

# Weed Monitoring 2018

FOXGROUND AND BERRY BYPASS POST-CONSTRUCTION MONITORING



JULY 2019



## Document Verification



Project Title: Foxground and Berry Bypass Post-construction Monitoring

Project Number: 17-647

Project File Name: 17-647 F2B Weed Monitoring report 2018 20180910

Revision	Date	Prepared by (name)	Reviewed by (name)	Approved by (name)
Final	10/09/18	Elijah Elias	Freya Gordon	Freya Gordon
Final	12/11/18	Elijah Elias	Natascha Arens	Natascha Arens
Final v2	04/07/19	Elijah Elias	Aleksei Atkin	Aleksei Atkin

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## ACRONYMS AND ABBREVIATIONS

BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BS Act	<i>Biosecurity Act 2015</i>
CoA	Ministers Conditions of Approval
CFFMP	Construction Flora and Fauna Management Plan
EcMP	Ecological Monitoring Program
EA	Environmental Assessment
ha	hectares
Km	Kilometres
LMP	Landscape Management Plan
m	Metres
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
sp/spp	Species/multiple species
SoC	Statement of Commitments

# 1 INTRODUCTION

Roads and Maritime Services (Roads and Maritime) have upgraded 12.5 km of the Princes Highway between Toolijooa Road north of Foxground, to Schofields Lane (the Foxground and Berry Bypass Project) and between Schofields Lane to Croziers Lane south of Berry (Figure 1-1).

NGH Environmental have been engaged by Roads and Maritime to provide post construction ecological services. Services provided by NGH Environmental include the following:

- Nest box monitoring
- Aquatic monitoring
- Weed monitoring (the subject of this report)
- Summer monitoring
- Specialist advice on ecological matters as required by Roads and Maritime

## 1.1 PURPOSE OF THE REPORT

A number of requirements regarding the management of weeds during the construction period are outlined in the following documents:

- Minister’s Conditions of Approval (CoA)
- The Roads and Maritime Statement of Commitments (SoC)
- The mitigation measures listed in the Foxground and Berry bypass Environmental Assessment (EA) (AECOM, 2012)

The Construction Flora and Fauna Management sub-plan (CFFMP) (FH 2014) and Ecological Monitoring Program (EcMP) (PB 2014) prepared for the project details the actions that need to be taken to meet those requirements.

The EcMP requires that the following monitoring be undertaken post construction:

Timing and frequency	Monitoring method	Data to be collected	Reporting
<b>Annual monitoring for a minimum 3 year period to commence at the start of the operational phase. Any time of year.</b>	Conduct post-construction monitoring of re-vegetated areas and extent of study area for the introduction/spread of weed species.	On visual inspection of the study area the following weed data would be collected: <ul style="list-style-type: none"> <li>• Species of weeds identified</li> <li>• Extent of infestations – cover and abundance</li> <li>• Extent of previously identified weed infestations - map if possible.</li> </ul>	Results included in Annual Weed Monitoring Report

The annual weed monitoring report must include the following information:

- Introduction – background description of the monitoring session (refer to Section 1)
- Methodology – description of methodology undertaken including site location and specific survey site locations (refer to Section 2)
- Results and discussion – description of monitoring results and comparison of results to performance indicators (refer to Section 3 and 4)
- Review of mitigation measures – the effectiveness of each measure will be reviewed (where appropriate) at the end of the monitoring period (refer to Section 3.2)
- Recommendations – suggestion of adaptive responses and contingency measures potentially required (where appropriate) based on the results of the monitoring session such as the implementation of contingency measures or modification of monitoring timing, frequency or methodology (refer to Section 5).

As this is the first year of the operational phase for the project, this report compares the 2018 monitoring results with the 2017 (construction) monitoring results. Mitigation measures for the remaining two years of survey have also been recommended.

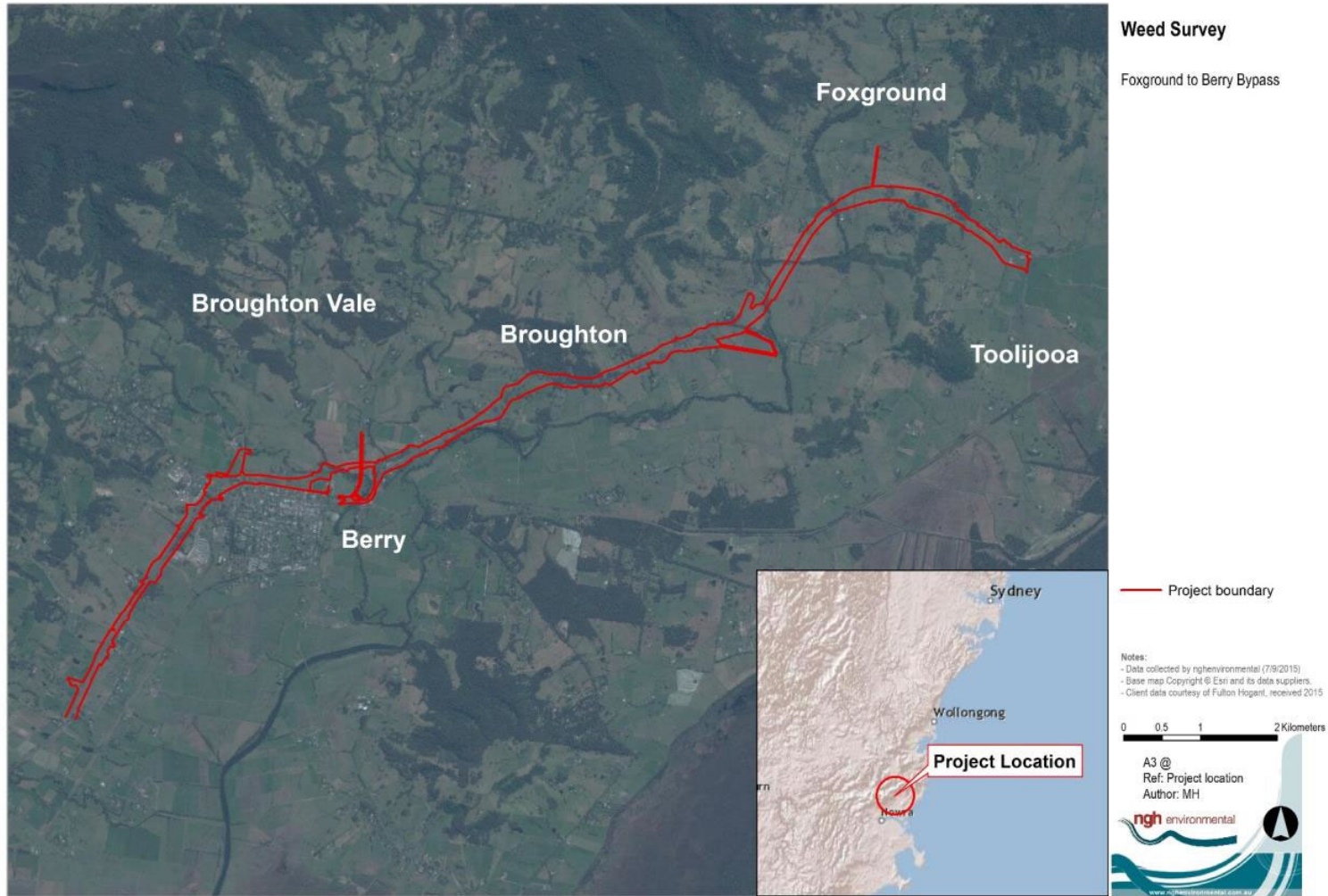


Figure 1-1 Location of the Foxground and Berry Bypass



## 2 MONITORING METHODOLOGY

### 2.1 ANNUAL SURVEY - 2018

A systematic weed survey was conducted at all survey locations by an ecologist on the 6th August 2018 as part of the Post-construction Ecological Monitoring program (Figure 2-1 to Figure 2-4).

The aim of the survey was to determine weed species presence, abundances, and to map the distribution of weed infestations. Data was collected using a Global Positioning System (GPS) enabled tablet running GIS Pro mapping software. The tablet was pre-loaded with topographic, aerial imagery and the project boundary base layer. At each survey point a photograph was taken in order to capture any changes in land condition and weeds species composition from previous and future monitoring events. Polygons were drawn around areas of weeds observed during the survey to capture the identity of weed species present and their abundances. The polygons were saved directly to a GIS shapefile. Weed species targeted in this survey included:

- those listed as Priority Weeds for the South-east region under the new *Biosecurity Act 2015* (Biosecurity Act)
- environmental weeds

Documented waypoints in this report signify the approximate location of each survey point where each site photograph was taken rather than the location of each individual weed. A brief site description was recorded where possible to aid with record keeping and as a basis for future management decisions.

### 2.2 SURVEY LIMITATIONS

The site presents varying degrees of non-uniformity for weed species that can change with seasons. Therefore, the results of this report are only indicative of the environmental conditions within the construction footprint at the time of survey. It should also be recognised that the time in which the survey was conducted was suitable to detect a range of weed species throughout the project footprint.



Figure 2-1 Northern survey locations



Figure 2-2 Central survey locations

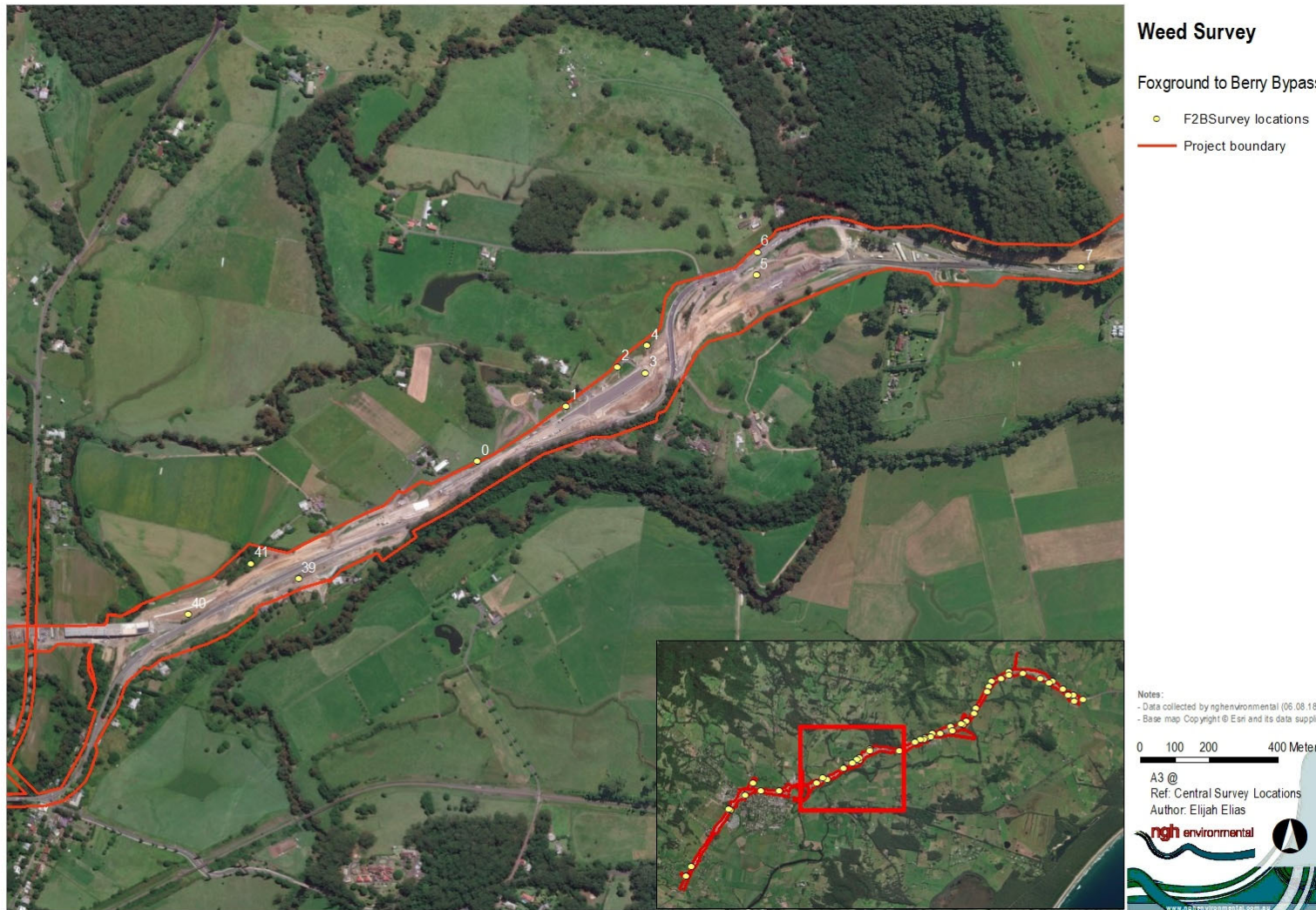


Figure 2-3 South-central survey locations



Figure 2-4 Southern survey locations

## 3 RESULTS AND DISCUSSION

### 3.1 2018 WEED MONITORING

#### 3.1.1 Weed species present

The 2018 Post-construction weed monitoring of the 49 chainages identified 31 exotic weed species within the Foxground and Berry Bypass project area. Four species are listed as Priority Weeds under the Biosecurity Act. Table 3-1 summarises the species identified and the Priority Weed Duty according to the Biosecurity Act.

Table 3-1 Priority and environmental weed species identified during 2018 weed monitoring

Weed Species	Common name	Environmental Weed	Priority Weed (Biosecurity Act)	Duty
<i>Ageratina adenophora</i>	Crofton weed	X		
<i>Andropogon virginicus</i>	Whisky grass	X		
<i>araujiaAraujia sericifera</i>	Moth vine	X		
<i>Bidens pilosa</i>	Cobbler's Pegs	X		
<i>Brassica oleracea</i>	Mustard	X		
<i>Cenchrus clandestinus</i>	Kikuyu	X		
<i>Cirsium vulgare</i>	Spear Thistle	X		
<i>Conyza bonariensis</i>	Fleabane	X		
<i>Cyperus eragrostis</i>	Tall flatsedge	X		
<i>Foeniculum vulgare</i>	Fennel	X		
<i>Grevillea robusta</i>	Silky oak	X		
<i>Lantana camara</i>	Lantana		Prohibition on dealings	
<i>Ligustrum lucidum</i>	Broad-leaved privet	X		
<i>Ligustrum sinense</i>	Small-leaved privet	X		
<i>Malva parviflora</i>	Mallow	X		
<i>Paspalum dilatatum</i>	Paspalum	X		
<i>dPhytolacca octandra</i>	Inkweed	X		
<i>Rubus fruticosus</i>	Blackberry		Prohibition on dealings	
<i>Rumex crispus</i>	Curly dock	X		
<i>Senecio madagascariensis</i>	Fireweed		Regional Recommended Measure	
<i>Setaria parviflora</i>	Pigeon grass	X		
<i>Sida rhombifolia</i>	Paddy's Lucerne	X		
<i>Solanum mauritianum</i>	Wild tobacco	X		

Weed Species	Common name	Environmental Weed	Priority Weed (Biosecurity Act)	Duty
<i>Solanum nigrum</i>	Blackberry nightshade	X		
<i>Sonchus oleraceus</i>	Sow thistle	X		
<i>Sporobolus fertilis</i>	Giant paramatta grass		Regional Recommended Measure	
<i>Tagetes minuta</i>	Stinking Roger	X		
<i>Taraxacum officinale</i>	Dandelion	X		
<i>Trifolium repens</i>	White Clover	X		
<i>Verbena bonariensis</i>	Purpletop	X		
<i>Xanthium occidentale</i>	Noogoora burr	X		


Priority Weed Duty – as listed under the Biosecurity Act for the South-east Region

**3.1.2 Cover and abundances**



Relative abundance is given by a cover abundance scale (modified Braun-Blanquet):



1. 1 to a few individuals present, less than 5% cover
2. many individuals present, but still less than 5% cover
3. 5 - < 20% cover
4. 20 - < 50% cover
5. 50 - < 75% cover
6. 75 - 100% cover



Table 3-2 Description of each survey location, dominant weeds and relative abundance



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
15	297055	6152294	North of Toolijooa Rd	Batter	Mustard <i>Brassica oleracea</i> - 3 Kikuyu <i>Cenchrus clandestinus</i> - 4 Purpletop <i>Verbena bonariensis</i> - 2 Fleabane <i>Conyza bonariensis</i> - 2 Cobbler’s Pegs <i>Bidens pilosa</i> - 3 Paddy’s Lucerne <i>Sida rhombifolia</i> - 2 Lantana <i>Lantana camara</i> – 1 Paspalum <i>Paspalum dilatatum</i> – 3 Fennel <i>Foeniculum vulgare</i> - 1 Fireweed <i>Senecio madagascariensis</i> - 2	







Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
14	296835	6152244	Near turn around bay south of Toolijooa Rd	Construction area, with bare soil areas	Kikuyu <i>Cenchrus clandestinus</i> - 6 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Purpletop <i>Verbena bonariensis</i> - 1 Mustard <i>Brassica oleracea</i> - 2 Fireweed <i>Senecio madagascariensis</i> - 2	
16	296799	615239	South of Toolijooa Rd	Roadside area	Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> - 5 Purpletop <i>Verbena bonariensis</i> - 2 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Sow thistle <i>Sonchus oleraceus</i> 2 Fireweed <i>Senecio madagascariensis</i> - 2 Paddy's Lucerne <i>Sida rhombifolia</i> - 2	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
17	296675	6152401	South of Toolijooa Rd	Roadside batter	Cobbler's Pegs <i>Bidens pilosa</i> -3 Mustard <i>Brassica oleracea</i> - 2 Fireweed <i>Senecio madagascariensis</i> - 3 Purpletop <i>Verbena bonariensis</i> - 2 Paddy's Lucerne <i>Sida rhombifolia</i> - 2 Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> – 5 Wild tobacco <i>Solanum mauritianum</i> -1 Stinking Roger <i>Tagetes minuta</i> - 3 Sow thistle <i>Sonchus oleraceus</i> 2	
18	296523	6152549	South of Toolijooa Rd	Roadside batter	Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> – 5 Stinking Roger <i>Tagetes minuta</i> - 3 Cobbler's Pegs <i>Bidens pilosa</i> -3 Paddy's Lucerne <i>Sida rhombifolia</i> - 2 Fireweed <i>Senecio madagascariensis</i> - 2 Purpletop <i>Verbena bonariensis</i> - 2 Fleabane <i>Conyza bonariensis</i> - 3	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
19	296251	6152744	Between BC1 and Toolijooa Rd	Roadside embankment	Lantana <i>Lantana camara</i> - 5 Kikuyu <i>Cenchrus clandestinus</i> - 5 Fleabane <i>Conyza bonariensis</i> - 3 Cobbler's Pegs <i>Bidens pilosa</i> -4 Stinking Roger <i>Tagetes minuta</i> - 3 Purpletop <i>Verbena bonariensis</i> - 3 Fireweed <i>Senecio madagascariensis</i> - 2 Sow thistle <i>Sonchus oleraceus</i> 2 Spear Thistle <i>Cirsium vulgare</i> - 2	
20	296157	6152704	Between BC1 and Toolijooa Rd	Access track between Toolijooa Rd and BC1	Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> – 4 Paddy's Lucerne <i>Sida rhombifolia</i> - 3 Fireweed <i>Senecio madagascariensis</i> – 2 Purpletop <i>Verbena bonariensis</i> - 3	

Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
21	29593	6152819	Between BC1 and Toolijooa Rd	Top of cut	Kikuyu <i>Cenchrus clandestinus</i> - 4 Paddy's Lucerne <i>Sida rhombifolia</i> – 2 Lantana <i>Lantana camara</i> - 3 Purpletop <i>Verbena bonariensis</i> - 3 Fireweed <i>Senecio madagascariensis</i> – 2 Paspalum <i>Paspalum dilatatum</i> – 4 Cobbler's Pegs <i>Bidens pilosa</i> -3	
22	295486	6152939	Between BC1 and Toolijooa Rd	Light vehicle track	Fireweed <i>Senecio madagascariensis</i> – 3 Kikuyu <i>Cenchrus clandestinus</i> - 5 Spear Thistle <i>Cirsium vulgare</i> - 2 Purpletop <i>Verbena bonariensis</i> – 3 Blackberry <i>Rubus fruticosus</i> - 2 Paspalum <i>Paspalum dilatatum</i> – 3 Cobbler's Pegs <i>Bidens pilosa</i> -2	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
24	295121	6152887	BC1	Adjacent to compound	Kikuyu <i>Cenchrus clandestinus</i> - 4 Cobbler's Pegs <i>Bidens pilosa</i> -3 Purpletop <i>Verbena bonariensis</i> – 2 Inkweed <i>Phytolacca octandra</i> - 1 Fireweed <i>Senecio madagascariensis</i> – 3 Stinking Roger <i>Tagetes minuta</i> - 2	
31	295126	6152978	BC1	Roadside batter	Fireweed <i>Senecio madagascariensis</i> – 4 Kikuyu <i>Cenchrus clandestinus</i> - 6 Paspalum <i>Paspalum dilatatum</i> – 5 Stinking Roger <i>Tagetes minuta</i> - 2 Paddy's Lucerne <i>Sida rhombifolia</i> - 2 Purpletop <i>Verbena bonariensis</i> – 2	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
25	294923	6152794	BC1	BC1	White Clover <i>Trifolium repens</i> - 3 Fireweed <i>Senecio madagascariensis</i> – 3 Kikuyu <i>Cenchrus clandestinus</i> - 4 Cobbler’s Pegs <i>Bidens Pilosa</i> -3 Wild tobacco <i>Solanum mauritianum</i> - 3 Lantana <i>Lantana camara</i> - 2 Fleabane <i>Conyza bonariensis</i> - 2 Inkweed <i>Phytolacca octandra</i> - 2 Stinking Roger <i>Tagetes minuta</i> - 2 Spear Thistle <i>Cirsium vulgare</i> - 2 Broad-leaved privet <i>Ligustrum lucidum</i> - 2	
26	294695	6152708	Between BC1 and BC2	Road side	Lantana <i>Lantana camara</i> - 5 Kikuyu <i>Cenchrus clandestinus</i> - 5 Sow thistle <i>Sonchus oleraceus</i> 3 Wild tobacco <i>Solanum mauritianum</i> - 2 Fireweed <i>Senecio madagascariensis</i> – 1 Paspalum <i>Paspalum dilatatum</i> – 3 Fleabane <i>Conyza bonariensis</i> - 2 Purpletop <i>Verbena bonariensis</i> – 3 Moth vine <i>Araujia sericifera</i> - 3 Spear Thistle <i>Cirsium vulgare</i> - 1 Silky oak <i>Grevillea robusta</i> - 1 Cobbler’s Pegs <i>Bidens pilosa</i> - 2 Inkweed <i>Phytolacca octandra</i> - 2	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
27	294623	6152587	Between BC1 and BC2	Road side	Sow thistle <i>Sonchus oleraceus</i> - 2 Cobbler's Pegs <i>Bidens pilosa</i> - 4 Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> - 3 Paddy's Lucerne <i>Sida rhombifolia</i> - 2 Fireweed <i>Senecio madagascariensis</i> - 3 Purpletop <i>Verbena bonariensis</i> - 2	
30	294583	6152452	Between BC1 and BC2	Road side	Kikuyu <i>Cenchrus clandestinus</i> - 4 Cobbler's Pegs <i>Bidens pilosa</i> - 4 Fireweed <i>Senecio madagascariensis</i> - 3 Purpletop <i>Verbena bonariensis</i> - 2 White Clover <i>Trifolium repens</i> - 3 Dandelion <i>Taraxacum officinale</i> - 2	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
28	294296	6152021	Between BC1 and BC2	Road side	White Clover <i>Trifolium repens</i> - 3 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Purpletop <i>Verbena bonariensis</i> – 3 Kikuyu <i>Cenchrus clandestinus</i> - 4 Sow thistle <i>Sonchus oleraceus</i> - 2 Paspalum <i>Paspalum dilatatum</i> – 5 Fireweed <i>Senecio madagascariensis</i> – 3	
29	294250	6151865	Between BC1 and BC2	Road side	Kikuyu <i>Cenchrus clandestinus</i> - 4 Fireweed <i>Senecio madagascariensis</i> – 3 Blackberry <i>Rubus fruticosus</i> - 1 Inkweed <i>Phytolacca octandra</i> - 2 Lantana <i>Lantana camara</i> - 1 Paspalum <i>Paspalum dilatatum</i> – 3 Crofton weed <i>Ageratina adenophora</i> - 1 Moth vine <i>Araujia sericifera</i> - 2 Purpletop <i>Verbena bonariensis</i> – 2 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Spear Thistle <i>Cirsium vulgare</i> - 1	





Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
32	294059	6151679	Between Austral Park compound and BC3	Access track	Fireweed <i>Senecio madagascariensis</i> – 2 Kikuyu <i>Cenchrus clandestinus</i> - 4 Paddy’s Lucerne <i>Sida rhombifolia</i> - 2 Sow thistle <i>Sonchus oleraceus</i> - 2 Inkweed <i>Phytolacca octandra</i> - 2 Mallow <i>Malva parviflora</i> - 2 Stinking Roger <i>Tagetes minuta</i> - 2 Paspalum <i>Paspalum dilatatum</i> – 4	
33	293916	6151611	Between Austral Park compound and BC3	Batter	Stinking Roger <i>Tagetes minuta</i> - 5 Fireweed <i>Senecio madagascariensis</i> – 5 Paspalum <i>Paspalum dilatatum</i> – 4 Paddy’s Lucerne <i>Sida rhombifolia</i> - 3 Kikuyu <i>Cenchrus clandestinus</i> - 5 Wild tobacco <i>Solanum mauritianum</i> - 2 Blackberry nightshade <i>Solanum nigrum</i> - 3 Noogoora burr <i>Xanthium occidentale</i> - 3	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
34	293975	6151579	Between Austral Park compound and BC3	Batter	Kikuyu <i>Cenchrus clandestinus</i> - 4 Paspalum <i>Paspalum dilatatum</i> - 4 Fleabane <i>Conyza bonariensis</i> - 3 Sow Thistle <i>Sonchus oleraceus</i> - 2 Cobbler's Pegs <i>Bidens pilosa</i> - 3 Purpletop <i>Verbena bonariensis</i> - 2	
35	293661	6151517	Between Austral Park compound and BC3	Batter	Stinking Roger <i>Tagetes minuta</i> - 2 Lantana <i>Lantana camara</i> - 4 Crofton weed <i>Ageratina adenophora</i> - 4 Fleabane <i>Conyza bonariensis</i> - 3 Kikuyu <i>Cenchrus clandestinus</i> - 4 Purpletop <i>Verbena bonariensis</i> - 2 Sow Thistle <i>Sonchus oleraceus</i> - 2 Fireweed <i>Senecio madagascariensis</i> - 3 Inkweed <i>Phytolacca octandra</i> - 2 Blackberry nightshade <i>Solanum nigrum</i> - 2 Spear thistle <i>Cirsium vulgare</i> - 2	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
36	293699	6151420	Between Austral Park compound and BC3	Batter	Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> - 5 Purpletop <i>Verbena bonariensis</i> - 4 Fireweed <i>Senecio madagascariensis</i> - 4 Crofton weed <i>Ageratina adenophora</i> - 3 Fleabane <i>Conyza bonariensis</i> - 3 Inkweed <i>Phytolacca octandra</i> - 2 Spear thistle <i>Cirsium vulgare</i> - 2 Mallow <i>Malva parviflora</i> - 1 Cobbler's Pegs <i>Bidens pilosa</i> - 3	
37	293391	6151342	Between Austral Park compound and BC3	Batter	Fireweed <i>Senecio madagascariensis</i> - 3 Inkweed <i>Phytolacca octandra</i> - 2 Purpletop <i>Verbena bonariensis</i> - 4 Kikuyu <i>Cenchrus clandestinus</i> - 6 Paspalum <i>Paspalum dilatatum</i> - 5 Paddy's Lucerne <i>Sida rhombifolia</i> - 2 Spear thistle <i>Cirsium vulgare</i> - 2 Stinking Roger <i>Tagetes minuta</i> - 1 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Fleabane <i>Conyza bonariensis</i> - 2 Whisky grass <i>Andropogon virginicus</i> - 1	

Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
13	293197	6151331	Austral Park	Western side Princess Hwy	<p>Lantana <i>Lantana camara</i> - 3</p> <p>Crofton weed <i>Ageratina adenophora</i> - 2</p> <p>Blackberry <i>Rubus fruticosus</i> - 2</p> <p>Moth vine <i>Araujia sericifera</i> - 2</p> <p>Wild tobacco <i>Solanum mauritianum</i> - 1</p> <p>Fireweed <i>Senecio madagascariensis</i> - 3</p> <p>Inkweed <i>Phytolacca octandra</i> - 3</p> <p>Purpletop <i>Verbena bonariensis</i> - 4</p> <p>Kikuyu <i>Cenchrus clandestinus</i> - 5</p> <p>Paspalum <i>Paspalum dilatatum</i> - 4</p> <p>Paddy's Lucerne <i>Sida rhombifolia</i> - 2</p> <p>Spear thistle <i>Cirsium vulgare</i> - 2</p> <p>Stinking Roger <i>Tagetes minuta</i> - 3</p> <p>Fleabane <i>Conyza bonariensis</i> - 2</p> <p>Whisky grass <i>Andropogon virginicus</i> - 2</p>	
38	293143	6151252	Austral Park	Western side Princess Hwy	<p>Kikuyu <i>Cenchrus clandestinus</i> - 5</p> <p>Paspalum <i>Paspalum dilatatum</i> - 5</p> <p>Cobbler's Pegs <i>Bidens pilosa</i> - 2</p> <p>Paddy's Lucerne <i>Sida rhombifolia</i> - 2</p> <p>Fireweed <i>Senecio madagascariensis</i> - 3</p> <p>Lantana <i>Lantana camara</i> - 4</p> <p>Blackberry <i>Rubus fruticosus</i> - 3</p> <p>Crofton weed <i>Ageratina adenophora</i> - 3</p> <p>Inkweed <i>Phytolacca octandra</i> - 2</p> <p>Blackberry nightshade <i>Solanum nigrum</i> - 2</p> <p>Purpletop <i>Verbena bonariensis</i> - 2</p> <p>Fleabane <i>Conyza bonariensis</i> - 2</p>	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
12	293089	6151221	Austral Park	Western side Princess Hwy	Blackberry nightshade <i>Solanum nigrum</i> - 3 Fireweed <i>Senecio madagascariensis</i> – 3 Stinking Roger <i>Tagetes minuta</i> - 2 Paspalum <i>Paspalum dilatatum</i> – 5 Kikuyu <i>Cenchrus clandestinus</i> - 4 Paddy’s Lucerne <i>Sida rhombifolia</i> - 3 Pigeon grass <i>Setaria parviflora</i> - 3 Inkweed <i>Phytolacca octandra</i> - 3 Wild tobacco <i>Solanum mauritianum</i> - 2 Purpletop <i>Verbena bonariensis</i> - 3 Lantana <i>Lantana camara</i> - 2	
10	292987	6151220	Austral Park	Western side Princess Hwy	Fireweed <i>Senecio madagascariensis</i> – 3 Kikuyu <i>Cenchrus clandestinus</i> - 5 Purpletop <i>Verbena bonariensis</i> - 4 Blackberry nightshade <i>Solanum nigrum</i> - 2 Paddy’s Lucerne <i>Sida rhombifolia</i> - 2 Cobbler’s Pegs <i>Bidens pilosa</i> – 2 Stinking Roger <i>Tagetes minuta</i> - 2	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
11	292977	6151168	Austral Park	Soil mound	Sow Thistle <i>Sonchus oleraceus</i> - 2 Cobbler's Pegs <i>Bidens Pilosa</i> - 2 Fennel <i>Foeniculum vulgare</i> - 1 Kikuyu <i>Cenchrus clandestinus</i> - 4 Purpletop <i>Verbena bonariensis</i> - 4 Fireweed <i>Senecio madagascariensis</i> - 2	
9	292873	6151166	Austral Park	Batter	Sow Thistle <i>Sonchus oleraceus</i> - 2 Fireweed <i>Senecio madagascariensis</i> - 2 Lantana <i>Lantana Camara</i> - 3 Ink weed <i>Phytolacca octandra</i> - 2 Purpletop <i>Verbena bonariensis</i> - 4 Paspalum <i>Paspalum dilatatum</i> - 4 Kikuyu <i>Cenchrus clandestinus</i> - 3 Fleabane <i>Conyza bonariensis</i> - 2 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Wild tobacco <i>Solanum mauritianum</i> - 1 Patty's lucerne <i>Sida rhombifolia</i> - 2 Blackberry nightshade <i>Solanum nigrum</i> 2 White Clover <i>Trifolium repens</i> 3	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
8	292746	6151115	Austral Park	Road side	Fireweed <i>Senecio madagascariensis</i> - 3 Wild tobacco <i>Solanum mauritianum</i> - 1 Purpletop <i>Verbena bonariensis</i> - 1 Paspalum <i>Paspalum dilatatum</i> - 4 Small-leaved privet <i>Ligustrum sinense</i> - 2 Fleabane <i>Conyza bonariensis</i> - 3 Tall flatsedge <i>Cyperus eragrostis</i> - 2 Kikuyu <i>Cenchrus clandestinus</i> - 4 Inkweed <i>Phytolacca octandra</i> - 1 Patty's Lucerne <i>Sida rhombifolia</i> - 3 Sow Thistle <i>Sonchus oleraceus</i> - 1 Stinking Roger <i>Tagetes minuta</i> - 1 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Blackberry <i>Rubus fruticosus</i> - 3	
7	292355	6150882	Central zone	Road side	Inkweed <i>Phytolacca octandra</i> - 1 Fireweed <i>Senecio madagascariensis</i> - 4 Kikuyu <i>Cenchrus clandestinus</i> - 5 Lantana <i>Lantana camara</i> - 3 Sow Thistle <i>Sonchus oleraceus</i> - 3 Purpletop <i>Verbena bonariensis</i> - Stinking Roger <i>Tagetes minuta</i> - 2 Paspalum <i>Paspalum dilatatum</i> - 3	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
6	291579	6150900	Tindell's Lane	Road side	Kikuyu <i>Cenchrus clandestinus</i> - 3 Blackberry <i>Rubus fruticosus</i> - 2 Giant paramatta grass <i>Sporobolous fertilis</i> - 2 Whisky grass <i>Andropogon virginicus</i> - 2 Paspalum <i>Paspalum dilatatum</i> - 3 Lantana <i>Lantana camara</i> - 3 Purpletop <i>Verbena bonariensis</i> - 2	
5	291578	6150845	Tindell's Lane	Batter	Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> - 5 Patty's lucerne <i>Sida rhombifolia</i> - 3 Fireweed <i>Senecio madagascariensis</i> - 3 Moth vine <i>Araujia sericifera</i> 1 Purpletop <i>Verbena bonariensis</i> - 2 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Fleabane <i>Conyza bonariensis</i> - 2 Sow Thistle <i>Sonchus oleraceus</i> - 2 Blackberry nightshade <i>Solanum nigrum</i> - 1	







Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
4	291320	6150671	Central zone Cut 6	Batter	Kikuyu <i>Cenchrus clandestinus</i> - 6 Blackberry nightshade <i>Solanum nigrum</i> - 3 Sow Thistle <i>Sonchus oleraceus</i> - 2 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Purpletop <i>Verbena bonariensis</i> - 2 Paspalum <i>Paspalum dilatatum</i> - 2 Fleabane <i>Conyza bonariensis</i> - 2 Sow Thistle <i>Sonchus oleraceus</i> - 2 Mallow <i>Malva parviflora</i> - 1	
3	291317	6150605	Central zone Cut 6	Batter	Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> - 4 Purpletop <i>Verbena bonariensis</i> - 3 Cobbler's Pegs <i>Bidens pilosa</i> - 3 Fireweed <i>Senecio madagascariensis</i> - 3 Patty's Lucerne <i>Sida rhombifolia</i> - 3 Sow Thistle <i>Sonchus oleraceus</i> - 2 Fleabane <i>Conyza bonariensis</i> - 2 White Clover <i>Trifolium repens</i> - 2 Mallow <i>Malva parviflora</i> - 1 Blackberry nightshade <i>Solanum nigrum</i> - 1	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
2	291251	6150619	Central zone Cut 6	Batter	Kikuyu <i>Cenchrus clandestinus</i> - 5 Blackberry nightshade <i>Solanum nigrum</i> - 3 Fireweed <i>Senecio madagascariensis</i> - 4 Sow Thistle <i>Sonchus oleraceus</i> - 2 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Fleabane <i>Conyza bonariensis</i> - 4 White Clover <i>Trifolium repens</i> - 2 Purpletop <i>Verbena bonariensis</i> - 3 Patty's lucerne <i>Sida rhombifolia</i> - 2	
1	291130	6150523	Central zone Cut 6	Batter	Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> - 5 Purpletop <i>Verbena bonariensis</i> - 3 Fireweed <i>Senecio madagascariensis</i> - 3 Crofton weed <i>Ageratina adenophora</i> - 1 Wild tobacco <i>Solanum mauritianum</i> - 1 Mallow <i>Malva parviflora</i> - 2 Sow Thistle <i>Sonchus oleraceus</i> - 2 Patty's lucerne <i>Sida rhombifolia</i> - 2	



Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
0	290920	6150386	Central zone	Batter	Sow Thistle <i>Sonchus oleraceus</i> - 3 Fireweed <i>Senecio madagascariensis</i> - 3 Kikuyu <i>Cenchrus clandestinus</i> - 4 Paspalum <i>Paspalum dilatatum</i> - 4 Patty's lucerne <i>Sida rhombifolia</i> - 2 Mallow <i>Malva parviflora</i> - 1	
39	290499	6150097	Southern zone	Batter	Kikuyu <i>Cenchrus clandestinus</i> - 5 Paspalum <i>Paspalum dilatatum</i> - 4 Fireweed <i>Senecio madagascariensis</i> - 4 Patty's lucerne <i>Sida rhombifolia</i> - 3 Crofton weed <i>Ageratina adenophora</i> - 2 Stinking Roger <i>Tagetes minuta</i> - 2 Lantana <i>Lantana camara</i> - 2 Giant paramatta grass <i>Sporobolous fertilis</i> - 3 Purpletop <i>Verbena bonariensis</i> - 2 Fleabane <i>Conyza bonariensis</i> - 2 Mallow <i>Malva parviflora</i> - 1 Cobbler's Pegs <i>Bidens pilosa</i> - 3	

Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
41	290384	6150131	Southern zone	Batter	Mallow <i>Malva parviflora</i> - 2 Fireweed <i>Senecio madagascariensis</i> - 4 Kikuyu <i>Cenchrus clandestinus</i> - 4 Purpletop <i>Verbena bonariensis</i> - 2 Paspalum <i>Paspalum dilatatum</i> - 3 Sow Thistle <i>Sonchus oleraceus</i> - 2	
40	290237	6150006	Southern zone	Embankment	Kikuyu <i>Cenchrus clandestinus</i> - 5 Fireweed <i>Senecio madagascariensis</i> - 5 Sow Thistle <i>Sonchus oleraceus</i> - 2 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Mallow <i>Malva parviflora</i> - 2	

Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
42	289262	6149761	Southern zone	Batter	White Clover <i>Trifolium repens</i> - 2 Sow Thistle <i>Sonchus oleraceus</i> - 2 Mallow <i>Malva parviflora</i> - 1 Cobbler's Pegs <i>Bidens pilosa</i> - 2	
43	288808	6149755	Southern zone	Batter	Paspalum <i>Paspalum dilatatum</i> - 5 Fireweed <i>Senecio madagascariensis</i> - 3 Fleabane <i>Conyza bonariensis</i> - 3 White Clover <i>Trifolium repens</i> - 2	

Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
49	288598	6149960	Southern zone	Town Creek Diversion, Rawling's Lane	Sow Thistle <i>Sonchus oleraceus</i> - 2 Lantana <i>Lantana camara</i> - 3 Fireweed <i>Senecio madagascariensis</i> - 2 Patty's lucerne <i>Sida rhombifolia</i> - 2 Kikuyu <i>Cenchrus clandestinus</i> - 5 Dock <i>Rumex obtusifolius</i> - 2 Paspalum <i>Paspalum dilatatum</i> - 3	
44	288407	6149644	Southern zone	Noise mound	Cobbler's Pegs <i>Bidens pilosa</i> - 2 Sow Thistle <i>Sonchus oleraceus</i> - 2	

Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
45	288031	6149263	Southern zone	Roadside	<p>Fireweed <i>Senecio madagascariensis</i> - 4                      Kikuyu <i>Cenchrus clandestinus</i> - 4                      Blackberry nightshade <i>Solanum nigrum</i> - 3                      Moth vine <i>Araujia sericifera</i> - 2                      Patty's lucerne <i>Sida rhombifolia</i> - 3                      Fleabane <i>Conyza bonariensis</i> - 3                      Cobbler's Pegs <i>Bidens pilosa</i> - 3                      Sow Thistle <i>Sonchus oleraceus</i> - 2                      Noogoora burr <i>Xanthium occidentale</i> - 2                      Spear thistle <i>Cirsium vulgare</i> - 2                      Blackberry <i>Rubus fruticosus</i> - 3                      Labtana <i>Lantana camara</i> - 3</p>	
48	287971	6149266	Southern zone	Roadside	<p>Kikuyu <i>Cenchrus clandestinus</i> - 4                      Purpletop <i>Verbena bonariensis</i> - 3                      Fireweed <i>Senecio madagascariensis</i> - 2                      Spear thistle <i>Cirsium vulgare</i> - 1                      Patty's lucerne <i>Sida rhombifolia</i> - 2                      Cobbler's Pegs <i>Bidens pilosa</i> - 2</p>	

Way point	Eastings	Northings	General Location	Site Description	Weeds and abundances	Photograph
47	287054	6147773	Southern zone	Roadside	Paspalum <i>Paspalum dilatatum</i> - 5 Fireweed <i>Senecio madagascariensis</i> - 4 Stinking Roger <i>Tagetes minuta</i> - 3 Cobbler's Pegs <i>Bidens pilosa</i> - 2 Kikuyu <i>Cenchrus clandestinus</i> - 4 Inkweed <i>Phytolacca octandra</i> - 1	
46	286918	6147524	Southern zone	Roadside	Whisky grass <i>Andropogon virginicus</i> - 3 Lantana <i>Lantana camara</i> - 3 Fireweed <i>Senecio madagascariensis</i> - 3 Kikuyu <i>Cenchrus clandestinus</i> - 4 Paspalum <i>Paspalum dilatatum</i> - 4 Patty's lucerne <i>Sida rhombifolia</i> - 3 Inkweed <i>Phytolacca octandra</i> - 2 Cobbler's Pegs <i>Bidens pilosa</i> - 3	



## 3.2 LANDSCAPE MAINTENANCE WORKS

Works undertaken in accordance with the Landscape Maintenance Plan for the Foxground and Berry Bypass Project 2017 (LMP) include priority weed control as part of required maintenance activities. The following summarises the weed inspection requirements:

- All areas
  - Priority Weed Control – monthly inspections
- Grassland Areas
  - Weed control in Grassland – monthly inspections
- Landscape Bed Plantings
  - Weed garden beds prior to weed setting flower – yearly inspection
  - Removal/treatment of priority weeds – every 4 weeks.

A monthly and annual maintenance audit is completed by the Foxground and Berry Bypass Landscape Officer to ensure that landscape maintenance works are undertaken and recommendations for future maintenance works will be provided. The landscape officer should look at maintenance works records to ensure adequate works are being conducted in accordance to the timeframes outlined in the LMP.

## 4 SUMMARY OF SURVEY RESULTS AND COMPARISON WITH 2017 MONITORING

The 2018 annual weed monitoring identified a total of 31 weed species across the 49 survey locations, including 27 environmental weeds, and four (4) species listed as Priority Weeds for the South-East region under the Biosecurity Act. Five (5) species observed in the 2017 survey were not identified in the 2018 annual survey (Blue in Table 4-1). Furthermore, there were an additional eight (8) species identified in 2018 that were not recorded in 2017 (Red in table 4-1), all of which are classed as environmental weeds. Refer to Table 4-1.

Overall, there has been an increase in the abundance and cover of weed species with 47 of the 49 monitoring sites displaying this trend. Thirty-six (36) of which have also seen an increase in weed diversity. It was apparent in the 2017 survey that areas were primarily bare during the construction phase. According to the Landscape Management Plan (LMP), hydro-mulched areas where a growth rate of 30% was not achieved would be resprayed. Although there is an expectation that cleared or disturbed sites are often colonised by weeds, these areas should have been well established by native grasses at the time of handover therefore should act as a suppressant for weed species.

The 2018 survey identified four (4) Priority Weeds within the project alignment. These species were previously identified during the 2017 survey, therefore no new Priority Weeds are present. The highly prevalent Fireweed has had a slight decrease in distribution; observed in 44 sites in 2018, compared to the 45 sites observed in 2017. However, there is an overall increase in average relative abundance across the project alignment (according to modified Braun-Blanquet) from 2.49 in 2017 to 2.95 in 2018. An increase in both spread and abundance in Blackberry was found. Blackberry was observed in seven (7) sites in the 2018 survey compared to one (1) site in 2017; and raised from an average relative abundance of 2 in 2017 to 2.14 in 2018. Similarly, Lantana increased in both abundance and spread, being observed in seventeen (17) sites in 2018 compared to just nine (8) in 2017; and increased from an average relative abundance of 2.13 in 2017 to 2.94 in 2018. Giant paramatta grass was observed in just two (2) sites in this years' survey,

similarly to 2017, however the abundance decreased from 3 in 2017 to 2.5 in 2018. See Figure 4-1 and Figure 4-2 below.

Table 4-1 Priority weeds and environmental weed species recorded in the project area: 2017-2018 comparison

Weed Species	Common name	Weed listing	Detected during 2017 surveys	Detected during 2018 surveys
<i>Ageratina adenophora</i>	Crofton Weed	Environmental	X	X
<i>Andropogon virginicus</i>	Whiskey Grass	Environmental	X	X
<i>Araujia sericifera</i>	Moth Vine	Environmental		X
<i>Aster subulatus</i>	Wild Aster	Environmental	X	
<i>Avena fatua</i>	Wild Oats	Environmental	X	
<i>Bidens pilosa</i>	Cobbler's Pegs	Environmental	X	X
<i>Brassica oleracea</i>	Mustard	Environmental		X
<i>Cenchrus clandestinus</i>	Kikuyu Grass	Environmental	X	X
<i>Cirsium vulgare</i>	Spear Thistle	Environmental	X	X
<i>Conyza bonariensis</i>	Fleabane	Environmental	X	X
<i>Cyperus eragrostis</i>	Tall flatsedge	Environmental		X
<i>Erythrina x sykesii</i>	Coral Tree	Environmental	X	
<i>Foeniculum vulgare</i>	Fennel	Environmental	X	X
<i>Grevillea robusta</i>	Silky Oak	Environmental		X
<i>Lantana camara</i>	Lantana	Priority Weed	X	X
<i>Ligustrum lucidum</i>	Large-leaved Privet	Environmental		X
<i>Ligustrum sinense</i>	Small-leaved Privet	Environmental	X	X
<i>Malva parviflora</i>	Mallow	Environmental		X
<i>Paspalum dilatatum</i>	Paspalum	Environmental	X	X
<i>Phytolacca octandra</i>	Inkweed	Environmental	X	X
<i>Plantago lanceolata</i>	Plantain	Environmental	X	
<i>Rubus fruticosus</i>	Blackberry	Priority Weed	X	X
<i>Rumex crispus</i>	Curly Dock	Environmental	X	X
<i>Senecio madagascariensis</i>	Fireweed	Priority Weed	X	X
<i>Setaria parviflora</i>	Pigeon Grass	Environmental		X
<i>Sida rhombifolia</i>	Paddy's Lucerne	Environmental	X	X

Weed Species	Common name	Weed listing	Detected during 2017 surveys	Detected during 2018 surveys
<i>Solanum mauritianum</i>	Wild Tobacco	Environmental	X	X
<i>Solanum nigrum</i>	Deadly Nightshade	Environmental	X	X
<i>Sonchus oleraceus</i>	Sow Thistle	Environmental	X	X
<i>Sporobolus fertilis</i>	Giant Paramatta Grass	Priority Weed	X	X
<i>Tagetes minuta</i>	Stinking Roger	Environmental	X	X
<i>Traxacum officinale</i>	Dandelion	Environmental	X	X
<i>Trifolium pratense</i>	Pink Clover	Environmental	X	
<i>Trifolium repens</i>	White Clover	Environmental	X	X
<i>Verbena boronariensis</i>	Verbena	Environmental	X	X
<i>Xanthium occidentale</i>	Nagoora burr	Environmental		X

**Priority Weed-** Listed as a Priority weed under the Biosecurity Act 2015 for the South-east region.

**Environmental –** Environmental weeds.

**Blue shaded –** Species present in 2017, absent in 2018.

**Red shaded –** Absent in 2017, Present in 2018

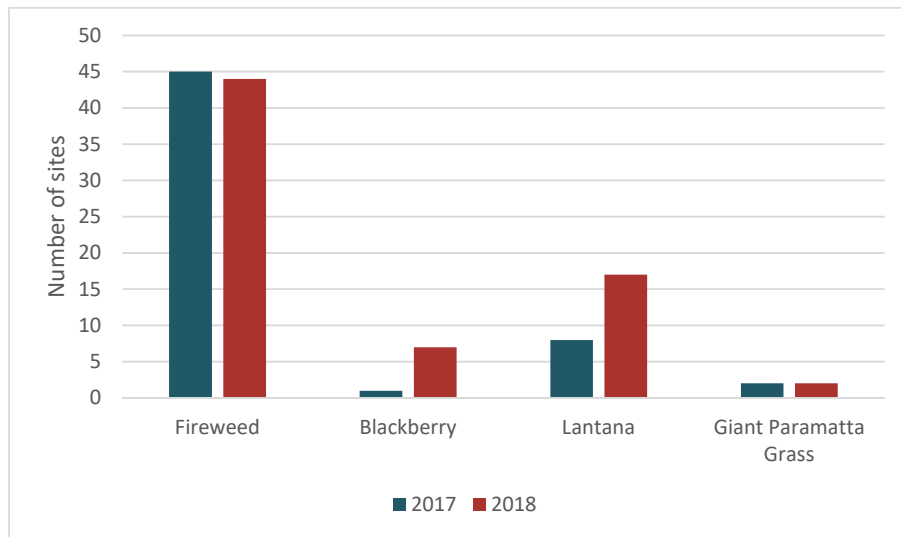


Figure 4-1 Priority weed occurrence 2017/2018

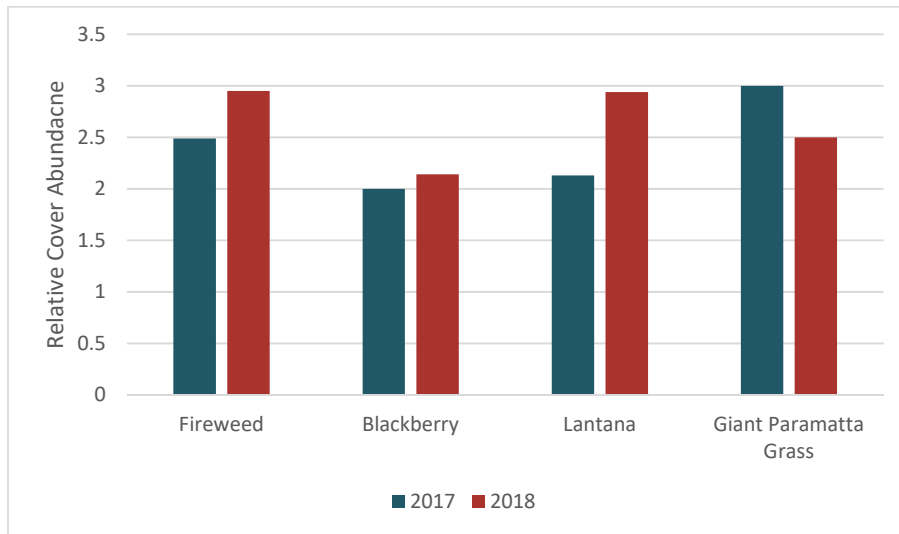


Figure 4-2 Priority Weeds average relative abundance 2017/2018 comparison

Fireweed is a quick coloniser and reproduces quickly, primarily spread via wind. In areas where it is present, it is not surprising that abundances have increased as it is such a prolific weed. As Blackberry and Lantana are both dense monoculture species and are highly prevalent in the projects surrounds, spread amongst the project alignment is expected without appropriate control. Kikuyu and Paspalum were the most prevalent environmental weeds, observed in 46 and 35 sites respectively. The 2018 survey observed and average relative abundance of 4.59 for Kikuyu and 4.06 for Paspalum. Although we have observed an increased spread and abundance of these two species, they can act as a good mechanism to suppress other more invasive weed species.

Appendix B provides photographic comparisons between the 2017 and 2018 surveys.

#### **4.1 COMPARISON WITH PERFORMANCE CRITERIA**

The following performance criteria relevant to weed management was taken from the EcMP (PB 2014). It should be noted that these do not relate specifically to the construction period monitoring but for the lifetime of the monitoring program, including post construction. Comparison is given across the two years of monitoring.

Table 4-2 Comparison against performance criteria

Measure	Performance Criteria	Performance Target	2017 Assessment	2018 Assessment
<b>Weed management</b>	No evidence of weed invasion or spread to adjacent areas	No new weed species become problematic within 12 months post-construction	<p>There has been an increase in the abundance and cover of weed species compared to the 2016 survey with seven more weed species recorded. None of these should be considered problematic, they are all relatively common environmental weed species.</p> <p>Those areas that have the highest presence of weeds are those that have had the longest time since disturbance and rehabilitation or planting. The passing of time has allowed weeds to colonise these areas.</p> <p>There was no evidence of weed invasion or spread to other areas.</p> <p>Survey results confirm that Fireweed remains the most prevalent weed issue across the project alignment as it has been recorded as being widespread in all three monitoring events. Fireweed was listed as Noxious (under the old NW Act) and is a Priority Weed for the South-east region under the Biosecurity Act.</p> <p>Fireweed was prevalent prior to construction and though there was some decrease during construction as areas were stripped of vegetation, it is now recolonising revegetated areas adjacent to the new highway. Private land is likely to be a constant source of seed, thus making Fireweed particularly difficult to control.</p>	<p>There has been an overall increase in the abundance and cover of weed species compared to the 2017 survey. There were an additional eight species identified in the project alignment. None of these weeds should be considered problematic as they are common environmental weeds.</p> <p>Areas with prevalent weed cover are those that have been highly disturbed and have limited revegetation successes. Mid storey species establishment has overall been a success, however grass and herbaceous weeds have colonised many areas.</p> <p>Two of the four priority weeds identified have spread to new areas. Weed control measures are recommended immediately to stop these weeds from spreading to more areas.</p> <p>Fireweed remains the most prevalent weed issue across the project alignment as it has been recorded as being widespread throughout the alignment. Fireweed is a Priority Weed for the South-east region under the Biosecurity Act. Fireweed is difficult to control due to its widespread presence in private lands surrounding the project alignment, placing more of an emphasis on control of spread to new areas than eradication.</p>

## 5 RECOMMENDATIONS

The 2018 weed monitoring recorded a general increase in weed cover and diversity, however this is to be expected given it is the first year of the operational phase of the project. Nonetheless, immediate and ongoing weed control is recommended.

It was previously recommended that stockpile areas, exposed batters, and other disturbed areas use cover crops to aid in suppressing weed germination and establishment. The following sites provide examples where revegetation attempts have been effective in the suppression of weed abundance and diversity across the project alignment:

- 4 - A dense mid-storey has been established with diverse canopy species providing sufficient weed suppressant
- 6 – A dense planting of *Lomandra longifolia* has provided effective suppressant for weed establishment
- 42 – landscape plantings in this area are moderately to well established providing a good suppressant for weed establishment and spread
- 44 - landscape plantings in this area are moderately to well established providing a good suppressant for weed establishment and spread

The overall revegetation attempts were largely ineffective as many planted trees were observed to have died before establishment. The LMP states that all dead or dying plant material would be removed during maintenance activities. Furthermore, that replacement planting would be conducted in failed or damaged plantings. It is important to note that species selection in revegetation attempts can considerably affect the success rate. Revegetation attempts should continue to further aid the prevention of spread and invasion of weed species. The RMS Landscape Officer should look at maintenance work records to ensure works are being completed and in accordance to the timeframes agreed upon in the LMP.

Suppression of Fireweed and other priority weeds is an ongoing issue. As Fireweed occurs throughout most of the project area and in the presence of various other weeds, targeted control measures are not yet required. Fireweed will be treated as routine weed control and conducted in all areas. Blackberry and Lantana have larger ecological impacts and should be controlled immediately across sites where present. RMS should consider engaging with land owners in the project surrounds to assist in overall weed control as they too have a General Biosecurity Duty under the Biosecurity Act 2015.

Areas of concern that require immediate action:

- 8 – A diverse amount of weed species were identified in this area. The area is occupied by large native canopy species and a creek line which both provides excellent habitat for fauna. Immediate weed management is recommended to ensure habitat value in this area is retained.
- 13 – An area impacted by runoff. This area was identified with the largest diversity of weeds. Immediate control is recommended for this area to reduce the risk of spread to neighbouring sites.
- 19 – An area on the fringe of wet sclerophyll forest and landscape grasses. It contains large native trees and is also a possum rope bridge access point. It is suggested that immediate weed control is implemented in this area to better utilise the habitat available for possums, gliders, and birds.

- 25 – Area is found on Broughton Mill Creek 1. Better maintenance of this area is recommended as it may be impacting the riparian habitat utilised by gliders, possums, and birds.
- 33 – An area dominated by *Tagetes minuta*. It is suggested to mow the area as part of maintenance and revegetate to better utilise the area. Large native canopy species surround this area which provide excellent perching and roosting habitat for birds. Planting native tussock grasses such as *Themeda triandra*, etc may outcompete weeds and encourage utilisation by small rodents and reptiles, therefore providing suitable foraging habitat for bird of prey species.
- 36 – Native planted trees have been well established however the mid and lower storey requires immediate weed control. Better maintenance of this area would reduce the spread of weeds and allow better utilisation of the established canopy species by birds, etc.

The hierarchy of weed control: Prevention, Eradication, Control, Asset protection; can be used as a guide to control infestations. As priority weeds are already present and are spread throughout multiple sites, controlling the spread of these species and invasion into other areas is the main mitigation method. Targeting these species during routine weed control in addition to educating weed control officers on these species will assist in their suppression. Avoiding their establishment in new areas is paramount in controlling them throughout the project alignment.

## **6 REFERENCES**

Biodiversity Guidelines, Roads and Maritime Services, 2011

Construction Flora and Fauna Management Sub-plan, Foxground and Berry bypass, Roads and Maritime Services, 2014

Ecological Monitoring Program, Princess Highway Upgrade Foxground and Berry bypass, Parsons Brinkerhoff, 2014





Environmental Assessment, Technical Paper: Terrestrial Flora and Fauna, Foxground and Berry bypass, AECOM, 2012





New South Wales Department of Primary Industries, 2014 <http://weeds.dpi.nsw.gov.au/Weeds/Details/53>  
[accessed 19/01/2016](#)





Landscape Maintenance Plan, Fulton Hogan, 2017











## APPENDIX A PHOTO COMPARISON 2017-2018





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
15	297055	6152294	North of Toolijooa Rd	Batter		
14	296835	6152244	Near turn around bay south of Toolijooa Rd	Construction area, with bare soil areas		





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
16	296799	615239	South of Toolijooa Rd	Roadside area	 A photograph showing a roadside area with a concrete curb, a metal post with a red reflector, and a road curving into the distance under a clear blue sky.	 A photograph showing a roadside area with a concrete curb, a metal post with a red reflector, and a road curving into the distance under a clear blue sky.
17	296675	6152401	South of Toolijooa Rd	Roadside batter	 A photograph showing a roadside batter with tall, dry grass in the foreground and a road curving into the distance under a clear blue sky.	 A photograph showing a roadside batter with tall, dry grass in the foreground and a road curving into the distance under a clear blue sky.





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
18	296523	6152549	South of Toolijooa Rd	Roadside batter	 A photograph showing a roadside batter covered in dry, yellowish-brown grass and some sparse green vegetation under a blue sky with scattered clouds.	 A photograph showing the same roadside batter in 2018, now heavily overgrown with dense green weeds and shrubs.
19	296251	6152744	Between BC1 and Toolijooa Rd	Roadside embankment	 A photograph of a roadside embankment with dry grass, next to a road with a white guardrail. The background shows a clear blue sky and distant hills.	 A photograph of the same roadside embankment in 2018, showing increased green vegetation and trees along the road edge.

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
20	296157	6152704	Between BC1 and Toolijooa Rd	Access track between Toolijooa Rd and BC1		
21	29593	6152819	Between BC1 and Toolijooa Rd	Top of cut		





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
22	295486	6152939	Between BC1 and Toolijooa Rd	Light vehicle track		
24	295121	6152887	BC1	Adjacent to compound		





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
31	295126	6152978	BC1	Roadside batter	 A wide-angle photograph showing a grassy roadside area with a concrete drainage channel in the middle ground. The background features rolling hills under a clear blue sky.	 A photograph showing the same roadside area as in 2017, but with significantly more dense and tall grasses in the foreground, indicating weed growth.
25	294923	6152794	BC1	BC1	 A photograph of a grassy area with a red and white striped barrier in the background. There are trees with yellowing leaves, suggesting autumn.	 A photograph of the same area as in 2017, showing a grassy field with a fence line and trees in the background.





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
26	294695	6152708	Between BC1 and BC2	Road side		
27	294623	6152587	Between BC1 and BC2	Road side		





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
30	294583	6152452	Between BC1 and BC2	Road side		
28	294296	6152021	Between BC2 and BC3	Road side		









Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
29	294250	6151865	Between BC2 and BC3	Road side		
32	294059	6151679	Between Austral Park compound and BC3	Access track		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
33	293916	6151611	Between Austral Park compound and BC3	Batter		
34	293975	6151579	Between Austral Park compound and BC3	Batter		





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
35	293661	6151517	Between Austral Park compound and BC3	Batter		
36	293699	6151420	Between Austral Park compound and BC3	Batter		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
37	293391	6151342	Between Austral Park compound and BC3	Batter		
13	293197	6151331	Austral Park	Western side Princess Hwy		





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
38	293143	6151252	Austral Park	Western side Princess Hwy		
12	293089	6151221	Austral Park	Western side Princess Hwy		





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
10	292987	6151220	Austral Park	Western side Princess Hwy		
11	292977	6151168	Austral Park	Soil mound		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
9	292873	6151166	Austral Park	Batter		
8	292746	6151115	Austral Park	Road side		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
7	292355	6150882	Central zone	Road side		
6	291579	6150900	Tindell's Lane	Road side		











Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
5	291578	6150845	Tindell's Lane	Batter		
4	291320	6150671	Central zone Cut 6	Batter		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
3	291317	6150605	Central zone Cut 6	Batter		
2	291251	6150619	Central zone Cut 6	Batter		





Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
1	291130	6150523	Central zone Cut 6	Batter		
0	290920	6150386	Central zone	Batter		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
39	290499	6150097	Southern zone	Batter		
41	290384	6150131	Southern zone	Batter		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
40	290237	6150006	Southern zone	Embankment		
42	289262	6149761	Southern zone	Batter		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
43	288808	6149755	Southern zone	Batter		
49	288598	6149960	Southern zone	Town Creek Diversion, Rawling's Lane		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
44	288407	6149644	Southern zone	Noise mound		
45	288031	6149263	Southern zone	Roadside		

Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
48	287971	6149266	Southern zone	Roadside		
47	287054	6147773	Southern zone	Roadside		



Way point	Eastings	Northings	General Location	Site Description	2017 Photograph	2018 Photograph
46	286918	6147524	Southern zone	Roadside		

## APPENDIX B PRIORITY WEEDS FOR THE SOUTH-EAST REGION

Weed	Duty
All plants	<p style="text-align: center;">General Biosecurity Duty</p> <p>All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.</p>
African boxthorn Lycium ferocissimum	<p style="text-align: center;">Prohibition on dealings</p> <p>Must not be imported into the State or sold</p>
African lovegrass Eragrostis curvula	<p style="text-align: center;">Regional Recommended Measure</p> <p>Land managers reduce impacts from the plant on priority assets.</p>
Alligator weed Alternanthera philoxeroides	<p style="text-align: center;">Prohibition on dealings</p> <p>Must not be imported into the State or sold</p>
Alligator weed Alternanthera philoxeroides	<p style="text-align: center;">Biosecurity Zone</p> <p>The Alligator Weed Biosecurity Zone is established for all land within the state except land in the following regions: Greater Sydney; Hunter (but only in the local government areas of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens). Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone</p>

<p>Anchored water hyacinth  Eichhornia azurea</p>	<p>Prohibited Matter  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Athel pine  Tamarix aphylla</p>	<p>Prohibition on dealings  Must not be imported into the State or sold</p>
<p>Bellyache bush  Jatropha gossypifolia</p>	<p>Prohibition on dealings  Must not be imported into the State or sold</p>
<p>Bitou bush  Chrysanthemoides monilifera  subsp. rotundata</p>	<p>Prohibition on dealings  Must not be imported into the State or sold</p>
<p>Bitou bush  Chrysanthemoides monilifera  subsp. rotundata</p>	<p>Biosecurity Zone  The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south. Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone</p>
<p>Black knapweed  Centaurea X moncktonii</p>	<p>Prohibited Matter  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>

<p>Black willow  Salix nigra</p>	<p>Prohibition on dealings  Must not be imported into the State or sold</p>
<p>Blackberry  Rubus fruticosus species aggregate</p>	<p>Prohibition on dealings  Must not be imported into the State or sold  All species in the Rubus fruticosus species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree</p>
<p>Blue hound's tongue  Cynoglossum creticum</p>	<p>Regional Recommended Measure  Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</p>
<p>Boneseed  Chrysanthemoides monilifera subsp. monilifera</p>	<p>Prohibition on dealings  Must not be imported into the State or sold</p>
<p>Boneseed  Chrysanthemoides monilifera subsp. monilifera</p>	<p>Control Order  Boneseed Control Zone: Whole of NSW  Boneseed Control Zone (Whole of NSW): Owners and occupiers of land on which there is boneseed must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of boneseed must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.</p>

<p>Boxing glove cactus                  Cylindropuntia fulgida var.                  mamillata</p>	<p>Prohibition on dealings                  Must not be imported into the State or sold</p>
<p>Bridal creeper                  Asparagus asparagoides</p>	<p>Prohibition on dealings                  Must not be imported into the State or sold                  *this requirement also applies to the Western Cape form of bridal creeper</p>
<p>Bridal veil creeper                  Asparagus declinatus</p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Broomrapes                  Orobanche species</p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries                  All species of Orobanche are Prohibited Matter in NSW, except the natives Orobanche cernua var. australiana and Orobanche minor</p>
<p>Cabomba                  Cabomba caroliniana</p>	<p>Prohibition on dealings                  Must not be imported into the State or sold</p>
<p>Cabomba                  Cabomba caroliniana</p>	<p>Regional Recommended Measure                  Exclusion zone: whole of region except the core infestation area of Wollongong, Shellharbour and Kiama councils.                  Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should</p>

	be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.
Cane cactus Austrocyllindropuntia cylindrica	Prohibition on dealings Must not be imported into the State or sold All species in the Austrocyllindropuntia genus have this requirement
Cane needle grass Nassella hyalina	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Cape broom Genista monspessulana	Prohibition on dealings Must not be imported into the State or sold
Cape broom Genista monspessulana	Regional Recommended Measure Core infestation: whole region except for the exclusion zone of Bega and Wingecarribee councils Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.
Cat's claw creeper Dolichandra unguis-cati	Prohibition on dealings Must not be imported into the State or sold
Cat's claw creeper Dolichandra unguis-cati	Regional Recommended Measure Land managers should mitigate the risk of new weeds

	being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Chilean needle grass Nassella neesiana	Prohibition on dealings Must not be imported into the State or sold
Chilean needle grass Nassella neesiana	Regional Recommended Measure Exclusion zone: whole of region except core infestation area of Wollongong, Kiama, Shellharbour, Wingecarribee, Gouburn/Murwaree, and Queanbeyan/Palerang Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant.
Climbing asparagus Asparagus africanus	Prohibition on dealings Must not be imported into the State or sold
Climbing asparagus Asparagus africanus	Regional Recommended Measure Exclusion zone: whole of region except core infestation areas. Core infestation area: Wollongong, Kiama, Shellharbour, Bega and Shoalhaven local government areas. Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core infestation area: Land managers should mitigate spread from their land.
Climbing asparagus fern Asparagus plumosus	Prohibition on dealings Must not be imported into the State or sold

<p>Common pear Opuntia stricta</p>	<p>Prohibition on dealings Must not be imported into the State or sold</p>
<p>Common pear Opuntia stricta</p>	<p>Regional Recommended Measure Core infestation area: whole region except the exclusion zone of Wollongong, Kiama, and Shellharbour, and Eurobadalla Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core infestation: Land managers should mitigate spread from their land. *This Regional Recommended Measure applies to all species of Opuntia except for Opuntia ficus-indica (Indian fig)</p>
<p>Coolatai grass Hyparrhenia hirta</p>	<p>Regional Recommended Measure Exclusion zone: whole region except the core infestation area of Bigga, Crooked Corner and Narrawa in the Upper Lachlan local government area, and Wollongong local government area Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.</p>
<p>Eurasian water milfoil Myriophyllum spicatum</p>	<p>Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Fireweed Senecio madagascariensis</p>	<p>Prohibition on dealings Must not be imported into the State or sold</p>



<p>Fireweed Senecio madagascariensis</p>	<p>Regional Recommended Measure Exclusion zone: whole of region except the core infestation area of Wollongong, Kiama, Shellharbour, Eurobodalla, Shoalhaven, Bega Valley and Wingecaribee councils Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.</p>
<p>Flax-leaf broom Genista linifolia</p>	<p>Prohibition on dealings Must not be imported into the State or sold</p>
<p>Flax-leaf broom Genista linifolia</p>	<p>Regional Recommended Measure Exclusion zone: whole region except for the core infestation areas of Wollongong, Shellharbour, Kiama, Shoalhaven and Eurobodalla councils Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.</p>
<p>Frogbit Limnobium laevigatum</p>	<p>Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries All species of Limnobium are Prohibited Matter</p>
<p>Gamba grass Andropogon gayanus</p>	<p>Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person</p>

	who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries
Giant devil's fig Solanum chrysotrichum	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Giant Parramatta grass Sporobolus fertilis	Regional Recommended Measure Exclusion zone: whole of region except core infestation area of Wollongong, Kiama, Shellharbour, Eurobodalla, and Shoalhaven councils Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.
Giant rat's tail grass Sporobolus pyramidalis	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Gorse Ulex europaeus	Prohibition on dealings Must not be imported into the State or sold
Gorse Ulex europaeus	Regional Recommended Measure Exclusion zone: whole of region except the core infestation area of Upper Lachlan, Wollongong,

	Shellharbour, Kiama, Shoalhaven, Eurobodalla, Yass Valley and Bega Valley councils Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.
Grey willow Salix cinerea	Prohibition on dealings Must not be imported into the State or sold
Ground asparagus Asparagus aethiopicus	Prohibition on dealings Must not be imported into the State or sold
Groundsel bush Baccharis halimifolia	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Hawkweeds Hieracium species	Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries All species in the genus Hieracium are Prohibited Matter
Holly leaved senecio Senecio glastifolius	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown,

	carried or released into the environment. Notify local control authority if found.
Horsetails Equisetum species	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Hudson pear Cylindropuntia rosea	Prohibition on dealings Must not be imported into the State or sold
Hydrocotyl Hydrocotyle ranunculoides	Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries
Hygrophila Hygrophila costata	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Hymenachne Hymenachne amplexicaulis and hybrids	Prohibition on dealings Must not be imported into the State or sold
Karoo thorn Vachellia karroo	Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person

	<p>who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Kidney-leaf mud plantain Heteranthera reniformis</p>	<p>Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</p>
<p>Kochia Bassia scoparia</p>	<p>Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries Excluding the subspecies trichophylla</p>
<p>Koster's curse Clidemia hirta</p>	<p>Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Lagarosiphon Lagarosiphon major</p>	<p>Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Lantana Lantana camara</p>	<p>Prohibition on dealings Must not be imported into the State or sold</p>

<p>Lantana Lantana camara</p>	<p>Regional                      Recommended                      Measure</p> <p>Exclusion zone: whole region excluding the core infestation area of Eurobodalla, Kiama, Shellharbour, Wollongong and the Shoalhaven local government area north of the Lantana Containment Line at 35°11'42" S</p> <p>Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.</p>
<p>Long-leaf willow primrose Ludwigia longifolia</p>	<p>Regional                      Recommended                      Measure</p> <p>Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</p>
<p>Ludwigia Ludwigia peruviana</p>	<p>Regional                      Recommended                      Measure</p> <p>Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</p>
<p>Madeira vine Anredera cordifolia</p>	<p>Prohibition                      on                      dealings</p> <p>Must not be imported into the State or sold</p>
<p>Mesquite Prosopis species</p>	<p>Prohibition                      on                      dealings</p> <p>Must not be imported into the State or sold</p> <p>All species in the genus Prosopis have this requirement</p>

<p>Mexican feather grass  <i>Nassella tenuissima</i></p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Miconia  <i>Miconia species</i></p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries                  All species of Miconia are Prohibited Matter in NSW</p>
<p>Mikania vine  <i>Mikania micrantha</i></p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries                  *all species in the genus Mikania are Prohibited Matter in NSW</p>
<p>Mimosa  <i>Mimosa pigra</i></p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Ming asparagus fern  <i>Asparagus macowanii</i> var. <i>zuluensis</i></p>	<p>Regional Recommended Measure                  Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</p>

<p>Mysore Caesalpinia decapetala</p> <p>thorn</p>	<p>Regional Exclusion zone: whole region except the core infestation area of Wollongong</p> <p>Recommended Measure</p> <p>Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.</p>
<p>Pampas Cortaderia species</p> <p>grass</p>	<p>Regional Exclusion zone: whole region except the core infestation area of Wollongong</p> <p>Recommended Measure</p> <p>Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found. This Regional Recommended Measure applies to Cortaderia jubata (pink pampas grass)</p>
<p>Parkinsonia Parkinsonia aculeata</p>	<p>Prohibition on dealings</p> <p>Must not be imported into the State or sold</p>
<p>Parkinsonia Parkinsonia aculeata</p>	<p>Control Order</p> <p>Parkinsonia Control Zone: Whole of NSW</p> <p>Parkinsonia Control Zone (Whole of NSW): Owners and occupiers of land on which there is parkinsonia must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of parkinsonia must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.</p>



<p>Parthenium weed                  Parthenium hysterophorus</p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Parthenium weed                  Parthenium hysterophorus</p>	<p>Prohibition on dealings                  The following equipment must not be imported into NSW from Queensland: grain harvesters (including the comb or front), comb trailers (including the comb or front), bins used for holding grain during harvest operations, augers or similar for moving grain, vehicles used to transport grain harvesters, support vehicles driven in paddocks during harvest operations, mineral exploration drilling rigs and vehicles used to transport those rigs, unless set out as an exception in Division 5, Part 2 of the Biosecurity Order (Permitted Activities) 2017</p>
<p>Pond apple                  Annona glabra</p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Prickly acacia                  Vachellia nilotica</p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Prickly pears -                  Austrocyliodropuntias                  Austrocyliodropuntia species</p>	<p>Prohibition on dealings                  Must not be imported into the State or sold                  All species in the Austrocyliodropuntia genus have this requirement</p>

<p>Prickly pears - <i>Cylindropuntias</i>  <i>Cylindropuntia</i> species</p>	<p>Prohibition on dealings          Must not be imported into the State or sold          All species in the <i>Cylindropuntia</i> genus have this requirement</p>
<p>Prickly pears - <i>Opuntias</i>  <i>Opuntia</i> species</p>	<p>Prohibition on dealings          Must not be imported into the State or sold          Except for <i>Opuntia ficus-indica</i> (Indian fig)</p>
<p>Prickly pears - <i>Opuntias</i>  <i>Opuntia</i> species</p>	<p>Regional Recommended Measure          Core infestation area: whole region except the exclusion zone of Wollongong, Kiama, and Shellharbour, and Eurobadalla          Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core infestation: Land managers should mitigate spread from their land. This Regional Recommended Measure applies to all species of <i>Opuntia</i> except for <i>Opuntia ficus-indica</i> (Indian fig)</p>
<p>Rope pear  <i>Cylindropuntia imbricata</i></p>	<p>Prohibition on dealings          Must not be imported into the State or sold          All species in the <i>Cylindropuntia</i> genus have this requirement</p>
<p>Rubber vine  <i>Cryptostegia grandiflora</i></p>	<p>Prohibited Matter          A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Sagittaria  <i>Sagittaria platyphylla</i></p>	<p>Prohibition on dealings          Must not be imported into the State or sold</p>

<p>Sagittaria Sagittaria platyphylla</p>	<p>Regional Recommended Measure Plant should not be allowed to be spread to priority sites of high environmental, economic or social value.</p>
<p>Salvinia Salvinia molesta</p>	<p>Prohibition on dealings Must not be imported into the State or sold</p>
<p>Salvinia Salvinia molesta</p>	<p>Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</p>
<p>Scotch broom Cytisus scoparius subsp. scoparius</p>	<p>Prohibition on dealings Must not be imported into the State or sold</p>
<p>Scotch broom Cytisus scoparius subsp. scoparius</p>	<p>Regional Recommended Measure Core infestation area: whole region except exclusion zone of : Bega council Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.</p>
<p>Sea spurge Euphorbia paralias</p>	<p>Regional Recommended Measure Exclusion zone: whole region except for the core infestation area of Eurobodalla and Bega Valley councils Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should</p>

	be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.
Senegal tea plant Gymnocoronis spilanthoides	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Serrated tussock Nassella trichotoma	Prohibition on dealings Must not be imported into the State or sold
Serrated tussock Nassella trichotoma	Regional Recommended Measure Core infestation: whole region except the exclusion zone of Shoalhaven, Eurobodalla, Kiama, Wollongong, Bega Valley and Shellharbour councils Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: Land managers should mitigate spread from their land. Core area: Land managers reduce impacts from the plant on priority assets.
Siam weed Chromolaena odorata	Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries
Sicklethorn Asparagus falcatus	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the

	plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Silverleaf nightshade Solanum elaeagnifolium	Prohibition on dealings Must not be imported into the State or sold
Smooth tree pear Opuntia monacantha	Prohibition on dealings Must not be imported into the State or sold
Smooth tree pear Opuntia monacantha	Regional Recommended Measure Core infestation area: whole region except the exclusion zone of Wollongong, Kiama, and Shellharbour, and Eurobadalla Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core infestation: Land managers should mitigate spread from their land. *This Regional Recommended Measure applies to all species of Opuntia except for Opuntia ficus-indica (Indian fig)
Snakefeather Asparagus scandens	Prohibition on dealings Must not be imported into the State or sold
Spanish broom Spartium junceum	Regional Recommended Measure Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Spanish heath Erica lusitanica	Regional Recommended Measure Land managers should mitigate the risk of new weeds

	being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.
Spongeplant Limnobiium spongia	Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries All species of Limnobiium are Prohibited Matter
Spotted knapweed Centaurea stoebe subsp. micranthos	Prohibited Matter A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries
St. John's wort Hypericum perforatum	Regional Recommended Measure Core infestation area: whole region except the exclusion area of Bega, Eurobodalla, Shoalhaven, Wollongong, Shellharbour and Kiama Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant.
Tiger pear Opuntia aurantiaca	Prohibition on dealings Must not be imported into the State or sold
Tiger pear Opuntia aurantiaca	Regional Recommended Measure Core infestation area: whole region except the exclusion zone of Wollongong, Kiama, Shellharbour,

	<p>and Eurobadalla</p> <p>Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core infestation: Land managers should mitigate spread from their land. *This Regional Recommended Measure applies to all species of Opuntia except for Opuntia ficus-indica (Indian fig)</p>
<p>Tropical soda apple Solanum viarum</p>	<p>Control Order</p> <p>Tropical Soda Apple Control Zone: Whole of NSW Tropical Soda Apple Control Zone (Whole of NSW): Owners and occupiers of land on which there is tropical soda apple must notify the local control authority of new infestations; destroy the plants including the fruit; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of tropical soda apple must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant on the land, or on or in a carrier.</p>
<p>Velvety tree pear Opuntia tomentosa</p>	<p>Prohibition on dealings</p> <p>Must not be imported into the State or sold</p>
<p>Velvety tree pear Opuntia tomentosa</p>	<p>Regional Recommended Measure</p> <p>Core infestation area: whole region except the exclusion zone of Wollongong, Kiama, and Shellharbour, and Eurobadalla</p> <p>Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core infestation: Land managers should mitigate spread from their land. This Regional Recommended Measure applies to all species of Opuntia except for Opuntia ficus-indica (Indian fig)</p>

<p>Water Trapa species</p> <p style="text-align: right;">caltrop</p>	<p style="text-align: center;">Prohibited Matter</p> <p>A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries All species in the Trapa genus are Prohibited Matter in NSW</p>
<p>Water Eichhornia crassipes</p> <p style="text-align: right;">hyacinth</p>	<p style="text-align: center;">Prohibition on dealings</p> <p>Must not be imported into the State or sold</p>
<p>Water Eichhornia crassipes</p> <p style="text-align: right;">hyacinth</p>	<p style="text-align: center;">Biosecurity Zone</p> <p>The Water Hyacinth Biosecurity Zone applies to all land within the State, except for the following regions: Greater Sydney or North Coast, North West (but only the local government area of Moree Plains), Hunter (but only in the local government areas of City of Cessnock, City of Lake Macquarie, MidCoast, City of Maitland, City of Newcastle or Port Stephens), South East (but only in the local government areas of Eurobodalla, Kiama, City of Shellharbour, City of Shoalhaven or City of Wollongong).</p> <p>Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone</p>
<p>Water Pistia stratiotes</p> <p style="text-align: right;">lettuce</p>	<p style="text-align: center;">Regional Recommended Measure</p> <p>Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</p>



<p>Water soldier                  Stratiotes aloides</p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>
<p>Willows                  Salix species</p>	<p>Prohibition on dealings                  Must not be imported into the State or sold                  All species in the Salix genus have this requirement, except Salix babylonica (weeping willows ), Salix x calodendron (pussy willow) and Salix x reichardtii (sterile pussy willow)</p>
<p>Witchweeds                  Striga species</p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries                  All species in the Striga genus are Prohibited Matter in NSW, except the native Striga parviflora</p>
<p>Yellow burrhead                  Limnocharis flava</p>	<p>Prohibited Matter                  A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries</p>