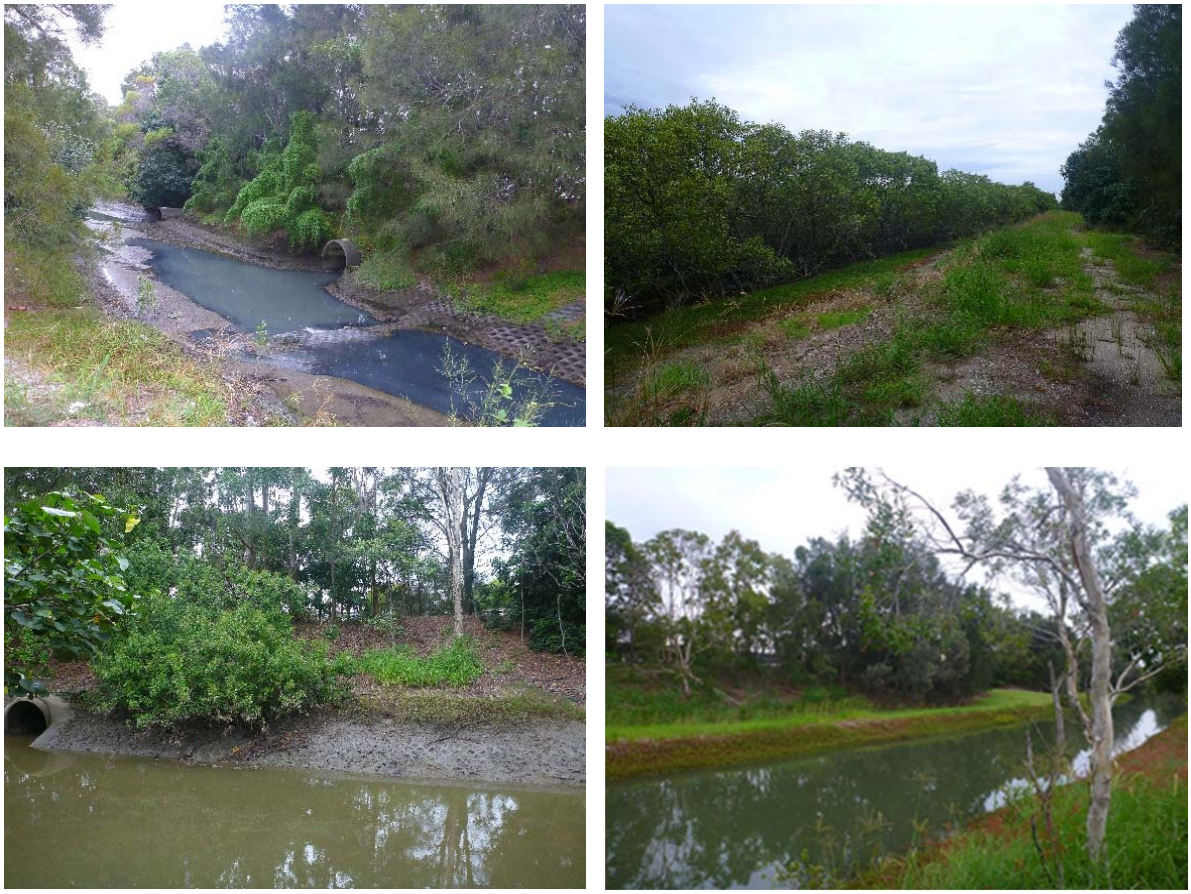
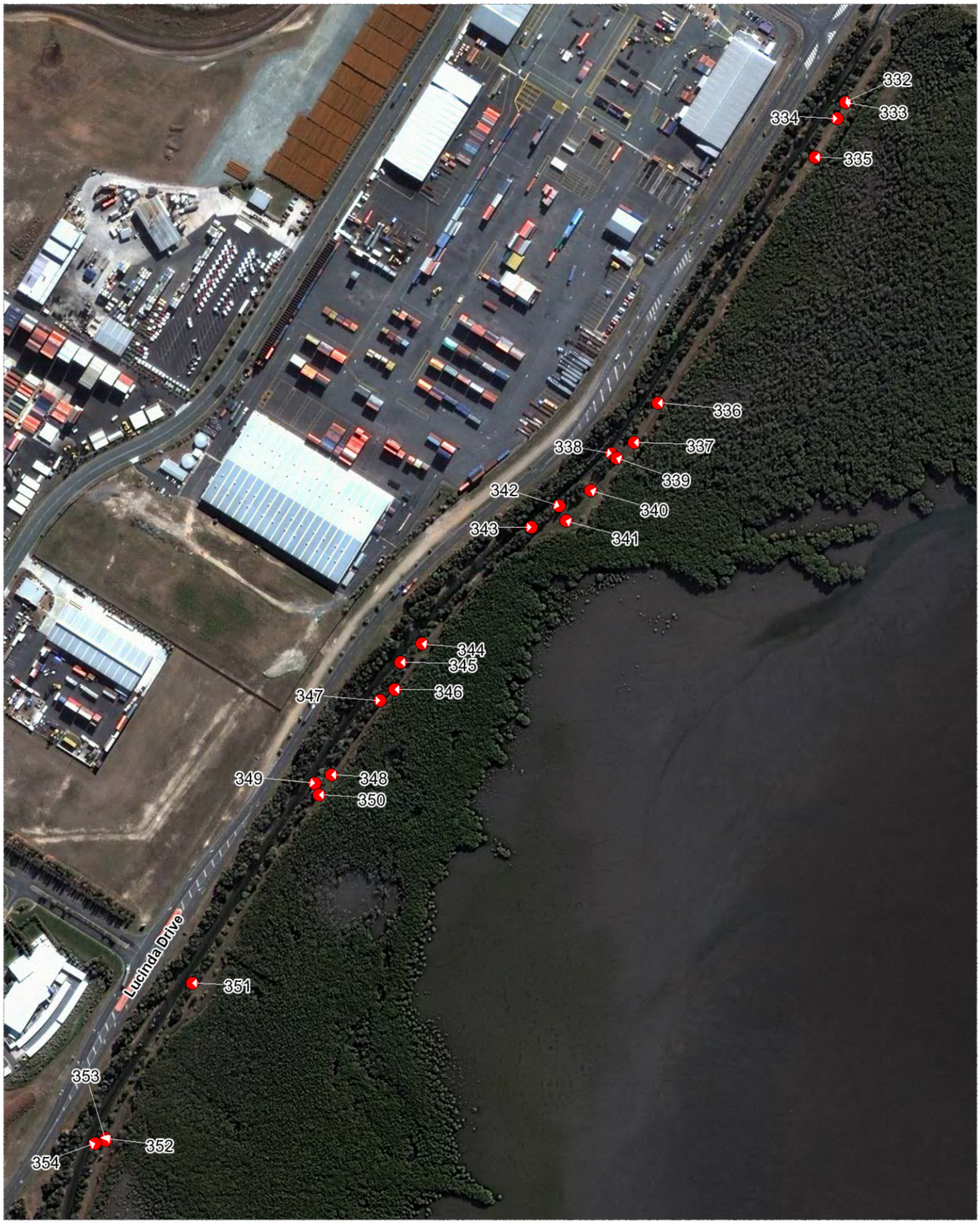


Figure 3-1 Lucinda Drain 2015



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Lucinda Drain (North): Weed Locations 2015

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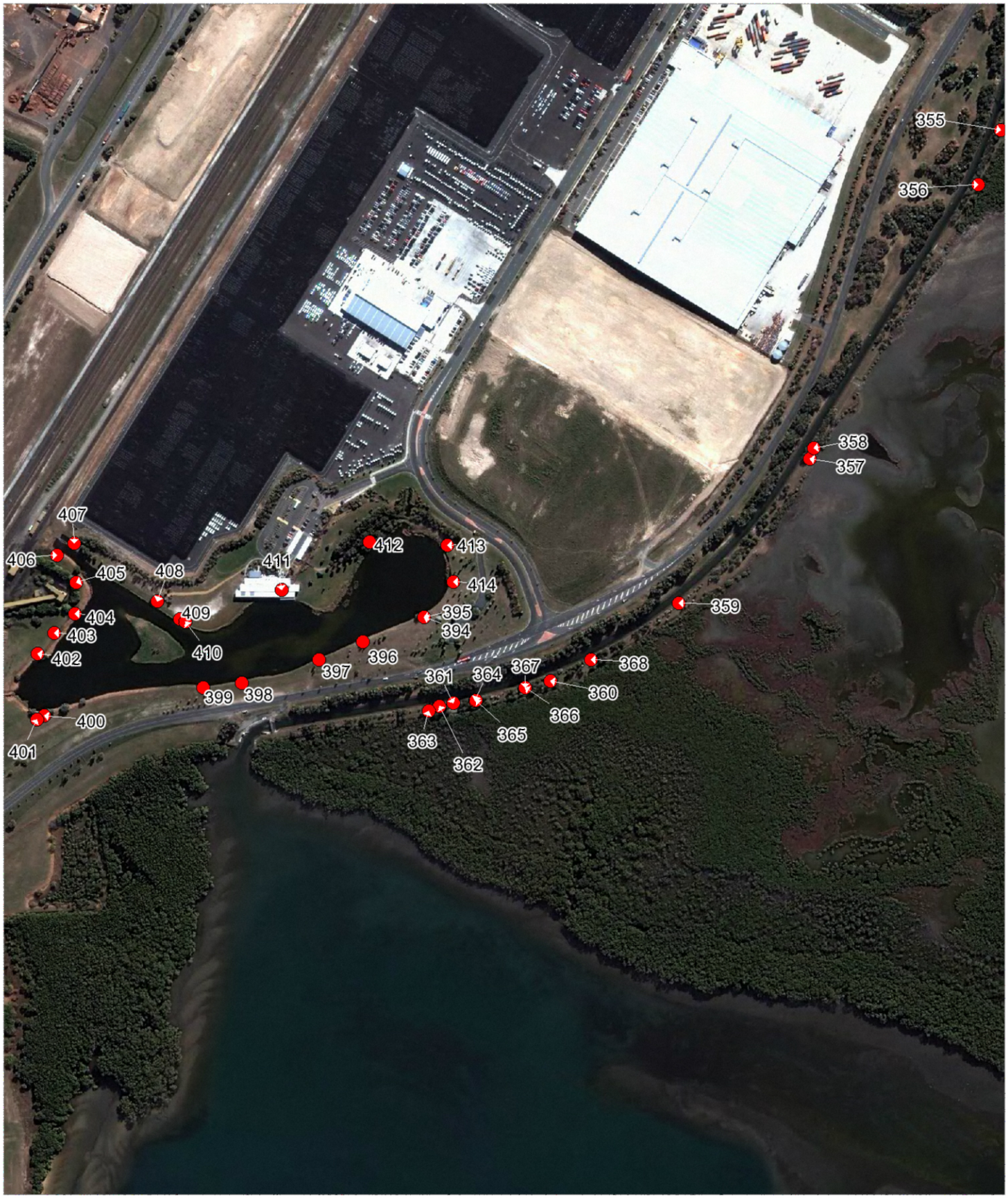

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Lucinda Drain (South) and Lake: Weed Locations 2015

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3.1.2 Weeds

Appendices B and C and Figures 3-2 a, 3-3b provide the results of the 2015 weed survey for Lucinda Drain. The following observations were made:

- No DOA-listed species were recorded within or directly adjacent to Lucinda Drain.
- The declared plant Prickly pear (*Opuntia* sp.) listed as Class 2 under the LP Act was recorded.
- Seven Class 3 declared species listed under the LP Act were recorded including: *Schinus terebinthifolius, Cinnamomum camphora,* Balloon vine (*Cardiospermum grandiflora*), *Celtis sinensis, Lantana camara,* Creeping lantana (*Lantana montevidensis*) and Basket asparagus fern (*Asparagus aethiopicus cv. Sprengeri*).
- One Class C species listed by BCC was recorded: *Asparagus aethiopicus* cv. *Sprengeri.*
- Seventeen Class R weeds listed by BCC were recorded at Lucinda Drain. These species are well established across Brisbane and are a moderate threat (BCC, 2015). The management objective for Class R weeds is to reduce the population as part of routine maintenance (BCC, 2015). Species recorded included *Opuntia* sp., *Schinus terebinthifolius, Cinnamomum camphora, Cardiospermum grandiflora, Celtis sinensis, Lantana camara, Lantana montevidensis, Senna pendula var. glabrata,* Mile-a-minute (*Ipomoea cairica*), Siratro (*Macroptilium atropurpureum*), Rubber fig (*Ficus elastica*), Mossman River grass (*Cenchrus echinatus*), Rhode's grass (*Chloris gayana*), Green panic (*Megathyrsus maximus var. maximus*), Thorn apple (*Datura* sp.), Brazilian nightshade (*Solanum seaforthianum*) and Blackberry nightshade (*Solanum nigrum*).

The RPS reporting does not provide abundance data for individual species therefore it cannot be determined if, and where, a particular species may be spreading and/or recruiting. However, the 2014 data records the number and size-class for woody species and estimates of groundcover to be used in ensuing surveys to detect patterns of recruitment and spread of individual species.

Consistent with previous surveys, the dominant woody weed recorded at Lucinda Drain was *Schinus terebinthifolius*. Twenty-three individuals were recorded on the banks of Lucinda Drain ranging in height from 1 m to 6 m. Other woody weeds recorded included seven mature *Lantana camara,* averaging 0.5-2.0 m in height, and three mature *Senna pendula* var. *glabrata,* ranging in height from 1-4 m. Three *Celtis sinensis* (comprising mature trees and seedlings) and a mature *Cinnamomum camphora* were recorded on the western banks. One mature Thornapple (*Datura ferox*) was noted on the eastern bank. Six *Opuntia* sp. were recorded at one location on the eastern bank directly adjacent to the mangrove zone. The woody weeds Castor oil tree (*Ricinus communis*) and Leucaena (*Leucaena leucocephala*) have not been recorded at Lucinda Drain since the 2013 survey by RPS.

Sparse vines (<5% cover) were recorded in the survey area including *Ipomoea cairica, Cardiospermum grandiflorum* and *Solanum seaforthianum*. Dense patches of *Macroptilium atropurpureum* were recorded on the eastern banks and were noted to be smothering some riparian Casuarina canopy trees.

The groundcover ranged from 10-100 % cover and was dominated by exotic grasses including *Chloris gayana, Megathyrsus maximus* var. *maximus,* Red natal grass (*Melinis repens*) and *Cenchrus echinatus.* In 2014, *Cenchrus echinatus* was recorded as an isolated patches on the eastern bank. This grass has since spread extensively along the eastern bank to become one of the co-dominant groundcovers. Other groundcovers included Cobbler's pegs (*Bidens pilosa*), Blue billygoat weed (*Ageratum houstonianum*), Tridax daisy (*Tridax procumbens*) and Hairy commelina (*Commelina benghalensis*).

No aquatic macrophyte weed species were recorded. The brackish to saline conditions of the channel limits the establishment of exotic macrophytes known from the region.

Weed species newly recorded for Lucinda Drain in 2015 included Gomphrena weed (*Gomphrena celosioides), Asparagus aethiopicus cv. Sprengeri,* Flatweed (*Hypochaeris radiata*), Scotch thistle (*Silybum marianum*), *Cinnamomum camphora* and Oxalis (*Oxalis corniculatum*). All species are widespread in the bioregion. Apart from the spread of *Cenchrus echinatus* and canopy smothering of *Macroptilium atropurpureum,* there were no other significant differences between survey results. Any differences in species records between survey events is most likely a reflection of the random-meander survey technique rather than actual presence/absence of a species. Anomalies with survey coverage can be overcome with the establishment and monitoring of permanent plots, however this approach generally results in reduced coverage over the entire sample area.

3.2 Port West Drain

3.2.1 Site Description

Port West Drain, located west of Lytton Road approximately 4 km south-west of the Port, comprises a narrow intertidal channel fringed with remnant mangroves dominated by mature *Avicennia marina*. The channel is bounded to the west by extensive mangrove forest and cleared land for industrial purposes lie to the east. No scheduled maintenance work, including weed removal, is undertaken at Port West Drain (RPS, 2013).

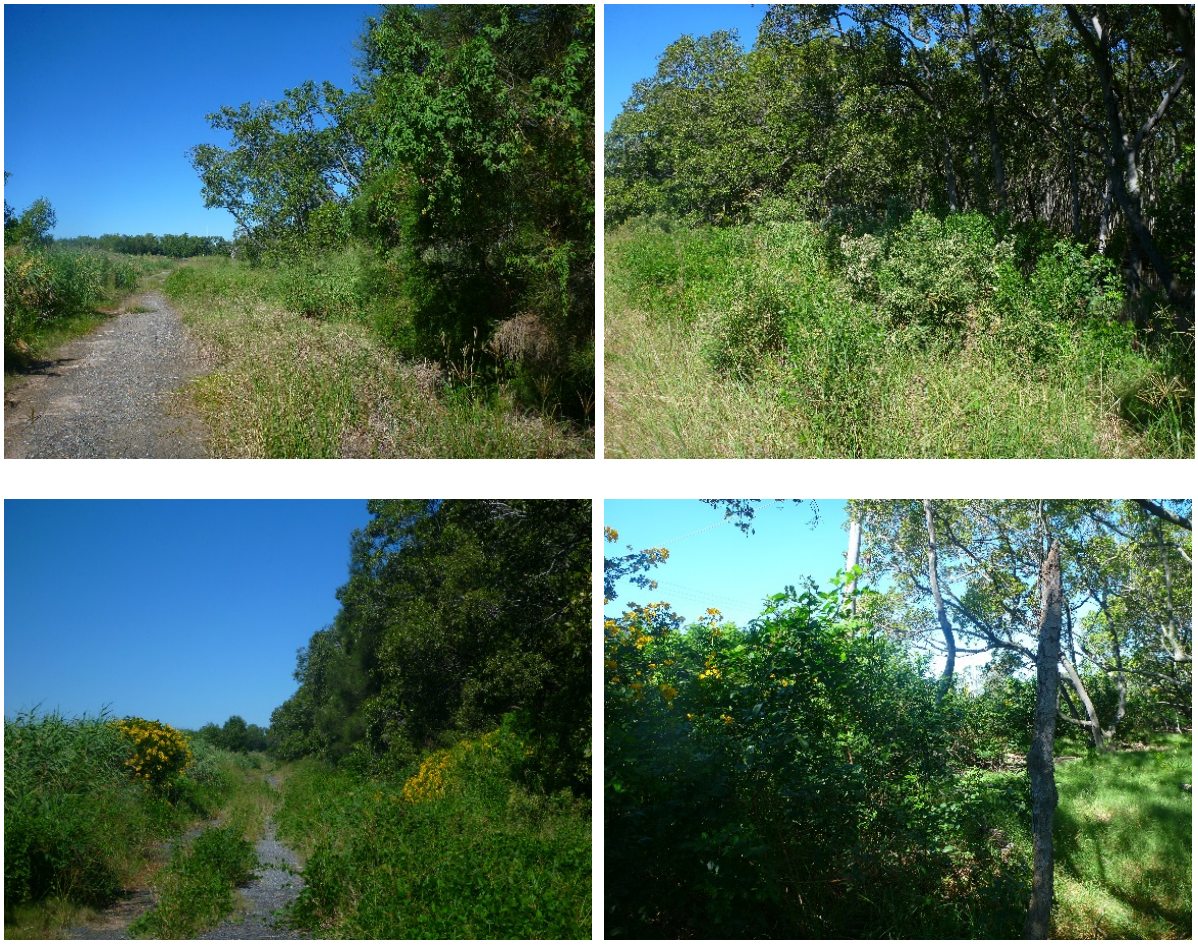


Figure 3-4 Port West Drain

3.2.2 Weeds

Appendices B and C and Figure 3-4 provide the results of the 2015 weed survey for Port West Drain. The following observations were made:

- No DOA-listed species were recorded within or directly adjacent to Port West Drain
- *Opuntia* sp. and *Baccharis halimifolia* listed as Class 2 under the LP Act were recorded
- Four Class 3 declared species were recorded including: *Schinus terebinthifolius, Celtis sinensis, Lantana camara and Asparagus aethiopicus cv. Sprengeri*

- Three Class C listed BCC weeds were recorded including *Asparagus aethiopicus cv. Sprengeri, Baccharis halimifolia* and Madeira vine (*Anredera cordifolia*). The management intent of Class C weeds, which are well established in Brisbane, is containment and reduction (BCC, 2014)
- Seventeen Class R weeds listed by BCC were recorded including: *Opuntia sp., Schinus terebinthifolius, Celtis sinensis, Lantana camara, Senna pendula var. glabrata, Ipomoea cairica, Ricinus communis, Macroptilium atropurpureum,* Glycine (*Neonotonia wightii*), Corky passionflower (*Passiflora suberosa*), Coral berry (*Rivina humilis*), *Chloris gayana, Megathyrsus maximus var. maximus,* Wild tobacco (*Solanum mauritianum*), Johnson grass (*Sorghum halepense*), *Solanum nigrum* and Stinking Roger (*Tagetes minuta*).

The intertidal lands vegetated with dense mangrove forest to the west of the channel limits extensive weed establishment in this area. However, the eastern riparian corridor adjacent to the cleared industrial land supports a mix of exotic shrubs and groundcovers which extend to under the mangrove canopy, but only occur to the high tide mark.

The dominant woody weed recorded at Port West Drain was *Schinus terebinthifolius*. Approximately 219 individuals were recorded on the eastern banks of Port West Drain ranging in height from 0.5-4 m.

Other woody weeds recorded included (in order of abundance):

- Approximately 140 *Baccharis halimifolia* ranging from seedlings (0.5 m in height) to adults (3 m in height)
- Approximately 136 *Senna pendula var. glabrata* ranging from seedlings (0.5 m in height) to adults (4 m in height)
- Approximately 70 *Lantana camara* ranging from 1 m in height
- 10 Inkweed (*Phytolacca octandra*) ranging from 0.5 -1 m in height
- 2 *Opuntia* sp., 1 m in height
- 2 mature *Solanum mauritianum*
- 2 Yellow pea bush (*Sesbania cannabina*).

Other widespread woody weeds included *Rivina humilis,* Balloon cotton bush (*Gomphocarpus physocarpus*) and *Solanum nigrum*. Individual *Ricinus communis, Celtis sinensis* and Date palm (*Phoenix dactylifera*) were also noted.

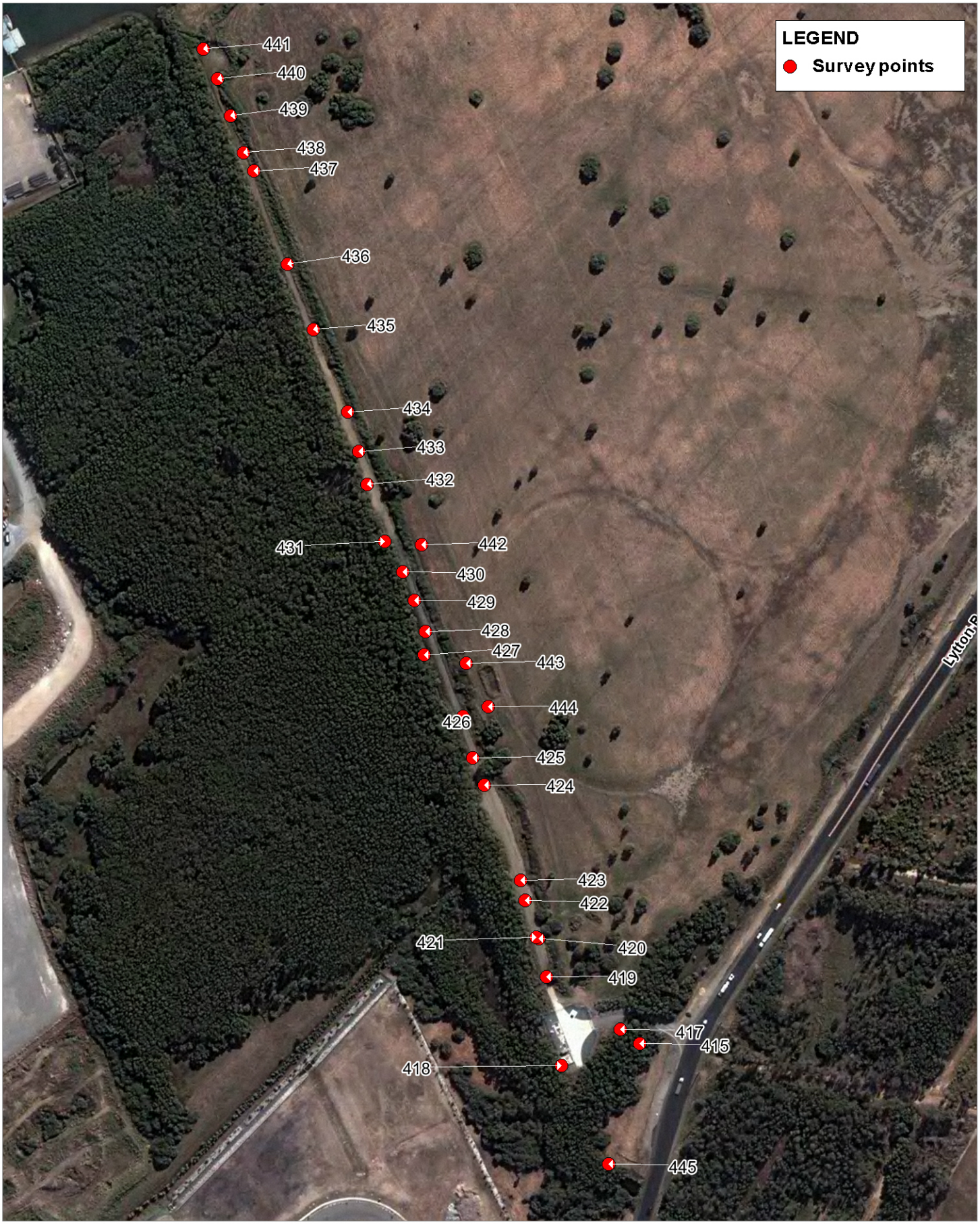
The groundcover averaged 90% cover and was dominated by the exotic grass *Megathyrsus maximus* var. *maximus.* Other grasses included *Chloris gayana,* Green couch (*Cynodon dactylon*), Summer grass (*Digitaria ciliaris), Melinis repens* and *Sorghum halepense* with Common reed (*Phragmites australis*) and Sand couch (*Sporobolus virginicus*) occurring in saline sites.

Sparse vines (<5% cover) were recorded in the survey area including *Passiflora suberosa,* Stinking passionflower (*Passiflora foetida*), *Neonotonia wightii, Anredera cordifolia, Ipomoea cairica* and *Macroptilium atropurpureum*.

Common herbs and forbs included *Ageratum houstonianum,* Lesser joyweed (*Alternanthera denticulata*), *Asparagus aethiopicus cv. Sprengeri, Bidens pilosa,* Flaxleaf fleabane (*Conyza bonariensis*), Thickhead (*Crassocephalum crepidioides*), Rattlepod (*Crotalaria pallida*), Emilia (*Emilia sonchifolia*), Scotch thistle (*Onopordum acanthium*), Common sowthistle (*Sonchus oleraceus*), *Tagetes minuta* and Purpletop (*Verbena bonariensis*).

No aquatic macrophyte weed species were recorded and none are likely to occur given the brackish to saline conditions of the waterways.

Rivina humilis seedlings were first recorded in the survey area in 2014 and have since become widespread throughout the site. Weed species newly recorded for Port West Drain in 2015 included *Asparagus aethiopicus cv. Sprengeri, Emilia sonchifolia, Anredera cordifolia, Opuntia sp., Crotalaria pallida* and *Celtis sinensis*. All species are widespread in the bioregion. Overall there were no other significant differences between survey results and as described above any differences in species records between events is most likely a reflection of the random-meander survey technique.



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Port West Drain Weed Survey Results 2015

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3.3 Port Gate Drain

3.3.1 Site Description

Port Gate Drain located in the south-west section of the PBPL lies to the south of Boat Passage in the vicinity of Howard Smith Drive. It collects stormwater run-off from the adjacent hardstand areas and drains into (and partially receives) the tidal waters in Boat Passage. The banks of the drain are constructed of concrete, gravel and/or compacted earth, which limits extensive vegetation growth. The tidal reaches of the drain support sparse fringing *Avicennia marina* seedlings, with a sparse groundcover of *Phragmites australis,* River club rush (*Schoenoplectus validus*) and *Fimbristylis* sp.. Outside the tidal zone the banks support a sparse groundcover of exotic grasses and shrubs.

It is understood that Port Gate Drain undergoes regular maintenance (including mowing and spraying for exotic species) which is facilitated by the PBPL (RPS, 2013).

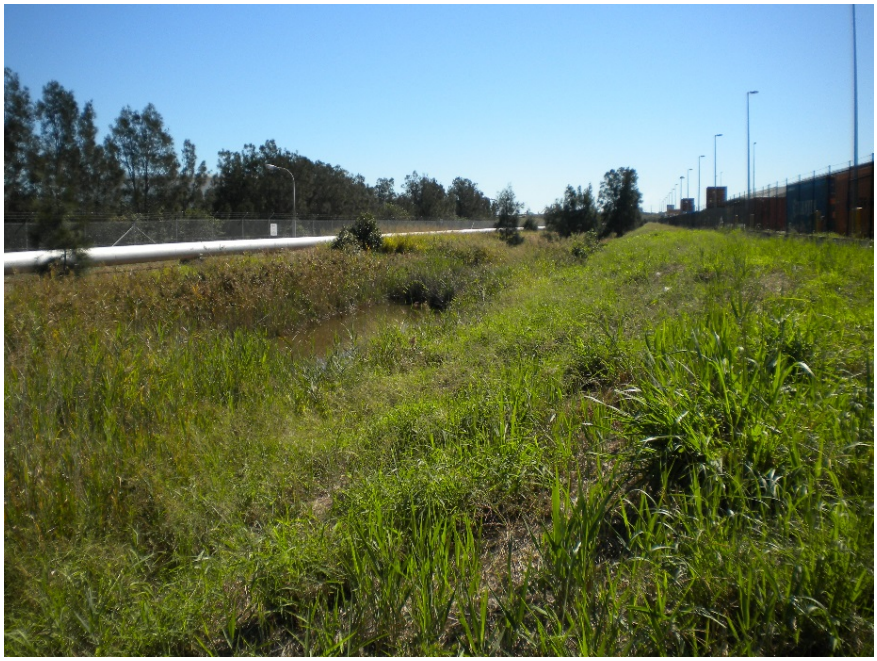

Figure 3-6 Port Gate Drain

3.3.2 Weeds

Appendices B and C and Figure 3-6 provide the results of the 2015 weed survey for Port Gate Drain. The following observations were made:

- No DOA-listed species were recorded within or directly adjacent to Port Gate Drain
- *Baccharis halimifolia* listed as Class 2 under the LP Act and Class C by BCC was recorded
- Five Class 3 declared species (LP Act) were recorded including: *Schinus terebinthifolius, Cinnamomum camphora, Cardiospermum grandiflora, Lantana camara* and Singapore daisy (*Sphagneticola trilobata*)

- Ten Class R weeds listed by BCC were recorded including: *Schinus terebinthifolius, Cinnamomum camphora, Cardiospermum grandiflora, Lantana camara, Ricinus communis, Leucaena leucocephala, Macroptilium atropurpureum, Chloris gayana, Megathyrsus maximus* var. *maximus* and *Sphagneticola trilobata.*

The dominant woody weed recorded at Port Gate Drain was *Schinus terebinthifolius* where approximately 70 individuals were noted. More than 50% of these were seedlings.

Other woody weeds recorded included (in order of abundance):

- 58 *Baccharis halimifolia* from seedlings (0.5 m in height) to adults (2 m in height)
- 9 *Leucaena leucocephala* seedlings
- Two *Cinnamomum camphora.*

Other individual woody weeds recorded included *Gomphocarpus physocarpus, Lantana camara, Phytolacca octandra* and *Ricinus communis.*

The groundcover averaged 90% cover and was dominated by the exotic grass M*egathyrsus maximus var. maximus*. Other grasses included *Chloris gayana, Cynodon dactylon, Digitaria ciliaris* and *Melinis repens* with *Phragmites australis* and *Sporobolus virginicus* in saline sites.

Common herbs and forbs included *Bidens pilosa, Conyza bonariensis, Crotalaria pallida,* Berry saltbush (*Einadia hastata*), *Emilia sonchifolia,* Ribwort (*Plantago lanceolata*), *Sphagneticola trilobata* and *Tridax procumbens*

Sparse vines (<5% cover) were recorded in the survey area including *Cardiospermum grandiflora, Macroptilium atropurpureum* and *Passiflora foetida.*

Sphagneticola trilobata, which is a widespread species in the bioregion, was recorded for the first time at Port Gate Drain in 2015. There were no other significant differences between survey results and as described above any differences in species records between events is most likely a reflection of the random-meander survey technique.

Title:

Port Gate Drain: Weed Locations 2015

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3.4 Constructed Lake

3.4.1 Site Description

The constructed lake at PBPL's previous visitors centre comprises an artificial lake bounded by cleared and disturbed low lying coastal plains which support a high density of weeds common throughout the Brisbane region. The lake is regularly maintained including mowing and weed control (RPS, 2013).

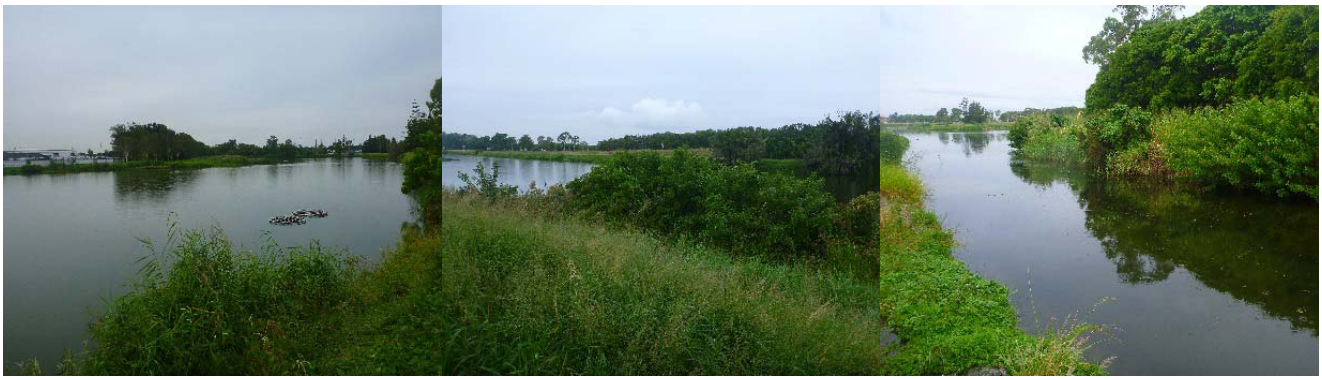

Figure 3-8 Constructed Lake

3.4.2 Weeds

Appendices B and C and Figure 3-3b provide the results of the 2015 weed survey for the constructed Lake. The following observations were made:

- No AQIS-listed species were recorded within or directly adjacent to the survey areas
- Two Class 2 declared species (LP Act) were recorded including: *Baccharis halimifolia* and Fireweed (*Senecio madagascariensis*)
- Two Class 3 declared species (LP Act) were recorded including: *Schinus terebinthifolius* and *Lantana camara*
- The BCC Class C weed *Baccharis halimifolia* was recorded
- Twelve Class R weeds listed by BCC were recorded including: *Senecio madagascariensis, Schinus terebinthifolius, Lantana camara, Ipomoea cairica, Ricinus communis, Macroptilium atropurpureum, Cenchrus echinatus, Megathyrsus maximus var. maximus, Solanum nigrum,* Balsam (*Impatiens* sp.), Long-leaved willow primrose (*Ludwigia* longifolia) and Whisky grass (*Andropogon virginicus*).

The dominant woody weed was *Schinus terebinthifolius* where over 100 individuals were recorded. More than 50% of these were mature individuals.

Other woody weeds recorded included (in order of abundance):

- 64 *Baccharis halimifolia*
- 22 *Ricinus communis*

- 5 *Senecio madagascariensis*
- 5 Giant Devil's fig (*Solanum chrysotrichum*)
- 2 *Lantana camara.*

Other widespread woody weeds recorded included *Gomphocarpus physocarpus, Phytolacca octandra* and *Solanum nigrum.*

Sparse vines (<5% cover) were recorded in the survey area including *Ipomoea cairica* and *Macroptilium atropurpureum.*

The sparse groundcover was regularly mowed. The most widespread grass was *Megathyrsus maximus var. maximus*. Other grasses included *Cenchrus echinatus, Melinis repens,* Paspalum (*Paspalum dilatatum*), water couch (*Paspalum distichum*) and South African pigeon grass (*Setaria sphacelata*). Other groundcover species included *Ageratum houstonianum, Conyza bonariensis, Gomphrena celosioides, Senecio madagascariensis,* Common sida (*Sida rhombifolia*), *Tridax procumbens* and Purpletop (*Verbena bonariensis*).

Aquatic macrophytes recorded on the lakes edge included Tall flatsedge (*Cyperus exaltatus*), Umbrella sedge (*Cyperus involucratus*) and *Ludwigia longifolia.*

Weed species newly recorded for the constructed lake in 2015 included *Gomphocarpus physocarpus, Crotalaria pallida, Andropogon virginicus* and Light blue snakeweed (*Stachytarpheta jamaicensis*). All species are widespread in the bioregion. Overall there were no other significant differences between survey results and as described above any differences in species records between events is most likely a reflection of the random-meander survey technique.

4 Discussion

With the exception of the western bank of the Port West Drain, the weed survey sites within the PBPL are highly disturbed and therefore prone to weed invasion. Given the nature of the Port, PBPL lands are also susceptible to the import of new weed species. However, all weeds recorded at PBPL are widespread in the Brisbane region and no DoA listed species have been detected. In terms of weed composition and distribution, the survey areas have remained relatively stable over the monitoring period (2001-2015) with minor areas of recruitment. Although approximately 27 new plant species arrive in the south-east Queensland region each year (BCC, 2013), no new weed species to the region were recorded in the current survey. Minor species fluctuations recorded over the monitoring period are likely to be a result of seasonal effects and the random meander survey technique rather than significant range expansions for weed species which are all widespread in the region.

The dominant weed species recorded on PBPL lands included:

- Woody weeds: *Schinus terebinthifolius* and *Baccharis halimifolia*.
- Vine cover: generally low (0<5% cover) in all survey areas and dominated by *Cardiospermum grandiflorum, Ipomoea cairica, Macroptilium atropurpureum, Neonotonia wightii, Passiflora suberosa* and *Passiflora foetida*.
- Ground cover: generally high cover (50-90%) given the disturbed nature of the survey areas and dominated by the exotic grasses *Megathyrsus maximus* var. *maximus*, Chloris *gayana,* and *Melinis repens*.

The highest weed species diversity was recorded in the groundlayer, which is a reflection of the higher richness in groundcover species in the region and the disturbed nature of the survey sites.

The brackish to saline conditions of the channels limits the establishment of most exotic macrophytes on PBPL lands with the exception of the constructed lake which supports a low density of freshwater aquatic macrophytes widespread throughout the Brisbane region.

In terms of weed composition and distribution all survey sites have remained relatively stable over the past decade. Whilst there has been minor recruitment of woody weeds in all areas, particularly *Schinus terebinthifolius*, *Baccharis halimifolia* and *Senna pendula var. glabrata,* and several species were newly recorded in 2015, all weeds recorded in the survey areas are widespread species in the Brisbane region and will be difficult to control on PBPL lands.

In 2014 an isolated outbreak of the groundcover *Cenchrus echinatus* was recorded on the eastern bank of Lucinda Drain which was attributed to recent earthworks or ground disturbance. This species has since become well established along the eastern length of Lucinda Drain. As this grass is well established on PBPL lands and throughout the Brisbane region it will be difficult to eradicate. *Macroptilium atropurpureum,* which is also widespread on PBPL lands and throughout Brisbane, has formed a dense cover over some riparian trees causing some canopy dieback on the eastern bank Of Lucinda Drain. It is recommended weed control is carried out along the eastern bank of Lucinda drain to reduce vine cover and to protect native riparian vegetation.

As the Port West Drain lies directly adjacent to cleared lands for future industrial precincts, weed control in this area will be difficult to achieve in the future without integrated management from all landholders. It should be noted that the conservation values of this area are restricted to the intertidal lands supporting dense mangrove forest, which, unless cleared or disturbed, are not susceptible to degradation by weed invasion spreading from PBPL lands.

The Port Gate Drain is a highly modified channel of low ecological value and no new weeds or species of management concern were recorded. Despite its proximity to potential vectors of new weed invasions (i.e imported car precincts), no new weeds or species of management concern were recorded in or directly adjacent to the constructed lakes.

5 Conclusion

Based on the annual weed monitoring results conducted over the past 14 years, the weed species recorded in the survey areas are widespread in Brisbane and the south-east Queensland bioregion, and for that reason will be difficult to control and are unlikely to be eradicated from PBPL lands. Despite this, it is recommended that PBPL continue weed control efforts to fulfil landholder obligations under the LP Act and within BCC. Ongoing management will also reduce potential future costs associated with delaying weed control, particularly the removal of mature woody shrubs and trees, and the removal of vines which can be detrimental to native canopy cover and may lead to additional revegetation costs, particularly in riparian areas.

Whilst the annual weed monitoring carried out to date provides comprehensive data for weed invasion in some high risk areas at the Port, such as adjacent to the imported car precinct, monitoring is not currently carried out in the road and rail corridors within PBPL lands which have the potential to spread weed species (including newly introduced species) from the Port to other parts of the region. Focusing weed monitoring efforts in these potentially high risk areas would enable PBPL to track the spread of weeds, including newly introduced species, to and from Port lands more widely.

Although there are very few aquatic weed species in the region that are able to tolerate saline conditions, current weed monitoring focuses on saline to brackish drainage channels and waterbodies (with the exception of the constructed wetland) which are at low risk to aquatic weed invasion. Monitoring freshwater pools and drainage lines may provide more conclusive data on the extent and composition of aquatic weeds, if any, on PBPL lands.

Most of the weed species recorded on PBPL lands are classed as environmental weeds which are plants that invade native ecosystems and may have significant environmental impacts such as effects on biodiversity and water quality. With the exception of remnant mangroves at Port West Drain (which have low susceptibility to weed invasion given the saline conditions), current weed monitoring survey efforts at the Port focus on disturbed habitats with limited ecological value. There are several environmentally-significant areas documented on PBPL lands, including mapped Wetlands and Essential Habitat, which may be susceptible to weed invasion. For example, remnant *Melaleuca quinquenervia* wetlands (RE12.3.5) mapped on PBPL lands may be susceptible to groundsel and vine invasion. This habitat may also be vulnerable to new species invasions, such as Kudzu (*Pueraria lobata*) (Class 2 pest), which has the potential to become a major environmental and economic management issue in coastal areas of south east Queensland. Environmentally-significant areas on PBPL lands which are sensitive to weed invasion may benefit from regular weed monitoring and targeted weed control by PBPL and ongoing management could reduce potential future costs associated with delaying weed control.

6 References

BCC (2013). Brisbane Invasive Species Management Plan 2013-17. Prepared by the Brisbane City Council, February 2013.

BMT WBM (2014). Port of Brisbane Annual Weed Survey – 2014. Report prepared for PBPL.

Brisbane City Council (2014). Weed Classification. http://weeds.brisbane.qld.gov.au/weed-classification, accessed August, 2014.

RPS Australia East Pty Ltd (2013). Annual Plant Assessment Port of Brisbane. Report Prepared for the Port of Brisbane, July 2013.

Appendix A DoA Target Weeds

Appendix 1

AQIS Weed Target Species List

Family	Botanical Name	Common Name	Author	Comments
ACANTHACEAE	Asystasia gangetica subsp. micrantha	Chinese Violet	(Nees) Ensermu	Rubber, coffee, oil-palm plantations, environmental weed.
	Blechum pyramidatum	Browne's Blechum, Green Shrimp Plant, Blackweed	(Lam.) Urb	Pastures, gardes, disturbed areas, rainforest understoreys.
ASTERACEAE	Austroeupatorium inulaefolium	Austroeupatorium	(H.B.K.) King & Robinson	Tea, rubber, rosella and other plantation crops; roadsides; environmental weed in secondary forests.
	Bidens biternata	Yellow Flowered Blackjack, Five Leaved Blackjack	Merr. and Sherff.	Weed of disturbed and cultivated areas, paddy fields.
	Chromolaena odorata	Siam Weed, Christmas Bush	(L.) King & Robinson	Pastures, oil palm, rubber, coffee, cashew, fruit, maize, forestry. Toxic to livestock. Major environmental weed: secondary forests, roadsides, disturbed sites.
	Hieracium aurantiacum	Orange Hawkweed	CRC Weed Management	Potential threat to alpine country and temperate tablelands of eastern Australia.
	Hieracium pilosella	Mouse-eared Hawkweed	DPIW, TAS	Major weed in pasture and native vegetation and is a serious threat to grasslands and alpine environments.
	Hieracium praeltum	King Devil	-	-
	Mikania micrantha	Mile-a-Minute	H.B.K.	Cocoa, coconut, orchards, rubber, oil palm, sugarcane, vegetables, upland rice, pastures; serious environmental weed
BORAGINACEAE	Cordia curassavica	Black Sage	Roem. and Shult.	Environmental weed.
CAPPARIDACEAE	Cleome rutidosperma	Fringed Spider Flower	Weeds Australia	Environmental weed of crops.
CHENOPODIACEAE	Bassia scoparia	Kochia	CRC Weed Management	Invades crops and pastures.
CYPERACEAE	Cyperus teneristolon	-	CRC Weed Management	Semi-arid agricultural crops and damp grasslands. Environmental weed.
	Schoenoplectus juncoides	-	(Roxb.) Palla	Rice, freshwater and tidal swamps.
	Trianoptiles solitaria	Subterranean Cape Sedge	CRC Weed Management	Grows in seasonally damp areas.
EQUISETACEAE	Equisetum ramosissimum	Horsetail, Scouring Rush	Desf. subsp. debile (Vauch.) Hauke	Rice terraces and bunds, tea plantations.
EUPHORBIACEAE	Croton hirtus	-	L'Herit	Rubber plantations; crops including mung beans, peanuts, soybeans, papaya, vegetables and tobacco.
FABACEAE	Mucuna pruriens	Velvet Bean, Cow-Itch	DC.	Weed of pastures and a wide range of dryland crops; smothering habit

Family	Botanical Name	Common Name	Author	Comments
				and ability to climb to tree tops makes a significant potential environmental weed. Irritant hairs can kill livestock if ingested and cause severe skin reaction if touched.
HALORACEAE	Myriophyllum spicatum	Eurasian Watermilfoil	L.	Serious weed of lakes, water-storages, canals and rivers. Affects fish and shellfish production and recreational use of water bodies
HYDROCHARITACEAE	Lagarosiphon major	Lagarosiphon	CRC Weed Management	Aquatic plant that can dominate freshwater lakes, dams and slow-moving streams.
LAMIACEAE	Clerodendrum chinense	Stickbush, Glory Bower, Honolulu Rose, Spanish Jasmine	(Osbeck) Mabb.	Disturbed forests, roadsides, gardens, pastures, plantations, environmental weed.
	Leucas aspera	Pansi-pansi, Feng Chao Cao	(Willd.) Link	Fields, dandy grasslands, wasteland, roadsides, overgrazed areas.
LIMNOCHARITACEAE	Limnocharis flava	Yellow Bur-head, Yellow Sawah Lettuce	(L.) Buchenau	Serious weed of rice and wetlands. Used as a green vegetable.
LYTHRACEAE	Rotala indica	Toothcup	(Willd.) Koehne	Rice fields, river banks, ditches and moist environments
MELASTOMACEAE	Clidemia hirta	Koster's Curse, Soap Bush	(L.) D. Don.	Cocoa, tea, coconut, oil palm and rubber plantations, cultivated areas, pastures, secondary forest and woodlands; other disturbed sites.
	Miconia calvescens	Miconia, Velvet Tree	DC.	Coastland, disturbed areas, natural forests, planted forests, riparian zones, scrub / shrublands, urban areas, wetlands.
MIMOSACEAE	Acacia karroo	Karroo Thorn	DPIF	Rangelands and open grasslands, suppresses the growth of agricultural productivity.
	Neptunia plena	Water Dead and Awake, Water Sensitive	(L.) Benth.	Wetlands, swamps and marshes, water-logged or flooded areas.
NYCTAGINACEAE	Boerhavia erecta	Erect Tar Vine	L.	Peanuts, sorghum, rice and other annual crops; weed of cultivated land, pastures and coastal environments.
OROBANCHACEAE	Aeginetia indica	Ye Gu	L.	Parasitizes bamboo shoots and crops such as rice, maize and sugarcane. Grassy lowlands, wet, swampy ground, forests, roadsides.
	Orobanche ramosa	Branched Broomrape	DAFF	Serious pest of crops and pastures.
PIPERACEAE	Piper aduncum	Spiked Pepper, False Karva	L.	Karva crops, grazing lands, abandoned gardens.
POACEAE	Digitaria insularis	-	(L.) Mes ex	Pineapples; unpalatable weed of

Family	Botanical Name	Common Name	Author	Comments
			Ekman	pastures, headlands,
	Echinochloa glabrescens	A barnyard grass	Munro ex Hook. f.	Rice, maize.
	Eragrostis japonica	Japanese Lovegrass, Pond Lovegrass	(Thunb.) Trin.	Arable lands and rice fields.
	Imperata conferta	Cogongrass, Lalang Jawa	(Presl.) Ohwi	Coconut, roadsides, hillsides, streams and trails in dense or open forest.
	Leptochloa chinensis	Red Sprangletop, Feathergrass	(L.) Nees.	Rice, cotton, soybean, maize, sugarcane, pineapple, sweet potato, vegetables, peanuts, tea, bananas.
	Nasella tenuissima	Mexican feather Grass	Territory and Municipal Services	Pastures and native grasslands. Highly invasive.
	Sacciolepis interrupta	-	(Willd.)	Rice, irrigation channels, wetlands. Potential environmental weed.
RUBIACEAE	Paederia foetida	Lesser Malayan Stinkwort	L.	Sugarcane, secondary forest; climbs over shrubs and trees - potential environmental weed.
SALVINIACEAE	Salvinia cucullata	Salvinia	Roxb.	Rice, waterways, wetlands.
SCROPHULARIACEAE	Limnophila sessiliflora	Ambulia, Asian Marshweed, Shi Long Wei	(Vahl) Blume	Ponds, swamps, rice fields, wet places along streams.
	Striga asiatica	Witchweed	(L.) O. Ktze.	Serious root parasite on rice, maize, sorghum, sugarcane, millet; also on some broadleaf crops including sunflower, tomatoes, some legumes.

Appendix B Dominant Weed Species (2015)

Species	Common Name	Lifeform
Ageratum houstonianum	Blue billygoat weed	forb
Alternanthera denticulata	Lesser joyweed	forb
Bidens pilosa	Cobbler's pegs	forb
Commelina benghalensis	Hairy commelina	forb
Conyza bonariensis	Flaxleaf fleabane	forb
Crassocephalum crepidioides	Thickhead	forb
Einadia hastata	Berry saltbush	forb
Emilia sonchifolia	Emilia	forb
Impatiens sp.	Balsam	forb
Lantana montevidensis	Creeping lantana	forb
Ludwigia longifolia	Long-leaved willow primrose	forb
Onopordum acanthium	Scotch thistle	forb
Plantago lanceolata	Ribwort	forb
Senecio madagascariensis	Fireweed	forb
Sida rhombifolia	Common sida	forb
Sonchus oleraceus	Common sowthistle	forb
Sphagneticola trilobata	Singapore daisy	forb
Stachytarpheta jamaicensis	Light blue snakeweed	forb
Tagetes minuta	Stinking Roger	forb
Tridax procumbens	Tridax daisy	forb
Verbena bonariensis	Purpletop	forb
Datura sp.	Thorn apple	forb
Andropogon virginicus	Whisky grass	grass
Cenchrus echinatus	Mossman River grass	grass
Chloris gayana	Rhode's grass	grass
Cynodon dactylon	Green couch	grass
Digitaria ciliaris	Summer grass	grass
Megathyrsus maximus var. maximus	Green panic	grass
Paspalum dilatatum	Paspalum	grass
Paspalum distichum	water couch	grass
Phragmites australis	Common reed	grass
Setaria sphacelata	South African pigeon grass	grass
Sorghum halepense	Johnson grass	grass
Sporobolus fertilis	Giant Parramatta Grass	grass
Sporobolus virginicus	Sand couch	grass
Cyperus exaltatus	Tall flatsedge	sedge
Cyperus involucratus	Umbrella sedge	sedge
Baccharis halimifolia	Groundsel	shrub
Crotalaria pallida	Rattlepod	shrub
Lantana camara	Lantana	shrub
Opuntia stricta	Prickly Pear	shrub
Phytolacca octandra	Inkweed	shrub
Rivina humilis	Coral berry	shrub
Sesbania cannabina	Yellow pea bush	shrub
Solanum chrysotrichum	Giant Devil's fig	shrub
Solanum nigrum	Blackberry nightshade	shrub

Dominant Weed Species (2015)

Species	Common Name	Lifeform
Celtis sinensis	Chinese Elm	tree
Cinnamomum camphora	Camphor laurel	tree
Ficus elastica	Rubber fig	tree
Leucaena leucocephala	Leucaena	tree
Ricinus communis	Castor oil tree	tree
Schinus terebinthifolius	Broad-leaf Pepper Tree	tree
Senna pendula var. glabrata	Easter cassia	tree
Solanum mauritianum	Wild tobacco	tree
Anredera cordifolia	Madeira vine	vine
Asparagus aethiopicus cv. Sprengeri	Basket asparagus fern	vine
Cardiospermum grandiflora	Balloon vine	vine
Ipomoea cairica	Mile-a-minute	vine
Macroptilium atropurpureum	Siratro	vine
Neonotonia wightii	Glycine	vine
Passiflora foetida	Stinking passionflower	vine
Passiflora suberosa	Corky passionflower	vine
Solanum seaforthianum	Brazilian nightshade	vine

Appendix C Weed Species Records for Port of Brisbane 2015 (refer to Figures 3-2a, 3-3b, 3-5, 3-7)

Survey Point	Weed Records 2015
332	*Solanum nigrum*
333	*Cenchrus echinatus*
334	*Cenchrus echinatus*
335	*Cenchrus echinatus*
336	*Cenchrus echinatus*
337	*Cenchrus echinatus*
338	2 x *Schinus terebinthifolius* (west bank)
339	*Cenchrus echinatus*
340	*Cenchrus echinatus*
341	*Solanum seaforthianum*
342	*Schinus terebinthifolius* x1
343	*Schinus terebinthifolius* x 4 (west bank)
344	*Schinus terebinthifolius* x 2 (west bank)
345	*Lantana camara* (west bank)
346	*Lantana camara*
347	*Schinus terebinthifolius* x 3 (west bank)
348	*Lantana camara*
349	*Lantana camara* x 4(east and west bank)
350	*Sporobolus sp.*
351	*Celtis sinensis, Senna pendula var. glabrata, Schinus terebinthifolius* x 4 (west bank)
352	*Senna pendula var. glabrata*
354	*Sporobolus sp., Lantana camara*
356	*Canopy dieback by Macroptilium atropurpureum*
357	*Opuntia sp.* x 6
358	*Sporobolus sp.*
359	*Schinus terebinthifolius* (west bank)
360	*Schinus terebinthifolius* (west bank)
361	*Schinus terebinthifolius* (west bank)
362	*Datura ferox*
363	*Senna pendula var. glabrata* (west bank)
366	*Schinus terebinthifolius* (west bank)

Weed Species Records for Port of Brisbane 2015 (refer to Figures 3-2a, 3-3b, 3-5, 3-7)

Survey Point	Weed Records 2015
367	*Schinus terebinthifolius* x 2 (west bank)
368	*Cinnamomum camphora* (west bank)
369	*Cenchrus echinatus*
370	*Baccharis halimifolia*
371	*Leucaena leucocephala x 8*
372	*Schinus terebinthifolius x 5, Leucaena leucocephala, Baccharis halimifolia x 2*
373	*Schinus terebinthifolius*
374	*Schinus terebinthifolius* (west bank)
375	*Schinus terebinthifolius, Baccharis halimifolia*
376	*Baccharis halimifolia x 11*
377	*Baccharis halimifolia x 2*
378	*Baccharis halimifolia*
379	*Baccharis halimifolia*
380	*Baccharis halimifolia*
381	*Baccharis halimifolia*
382	*Baccharis halimifolia*
383	*Schinus terebinthifolius*
384	*Schinus terebinthifolius*
385	*Schinus terebinthifolius x 10, Baccharis halimifolia x 2*
386	*Schinus terebinthifolius, Baccharis halimifolia, Lantana camara*
387	*Schinus terebinthifolius x 6, Baccharis halimifolia x 4, Cinnamomum camphora x 2*
388	*Schinus terebinthifolius x 14, Baccharis halimifolia*
389	*Baccharis halimifolia x 23*
390	*Schinus terebinthifolius*
391	*Baccharis halimifolia x 2*
392	*Schinus terebinthifolius, Baccharis halimifolia x 3*
393	*Schinus terebinthifolius, Solanum chrysotrichum*
394	*Passiflora sp.*
395	*Schinus terebinthifolius*
396	*Lantana camara x 2*
397	*Solanum nigrum*
398	*Schinus terebinthifolius*
399	*Schinus terebinthifolius*
400	*Schinus terebinthifolius*
401	*Ricinus communis x 18, Baccharis halimifolia*

Weed Species Records for Port of Brisbane 2015 (refer to Figures 3-2a, 3-3b, 3-5, 3-7)

Survey Point	Weed Records 2015
402	*Schinus terebinthifolius x 20, Baccharis halimifolia x 12*
403	*Ricinus communis* x 2, *Baccharis halimifolia* x 10
404	*Solanum chrysotrichum* x 5, *Ricinus communis*
405	*Schinus terebinthifolius* x 20, *Baccharis halimifolia*
406	*Schinus terebinthifolius* x 6
407	*Senecio madagascariensis* x 5
408	*Schinus terebinthifolius, Senecio madagascariensis* x 8
409	*Stachytarpheta jamaicensis*
410	*Cenchrus echinatus*
411	*Senecio madagascariensis*
412	*Schinus terebinthifolius* x 49, *Baccharis halimifolia* x 3
414	*Schinus terebinthifolius*
416	*Opuntia sp.* x 2, *S. terebinthifolius* x 100, *S. pendula* x 60
417	*S. nigrum, R. humilis, C. sinense, B. halimifolia*
418	*S. terebinthifolius x* 10, *S. pendula*
419	*S. pendula*
420	*Sporobolus sp.* x 4
421	*B. halimifolia*
422	*B. halimifolia* x 22
423	*S. terebinthifolius* x 3, *B. halimifolia, A. cordifolia*
424	*B. halimifolia* x 4, *S. pendula* x 4, *S. terebinthifolius*
425	*B. halimifolia* x 9, *S. pendula* x 14, *S. terebinthifolius* x 4
426	*B. halimifolia* x 55, *S. pendula* x 7, *S. terebinthifolius* x 4, *P. octandra, L. camara* x 60
427	*B. halimifolia* x 33, *S. pendula* x 9, *S. terebinthifolius, R. humilis, S. cannabina*
428	*B. halimifolia* x 17, *S. pendula* x 6, *S. terebinthifolius* x 5
429	*B. halimifolia* x 6, *S. terebinthifolius, L. camara*
430	*S. pendula* x 2, *S. terebinthifolius* x 2
431	*S. pendula* x 6, *S. terebinthifolius* x 45
432	*S. pendula* x 5, *S. terebinthifolius* x 2, *L. camara, P. octandra* x 7
433	*S. pendula* x 15, *S. terebinthifolius, P. octandra*
434	*S. cannabina, L. camara* x 2, *S. terebinthifolius* x 22, *B. halimifolia* x 2, *S. pendula*
435	*S. terebinthifolius* x 11, *S. pendula, R. communis*
436	*B. halimifolia, S. pendula* x 3, *S. terebinthifolius x 2*
438	*S. terebinthifolius* x 2
439	*L. camara*

Weed Species Records for Port of Brisbane 2015 (refer to Figures 3-2a, 3-3b, 3-5, 3-7)

Survey Point	Weed Records 2015
440	*S. pendula, S. terebinthifolius, L. camara*
441	*L. camara*
442	*S. terebinthifolius*
443	*L. camara*
444	*S. terebinthifolius, B. halimifolia*
445	*S. terebinthifolius* x 100+

Appendix D Weed Species Records for Port of Brisbane 2013-2015

Target Species	LP Act	BCC	Lucinda Drain			Port Gate			Port West			Lake		
	Class		2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015
AGAVACEAE														
Agave sp.		R							x			x	x	
AMARANTHACEAE														
Alternanthera denticulata				x	x				x	x	x	x		
Alternanthera pungens														
Amaranthus quitensis														
Amaranthus viridis												x	x	
Gomphrena celosioides					x							x	x	x
ANACARDIACEAE														
Schinus terebinthifolius	3	R	x	x	x	x	x	x	x	x	x	x	x	x
APIACEAE														
Cyclospermum leptophyllum												x		
Centella asiatica														
ARAUCARIACEAE														
Araucaria heterophylla														x
ASCLEPIADACEAE														
Gomphocarpus physocarpus						x	x	x	x	x	x			x
ASPARAGACEAE														
Asparagus aethiopicus cv. Sprengeri	3	C			x						x			
Asparagus plumosus	3	C								x				
ASTERACEAE														
Ageratum houstonianum			x	x	x				x	x	x	x	x	x
Ambrosia artemisiifolia	2	R												
Ambrosia tenuifolia														
Aster subulatus						x						x		
Baccharis halimifolia	2	C				x	x	x	x	x	x	x	x	x
Bidens pilosa			x	x	x	x	x	x	x	x	x	x	x	
Calyptocarpus vialis												x		
Cirsium vulgare														
Conyza bonariensis						x	x	x	x	x	x		x	x
Conyza pusilla														
Conyza sumatrensis			x			x						x		
Cotula australis			x											
Crassocephalum crepidioides				x	x					x	x	x		
Gamochaeta calviceps														
Emilia sonchifolia						x	x	x			x			
Hypochaeris radicata					x					x				
Nerium oleander														
Onopordum acanthium									x	x	x	x	x	x
Parthenium hysterophorus	2	C												
Pseudognaphalium luteoalbum														
Senecio madagascariensis	2	R							x			x	x	x
Silybum marianum					x									
Sonchus oleraceus			x						x	x	x	x		
Sphagneticola trilobata	3	R						x						
Synedrella nodiflora			x											
Tagetes minuta		R	x						x		x	x		
Tridax procumbens			x	x	x		x	x				x	x	x
Wollastonia biflora			x											

Target Species	LP Act	BCC	Lucinda Drain			Port Gate			Port West			Lake		
	Class		2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015
ARECACEAE														
Syagrus romanzoffiana			x											
Phoenix dactylifera											x			
BALSAMINACEAE														
Impatiens walleriana		R										x	x	x
BASELLACEAE														
Anredera cordifolia		C									x			
BORAGINACEAE														
Heliotropium amplexicaule														
BRASSICACEAE														
Brassica tournefortii			x											
Cakile maritime														
Lepidium africanum			x									x	x	x
CACTACEAE														
Opuntia sp.	2	R	x		x						x			
CAESALPINIACEAE														
Senna pendula var. glabrata		R	x	x	x				x	x	x			
CAMPANULACEAE														
Lobelia erinus									x					
CARYOPHYLLACEAE														
Cerastium glomeratum														
Polycarpon tetraphyllum														
CHENOPODIACEAE														
Chenopodium ambrosioides														
Chenopodium sp.														
Einadia hastata								x						
COMMELINACEAE														
Commelina benghalensis			x	x	x							x		
CONVOLVULACEAE														
Convolvulus arvensis														
Ipomoea cairica		R	x	x	x	x			x	x	x	x	x	x
Ipomoea indica		R	x									x		
Ipomoea quamoclit			x											
CYPERACEAE														
Cyperus aggregatus														
Cyperus brevifolius			x									x		
Cyperus congestus												x		
Cyperus eragrostis												x		
Cyperus exaltatus														x
Cyperus involucratus													x	x
Cyperus rotundus									x			x		
EUPHORBIACEAE														
Chamaesyce maculata			x									x		
Chamaesyce nutans												x		
Euphorbia hirta														
Euphorbia prostrata			x									x		
Euphorbia cyathophora									x					
Phyllanthus tenellus														
Ricinus communis		R	x				x	x	x	x	x	x	x	x
FABACEAE														
Centaurium erythraea														
Crotalaria incana														
Crotalaria lanceolata												x	x	x
Crotalaria pallida				x	x		x	x			x			x
Desmodium uncinatum		R												
Indigofera hirsute			x											
Indigofera spicata												x		
Leucaena leucocephala		R	x			x	x	x	x			x		

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Macroptilium atropurpureum		R	x	x	x	x	x	x		x	x	x	x	x
Macroptilium lathyroides			x			x			x			x		
Medicago lupulina														
Medicago polymorpha												x		
Medicago sativa														
Melilotus albus														
Melilotus indicus														
Neonotonia wightii		R	x						x	x	x	x		
Sesbania cannabina										x	x			
Stylosanthes hamata			x									x		
Stylosanthes humilis			x			x						x		
Trifolium repens												x		
Trifolium fragiferum												x		
LAURACEAE														
Cinnamomum camphora	3	R			x	x	x	x						
MALVACEAE														
Malvastrum americanum														
Sida cornifolia			x	x	x	x								
Sida rhombifolia												x	x	x
MORACEAE														
Ficus elastica		R	x	x	x									
MYRINIACEAE														
Anagallis arvensis												x		
ONAGRACEAE														
Ludwigia longifolia		R										x	x	x
Ludwigia peruviana														
Oenothera drummondii subsp. Drummondii			x									x		
Oenothera laciniata			x									x	x	x
OXALIDACEAE														
Oxalis corniculata					x									
PASSIFLORACEAE														
Passiflora foetida						x	x	x	x		x			
Passiflora suberosa		R							x	x	x			
Passiflora subpeltata			x									x		
PETIVERIACAE														
Rivinia humilis		R								x	x			
PHYTOLACCACEAE														
Phytolacca octandra							x	x		x	x		x	x
PLANTAGINACEAE														
Plantago lanceolata			x	x	x		x	x					x	
POACEAE														
Andropogon virginicus		R												x
Brachiaria decumbens			x	x	x	x								
Brachiaria mutica			x	x	x									
Cenchrus ciliaris														
Cenchrus echinatus		R		x	x								x	x
Chloris gayana		R	x	x	x	x	x	x	x	x	x	x	x	
Chloris virgata														
Cynodon dactylon			x	x	x	x		x	x	x	x	x	x	
Dichanthium aristatum														
Digitaria ciliaris			x	x	x	x	x	x	x	x	x	x	x	
Echinochloa colona														
Echinochloa telmatophila														
Eleusine indica														
Eragrostis tenuifolia												x		
Lolium hybridum														
Melinis minutiflora		R										x		
Melinis repens		R	x	x	x	x	x	x	x	x	x	x	x	x
Poa annua														
Panicum larcomianum														
Panicum miliaceum														
Megathyrsus maximus var. maximus		R	x	x	x	x	x	x	x	x	x	x	x	x
Megathyrsus var. pubiglumis														
Paspalum dilatatum			x			x								x
Paspalum distichum			x				x					x	x	x

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Paspalum urvillei					x									
Phragmites australis								x			x			
Polypogon monspeliensis			x									x		
Setaria sphacelata			x									x	x	x
Sorghum halepense		R					x			x	x			
Sporobolus africanus			x		x									
Sporobolus fertilis	2	R												
Sporobolus virginicus								x			x			
Urochloa mosambicensis			x									x		
POLYGONACEAE														
Rumex crispus														
Rumex brownii														
PORTULACACEAE														
Portulaca oleracea			x	x	x	x						x		x
Portulaca pilosa														
SAPINDACEAE														
Cardiospermum grandiflora	3	R	x	x	x		x	x						
SCROPHULARIACEAE														
Misopates orontium														
SOLANACEAE														
Datura sp.		R		x	x								x	
Datura stramonium														
Physalis minima														
Solanum chrysotrichum			x						x			x		x
Solanum mauritianum		R								x	x			
Solanum seaforthianum		R		x	x									
Solanum dulcamara														
Solanum torvum		R											x	
Solanum nigrum		R	x	x	x	x			x	x	x	x	x	x
TAMARICACEAE														
Tamarix ramosissima														
Tamarix aphylla	3													
ULMACEAE														
Celtis sinensis	3	R			x						x			
VERBENACEAE														
Lantana camara	3	R	x	x	x	x		x	x	x	x		x	x
Lantana montevidensis	3	R			x									
Stachytarpheta jamaicensis														x
Verbena aristigera			x									x		
Verbena bonariensis			x	x	x				x	x	x	x	x	x

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