

Weed Management Strategy and Action Plan Kingborough Municipal Area 2017 - 2027



'Working together to manage weeds in Kingborough'

DOCUMENT INFORMATION

Title	Kingborough Council
	Weed Management Strategy and Action Plan 2017 - 2027

Revision History

Prepared by	Philip Barker (NBES)	June 2015 – January 2016
Consultation	Rene Raichert (KC), Liz Quinn (KC)	May, June, August 2015
Reviewed by	Grant Daniels (NBES)	January 15 2016
Draft 1 distributed to	Rene Raichert	January 20 2016
Draft 2 distributed to	Rene Raichert	February 22 2016
Draft 3 distributed to	Rene Raichert	March 7 2016
Public feedback closes		April 2016
Draft 4 distributed to	Rene Raichert	May 10 2016
Final draft prepared by	Kingborough Council	September 2016
Endorsed by Council		14 November 2016

ACKNOWLEDGMENTS

Preparation of this plan was by Dr Philip Barker of North Barker Ecosystem Services, with Susan Jungalwalla undertaking data management and analysis.

Kingborough Council funded the Plan. Project management was undertaken by Rene Raichert and Liz Quinn of Kingborough Council.

Kingborough Council provided supplementary data on weed locations.

Other sources of data include the LIST, Natural Values Atlas and NBES. All sources are acknowledged on maps and in GIS tables.

EXECUTIVE SUMMARY

This weed strategy has been prepared to guide weed management within the Kingborough municipality for the next 10 years.

Kingborough Council has made tremendous progress on tackling weed issues on Council managed land to date. This has been achieved through the combined efforts of volunteer community groups and Council staff, with strategic planning in local Reserves and a coordinated and sustained level of on-ground works. With around three quarters of the municipality supporting native vegetation, but Council only managing a small percentage of this, one important challenge is to take a strategic approach to achieve weed management outcomes across the whole of the municipal area.

Kingborough has existing weed management strategies that separately cover Bruny Island and the “mainland” balance of the municipality. This strategy brings the existing strategies together by prioritising weeds, mapping distributions, and proposing a weed management strategy that covers both areas.

This strategy also identifies other challenges that need to be tackled to allow ongoing progress toward the weed management aims and these are presented as key “planks” to the strategy.

This plan identifies seven key planks to support effective and efficient weed management, and describes management actions to assist in ensuring that the key planks are the foundation of weed management in Kingborough.

Key planks

Plank 1 – Best Practice Weed Management

Plank 2 – Integrated Weed Management

Plank 3 – Planning

Plank 4 – Risk Management

Plank 5 – Stakeholder Engagement and Partnerships

Plank 6 – Education and Training

Plank 7 – Monitoring and Review

Priorities and management of weeds

The strategy prioritises the selection of sites for weed management based on the occurrence of selection criteria that include highest weed priority, community priority, threatened flora and vegetation priorities. The co-occurrence of these selection drivers results in higher order selection as a site priority.

Management zones have been defined and prescriptions recommended that mitigate the potential risks of weed management actions that are characteristic of each zone.

Kingborough contains a wide range of introduced plants. Just over 400 species are considered to be naturalised in the municipality. Some of these are well established and widespread. Others are fairly recent introductions, with small populations of limited threat to environmental, economic and/or social values. Thirty-eight of the 115 declared weeds listed under the *Tasmanian Weed Management Act 1999* are naturalised within Kingborough, with 10 of these also listed as Weeds of National Significance (WONS).

This plan has prioritised the declared weeds and environmental weeds that are present in the municipality into five management groups:

1. **Eradicate** any infestation.
2. **Eradicate or quarantine** within term of the action plan (10 years).
3. **Eradicate isolated infestations** and contain wider infestations to ensure no further spread within term of the action plan (10 years).
4. **Control and contain** where threatening important values – considered response for all species.
5. **Monitor** local environmental weeds. Aim to minimise further spread and control and contain when in association with declared weeds.

Some **Priority Actions** of the Plan are:

- Undertake a review of the operational aspects of weed management:
 - Identify areas in which efficiency and effectiveness can be improved;
 - Identify where best practices are and are not being applied.
- Train all staff in integrated weed management and how to incorporate this into site treatment plans.
- Develop and embrace annual works and site planning procedures as the basis for operations and monitoring.
- Integrate GIS and databases into planning and monitoring.
- Trial a range of tools to engage and provide incentive to other weed managers, including:
 - Reverse auctions to undertake weed works;
 - Cooperative or coordinated weed management agreements; and
 - Service agreements.
- Implement an educational strategy focussed on engagement, understanding and interaction using modern media tools.
- Complete a training program aimed at attaining and maintaining best practices knowledge.
- Place more stringent controls on declared and environmental weeds as part of the development planning process.
- Map roadside weeds as the basis to a control strategy that reduces the risk of spread.
- Establish and adopt best practice hygiene measures.
- Integrate audits and adherence to site plans, and construct a performance indicator based on the cost of improvement in weed control.

TABLE OF CONTENTS

1	AIM	1
2	INTRODUCTION	1
3	BACKGROUND AND OBJECTIVES	1
3.1	<i>Weed Management in Kingborough</i>	2
3.2	<i>Strategic Context</i>	2
3.3	<i>Kingborough Municipal Area - Geography</i>	3
4	WEEDS OF THE KINGBOROUGH MUNICIPAL AREA	7
4.1	<i>The significance of weeds in the Kingborough</i>	7
4.2	<i>Prioritising weeds for control in Kingborough</i>	7
4.3	<i>Prioritisation method</i>	8
4.4	<i>Management Strategy for Environmental Weeds</i>	10
5	WEED MANAGEMENT STRATEGIC FRAMEWORK	16
5.1	<i>Plank 1 – Best Practice Management</i>	16
5.2	<i>Plank 2 – Integrated Weed Management</i>	17
5.3	<i>Plank 3 – Planning</i>	18
5.4	<i>Plank 4 – Risk Management</i>	19
5.5	<i>Plank 5 – Stakeholder Engagement and Partnerships</i>	20
5.6	<i>Plank 6 – Education and Training</i>	23
5.7	<i>Plank 7 – Monitoring and Review</i>	23
6	ACTION PLAN	24
6.1	<i>Best Practice Management</i>	25
6.2	<i>Integrated Weed Management</i>	26
6.3	<i>Planning</i>	26
6.4	<i>Risk Management</i>	27
6.5	<i>Stakeholder Engagement and Partnerships</i>	29
6.6	<i>Education and Training</i>	33
6.7	<i>Monitoring and Review</i>	34
7	WEED MANAGEMENT PRIORITIES	37
7.1	<i>Strategic Priorities</i>	37
7.2	<i>Site selection</i>	40
7.3	<i>Weed Management Zones</i>	47

8	ROADSIDE WEED MANAGEMENT	53
9	CLASSIFYING LOCAL WEEDS USING THE WMA CATEGORIES	54
	REFERENCES	55
	APPENDIXES	57
	Appendix 1 – Policy and Legislation Overview	56
	Appendix 2 - Stakeholders by land tenure and area (ha).	59
	Appendix 3 - Priority Declared weeds in Kingborough Municipality.	62
	Appendix 4 – Zone A Weeds that Are Not Recorded in Kingborough.	64
	Appendix 5 – National Environmental Alert List	69
	Appendix 6 – Southern Regional High Priority Weeds	72
	Appendix 7 – Declared weed mapping within Municipality	74
	Appendix 8 - Recommended contents of work and site plans	89
	Appendix 9 - Ten Year Kingborough Weed Strategy Action Plan	91
	TABLE OF FIGURES	
	Figure 1 – Kingborough Municipal Area boundary	4
	Figure 2 - Kingborough native vegetation and Reserve boundaries.	6
	Figure 3 - Extent of priority 1 weeds	11
	Figure 4 - Extent of priority 2 weeds	12
	Figure 5 - Extent of priority 3 weeds	13
	Figure 6 - Extent of priority 4 weeds	14
	Figure 7 - Extent of priority 5 weeds	15
	Figure 8 - Optimised site priorities.	42
	Figure 9 - Weed driven priorities.	43
	Figure 10 - Community driven reserve priorities.	44
	Figure 11 - Threatened flora priorities.	45
	Figure 12 - Vegetation priorities.	46
	Figure 13 - Weed Management Zones	52
	Figure 14 – Declared weeds within Kingborough (Map 1 of 15)	79
	Figure 15 – Declared weeds within Kingborough LGA (Map 2 of 15)	80
	Figure 16 - Declared weeds within Kingborough LGA (Map 3 of 15)	81
	Figure 17 - Declared weeds within Kingborough LGA (Map 4 of 15)	77
	Figure 18 - Declared weeds within Kingborough LGA (Map 5 of 15)	78
	Figure 19 - Declared weeds within Kingborough LGA (Map 6 of 15)	79
	Figure 20 - Declared weeds within Kingborough LGA (Map 7 of 15)	80
	Figure 21 - Declared weeds within Kingborough LGA (Map 8 of 15)	81

Figure 22 - Declared weeds within Kingborough LGA (Map 9 of 15)	82
Figure 23 - Declared weeds within Kingborough LGA (Map 10 of 15)	83
Figure 24 - Declared weeds within Kingborough LGA (Map 11 of 15)	84
Figure 25 - Declared weeds within Kingborough LGA (Map 12 of 15)	85
Figure 26 - Declared weeds within Kingborough LGA (Map 13 of 15)	86
Figure 27 - Declared weeds within Kingborough LGA (Map 14 of 15)	87
Figure 28 - Declared weeds within Kingborough LGA (Map 15 of 15)	88

TABLE OF TABLES

Table 1 – TASVEG mapping classes within Kingborough Municipal Area	5
Table 2 – Stakeholders as Land tenure	5
Table 3 - Weed prioritisation including elevated non declared weeds	9
Table 4 - Weed threat versus Likelihood of success matrix	10
Table 5 - Reserve prioritisation based on community participation.	39
Table 6 - Threatened flora classification	39
Table 7 - Threatened flora strategic priorities	39
Table 8 - Native vegetation priorities based on threat status and area	40

ABBREVIATIONS

DPIPWE	Department of Primary Industries, Parks, Water & Environment
EEG	Efficiency and Effectiveness Gain
GIS	Geographic Information System
KC	Kingborough Council
KNPW	Kingborough Non-Declared Prioritised Weed
KMA	Kingborough Municipal Area
PWS	Parks & Wildlife Service
STWS	Southern Tasmanian Weed Management Strategy
TSPA	Tasmanian <i>Threatened Species Protection Act 1995</i>
WONS	Weeds of National Significance
WMA	Tasmanian <i>Weed Management Act 1999</i>
WMP	Weed Management Plan
WMS	Weed Management Strategy
WWP	Weed Work Plan

1 AIM

“To implement a Municipal Weed Strategy and Action Plan in which everyone is working together to manage weeds across all land tenures, thereby protecting natural, social and economic values of Kingborough and its neighbours”

This aim and vision reflects the *Southern Tasmanian Weed Strategy 2011-2016*.

2 INTRODUCTION

Kingborough Council (the Council, KC) has made meaningful achievements in controlling weed infestations in their municipal area (KMA). This has been achieved through the combined efforts of volunteer community groups and Council staff, with strategic approaches over local Reserves and a coordinated and sustained level of on-ground works. Despite the achievements that have been made to date, and the considerable resources devoted to weed management, the ubiquity of many environmental weeds is such that it is neither possible nor practical to plan to eradicate all introduced species from the municipality. It is possible, however, to come to understand the full range of potentially competing priorities for weed management. With that understanding, resources may then be allocated across the range of competing priorities in a fashion that satisfies the vast majority of stakeholders.

This Strategy and Action Plan aims to deliver an approach which includes accepted strategic objectives as well as novel concepts. The approach will be applied to all land within the KMA to protect key assets by controlling threatening weeds. This involves planning for enhanced co-operation of all landowners in order to maximise on-ground resources for weed management and achieve high level, sustainable weed outcomes. It also seeks to ensure KC leads by example, encouraging other stakeholders to either get involved or to increase their level of involvement.



Left: Flower of Paterson's curse (*Echium plantaginifolium*).

Cooperation and coordinated action from landowners across all land tenures is vital. Without it, successful eradication of Paterson's curse from the municipality is highly unlikely.

3 BACKGROUND AND OBJECTIVES

3.1 Weed Management in Kingborough

To date, Council has made large strides in weed management within Council owned or managed lands. Included in these efforts has been the progressive implementation of the *Bruny Island Weed Management Strategy*, the *Bruny Island Roadside Weed Management Strategy* and the *Channel Weed Management Strategy*.

Example of progress in weed management include; the employment of two full time weed staff, the appointment of authorised officers under the act , dedicated annual funding for weed control activities, establishment of a weed crew (vehicle, quick spray etc.) and extensive weed control works in bushland reserves, among many other achievements.

Stage 1 of the development of the current Strategy included a review of the implementation of existing strategies. It also included a review of all relevant legislation and policy frameworks and an investigation of approaches that could be employed within the KMA.

From this it was established that the Strategy would:

- provide a strategic framework that includes objectives, strategies, actions, monitoring and evaluation for the management of weeds throughout the municipality;
- define management zones within the municipality and stratify weed risk assessments by these zones;
- contain an Action Plan that outlines the required management actions to be undertaken; identifying agencies, people, budgetary requirements and timing for implementation of the actions in line with priorities and capabilities;
- describe and propose pathways for the delivery of innovative approaches to weed management that engage the community, for example levy funded incentives or works programs; and
- advocate for the implementation of regulatory responses to weed management issues, including consideration of “rezoning” weeds under the Weed Management Act 1999.

3.2 Strategic Context

Priorities within weed management plans throughout Australia are generally arranged hierarchically down from the *Australian Weeds Strategy 2007*, through State weed management strategies, to regional and/or local strategies. The objectives and principles of the overarching Australian strategy flow down through the subsequent levels, only being reinterpreted in plans where scale requires.

In relation to KC, the regional guiding strategy is the *Southern Tasmanian Weed Strategy 2011-2016*.

See Appendix 1 for a policy overview.

Southern Tasmanian Weed Management Strategy (STWS)

The *Southern Tasmanian Weed Strategy* is based on principles adopted from the *Australian Weeds Strategy 2007* which was developed by the Australian Weeds Committee. These are (verbatim):

1. Weed management is an essential part of the sustainable management of natural resources for the benefit of the economy, the environment, human and amenity.

2. Combating weed problems is a shared responsibility that requires all parties to have a clear understanding of their roles.
3. Good science underpins the effective development, monitoring and review of weed management strategies.
4. Prioritisation of and investment in weed management must be informed by a risk management approach.
5. Prevention and early intervention are the most cost-effective approaches for managing weeds.
6. Weed management requires coordination amongst all levels of government in partnership with industry, land and water managers and the community regardless of tenure.
7. Building capacity across government, industry, land and water managers, and the community is fundamental to effective weed management.

Existing KMA strategies

A review identified the need to unify existing weed management strategies (WMS) within the municipality. In particular it referred to the Bruny Island WMS, the Bruny Island Roadside WMS and the Channel WMS. There are, however, also numerous weed management plans for various reserves and specific locations.

Enormous effort has been spent on gathering data and formulating actions in the major strategies. In addition, much work has been completed toward the implementation of the respective aims. One challenge for this Strategy is to not kick the can along the road by restating what has not yet been achieved. Another is to bring forward those parts of each strategy or plan that can be accommodated within a new strategic framework that unifies but updates.

Toward this end, this Strategy and Action Plan brings forward aspects of preceding work to the extent that they can be included in unifying the approach.

3.3 Kingborough Municipal Area - Geography

The Kingborough Municipal Area, situated in southeast Tasmania, covers approximately 717 square kilometres, with a population of approximately 34 000¹.

The municipality extends from the southern slopes of Mount Wellington, south along the spine of the Snug Tiers and east to the Channel, including Bruny Island. The municipality is bordered by Hobart City Council to the north and Huon Council to the south (Figure 1).

Defining characteristics include the D'Entrecasteaux Channel, which separates the "mainland" portion from Bruny Island, and the Snug Tiers, which forms a prominent ridge that runs parallel to the Channel. This results in high topographic diversity, from the ranges of the Snug Tiers down to the coast and rising again to Mt Mangana on Bruny Island. The geology of the region is generally made up of Permian mudstone, Triassic sandstone, Jurassic dolerite or Tertiary basalt. Low-lying areas typically contain more fertile alluvial deposits.

Kingborough is bordered by approximately 336 km of coastline, including that on Bruny Island. A diversity of anthropogenic and natural environments is present, with three quarters of the municipality consisting of native vegetation (Table 1 and Figure 2). This native vegetation is predominantly dry or wet sclerophyll forest, with smaller extents of non-forest and non-eucalypt forest types and rainforest.

¹ Kingborough Council web site 2015



Figure 1 – Kingborough municipal area boundary.

Tenure

Table 2 summarises stakeholders by the area of the land tenures and the percentage of the total area within the KMA. An expanded list of stakeholders and detailed statistics are presented in Appendix 2.

VEGETATION TYPE	AREA (ha)	PERCENT
Agricultural, urban and exotic vegetation	18,076	25
Dry eucalypt forest and woodland	29,025	40
Native grassland	158	0.2
Non eucalypt forest and woodland	639	1
Other natural environments	1,213	1.5
Saltmarsh and wetland	207	0.3
Scrub, heathland and coastal complex	6,164	9
Wet eucalypt forest and woodland	16,623	23
Rainforest	278	0.5
Moorland, sedgeland, rushland and peatland	138	0.2
Total	72,521	100

Table 1 - TASVEG mapping classes within Kingborough Municipal Area².

TENURE	AREA (ha)	PERCENT
Council	2500	3
Forestry Tasmania	2400	3
Parks and Wildlife Service	14,500	29
Private	45,500	61
State Departments	7500	10
Total major stakeholders	72,500	97
Total in Kingborough	74,500	

Table 2 - Stakeholders as Land tenure area (ha) and percent of total area in the KMA.

² Based on TASVEG 3.0 (Kitchener and Harris 2013)

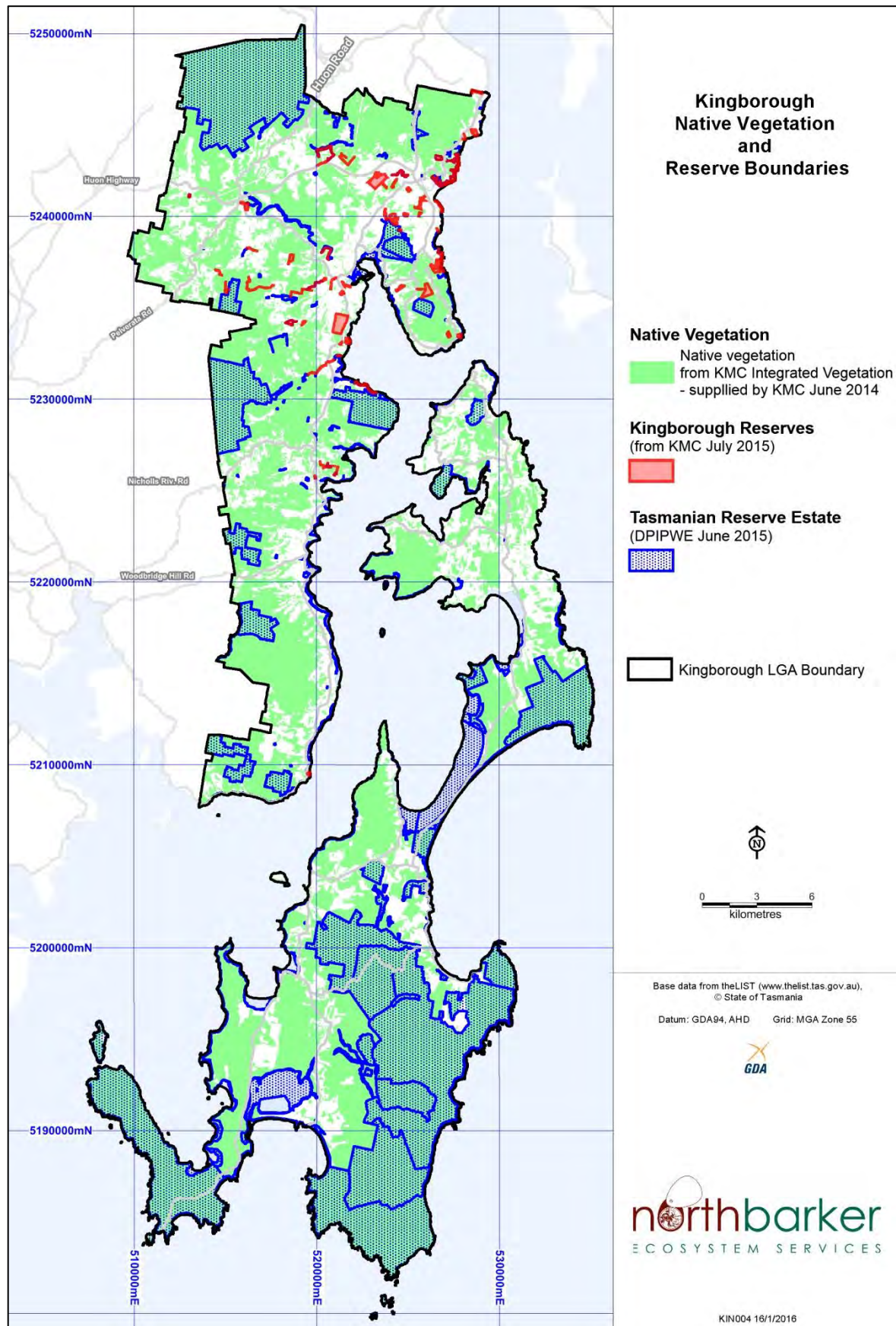


Figure 2 - Kingborough native vegetation and Reserve boundaries.

4 WEEDS OF THE KINGBOROUGH MUNICIPAL AREA

4.1 The significance of weeds in the Kingborough Municipal Area

The national weed strategy defines a weed as follows:

“A weed is considered a plant that requires some form of action to reduce what are perceived as harmful effects on the economy, the environment, human health and or amenity”

Council has an obligation under the Tasmanian *Weed Management Act 1999* (WMA) to control declared weeds on land it has the title for or manages. Competing with this obligation is the threat posed by numerous other weeds that are not listed under State or Federal legislation. Often legislation is slower to evolve than local knowledge. Therefore, any weed strategy should prioritise weeds based on threat and in conjunction with legislation. Prioritising all known weeds will assist in identifying potential gaps, assist with future funding and aid in the understanding of where to focus time and resources going forward.

Kingborough contains a wide range of introduced plants. Just over 400 species are considered to be naturalised in the municipality³. Some of these are well established and widespread. Others are fairly recent introductions, with small populations of limited threat to environmental, economic and/or social values.

Thirty-eight of the 115 declared weeds listed under the Tasmanian *Weed Management Act 1999* are naturalised within Kingborough, with 10 of the 38 also listed as Weeds of National Significance (WONS) – Appendix 3. Environmental weeds are also a significant threat to both ecological integrity and economic productivity in the Kingborough Municipality.

Ragwort, canary broom, English broom, boneseed, numerous thistles, pampas grass, gorse, blackberry, Spanish heath and African boxthorn are some of the weeds currently presenting significant problems in Kingborough. Along the coastal strips are pressures from weeds such as pines, boneseed and marram grass. There is also the threat of new weeds establishing in the region, as is particularly apparent in areas adjacent to other municipalities.

4.2 Prioritising Weeds for Control in Kingborough

The Tasmanian WMA categorises declared weeds as Zone A or Zone B. In the WMA, Zone A denotes a weed that is not yet present in a municipal area, or is present to a limited extent, and for which eradication is the primary aim. Zone B species are those that are widespread in a municipality and for which control is the primary management objective. As this Strategy is considering weeds within a municipality (rather than between municipalities), the same concept is applied to variation within the WMA zone A and zone B classes - *i.e.* it is reasonable to suggest that some WMA Zone B actually occur at scale at which eradication may be achievable in particular places.

³ Based on data collated from Kingborough Council, North Barker, and the Tasmanian Natural Values Atlas

4.3 Prioritisation method

Declared weeds

For the purposes of this Strategy, declared weeds and WONS known to occur within Kingborough have been allocated a priority rank from 1 (highest) to 4 (lowest), refer to Table 3 and Appendix 3. The priority rank in Table 3 relates to the rank listed in Appendix 3.

Kingborough Non-declared Priority Weeds (KNPW)

Non-declared weeds within the Kingborough municipal area have mostly been rated as priority 5. A selection of these species, however, have been elevated and ranked among the declared weeds to reflect the higher importance placed on them by Council in relation to Council managed land. These are:

PRIORITY 1 KNPW

Isolated occurrences and/or highly invasive:

Ilex aquifolium (holly)

Billardiera heterophylla (bluebell creeper)

Kunzea ambigua (tick bush)

Kunzea ericoides (burkan)

PRIORITY 2 KNPW

Widespread occurrence and/or moderately invasive:

Acacia retinodes (wirilda)

Passiflora tarminiana (banana passionfruit)

Watsonia meriana var. *bulbillifera* (bulbil watsonia)

PRIORITY 4 KNPW

Widespread occurrence generally confined to disturbed habitats:

Rosa rubiginosa (briar rose)

Vinca major (blue periwinkle)

Pinus radiata (radiata pine)

The weed management priorities, including strategic site selection drivers are described in detail and presented spatially in Section 7, following the strategic framework.

Priority Rank	Category	Action Target
1	Declared Zone A with localised infestations - 20 species Priority 1 KNPW - 4 species	Coordinated rapid response for new infestations in consultation with DPIPW Eradicate within 10 years
2	Declared Zone A with relatively widespread infestations - 8 species Priority 2 KNPW - 4 species	Eradicate or contain within term of the action plan (10 years)
3	Declared Zone B with localised infestations 4 species	Eradicate isolated infestations, contain infestations to ensure no further spread within term of the action plan (10 years)
4	Declared Zone B with relatively widespread infestations - 15 species Priority 4 KNPW - 4 species	Control and contain where threatening important values, aim to control spread from core infestations within term of the action plan (10 years) Considered response for all species Implement trial for incentives targeting eradication/control by landholders with properties > 2 ha
5	Non-declared Weeds	Control and contain where in association with higher priorities or where practical through landowner partnerships/agreements. Target eradication of small infestations during term of the action plan (10 years)

Table 3 - Weed prioritisation, including elevated non declared weeds, and Action Plan targets.

4.4 Management Strategy for Non Declared Weeds

To ensure that operational efforts remain effective and efficient, it is imperative to safeguard weed control endeavours against the often tempting desire to treat those weeds which are either most prevalent or most noticed.

Dedicating resources into projects that are predictably fruitless, or redistributing resources so that lower priorities out compete those of a higher level can unravel even the best laid plans and quickly render efforts ineffective. Another by-product of such decisions can be seen when involving volunteer and community groups in weed control activities. If sites or weed species are chosen inappropriately, those involved may soon feel time was spent better elsewhere and their valuable dedication might soon be eroded.

When considering any non-declared weed which has not been prioritised as a KNPW, the following management considerations should be carefully weighed.

1. The feasibility and cost of targeting non-declared weeds should be assessed against the risk the species poses. The best gains will come from those weeds that pose a significant threat whilst still being feasible to eradicate (table 4).
2. Localised species of high threat that should be targeted for localised eradication.
3. Entrenched species requires a 'containment' style of management. In this scenario localised species should be controlled in order to protect identified assets from further infestations. Areas currently free of these weeds should also be kept free.
4. These weeds should be considered when in association with higher priority weeds.
5. Coastal weeds should not be allowed to establish on beaches (and native coastal communities) that are currently un-infested or only contain light infestations.

Weed threat	Likelihood of successful control				
	Unlikely	Low	Medium	High	Very High
Negligible	Limited Action	Limited Action	Limited Action	Limited Action	Monitor
Low	Limited Action	Limited Action	Limited Action	Monitor	Monitor/ protect priority sites
Medium	Manage sites	Manage sites	Manage sites	Protect priority sites	Contain spread
High	Manage weed	Manage weed	Protect priority sites	Contain spread	Local eradication
Very High	Manage weed	Monitor/ protect priority sites	Contain spread	Local eradication	Eradication

Table 4 - Weed threat versus Likelihood of success matrix.

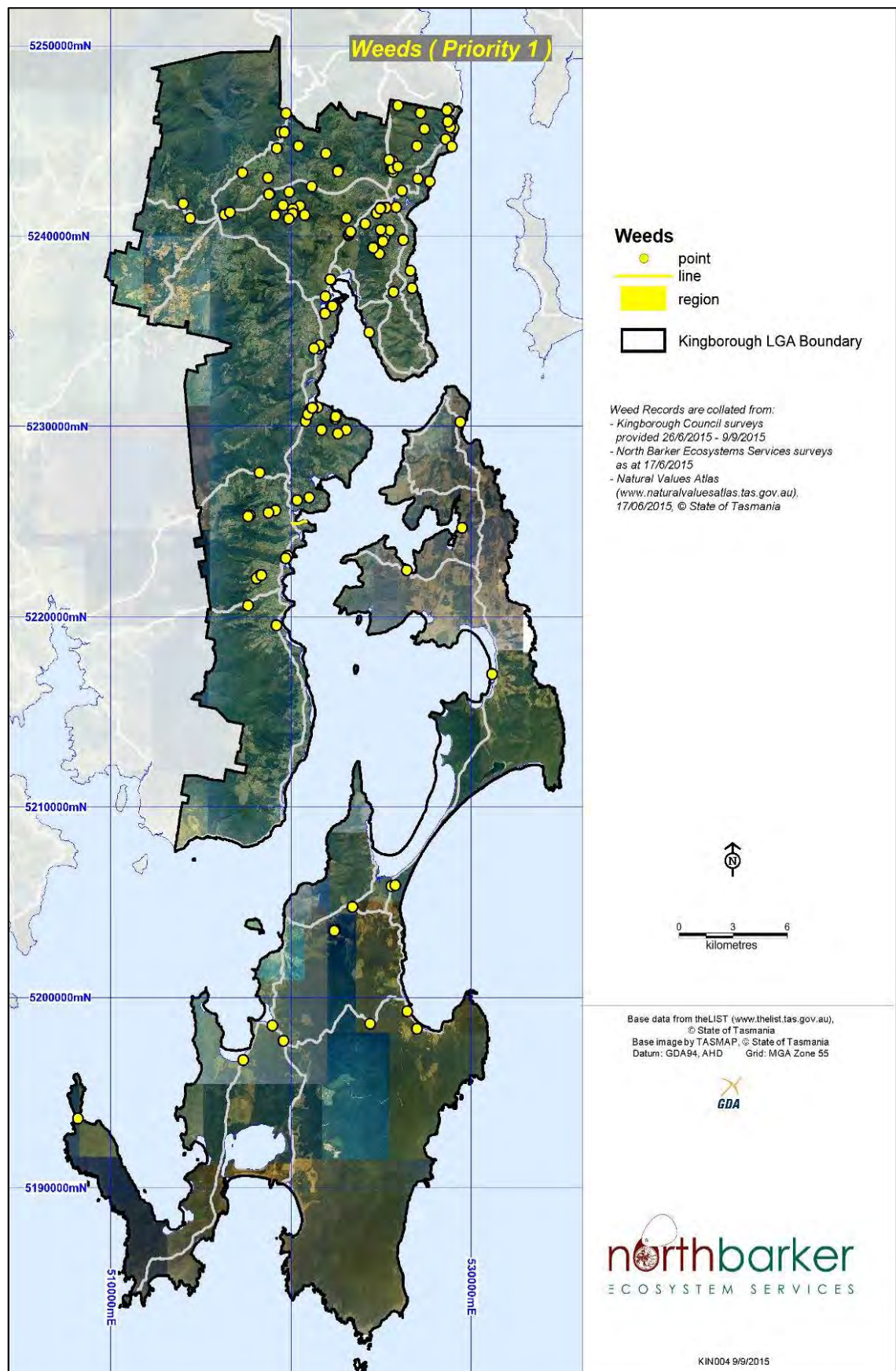


Figure 3 - Extent of Priority 1 weeds.

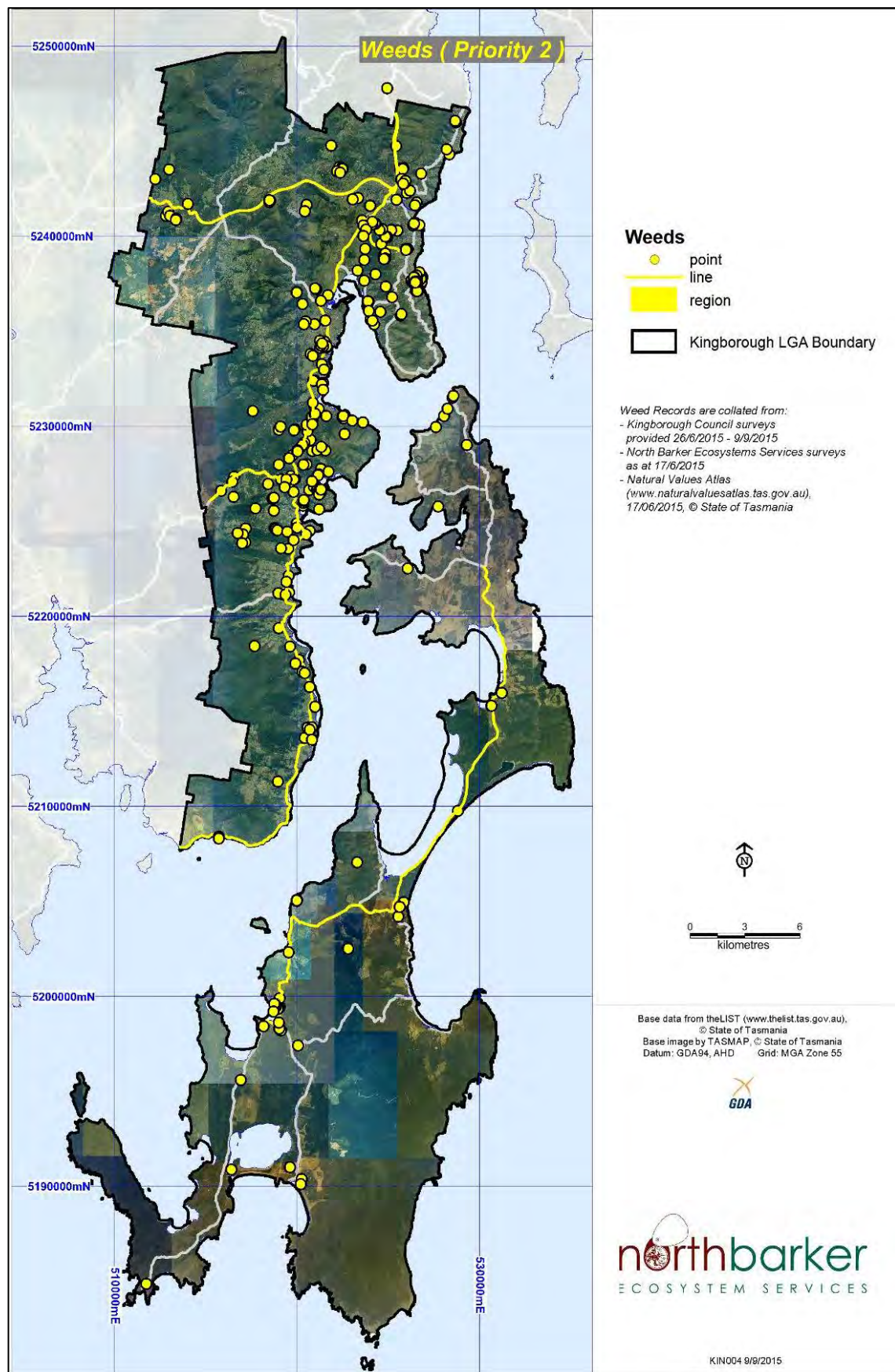


Figure 4 - Extent of Priority 2 weeds.

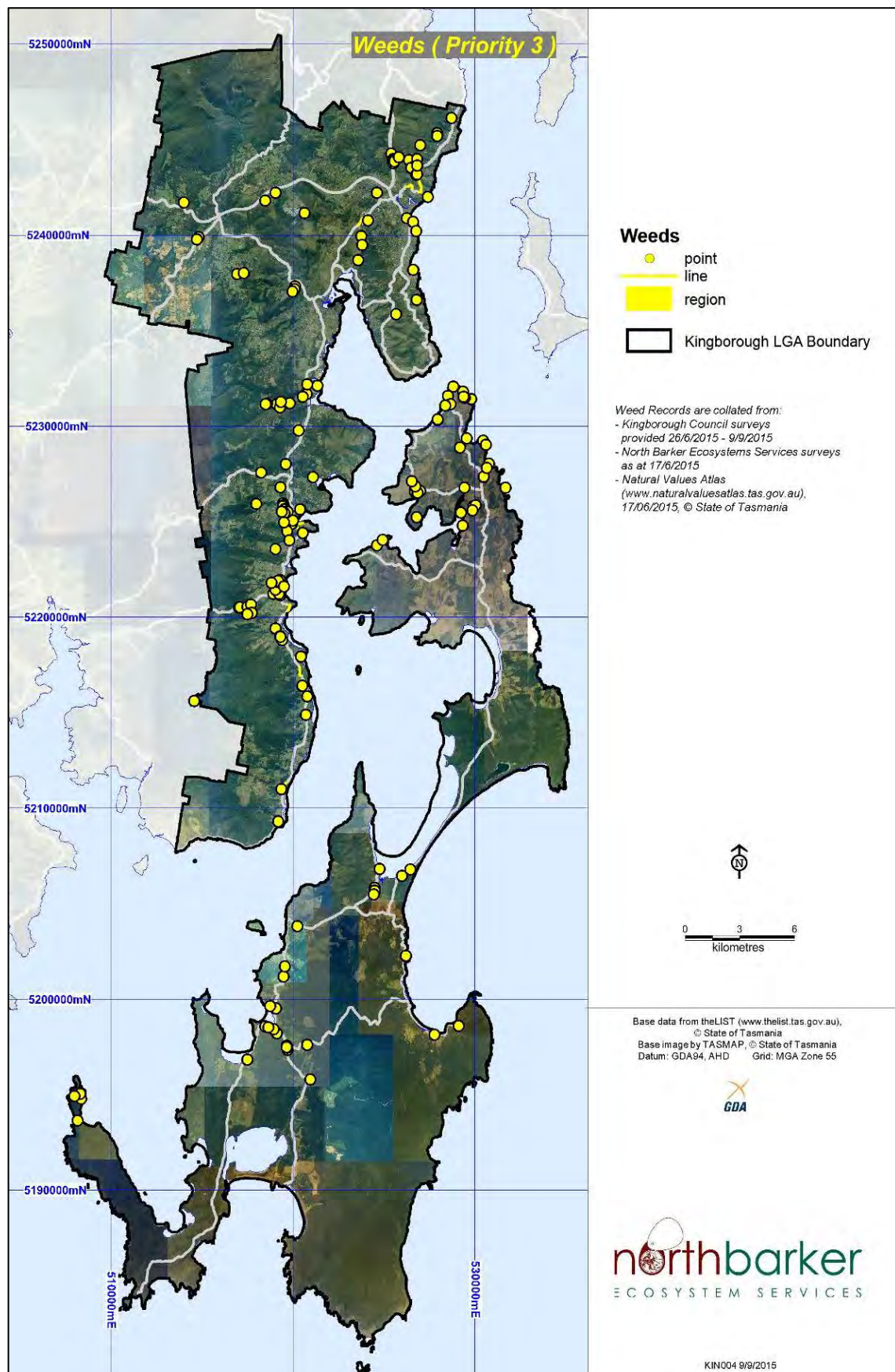


Figure 5 - Extent of Priority 3 weeds.

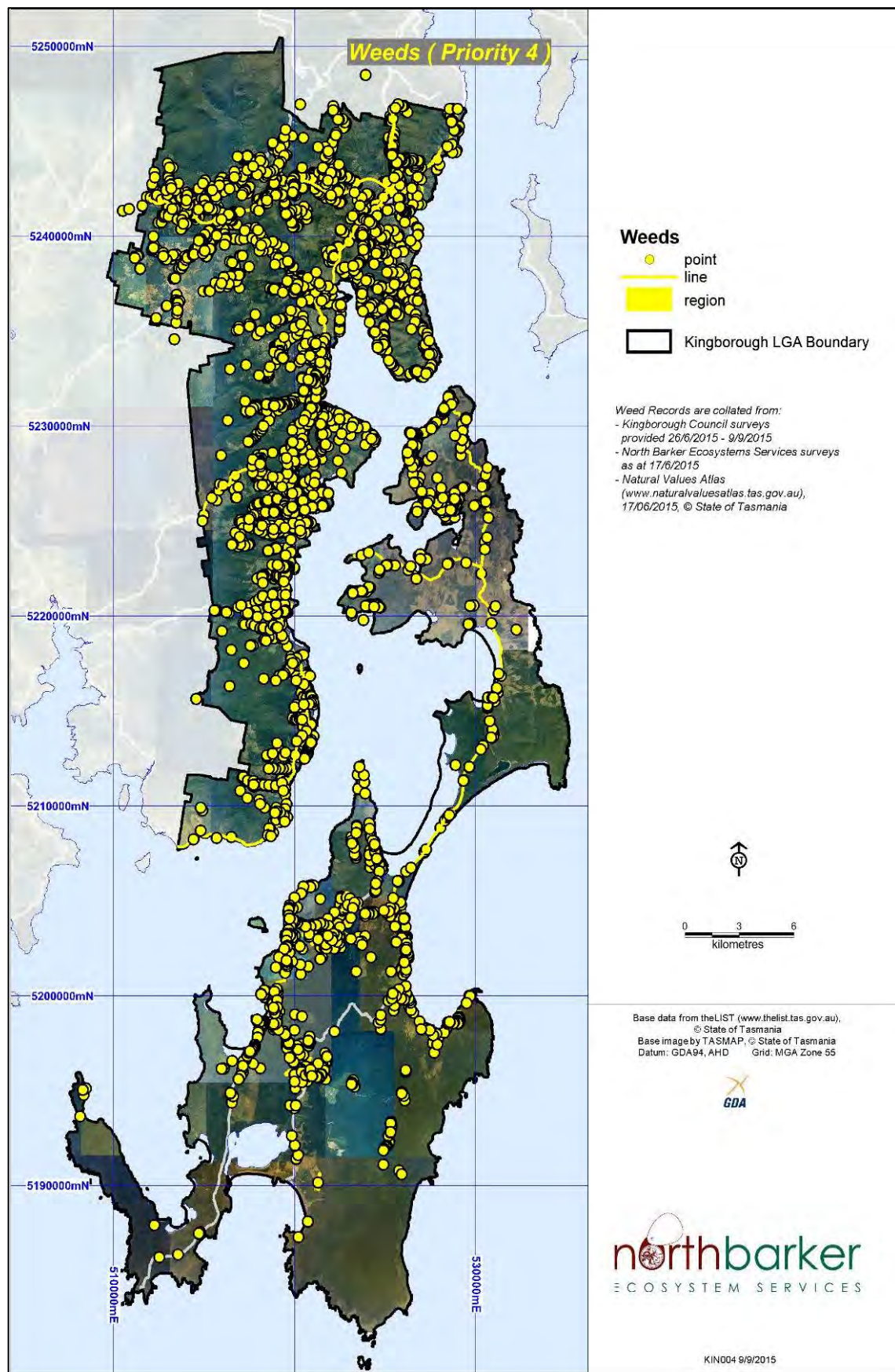


Figure 6 - Extent of Priority 4 weeds.

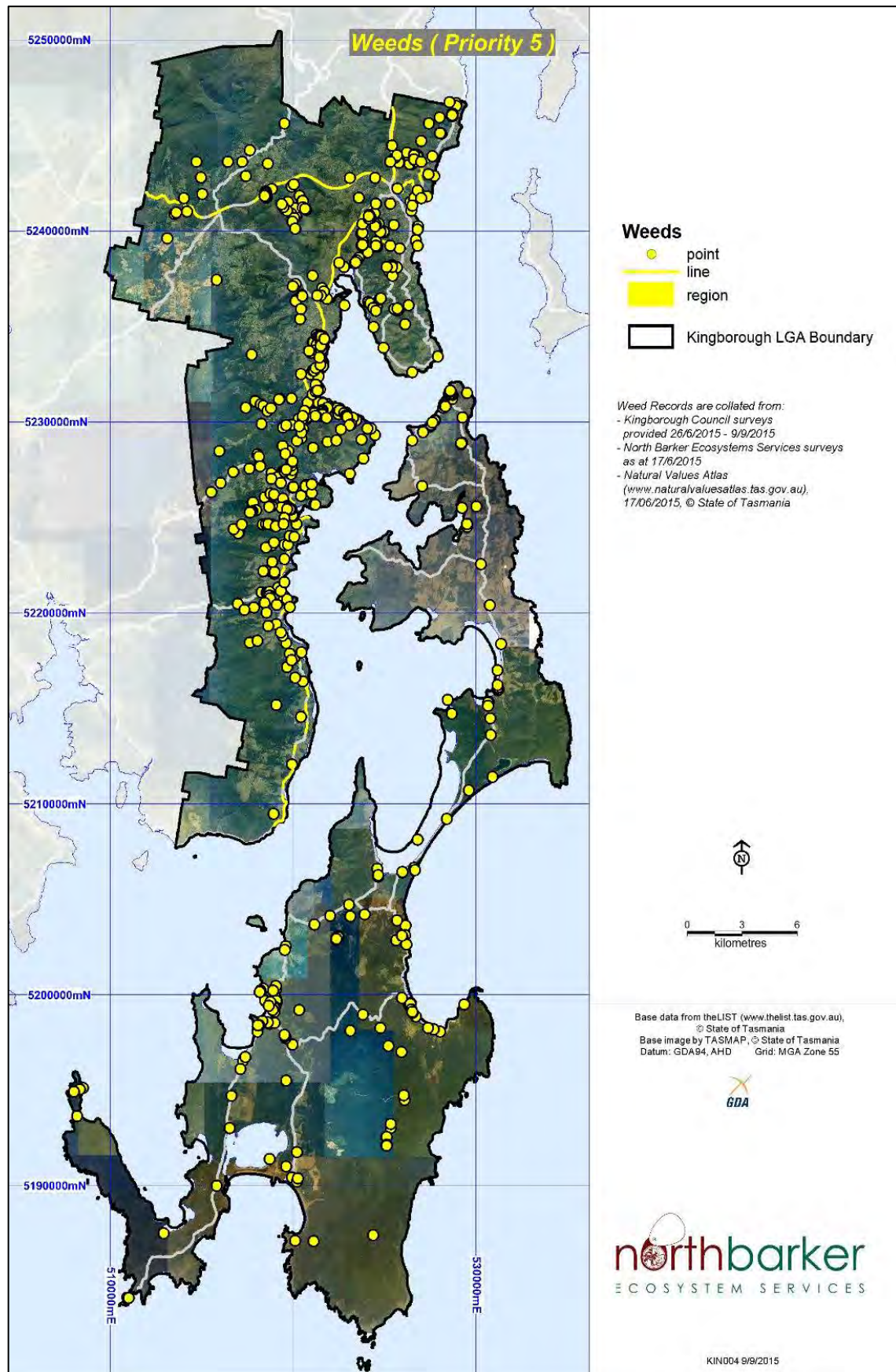


Figure 7 - Extent of Priority 5 weeds.

5 WEED MANAGEMENT STRATEGIC FRAMEWORK

The development and implementation of weed control strategies are generally based on a set of principles that flow from the national to municipal and that are outlined above in section 3.2. The following section outlines some key planks that are consistent with the overall principles of strategic weed management. The goal in implementing actions derived from these key planks is to optimise the level of integration of the interests and resources of the various stakeholders. This will provide cost effective and efficient weed management outcomes. The focus on these few key planks of weed management will return a high proportion of the efficiency and effectiveness gains to be had.

5.1 Plank 1 – Best Practice Management

The opportunity to embrace best practices with a view to greater efficiency and effectiveness of weed control is foremost when it comes to maximising cost effectiveness. Large gains in effectiveness and efficiency should first be sought in the application of proven best practices.

All improvements in efficiency and effectiveness translate directly into savings in time and money. Until an organisation can report that it applies best practice it is not in a space from which to make effective gains from innovation. Any innovation will be shackled by poor practices. In a sense, the application of best practice is in itself innovation for organisations that do not currently achieve it.

The list below includes a number of practices that are well recognised for increasing effectiveness in weed treatment.

1. A planned weed control program on an annual and seasonal basis;
2. Prevention and early intervention including accurate and up to date weed mapping;
3. Up to date records of weed control including date of treatment, treatment applied, weed(s) treated and area treated;
4. Eradication of isolated outliers, which arrests one of the primary mechanisms of weed expansion;
5. Identification and treatment of the source of reinvasion – looking beyond boundaries;
6. A commitment to secondary and tertiary treatment, including revegetation;
7. Improving hygiene - cleaning weed seeds from tools, equipment, machinery, vehicles, pets, clothing and boots contributes strongly to arresting weed spread;
8. Catchment management – top down approach in relation to water movement, which can facilitate dispersal of weeds;
9. Focussing on completing all stages of treatment (primary through to rehabilitation) of an achievable number of tasks;
10. A commitment to integrated weed management methods to reduce the control effort required. For example the use of revegetation to suppress weeds, alternating treatments to reduce the risk of resistance and minimising weed habitat by utilising landscape design, for instance batters and roadsides that are easy to mow.
11. Minimising site disturbance;
12. Monitoring of primary treatments and prescribed responses to ensure appropriate and timely secondary treatment. This includes scouting to help ensure new infestations are discovered early or to identify seasonal priorities;

13. Working efficiently: maximising team effort by organising labour tasks;
14. Optimising utilisation of equipment – consider sharing and hiring;
15. Utilising ChemCert trained staff and well-trained volunteers; and
16. Selecting, applying and storing chemicals appropriately and safely.



Implications to strategy

- Review current on-ground weed practices against best practices and ensure adequate skills and knowledge are present within all those implementing weed control/eradication programs.

5.2 Plank 2 – Integrated Weed Management

Integrated weed management is the control of weeds through a long-term management approach, using several weed management techniques. In doing so, there is a reduced risk that the weed species will adapt to a particular control method, which is likely if only one technique is used. Integrated weed management should consider the most economical and effective control of weeds, whilst avoiding irreversible negative impacts to the desirable qualities of the land, such as its native ecology or agricultural crops. Weed treatments are all too often locked into cyclical herbicide spraying programs because integrated weed management has failed to be considered as part of the solution.



Left: The flowers and foliage of a mature ragwort plant (*Senecio jacobaea*).

Above: The ragwort flea beetle (*Longitarsus flavicornis*) can be a useful ally in the control of ragwort, provided land managers understand how to integrate the beetle into weed control activities. Mismanagement can have an enormous impact on beetle population numbers, allowing ragwort to persist and spread.

The application of integrated weed management acknowledges that whilst alternative weed treatment techniques may be available, in some instances, herbicides are essential. This means that all risks associated with herbicide use must be managed appropriately and effectively. The repeated use of the same chemical in association with the survival of some plants can lead to herbicide resistant populations. The application of a more diverse range of control techniques can reduce this risk.

Furthermore, the use of herbicides can create patches of bare ground suitable for the recolonisation of weeds, which can lock the weed manager unwittingly into a cycle of control and reestablishment. Something has to change to break this cycle. Repetitious seasonal programs may be appropriate in some circumstances where alternatives are limited, for example footpath weed management. In other circumstances, such as native vegetation, the aim of the treatment plan must be to reduce the weed management effort and ultimately rehabilitate the site, not simply to control what is there at one point in time.

Kingborough Council is committed to ensuring herbicides are used safely and appropriately. Part of this commitment is to investigate alternative and innovative means of weed control and to utilise them where practical. Alternative means of weed control should be considered for every weed control project. The following measures are applicable to different circumstances and their feasibility needs to be judged on a case by case basis. For example, some can be applied to primary control, while others are more suited to secondary control or preventative measures. The growth form of a weed also influences the effectiveness of particular control techniques.

1. Selective herbicide;
2. Biocontrol – species specific insect pests and plant diseases;
3. Mulch – effective in preventing germination;
4. Steam – effective on annuals or germinants;
5. Tilling – stimulates a germination response that can again tilled, sprayed or mulched;
6. Physical removal/ grubbing, followed by stamping down soil – a chemical free alternative where the number of plants is low and the action is feasible;
7. Burning and treating regrowth – particularly useful for dense occurrences (e.g. gorse) with subsequent easy access to regrowth that may be spot sprayed. Fire needs to be managed to ensure it is controlled.
8. Cut and paste – excellent technique for targeting relatively large individuals; and
9. Rehabilitation – provides shading cover and competition to minimise germination and establishment.



Implications to strategy

- Review current on-ground weed practices against best practices and ensure adequate skills and knowledge are present within all those implementing weed control/eradication programs.
- Ensure all Council weed control workers undertake appropriate training in the use of chemicals and are proficient in the application of integrated weed management practices.

5.3 Plank 3 – Planning

Strategic planning at the highest level provides guidance on the principles of weed management. Planning at the implementation scale provides for delivery of outcomes. Plans need to be pragmatic enough to allow flexibility and be able to accommodate management efforts that are responsive to changing Council priorities and community aspirations.

If planning is too tightly constrained by time or over-ambitious aspirations, then implementation is doomed to fail. Thus, the development and implementation of plans needs to be well considered to accommodate flexibility but also clearly direct works in line with strategic priorities and best practice methods. Monitoring should be included in plans to gauge effectiveness and adherence to plans. In these ways implementation plans become a valuable resource and performance management tool.

The greater the level of consistency between the high level strategic framework and site treatment plans the more likely that success will flow. Consistency between the two ensures that managers and practitioners at all levels are working from the same principles and toward the same goals.

5.4 Plank 4 – Risk Management

Prevention and early detection

Prevention, early detection, eradication and control/containment are the ultimate risk management objectives. The effective mitigation of risks provides an opportunity to protect important places from weed invasion and to minimise the resources needed for weed management. The eradication of weeds from sites detected early is generally more likely to be achievable. However, a challenge for early detection is the ability to identify new weeds that managers are not familiar with.

In this context examples of risk management may include the routine monitoring of Council reserves and other assets, as well as selected places at risk of incursions, to ensure that the weed flora is understood and is appropriately prioritised and treated in the works plans.

Unmonitored environments where weeds are thought to be absent can develop into significant sources of propagule pressure, with subsequent demands on resources. The obvious advantage of an investment in monitoring weed free areas is the opportunity for early detection and efficient low cost weed control or eradication.

Early detection is essential for new incursions of priority weeds. Those posing the greatest risk are weeds known to be highly invasive elsewhere. However, the circumstances into which a weed invades can be a major determinant of its rate of establishment. Kingborough contains significant areas of bushland in which future development may occur. With more people attracted to a peri urban lifestyle comes the increased risk of weed colonisation associated with cleared bushland. Clearing provides conditions suitable for the introduction and spread of weeds into areas previously free of infestations. The opportunity here is to ensure pre-emptive risk management.

All development applications should provide rigorous consideration to the implications of the spread of weeds in areas within or adjacent to native vegetation. The approval to build within these areas should include a stringent assessment and planned response that minimises the threat of weeds. The benefits gained by including existing weed control and future management at this early stage significantly reduces the potential costs of weed management that is otherwise only begun once an infestation becomes apparent. Compliance checks and enforcement of permit conditions are also critical if the best outcomes are to be achieved.

The encouragement of private landowners to assist the Council with early detection of weeds is also desirable and provides potentially many more observers. This encouragement is further developed in Planks 5 and 6.

Climate change

Climate change models of weed distributions generally point to a southerly migration of species as southern latitudes warm. For Tasmania this means that the states biosecurity measures need to include effective measures that minimise the likelihood of “new” weed species penetrating the barriers to importation, both as accidental imports and as permitted imports.

Beyond distribution models, a changing climate may result in what are called novel ecosystems. These are new ecosystems, for example, drier more open woodlands that have niche spaces in them. The niche spaces may subsequently support weed species that include existing or new weed species.

The management of novel ecosystems, new weeds and existing weeds with changed “behaviour” in a changing climate will need to be adaptive. The management principals are likely to be the same as now. However, the existing methods, and combinations of methods in integrated approaches, may need to be adapted to weed growth and behaviour (ecology) that has not previously been experienced.

Perhaps the most important aspect of preparedness for climate change is to expect the unexpected. Our understanding of the ecology of plants is dominated by our observations of realized niches. The unexpected comes from our lack of knowledge of what the potential niches of plants are and hence the potential for unimagined novel ecosystems.

Weed risk assessments

Weed risk assessments include consideration of a large range of attributes of a weed species that relate to biogeography, biology and ecology. Weed species listed under the Tasmanian WMA have undergone a weed risk assessment prior to their declaration.

The risk assessments ultimately attribute a weed with a score. A low score indicates species that pose a low risk, while a weed that exceeds a particular threshold would be considered suitable for declaration in Tasmania.

The weed risk assessments for declared weeds indicate a particular species potential to invade and spread. The result of the scoring system has been used to assist with prioritising weed driven selections.



Implications to strategy

- Require funded weed control plans that minimise the risks posed by development within area of high conservation value and environmental importance.

5.5 Plank 5 – Stakeholder Engagement and Partnerships

The summarised tenure break down in Table 2 (on page 5) reflects some of the major stakeholders in the municipality. These five entities manage more than 97 % of Kingborough. The relative values demonstrate the small area that Council directly controls with regard to weed management.

Urban density is greatest in the north-eastern part of the municipality in close proximity to the main transport corridor. Extensive areas of bushland interface with private landholdings throughout every township of the KMA.

Current distributions suggest weed issues are generated in populated areas and spread linearly along creek systems and roads, with spot invasions ahead of fronts also resulting from animal and wind dispersal. New weed populations then establish wherever suitable conditions exist, regardless of tenure. Some invasive weed species will even establish in undisturbed bush. Public Open Spaces and footpath verges can also become points of weed infestations if not well managed. Roadside weed management is a particular concern for Council because of varied tenures and highly suitable conditions for weed transport and establishment.

What this means is, weed dispersal vectors and propensity to establish are factors independent of tenure boundaries. In order to provide cost effective weed management that meets landowner expectations, programs need to be integrated across all tenures, private and public. This can also be effective in minimising reinfestation and thus reducing management requirements in the long term.

Agency engagement

Strong outcomes rely on good stakeholder relationships, good work practices and collaborative weed programs with respective landowners including agencies. Cooperation is required and there are opportunities to grow mutually beneficial relationships.

For instance, among the various State Departments that manage land within KMA, the Department of State Growth should be supported and encouraged to control weeds on State roads. The Parks and Wildlife Service (PWS) should be encouraged to manage relevant reserves. In each case the Council could seek input into the nature and precise locations of activities.

It is acknowledged that all agencies face constraints from their financial budgets. Improved financial outcomes can be gained through cooperative service agreements between stakeholders and mandatory monitoring and secondary treatments (thus reducing future costs through more sustained control).

Without mutually beneficial cooperation, independent weed management priorities may diverge and are unlikely to deliver best practice strategic weed management.



Implications to strategy

- The Council is to foster cooperative projects with various landowners and agencies in which costs are shared.
- Funded service agreements with State agencies provide an instrument to achieve cross-ownership outcomes.

Private land holders

Private land holders manage a significant portion of the KMA. The owners of larger lots and bushland interfaces are particularly important allies, as the land they own is often adjacent to areas of high natural values or, alternatively, high priority weed infestations. Their engagement and cooperation is a valuable asset. Cooperative private landholders can partner with Council, business and community groups to manage priority weeds and locations.

Community engagement and partnerships

On ground weed work is resource demanding and successful weed management requires a long term commitment. Care groups and landowners involved with partnerships/agreements provide substantial volunteer hours in eradicating and controlling weeds. As such, outcomes are greatly enhanced by fostering community support and building upon relationships and networks.

Kingborough Council has a large number of volunteer Landcare and Coastcare groups that operate predominantly on Council land, but focus at times on other land tenures throughout the municipality. These groups vary in skill levels and numbers and a group's longevity is contingent on many factors. Due to the inevitable ebbs and flows of those contributing to weed control in Kingborough, a list of groups has not been included here, but is available in the Kingborough Community Directory. Council acknowledges the valuable work that they perform and the contribution they make to the community.

It remains critical that Council supports care groups and nurtures these relationships.



Above: Members of the Tramway Hill Landcare group provide valuable time and assistance maintaining Council reserves in the Margate area. Photo: Roz Thurn.

Collaboration between Council and community groups presents the best opportunity to maximise external funding opportunities. There is no better way of demonstrating Council's commitment to increasing community participation than by providing incentives and rewards to rate payers willing to participate. As Council has limited resources for weed management across the municipality, it is important that future efforts are focused on developing new partnerships and expanding upon current collaborations across all land tenures. Novel ideas need to be investigated and a number are proposed in the Action Plan.

To encourage all stakeholders to take weed management seriously it is essential that Council and key stakeholder agencies lead by example. Weed infestations on public land include some of the more visible examples. Likewise, these sites provide opportunities to demonstrate how well coordinated weed management can be successful. There is no better way of encouraging a landowner to become involved than by demonstrating how the issue is taken seriously by Council and government agencies. Landowners may become frustrated and disheartened if they perceive “government” is not doing their bit.



Implications to strategy

- Weed Officer should provide continued support to volunteers such as Landcare Groups.
- Weed Officer continues to facilitate access to advice and specialist knowledge, and inform volunteer groups of available funding.
- Develop a cost effective system of partnership agreements with volunteer groups and with strategically important land owners.

5.6 Plank 6 – Education and Training

Education

Community engagement provides an opportunity to educate interested groups and ratepayers generally. This potential for positive engagement is a much under-valued resource.

Community education can make an important contribution to the weed control effort. Much can be gained by awareness and an understanding of what is at risk, where it is at risk and why it is at risk. If the ultimate aim of education is an understanding of the local weed management issues and solutions, then more people are more likely to participate in efforts towards the solution, even if their participation is indirect, *i.e.* they no longer contribute to the problem. In this context, the spread of understanding, through education, will produce better weed management outcomes than facts and information alone.

Training

Staff, contractors and volunteers who regularly undertake work relating to weeds, including earth and plant movement, need to be regularly engaged in training that is specific to the delivery of the municipal Weed Management Strategy. As procedures, regulations and techniques are revised and personnel change overtime, periodic training is required to keep up to date with best practices. Where relevant, training should include ChemCert, equipment use, hygiene principles and practices, weed identification, and control techniques.

5.7 Plank 7 – Monitoring and Review

What does success look like? This is a question that must be asked when the answer is unlikely to be immediately obvious. Very few areas are likely to remain entirely free of weeds for perpetuity. Thus it is through consideration of composition, distribution and abundance, in relation to the resources applied, that we can judge success.

Recording and data-basing of weed management efforts and results is an opportunity that should not be lost. As time progresses, the gathering of baseline information and subsequent responses to primary and secondary treatments will develop into a valuable record and planning resource. From baseline data a manager can undertake measurements, set targets and generate

performance indicators. Once there is sufficient data to detect change due to management effort, then success can be measured.

Whether a site has previously been treated or not, it is never too late to collect a baseline dataset. These records are an essential reference from which to measure the effectiveness of efforts and plan follow up treatments, including alternative approaches should a treatment prove ineffective. A database could be designed with failsafe controls that ensure no new record can be entered until the previous one is completed.

Further detail on monitoring and review is provided in the Action Plan.

The effectiveness of the management plan is dependent on the ability to implement, monitor, respond to information gained, review and update. There is an inherent risk with all strategic planning that relevance and impetus fades with time. Monitoring and evaluation must be incorporated to ensure review and adjustment where necessary. New ideas may originate or current ideas may prove unrealistic. These are normal barriers to success and the ability to respond to these challenges is also important.

Performance indicators (PI's) are useful measures of progress and compliance with plans. Ideally some level of quantitative or measureable performance is required to track progress and identify strengths and weaknesses. Care should be taken to design PI's that are meaningful and unlikely to result in perverse outcomes.

Thoughtful PI's include leverage. For example, if a weed plan for a site is implemented completely (baseline collected, primary and secondary treatments undertaken, and monitoring completed), the PI is multiplied to return a maximum score. On the other hand, if a greater number of sites have had primary treatment at the expense of secondary treatment, then only the primary treatment is scored and so the multiplier is not applied as a reward. This will encourage managers to stick to the plan. A five yearly review is sufficient for PI's such as described to be meaningful.

While some changes or updates will be routinely required to accommodate regulatory changes and the like, other changes should be based on data and respond to the performance measures recommended above.



Implications to strategy

- Implement a live tablet based GIS database for all weed management activities occurring in the KMA.

6 ACTION PLAN

This plan identifies actions that take advantages of the opportunities described under the planks in section 5. Each action aims to steer future weed management within the municipality towards efficient and effective weed management. The Action Plan is outlined in Appendix 9.

The present Action Plan takes into account the progress relating to the Bruny Island and Channel Weed Management Strategies. The progress of those strategies was reviewed in Stage 1 of the development of the current Strategy and a number of incomplete, or actions requiring continuation, will be carried forward. New actions from this plan focus directly on the 7 planks of the strategic framework. This focus will return a high proportion of the efficiency and effectiveness gains to be had (referred to as EEG).

6.1 Best Practice Management

The concept of best practice and the practices themselves are required to be adopted within each of the planks of the strategic framework described above.

High level strategies, action plans and site works plans can only succeed if the foundations on which they are built and operate are consistent and sound. This consistency is all too often not evident. An appraisal of all aspects of weed management planning and control at Kingborough Council is needed to determine how the current weed management effort compares to the major planks of the strategic framework. Once this is understood, adjustments can be consistent with the planks and align them with best practice.

Operational review

High level strategies, action plans and site plans can only succeed if the foundations on which they are built and operate are consistent and sound. An appraisal of all aspects of weed management planning and control at Kingborough Council is needed to determine how current efforts compare to the major planks of the strategic framework. Once this is understood, adjustments can be consistent with the planks and align with them in best practice.

A review would include but not necessarily be limited to, chemical use and storage, safety, equipment used, training of staff, information gaps, and contract content. The operational organisation should be included in the review. It should include interviews and field assessments to identify areas in which significant improvements can be made toward efficient and effective weed management.

EEG: Best practices reduce wasted effort and resources and maximise effectiveness and safety from planning to implementation.



6.1 Action 1: A review of the Kingborough weed management operation is required.

6.1 Action 2: Develop a best practice checklist for weed management which is accessible to all staff.

6.2 Integrated Weed Management

The principals of integrated weed management should be adopted and evident in the range of techniques applied in specific site treatment plans, as well as more generally.

The various options for treatments at a site should reflect site opportunities and constraints. For example, access limitations and vulnerabilities, such as erosion potential and habitat sensitivity, including waterways.

Other than where a continuous program is necessary, an integrated treatment plan should conclude with rehabilitation.



6.2 Action 1: Ensure that all staff understand the concept and are committed to the application of integrated weed management techniques.

6.2 Action 2: Site treatment plans should include the range of weed management treatments that can be integrated to meet the stated aim of the site treatment plan.

6.2 Action 3: Include mitigation actions described in the Weed Management Zones (Section 7.3) in site plans as integrated weed management options.

6.2 Action 4: Review policy, procedure and implementation of the “No Spray Register”. Ensure that land owners are aware of weed species present and the associated management responsibilities and that appropriate and effective integrated pest management options are adopted for the weed species present.

EEG: *Integrated weed management techniques reduce chemical use and ultimately reduce the time and cost required maintaining a site weed free or under control.*

6.3 Planning

Information management

The electronic management of information is essential in a modern data and project management environment. In the context of weed management, all elements of the works and site plans should be stored as fields in a GIS database. The planning and treatment processes or protocols must be inextricably linked to the data tables. This ensures that there is consistency between planning and treatments, and that all data is able to be illustrated on a map.

A GIS interface that can be used on tablets in the field can ensure that the data can be downloaded and uploaded via the GIS table. ‘Exponare’ is such a system that could be adopted for use. Less complex systems are also available.

EEG: *Planning is the basis for integration of strategic and implementation aims. Efficiency and effectiveness is enhanced by connecting the aims of strategic planks to site treatment.*

Prioritising tasks

The analysis of weed and site priorities has been described in previous sections of this strategy. In terms of the selection of sites for work schedules, this does not need to be driven 100 % by the prioritisation list, but should be informed by it to the extent that intuitive selections optimise the selection by balancing with other demands.

Works plan

Weed management planning requires an overarching works plan and schedule, as well as individual site treatment plans that flow from the works plan.

The works plan should include and identify the sites selected to be treated when prioritising tasks and the schedule must take into account the seasonal vulnerability of priority weeds. Appendix summarises the recommended contents of a work plan.

Site treatment plan

Site treatment plan templates must at a minimum include all of the National attributes required for weed mapping. Appendix 8 summarises the recommended contents of a site treatment plan.



6.3 Action 1: Develop and utilise a live electronic information management system for use in the field.

6.3 Action 2: Develop a works plan for 12 months in advance. The plan should be based on an optimisation of sites determined from weed, site and community led priorities.

6.3 Action 3: Develop a site treatment plan template.

6.4 Risk Management

Prevention

There are many small and potentially useful actions that can be recommended to reduce the risk of new weed incursions. Most have been recommended in most weed management strategies.



6.4 Action 1: Highlight the list of all Zone A weeds in Tasmania that are not known from Kingborough (Appendix 4). Ensure weed management staff can access assistance to identify each of the species.

6.4 Action 2: Lobby state government to complete risk assessments for weeds predicted to have suitable habitat under climate change models. These should be added to alert lists and to Zone A of the WMA.

6.4 Action 3: Ensure implementation of best practice hygiene management practices for staff, contractors and green waste management and encourage landowners to do the same, particularly when working in containment areas.

Early detection

Early detection is required for new invasions to Kingborough and for new incursions of high priority weeds. The circumstances into which a weed invades can be a major determinant of its rate of establishment. In other words, eliminating suitable habitats can be an additional pre-emptive measure.

EEG: *Early detection and control of new infestations is a major gain in the long term demand on resources and reduces the risk to high value assets.*



6.4 Action 4: Develop a weed alert network (made up of stakeholders) that assists the Council in sourcing weed information that will aid in verifying new weeds and provide more eyes on the ground.

6.4 Action 5: Develop a quick priority response procedure for when new weeds are identified.

6.4 Action 6: Ensure no declared/WONS weeds are for sale in the municipality through inspections of nurseries and community markets.

6.4 Action 7: Utilise a weed scout to rapidly monitor high value assets each year, as well as a selection of weed free areas, so control can be implemented in a timely fashion. Allow for this responsive management in the works plan schedule. Ensure that one focus of scouting includes high risk vectors such as roads, table drains, fence lines and water ways.

Councils Development Application Approvals Process

Most development applications involve a number of elements that present a risk of introducing or spreading weeds. The main elements of development that present this risk are ground disturbance and the import / export of weed propagules.

Development approvals should include conditions that require weed infestations to be eradicated or controlled before works commence and following the completion of works for a period that covers adequate follow-up treatment.



6.4 Action 8: Ensure effective and best practice hygiene procedures are in place as part of the approval process for developments.

Containment

Containment is a reasonable aim for many widespread species. As implied by the name of the action, containment is appropriate for core weed sites that cannot be eradicated in the current strategy and are not managed under a maintenance program. Some containment sites may be quite stable in size but remain sources of propagules that disperse to other locations. The rate of spread is controlled by eradicating satellite sites as they establish, and thus preventing them becoming a source of propagules for further dispersal from the core. This should be prioritised based on nearby sites of value.

To select areas for containment ideally requires knowledge of the level of infestations of all sites and an understanding of the vectors. This requires reliable knowledge of at least distribution. Those sites judged to be expanding or sources for propagules, but too large to eradicate, should be identified. Some such sites may be expanding linearly along roads, others radially from the core. In either case there will typically be a pattern of satellites emanating from the core. The satellites should be the first treated in the containment effort.



6.4 Action 9: Implement a strategic approach to the containment of sites infested by widespread weeds. This should focus on control of widespread weeds near assets, and/or places that are satellites of the core containment area.

6.4 Action 10: Maintain an up-to-date weed and weed management database, as described above. In time this will provide the data to support site selections for the management of cores and satellites.



Left: Boneseed (*Chrysanthemoides monilifera* ssp. *monilifera*) is one example of where the primary management aim is containment. A regional containment line has been supported by many Southern Councils in an effort to prevent further spread of this highly invasive weed.

For the Kingborough municipal area, the boneseed containment line is Snug River. This means that boneseed infestations found south of Snug River are targeted for eradication.

6.5 Stakeholder Engagement and Partnerships

Australia is lowly ranked against other advanced economies for the level of implementation of innovation. One reason that is thought to contribute to this is the high level of competition that generally exists in our society. Competition drives the creation of innovative ideas by individuals, but implementation of innovative ideas is more successful when developed and implemented by teams. Team members buy into and own the innovation.

Strong stakeholder and community partnerships are valuable assets when seeking to develop and implement cooperative and innovative efforts. In this case, a strong motivation for innovation is to deliver more efficient and effective weed management for all interests.

While the following actions have been recommended, and have proven to be effective, further development should be undertaken by cooperative team efforts with stakeholder agencies and community partners.

Rebates

Rebates should be targeted according to levels of infestation and proximity to assets. Landowners should be required to use the money saved to contribute to the control of weeds. Engagement of weed control contractors at this scale can be cost effective.



6.4 Action 8: Ensure effective and best practice hygiene procedures are in place as part of the approval process for developments.

Levies

Levies collect additional financial resources that can allow the weed management effort to achieve more in the same time. Levies are a broader based source of revenue that can be applied to targets or broadly utilised.

A levy to collect revenue for weed management can be dedicated in the Council's budget and applied directly without detracting from other demands on the budget. Levies can be collected from any of a number of sources from which Council already gather revenue. For example as an addition to waste management charges added to rates or collected at the tip. This could be identified separately on the rates bill, or as portion of charges such as development application fees. The broader the base, the fairer the levy given that everyone benefits, either directly or indirectly from weed management. For example, even a person who tolerates the visual impact of weeds benefits from the effect of reduced costs on agriculture through lower food prices.

An existing levy that is collected at the Barretta tip is a good example of an existing environmental levy. The levy is used to rehabilitate the former landfill site and to contribute to the upgrading of a waste transfer station. The long term imposition of this levy has resulted in a level of acceptance by ratepayers. The redirection of the funds from this levy to other environmental works may therefore not meet with resistance in the way a new or additional levy might.

EEG: Rate rebates encourage landowners to control weeds on their land. It is an effective way of achieving gains on private land that may otherwise not be managed.

Reverse auction

Motivated people using best practice methods are the most effective weed managers. Innovative approaches that engage the community must motivate the community. An innovative mechanism that only engages motivated people and seeks to leverage the work that they complete is the reverse auction. In a reverse auction, people, businesses or care groups propose a project that meets a set of criteria set by the auctioneer (Council) and indicate a price at which they are prepared to complete the project.

While any project that meets the criteria should be acceptable Council could also identify target areas and invite community based applications to complete the weed control task. The most cost effective proposals would be funded.

The basic criteria should include:

- Priority locations
- Priority weeds
- Best practice methods
- A price for primary treatment
- A price for secondary treatment at 12 and 24 months.

Rehabilitation



6.5 Action 2: Trial a reverse auction incentive scheme

Cooperative Weed Management Areas (CWMA)

Large scale management of weeds that occur across tenures and property ownership boundaries are fraught with practical difficulties. Without sustained coordination of effort, the outcomes may be poor. Effectively the weeds are dividing and ruling the land managers.

As weed dispersal is not restricted by tenure, where an important weed infestation is recognised that crosses boundaries, cooperation between owners is essential.

CWMA's have been implemented in the USA where members have a shared focus, generally agriculture. However, the shared focus can just as easily be, for example, cost effectiveness, nature conservation, or maintenance of visual amenity.

The basis for management of CWMA's is typically contractual agreements. In Kingborough these could be Service Agreements or Memorandums of Understanding (MOU's) that articulate a common goal, set of protocols, and actions agreed between participants.

The content of an agreement should reflect the level of an organisation's or landowner's capacity so that it is achievable. The level of binding obviously needs to reflect an organisation's or landowner's preparedness to commit. Nevertheless, some success with a low level of commitment may well lead to greater future commitment. From little things big things grow.

The partners for the initial CWMA's should be carefully chosen from motivated organisations or landowner's so that success is likely. Opportunities exist for cooperative weed management efforts between Council and CLS, State roads, PWS, Tas. Networks and Tas. Water. In addition, an opportunity exists for a cooperative weed management effort between Council and landowners that have road or stream frontage.



6.5 Action 3: Develop and implement at least 2 Cooperative Weed Management Agreements for trial within the municipality.

EEG: Effective management of weed infestations, that cross tenure boundaries, dramatically reduces the rate of reinfestation and thus the requirement for repeated control by each partner.

Coordinated Weed Management (CWM)

Weed management efforts can be coordinated with very little cooperation from a partner. In the annual planning framework Council should liaise with other organisations to find out where they intend to control weeds. With this knowledge, Council can plan to control adjacent or continuous weed infestations that cross tenure boundaries onto Council managed land.

Council should coordinate through advertising individuals, groups and organisations to tackle a particular weed at a time that takes into consideration best time to treat the weed and transporting weed seed etc.



6.5 Action 4: Engage with partners and establish at least 3 Coordinated Weed Management agreements.

EEG: Whether cooperative or coordinated, these approaches provide effective management of weed infestations that cross tenure boundaries. The combined efforts dramatically reduce the rate of reinfestation and thus the requirement for repeated control by each partner.

Service Agreements

Cooperative or coordinated efforts may not be effective if the potential partner isn't strategically managing weeds. In such cases a Service Agreement with the partner may be more effective. A Service Agreement involves the partner paying the Council for the weeding service. This is particularly applicable where a partner's weed issues are strategically important in the Kingborough strategy. Examples include, where a particular road, easement or utility presents a particular risk of infestation or spread to a priority site.

The terms of the Service Agreement would have to be attractive to the partner but also allow Council to leverage the outcome by gaining more effective control of the weed management strategy at the site.



6.5 Action 5: Service agreements developed and at least 2 clients engaged.

EEG. Control over the weed management effort allows the effort to be integrated into the Council priorities and planning processes. The effort will be more effective and ultimately more cost efficient as control is gained.

Community partnerships

Partnerships with community groups build on education efforts and provide for a stronger sense of ownership of the assets threatened by weeds and the solutions to weed control. Practical community partnerships need not be limited to weed control projects and can include developing aspects of educational material and training.

All such groups and individuals should be encouraged to document volunteer hours involved in each activity and to report annually to Council using a standard proforma provided for their use. Council, in recognition of these volunteering contributions, should incorporate aggregate hours and value in the State of the Environment reporting process and use the data to leverage funding support.



6.5 Action 6: Increase the number of groups that are active and publish volunteer hours for use in funding applications

Replacement plant policy

The rehabilitation of weeded sites is an essential element of improving the effectiveness of weeding efforts.

Where persons or care groups have completed primary weeding projects, Council should continue making available plants to replace the weeds. This is an excellent way to leverage the weeding effort by progressing toward effective control or eradication of weeds from the site.

The Action should include the provision of plants to rate payers or groups known to be undertaking primary weeding projects.



6.5 Action 7: Ratify a replacement plant policy

EEG: Rehabilitation is an important component of integrated weed management that will reduce the risk of reinfestation and cost effectively reward the weed manager.



Above: Enthusiastic corporate volunteers after a planting event. Partnerships with community groups build on Councils efforts and provide for a stronger sense of community ownership of natural assets. This sense of ownership fosters a desire to be part of the solutions to weed control, including rehabilitation work and follow up.

6.6 Education and Training

Education

Maximising participation with stakeholders and the local community requires an increased understanding of the threats and other issues posed by weeds, as well as the range of potential solutions and the Councils strategic approach. To facilitate this increased understanding, the Council must engage with stakeholders and the community. The range of communication and education strategies available today is dramatically different to a decade or more ago and Council should adjust to this change.



6.6 Action 1: Prepare a modern Weed Communications Strategy

The strategy should effectively disseminate information to renew interest and increase understanding of the weed management “challenge”. It must clearly communicate the Councils role and the essential need for community participation. The planks of the Weed Management Strategy should be re interpreted and reinforced through the Communications Strategy.

However, the Communications Strategy should be extended to utilise modern media tools like Instagram, blogs or Facebook, to launch the whole of the weed information, education and discussion into cyber space.

Other opportunities for engagement include the potential use or development of apps to allow reporting of occurrences by individuals or other agencies.

Introduce a separate webpage to the Council website that is kept up-to-date and holds all the relevant weed information relevant to Kingborough. This should be linked to other agencies and act as a central page linking to the other communication tools such as Facebook/Instagram with an ongoing regularly updated blog.

A forum should form part of this website to encourage interaction and dispersal of information. This is also a good learning tool for others who may simply read the forums and not contribute, or just ask questions.

The Communications Strategy should also continue to provide hard copy written and pictorial information and guides, including a regular feature on weeds in a local paper and newsletters.

Training

All staff, contractors and volunteers regularly involved in weed management should be trained to identify weeds, particularly the lesser known species. All staff, contractors and volunteers regularly involved in weed management should be trained to understand the principles and practices of weed hygiene and weed treatment.



6.6 Action 2: Ensure Council weed managers are ChemCert trained and volunteers are adequately trained for techniques approved in the field, such as cut and paste.

6.6 Action 3: Design and implement an innovative initiative around an awareness and action program that brings together schools and community for practical weed management activities.

EEG: *A practitioner who understands a task, the risks and the mitigation will be much more effective than one who does not. Regular education and training counters the attrition of knowledge and skills over time.*

6.7 Monitoring and Review

There is an inherent risk with all strategic and implementation plans that relevance and impetus fades with time. Monitoring and review must be incorporated to ensure evidence based adjustment and that the measurement of success is part of the weed management culture.

Strategic review



6.7 Action 1: Reconsider the relevance of the strategic framework after 5 years. Review progress against each of the strategic planks and refocus or redefine actions that have not progressed.

Are the major planks the most likely to return cost effective improvements in efficiency and effectiveness of weed management? Adjust as necessary.

Site monitoring

The effectiveness of a management plan cannot be known without a monitoring program. Monitoring programs start with planning and data collection but do not end with a revisit or with re-measurement. Monitoring includes ensuring the previous task is complete, determining the

effectiveness of treatment and adjusting as necessary. Adjustment includes a scheduled response to findings in the works and site treatment plans.

The monitoring program should include a measure of resources used for each treatment (person hrs per unit of time). Cost is a strong standardised measure per unit area. The effectiveness of a management plan can then be judged by the cost required to achieve the management aim.



6.7 Action 2: Construct a performance indicator (PI) based on the cost of improvement evident in data.

The PI requires the area treated, abundance and person hrs. This gives a rate of treatment per hr. The impetus is toward having the rate decline overtime because at least one of the inputs has declined.

Audit and efficacy



6.7 Action 3: Audit the adherence to and effectiveness of the planning and site treatment plans. If adherence and or effectiveness is less than expected (PI static or falling), question why and adjust.

Data management

It is critical that staff to be able to maintain and update data in the GIS, particularly weed species given the many weeds that are currently in the early stages of declaration. Failure to ensure this would mean priorities do not remain active and weed control activities are will drift away from changing priorities.

EEG: Efficiency and effectiveness can only be judged and measured on evidence gained from consistently recorded data.



6.7 Action 4: Train weed staff to maintain and update the GIS databases and to rerun metrics that generate priorities.



Above: Heather (*Caluna vulgaris*), also known as Scotch heather, is on the *Alert List for Environmental Weeds*. In Australia, it is known to have escaped from gardens in Tasmania and has been recorded in central Tasmania, Bruny Island, Kingston and Mt. Wellington. Due its dense canopy, sites with mature heather are often devoid of other species. As a result it is treated as a high priority weed for eradication. It is closely related to Spanish heath (*Erica lusitanica*).

7 WEED MANAGEMENT PRIORITIES

There always exists a number of alternative ways to prioritise weed management. For example, there is debate about the options of treating all weeds within a specific site or concentrating on treating priority weeds on all land on which they are found. Weeds can also be prioritised based on invasiveness or by adopting higher level systems, such as those of the Tasmanian Weed Management Act 1999. Each approach has merit from the perspectives of conservation and effectiveness. However, it is also inevitable that additional choices need to be made in the context of practicality and competing demands, including community driven priorities, such as those areas under the stewardship of care groups. Reactive management actions in response to public concern also need to be resourced.

The context of weed management in the KMA is complicated by a diverse range of these competing elements. They include the priority of weeds, the importance of particular sites and the various motivations to control weeds, such as visual amenity or the conservation of threatened species and vegetation types. There are a myriad of potential solutions that largely rely on prioritising and ranking. Normally there is no single solution that will satisfy all interests, but rather alternative solutions that involve different balances of the various interests. We must, therefore, try to optimise the solution.

In most situations where values interact, it isn't possible to optimise all of the objectives at the same time, and so compromise solutions or trade-offs are required⁴. Complicating the interactions even further is the fact that compromise solutions can't do better for one objective without worsening the outcome for another of equal importance. Where resources are not unlimited it is not possible to implement a fully optimised solution.

A severe limitation of the quality of optimisation is the quality of data. For example where the selection of a site is context dependant, the data may not be of equal quality across all sites. It is also difficult to specify preferences or weighting where objectives are incomparable. For example, the maintenance of visual amenity versus the protection of native habitat or maintaining storm waterways. Biases can be applied and may be based, for example, on sources of weed management funding.

So, a certain level of reordering of priorities is required to balance the selection of sites for management and hence help to satisfy most interests. Ultimately, this process will require KC weed managers to select sites to fill annual works plans that also accommodate operational limitations and constraints.

7.1 Strategic Priorities

In this strategy four priority drivers are used to select sites; weeds, community (reserves), threatened flora habitat and vegetation.

Each driver was itself prioritised based on the following rationale.

Weed priorities

See Section 4.2 for the rationale for this prioritisation.

⁴ Lucas, C. Practical Objective Optimisation

Community reserve priorities

KC ranked reserves based on a number of condition criteria and the level of community interest. The strategic prioritisation is a reclassification of the community interest rank (Table 5).

STRATEGIC PRIORITY	RATIONALE	COMMUNITY INTEREST RANK (KC)	COMMUNITY INTEREST KEY (KE)
1	Active Community Group	1	Active Community Group
2	Recent Community Participation	2	Community engaged
3	Low or unknown Community Participation	3	Inactive Community Group
3	Low or unknown Community Participation	4	Lack of community participation
3	Low or unknown Community Participation	5	Actively being degraded/ neglected
3	Low or unknown Community Participation	6	no info (reserve Ids 51,54,55)

Table 5 Reserve prioritisation based on the level of community participation.

Threatened fauna

Threatened fauna have been included in the management zones to be taken into account by management prescription. While there are some exceptions, the rationale is that many animals range across significant areas and so NVA point observation records are not useful. Where animals are dependent upon particular vegetation types, those types are included in the management zones.

Threatened flora

For threatened flora each species was initially prioritised by threat status based on the schedules of the EPBCA and the TSPA (Table 6). Each species was also scored for the susceptibility of its life form to the impact of weeds, for example orchids are considered to be more susceptible than shrubs and shrubs more susceptible than trees. The sum of the threat status and the life form susceptibility scores was classed and used as the strategic priority for threatened flora (Table 6).

EPBCA 1999	TSPA 1995	Schedule class / # species		
		1	2	3
Critically Endangered	endangered	3		
Endangered	endangered	3		
	vulnerable	1		
Vulnerable	vulnerable		2	
Vulnerable			1	
	endangered		8	
	rare			50
	rare (P)			1
	vulnerable			4
	vulnerable (P)			1
Grand Total		7	11	56

Table 6 Threatened flora classification based on listing schedules of the EPBCA and TSPA. (p = pending - proposed change).

Schedule Class	Susceptibility	Rank class / # species		
		1	2	3
1	1	5		
	2	2		
2	1	7		
	2		3	
	3			1
3	1		9	
	2			37
	3			10
Total # species		14	12	48

Table 7 Threatened flora strategic priorities based on schedule class and life form susceptibility.

Vegetation

All native vegetation was classified according to the threat status on the Nature Conservation Act 2002 and the extent present in the municipal area (Table).

Strategic priority	Rationale	Area (ha)
1	Threatened & rare<50 ha	307
1	other native & rare<100 ha	502
2	Threatened	5794
3	other native	47843
	TOTAL Area	54445

Table 8 Native vegetation priorities based on threat status and area (ha) in the KMA.

7.2 Site selection

Site definition

The entire Kingborough municipal area was divided into a 500 m * 500 m grid. Each grid square represents a site. Each site was attributed a score for each of the selection drivers described above. This scale is appropriate to accommodate the precision of data, including weed and threatened species records, Tasveg mapping and cadastral boundaries.

Only sites with weeds are considered. The selection is based on the highest priority weed at the site. The other drivers attributed to each site may occur anywhere in the grid square. As a result, a priority weed in the grid square may not occur in a reserve that is recorded as present in the same grid square and may not occur in the threatened species habitat or threatened vegetation that is recorded in the grid square. Nevertheless, the priority weed cannot be more than 500 m from the other attributes and so is worth consideration.

Site prioritisation

The initial priorities are based on ranked strings. The strings are constructed as continuous numbers in which each digit in the string represents a separate driver in the order of priority. So the string for a site with all of the highest ranked drivers would look like 1111.

By selecting sites simply on the rank of the string, all priority 1 weed sites would be selected first with the order determined by the reserve status then flora then vegetation. Then all priority 2 weeds sites would be selected etc. etc. Some sites with high priority threatened flora and or threatened vegetation could rank quite low if they are not associated with high priority weeds or reserves.

Optimisation includes selecting only the highest weed driven priorities in reserves before those outside; then weed driven sites within threatened species habitat before others etc. Figure 8 illustrates the optimised solution proposed for this strategy. The key in this figure describes the strings of selection criteria for each category. As a result of the optimisation process each category is mutually exclusive with a declining priority.

The effect of these compromise decisions to reorder the selection criteria for certain values moves towards an optimum solution. There are numerous alternative ways that these criteria can be ranked.

All data can be visually explored and sites interrogated on a GIS to assist with selection of sites for works plans. This visual exploration of the data set is essential to understand the opportunities presented and the limitations of the analysis.

Figure 9 illustrates weed driven priorities and Figure 10 illustrates community driven reserve priorities used in the ranked strings before optimisation.

Figure 11 illustrates the threatened flora susceptibility priorities and Figure 12 illustrates the vegetation priorities used in the ranked strings before optimisation.

All of the categories in the map legends of Figures 9-12 are those described as strategic priorities (7.1).



Left: The flowers of the endangered black-hooded sunorchid (*Thelymitra atronitida*).

During the optimisation process, threatened orchids were prioritised above threatened species of a larger growth habit.

Vulnerability of species to being outcompeted by weeds as a result of habit and form were a consideration during the optimisation process.

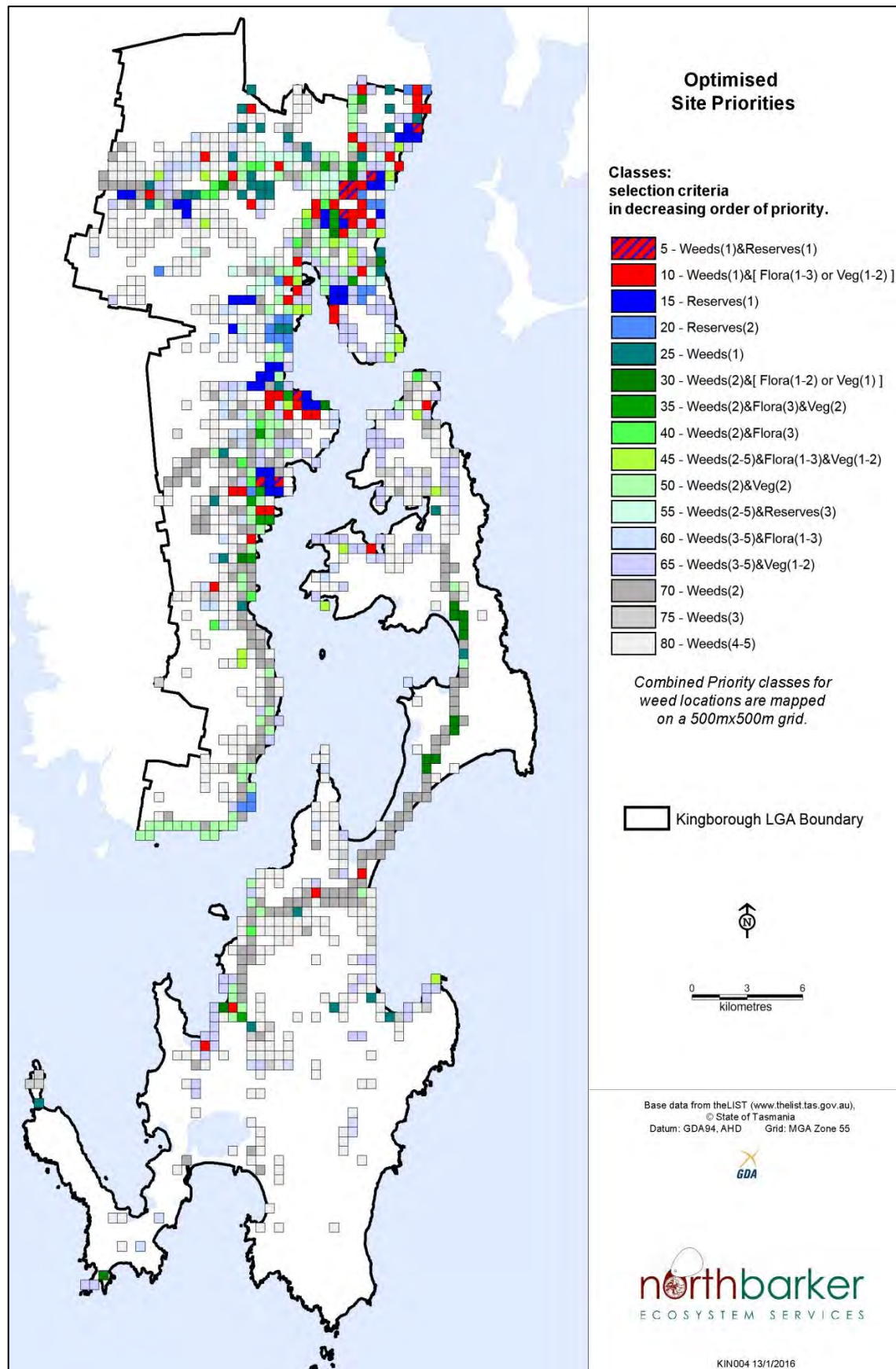


Figure 8 - Optimised site priorities.

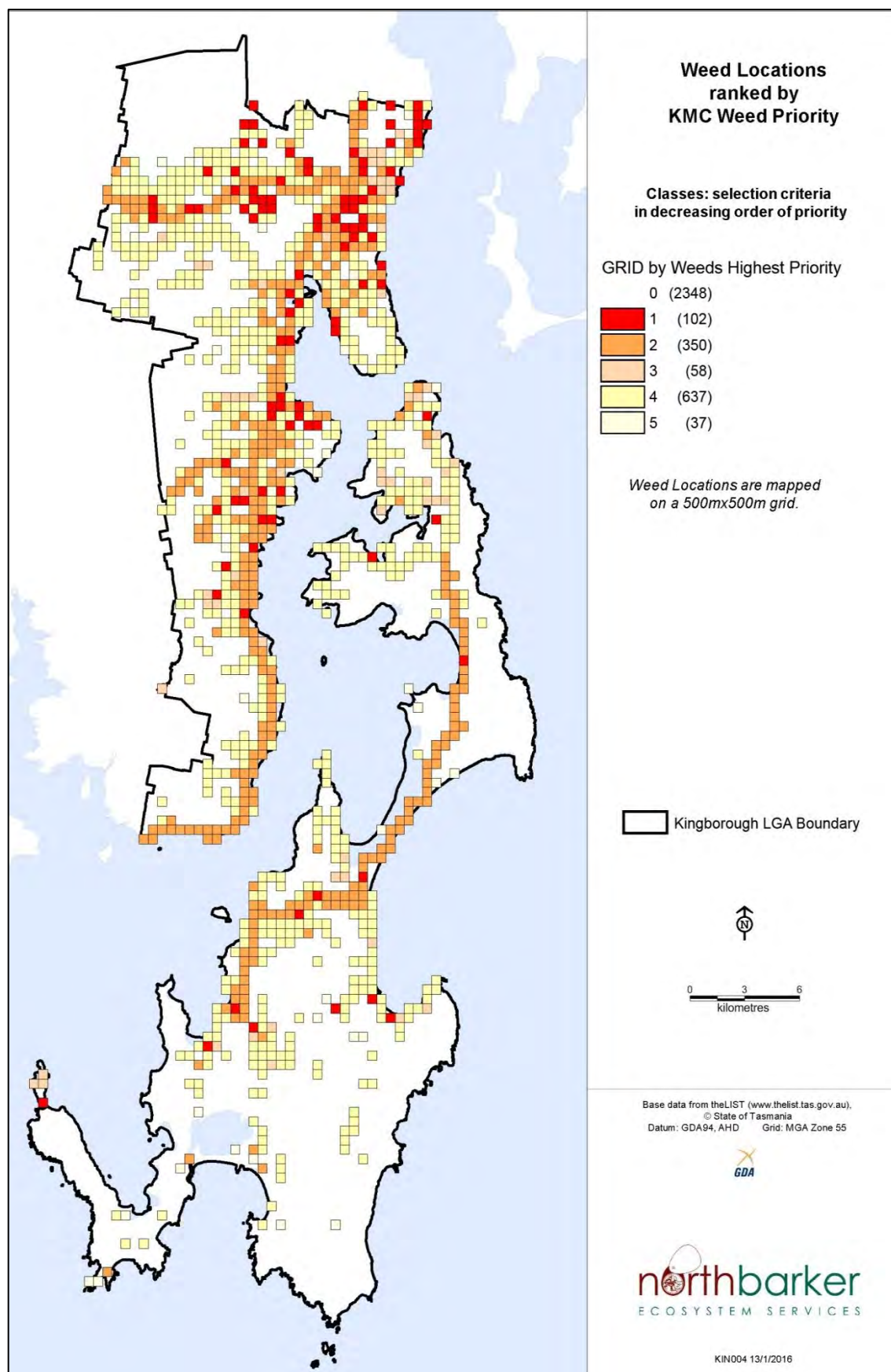


Figure 9 - Weed driven priorities.

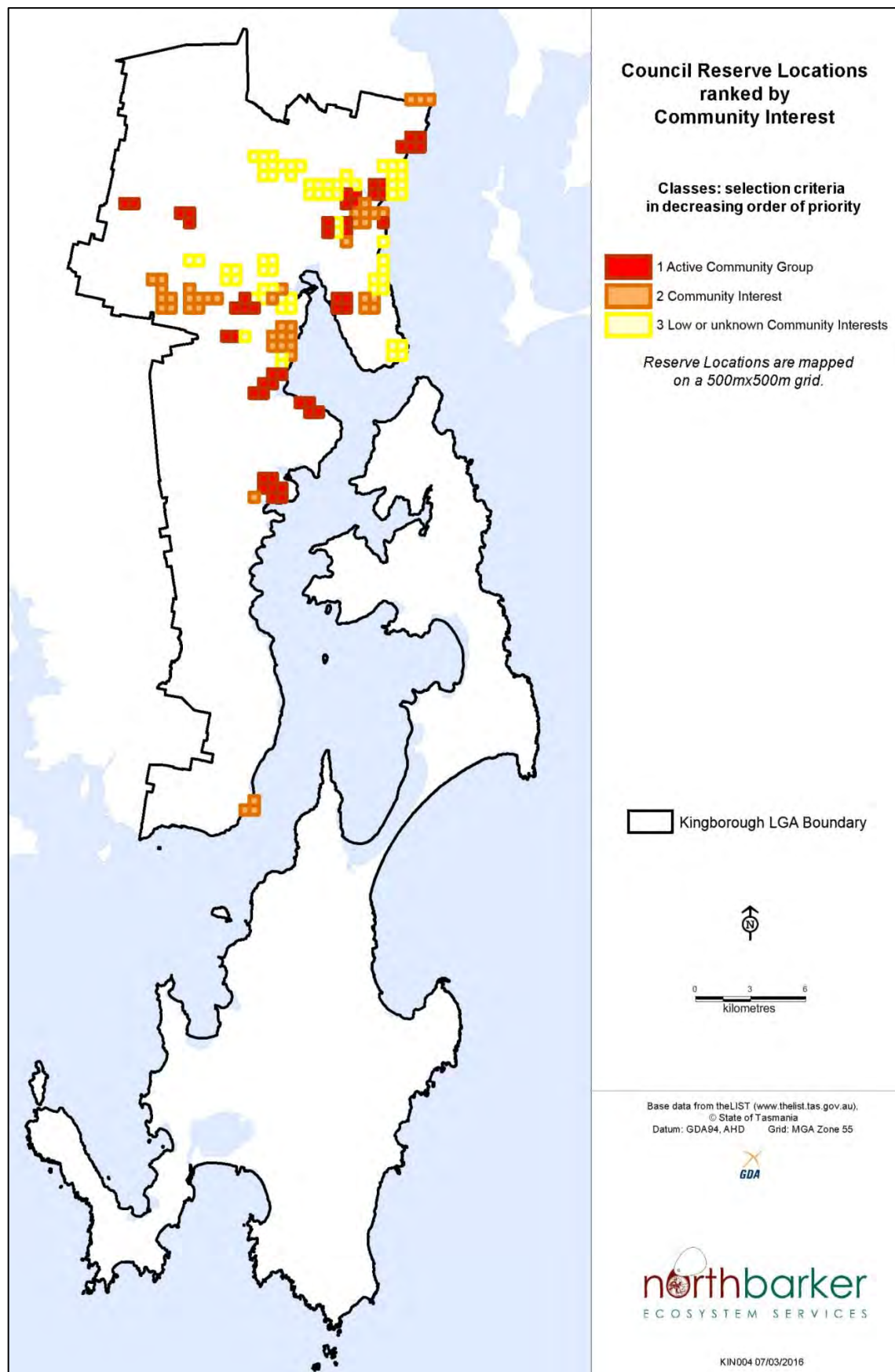


Figure 10 - Community driven reserve priorities.

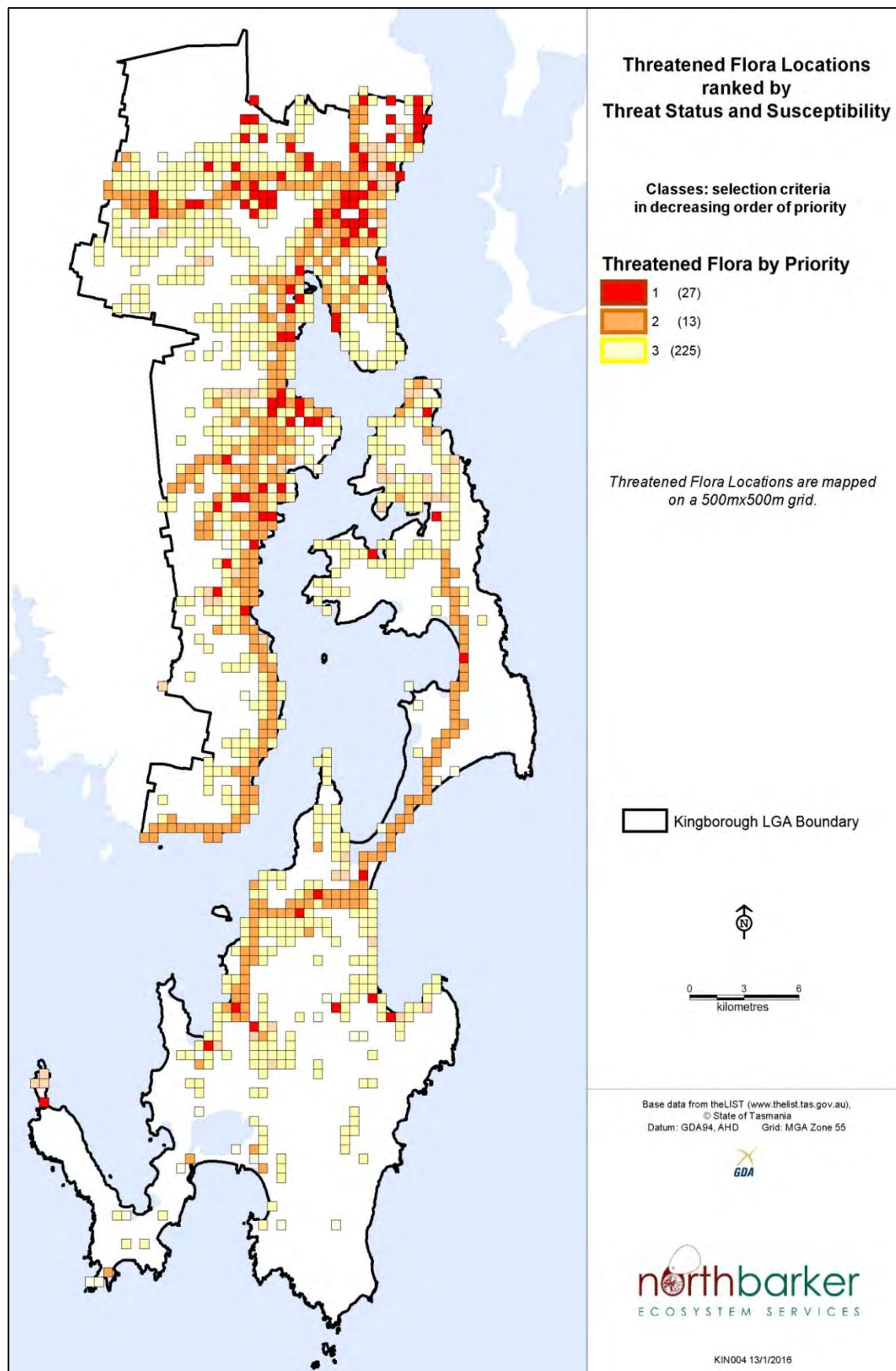


Figure 11 - Threatened flora priorities.

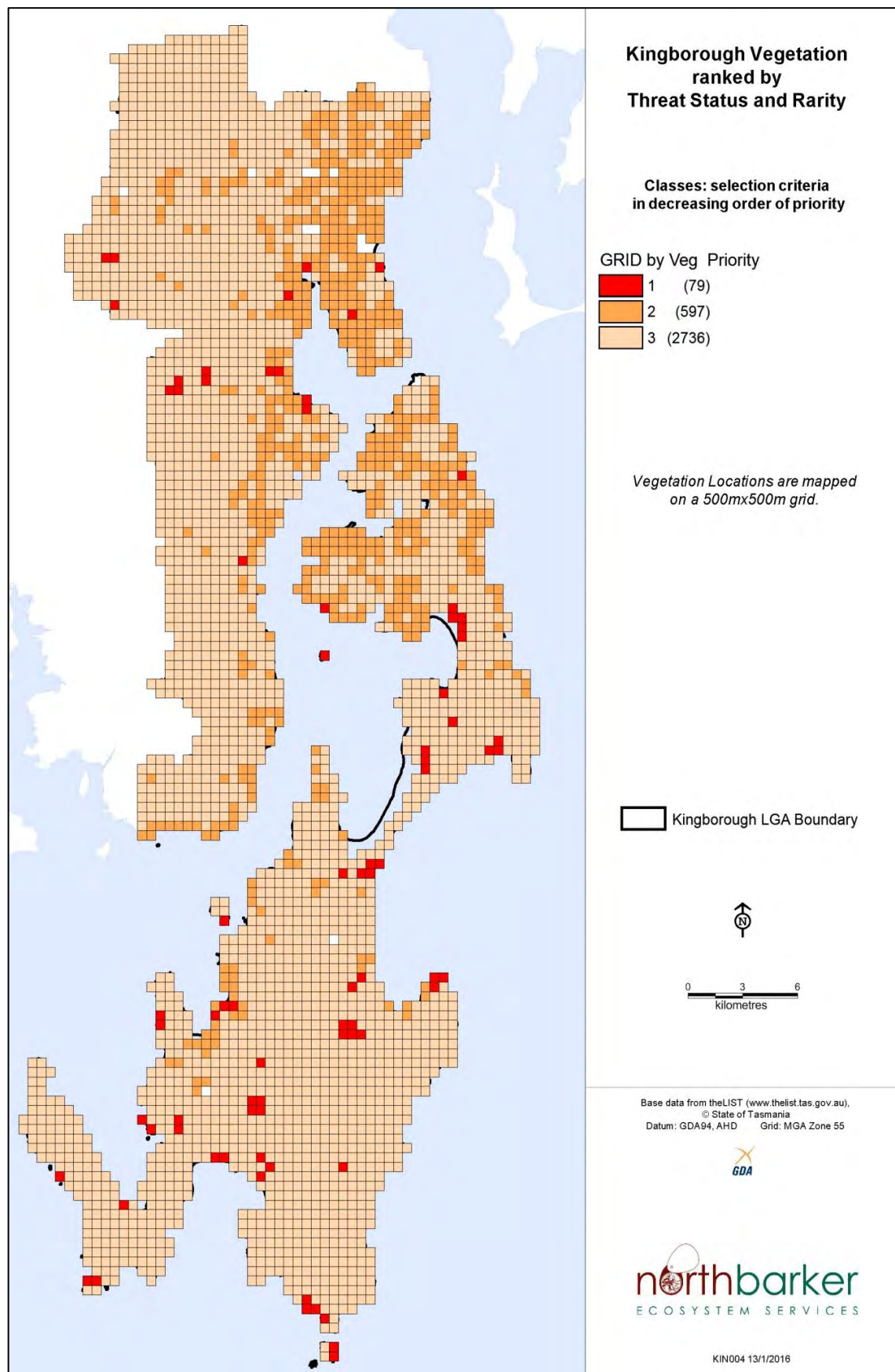


Figure 12 - Vegetation priorities.

7.3 Weed Management Zones

Weed management techniques should be adapted to take account of particular habitat sensitivities in one place or another. For example, coastal sand dunes are very sensitive to erosion and so physical disturbance needs to be minimised. Riparian areas are so close to waterways that the potential for pollution must be considered.

The habitats that require specific management regimes are here defined as weed management zones (WMZ). The WMZ's have not been used to attribute management priorities. However, each site selected for treatment is also identified by weed management zone, together with the relevant management prescription. Figure 13 illustrates the distribution of the WMZ's.

Coastal

All land within 40 m of the high tide level.

As throughout the rest of Australia, a high proportion of the Kingborough population resides near or utilises the coast. Hence, coastal habitats are under relatively high weed pressure. The coastal zone is also characterised by highly erodible soft sediments and naturally disturbed ground, including dunes. The coastal zone is home to characteristic habitats and species, some of which are directly threatened by weeds. Consequently, weed control in this important but fragile habitat should proceed with particular caution. The major risks and mitigations are as follows.



Risk: Occupation of the site or adjacent beach by shorebirds.

Mitigation: Ensure that weed control is undertaken outside of the spring and early summer period to avoid disturbance.



Risk: Herbicide translocation through sandy soil to non-target species.

Mitigation: Employ alternative methods to spraying herbicide, particularly cut and paste and physical removal. If it is necessary to spray herbicide near or on dunes then use of non-residual herbicides that do not move through the soil profile is required. An off label permit is required for chemical control of marram grass.

Manual control is only effective for small infestations. For rhizomatous plants such as marram grass, dig out all rhizomes to a depth of 50 cm and repeat every 3 or 4 weeks until the rhizomes stop growing through to the surface. Monitor periodically thereafter. The use of machinery can greatly increase the area that can be treated, but should only be used where the benefits outweigh the risks of erosion.



Risk: Erosion of dunes.

Mitigation: Revegetation of the site, laying brush on the site to protect from wind erosion, protection of the site from access by people.

The erosion caused by marram removal is often a movement towards a new equilibrium dune shape. Nevertheless, the potential for unwanted erosion should be managed.

Riparian

All land within the KMA waterway layer.

Riparian areas are very important contributors to the protection of water quality. They also represent specific habitats and refuges for plants and animals. However, riparian areas are

particularly susceptible to weed invasion. Relatively moist soils support the growth of weeds; disturbance by floods promotes seed dispersal and germination; and low levels of management due to difficult access provide windows for establishment.

The management of weeds in riparian areas should also be strategic by recognising that weed propagules move through catchments in drainage water from paddocks, roads and urban areas, into creeks and rivers. The main strategic requirement is to consider the higher order streams and sources of weeds in an overall riparian management approach. Where practical, start at the top of the catchment; notwithstanding other priorities, which may require lower catchment sites to also be managed.

The association of the habitat with fresh water and the susceptibility of river and creek banks to erosion require that riparian weed control measures include certain precautions.



Risk: Chemical water pollution.

Mitigation: Use non chemical methods as much as possible.

Herbicide selection – herbicides applied to the edge of a water body or wetted areas must be registered for use in aquatic environments by the Australian Pesticides and Veterinary Medicines Authority.



Risk: Erosion of riparian soils and banks.

Mitigation: Gradual progressive weed control avoiding large scale soil disturbance.

- Cut and paste or drill and fill, leaving stumps in place to avoid soil disturbance.
- Remove large dead weeds, particularly willows, to avoid stream blockage, flooding and scouring.
- Rehabilitation will help to sustain the function of the riparian area as a filter strip and provider of shade, thus contributing to the maintenance of water quality.

Threatened Species Habitat

Threatened species and their habitats are a very high priority for protection through weed control. Threatened plants are susceptible to herbicides and may be killed just as readily as weeds. Threatened fauna are susceptible to habitat alteration due to weed removal. This is particularly important where weeds have contributed to protection from predators or by providing nesting opportunities. Weed control in threatened species habitats must therefore proceed with caution.



Risk: Spraying threatened plants with herbicide.

Mitigation: Know how to identify the threatened plants, mark plants in small patches to be controlled, control weeds progressively in the small patches, avoid the use of herbicide where possible.

If herbicide must be used then apply by cut and paste method or apply a selective herbicide that does not affect the threatened species. For example, if the threatened plant is a grass and the weed is woody, then use a selective woody weed herbicide.

Apply sprays with a hooded nozzle from short range, with a large droplet size and from a down-wind position.



Risk: Weed removal destroys animal habitat.

Mitigation: Determine what species are using the habitat and what the critical component is that the weeds are offering. For example, ground level protective cover for ground nesters.

Control weeds progressively in the small patches, rehabilitate patches with high covers of native plants that provide the same habitat quality.



Above: This photo depicts ivy in the form of a dense ground cover and providing vital camouflage for a nesting burrow. Weed management in areas of known or potential habitat must be undertaken with careful planning and sensitivity.

Urban

The urban zone includes all land that is predominantly developed for housing and commercial use.

The urban landscape presents at least two distinct weed management requirements. The first is the control of weeds of all types that are highly visible to the public. Visibility in urban areas is high because weeds are obvious when in footpaths, along roadsides and in all places where visitation is high.

The presence of people brings with it scrutiny of weed control practices. Such scrutiny presents as opinions that are often poles apart. One pole being that the weeds must be controlled with little consideration of the method, the other being that the application of herbicides in public places is undesirable.

Weeds in urban areas, such as on streets and footpaths are often controlled by implementing weed spray “programs”. Such programs are often driven by the calendar and are repeated whether necessary or not.

When planning to control weeds in the urban zone the following should be considered and applied as practicable.



Risks:

- Herbicide may be washed from streetscapes into water ways
- The public will criticise Council if visible weeds are not controlled
- Sites that cannot be accessed easily become sources of weeds

Mitigation:

- Alternative weed control measures should be considered where appropriate. These include the application of steam to treat footpaths when a weed species is sensitive to steam.
- Urban parks and gardens can be planted with high covers of desirable plants and the ground heavily mulched.
- Landscape access can be improved so that weeds can be mowed. For example, producing or modifying batters so that they are not too steep for mowing.
- Seal cracks and joints in footpaths and other surfaces that support weeds.

Quarries, Landscaping and Transfer Stations

Quarries and transfer stations are import and export sites. The users of these sites bring vehicles and materials from far afield and then carry materials far afield. The materials include earth products and mulches. The sites are prone to weed infestation because they have lots of disturbed land and have lots of visitors. As sources of weed seeds, mitigation efforts at these sites can have dramatic impacts by reducing spread to sites that receive the products.



Risks:

- Weed seeds are exported from these sites in products
- New weeds arrive at these sites through imports of product and visitor vehicles
- Land adjacent to these sites is vulnerable

Mitigation:

- All sites should have and implement a seasonally based weed control plan
- All sites should be certified as weed free periodically (every two years)
- Stock piling of material should be kept to a minimum to avoid contamination

No Spray Areas

Some areas are no spray zones (NSZ) for a variety of reasons. Some are for perceived health risk, personal choice and protection of organic production.

**Risks:**

- Weeds are not controlled adequately
- NSZ becomes source of weeds

Mitigation:

- Cooperative management agreements whereby the adjacent landowners control the weeds
- Monitor weed management and apply aspects of integrated weed management and techniques that are best suited to the circumstances

Peri Urban and Rural Areas

The peri urban and rural areas in the KMA are strongly associated with residential development in and adjacent to native vegetation. The area is diverse and privately owned. This zone is an extremely important one for the maintenance of a broad range of vegetation types and habitats. The primary responsibility for weed control rests with the landowners. However, the Tasmanian WMA requires that land owners prevent declared weeds from spreading to threatened species habitat and threatened vegetation communities. This regulation applies to their land, adjacent land and to land that is being managed under a weed management plan. Despite these regulations, some severe weed infestations are present on some properties, particularly on large blocks that tend to be beyond the management capacity of most owners.

**Risks:**

- Lots in and adjacent to remnant native vegetation become sources of weeds
- Threatened species and communities on environmental living lots are degraded by weeds

Mitigation:

- Cooperative weed management agreements
- Coordinated weed management agreements
- Rate rebate scheme
- Reverse auction scheme
- Encourage landowners to participate in Landcare programs
- Enforcement of WMA regulations
- Target the area for training opportunities

Other Areas

Beyond these specific WMZ's no modification to best practice weed management is recommended but where circumstances demand adjustments to mitigate risks should be made.

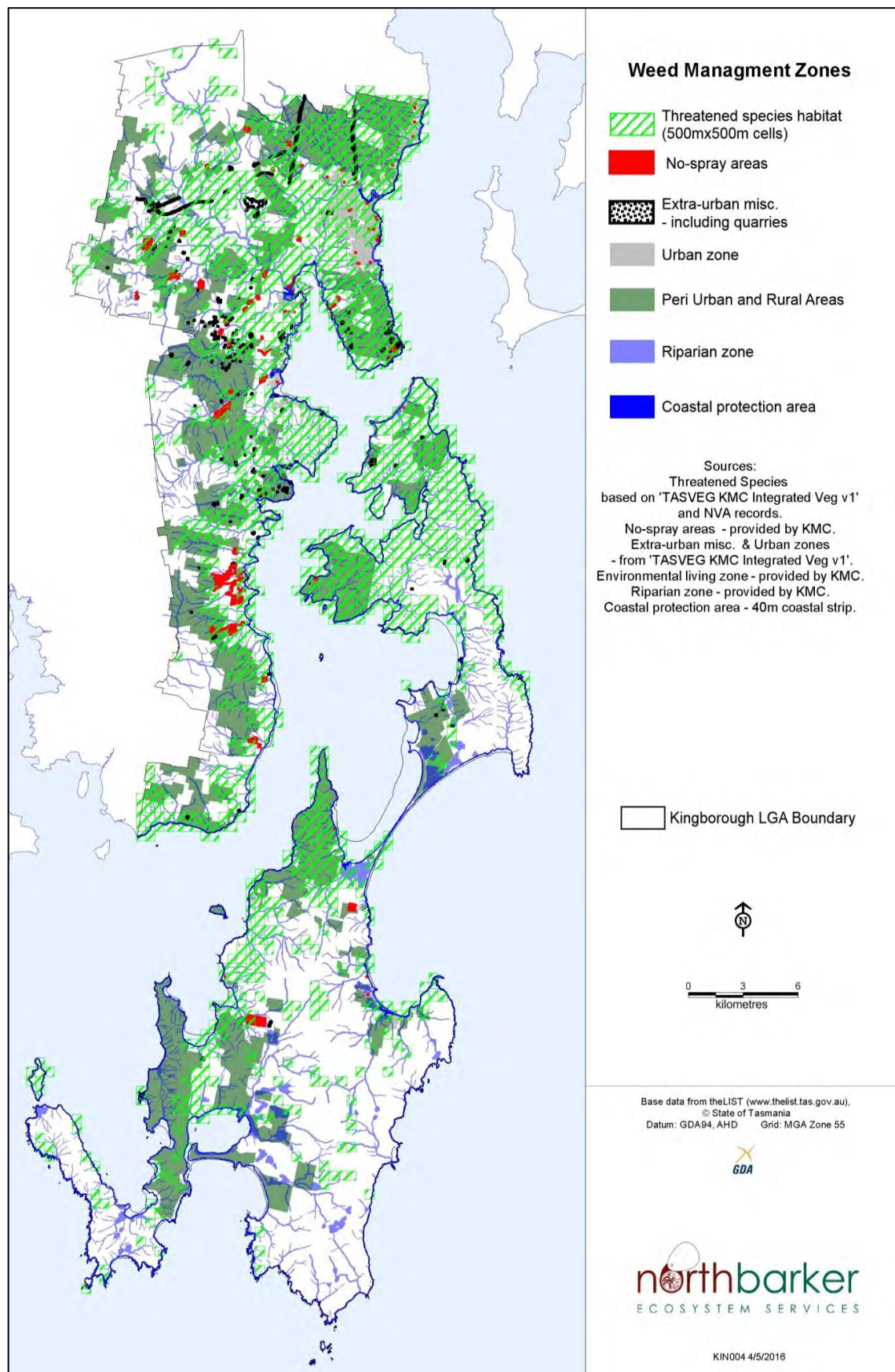


Figure 13 - Weed Management Zones.

8 ROADSIDE WEED MANAGEMENT

Roads and roadsides are by far the most effective vectors of weeds. Vehicles can pass along them from anywhere in the State (or country), with little to no effective control with regard to weeds being carried in radiators, in mud, or on floor mats, *etc.* Vehicles are capable of delivering new weeds to Kingborough and roadsides provide viable habitat for them to establish. The management of roadside weeds in itself can spread weeds, particularly through the use of slashers.

There are a number of strategic weed management prescriptions that can reduce the spread of weeds along roadsides.

1. Establish a cooperative weed management plan with the State Government department responsible for roads.
2. Establish coordinated weed management plans with landowners adjacent to strategically important roads.
3. Map roadsides for weeds.
4. Based on weed maps, plan and slash areas free of weeds before slashing areas infested.
5. Within infested areas, to prevent spread, begin all roadside slashing at the limit of the weeds and work toward the centre of the infestation.
6. Time roadside management to minimise the spread of seed and to follow pre-treatments, such as spot spraying.
7. Wash vehicles and machinery before entering a weed free section.
8. Remove weeds from roadside refuges where slashers do not reach, such as close to fence lines.



Left: Management of roadsides can prove to be a complex juggle of meeting the requirements of roadside safety, road surface protection, vegetation management, resource constraints and best practice weed control.

9 CLASSIFYING LOCAL WEEDS USING THE WMA CATEGORIES

The *Weed Management Act 1999* categorises declared weeds based on their distribution within the State and municipalities. Based on distribution, municipalities are classified as either Zone A or Zone B for respective weeds. Management objectives are based on the zone categories at the municipal level.

Zone A weeds include weeds not known or not yet present in a municipality, as well as weeds that are localised in extent. The management aim is prevention or eradication.

Zone B weeds are those that are known to be present and are sufficiently widespread and abundant that eradication is not feasible. As such control of spread and containment are the management aims.

This zone classification with associated management aims could be applied to non-declared weeds at the municipal level. The distribution logic is the same and the management aims would be justifiable if the non-declared weeds are deemed to be a threat to either agriculture or to biodiversity. However, most non-declared weeds are in fact not deemed to present the same level of threat to agriculture and biodiversity as declared weeds. Note that numerous non-declared weeds have not had risk assessments completed. In this strategy they have not been categorised in the same way and have generally not been rated at the same level of priority as declared species. Nevertheless, the categorisation of non-declared weeds using the same distributional criteria is worthwhile. The categorisation could then be integrated or applied in parallel with the declared weeds.

REFERENCES

- Australian Bureau of Statistics (2011). Census statistics. Website: <http://www.abs.gov.au/websitedbs/censushome.nsf/home/data>
- Australian Weeds Committee (2006). *Australian Weeds Strategy; A national strategy for weed management in Australia*. Natural Resource Management Ministerial Council
- Kingborough Council (2015). *Interim Kingborough Planning Scheme 2015*, Tasmania.
- CRC for Australian Weed Management (2002) Best Practice Management Guideline for Environmental Weeds. ISSN 1442-7192.
- Department of Primary Industries, Parks, Water and Environment (2015). Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania. (Eds.) Karen Stewart and Michael Askey-Doran. Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.
- DPIPWE (2013). Department of Primary Industries, Parks, Water and Environment. TASVEG 3.0, Released November 2013. Tasmanian Vegetation Monitoring and Mapping Program, Resource Management and Conservation Division.
- EPA South Australia (2007). Safe and effective herbicide use. A handbook for near-water applications.
- Greening Australia Incentive Programs Design and Implementation Considerations. (undated PDF) <http://www.environment.gov.au/system/files/pages/c4a2d7e0-87f8-48de-b0b7-d8ab55d41ca1/files/incentives-program.pdf>
- Grimm, S. (2012). The Value of Understanding. *Philosophy Compass* 7/2 103-117.
- Hilmarsson, S.T., and Rikhardsson, RP. The evolution of motivation and incentive systems Research : A Literature Review. SSRN.
- Lucas, C. (2006). Practical Multiobjective Optimisation. <http://www.calresco.org/lucas/pmo.htm>
- Southern Tasmanian Weed Strategy Draft 2011 – 2016, Southern Tasmania Natural Resource Management Region
- Tasmanian State Government (1995). Threatened Species Protection Act 1995. No.83 of 1995. Government Printer, Hobart, Tasmania
- Tasmanian State Government (1999). Weed Management Act 1999. No.105 of 1999. Government Printer, Hobart, Tasmania.

APPENDIX 1 – POLICY AND LEGISLATION OVERVIEW

Tasmanian *Weed Management Act 1999*

This is the core piece of weed management legislation within Tasmania. The Act defines a list of ‘declared’ weeds that:

- Present a threat to Tasmania but are not yet naturalised
- Present a threat but are currently of limited distribution
- Are widely distributed requiring management due to their threat to the native environment and/or agriculture

There are 115 weeds that have been declared for Tasmania. 36 of these weeds have a presence within the Kingborough municipality and are detailed in Appendix 3.

The *Weed Management Act 1999* (WMA) also provides a Statutory Weed Management Plan (WMP) for each of these declared weeds. The WMP places each weed into either Zone A or Zone B within each municipality. The management objectives for each zone are:

- Zone A – Eradication
- Zone B – Containment (preventing spread to other areas free of that weed)

Under the WMA, landholders are under a legal requirement to control weeds on their land. Weed Inspectors are given powers to enforce the requirements of the Act; they can be employees under State or local government or relevant bodies including community groups. Kingborough has five staff trained under the WMA as weed inspectors. These inspectors must undergo training relating to their responsibilities under the WMA and have the responsibility of enforcing this Act. Failure to abide with the Act can result in on-the-spot fines or a requirement notice issued by an Inspector, requiring a landholder to undertake specific weed management actions.

Weeds of National Significance

The *Australian Weed Strategy* identifies a list of 33 Weeds of National Significance (WONS). National and State Strategies have been developed for some of the WONS that are present within Kingborough. Individual landowners and managers are ultimately responsible for managing WONS. State governments are responsible for overall legislation and administration. Federal Government funding for weed control is largely informed by the WONS strategic goals.

10 of the WONS have a recorded presence within the Kingborough Municipality (Appendix 3). These are bridal creeper, boneseed, English and canary brooms, African boxthorn, Chilean needle grass, serrated tussock grass, blackberry, willows and gorse.

All of the original 20 WONS are now declared under the WMA and all jurisdictions have agreed to declare all WONS species even if that weed is unlikely to occur in that jurisdiction. The intent of this action is to prevent the sale and trade of any WONS species.



Implications to strategy

- Consider national targets for WONS into local weed control programs
- Grant applications to the Commonwealth should include clear reference to WONS strategic goals

National Environmental Alert List

Plant species that are in the early stages of establishment with the potential to become a significant threat to biodiversity are shown on the National Environmental Alert List⁵. 10 of these species are declared under the Tasmanian *Weed Management Act 1999*. To date there are 28 exotic weeds on this list, of which 11 are known from Tasmania or have may have suitable habitat within Tasmania (Appendix 5 – National Environmental Alert List).

Southern Tasmania Weed Management Strategy

The Southern Tasmanian Weed Strategy (STWS) is based on principles adopted from the *Australian Weeds Strategy 2007* developed by the Australian Weeds Committee. These are:

- I. Weed management is an essential and integral part of the sustainable management of natural resources for the benefit of the economy, the environment, human and amenity.
- II. Combating weed problems is a shared responsibility that requires all parties to have a clear understanding of their roles.
- III. Good science underpins the effective development, monitoring and review of weed management strategies.
- IV. Prioritisation of and investment in weed management must be informed by a risk management approach.
- V. Prevention and early intervention are the most cost-effective techniques for managing weeds.
- VI. Weed management requires coordination among all levels of government in partnership with industry, land and water managers and the community regardless of tenure.
- VII. Building capacity across government, industry, land and water managers, and the community is fundamental to effective weed management.

Tasmania's weed management strategy, *Weed Plan*, is also based around these principles.

Successful implementation of this strategy is underpinned by the following additional principles:

- I. Adequate resources are required to coordinate implementation of the strategy;
- II. Key stakeholders engaged and agreed longer-term action plan developed;
- III. Appropriate approvals sought from land managers and agencies;
- IV. Appropriate hygiene practices developed and implemented;
- V. Infestation(s) surveyed and recorded using National Core Attributes for weed mapping and data fed into the DPIPW Natural Values Atlas annually;
- VI. Agreed best practice integrated weed management principles used to control weeds;

⁵ accessed via <http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/alert.html>

- VII. Outlier plants treated first, then infestation contracted towards core area; and
- VIII. Annual monitoring and follow-up program committed to for at least seven years.



Implications to strategy

- Strategy should adopt principles within Southern Tasmania Weed Management Strategy

Regional High Priority Weeds

Weed priorities for the Southern Region as a whole and for each of the twelve municipalities have been identified to assist with planning and on-ground works.

There are over 30 high priority weeds. Baseline weed mapping is available on the DPIPWE Natural Values Atlas (www.naturalvaluesatlas.tas.gov.au). Regional eradication targets include chilean needle grass, bridal creeper, seeding willows, cutleaf nightshade, heather, African feathergrass, African lovegrass, espartillo and orange hawkweed plus the strengthening and contracting of containment lines for boneseed. The following link is to a booklet of these weeds of southern Tasmania.

<http://stca.tas.gov.au/weeds/wp-content/uploads/2010/01/Weeds-of-S-Tas-booklet-smaller.pdf>

The current list of 30 weeds is now out-dated and some weeds listed as a regional priority are not necessarily a priority within Kingborough (Appendix 6).



Implications to strategy

- High Priority Weeds for the southern region should form part of the focus of weed control programs however not all species on this list are prominent weeds within the municipality. Refine list of weeds and incorporate into weed priorities.

Kingborough Interim Planning Scheme 2015

The *Kingborough Interim Planning Scheme 2015* regulates the development approvals process. The current planning scheme does not provide any explicit prescriptions for the management of particular weed species. Conditions of approval are often included which aim to include weed management planning during and post development in order to minimise impacts to natural values.

The *Kingborough Interim Planning Scheme 2015* applies the Biodiversity Code (E10). The purpose of the code is to protect threatened vegetation communities, threatened species habitat and other significant vegetation values. It also aims to protect rather than just minimise loss of threatened native vegetation and threatened species.

Kingborough Interim Planning Scheme 2015 includes a Biodiversity Management Zone. The Code is explicit in identifying vegetation types and habitats that require protection.

APPENDIX 2 - STAKEHOLDERS BY LAND TENURE AND AREA (HA).

Parcel Description	Tenure	Area (ha)
Aboriginal Land	Freehold Title	42.54
Acquired Road	Crown Land	350.83
	Freehold Title	0.03
Aurora Energy Pty Ltd	Freehold Title	0.54
Casement Unknown	Unknown	1.02
Commonwealth of Australia	Commonwealth of Australia	2.70
Department of Education	Crown Land	61.29
Dept. of Health and Human Service	Crown Land	7.23
Dept. of Police and Public Safety	Crown Land	0.84
DPIPWE (Crown Land Services)	Crown Land	1980.61
	Marine Crown Land	0.00
	Tidal Crown Land	216.18
	Vertical Subdivision	2.63
DPIPWE Future Potential Production Forest ⁶	Crown Land	5258.01
Footway	Council	12.27
	Crown Land	0.01
	Freehold Title	4.86
	Unknown	0.08
Forestry Tasmania	Crown Land	2401.17
Horseway	Council	1.46
Housing Tasmania	Freehold Title	92.80
	Horizontal Strata	2.38

⁶ This land is currently reserved but the Liberal governments policy is to reconsider its potential to be harvested after 6 years from the date of the policy. This may result in the lands tenure changing at that time.

Parcel Description	Tenure	Area (ha)
	Vertical Strata	0.08
Hydro Electric Corporation	Freehold Title	0.01
LGA Subdivision Road	Council	128.65
	Crown Land	14.30
	Freehold Title	180.12
Local Government Authority	Council	651.78
	Crown Land	0.04
	Freehold Title	22.43
	Vested	1909.31
Marine and Safety Tasmania	Crown Land	0.02
Onshore Water Body	Not Applicable	35.64
Parks and Wildlife Service	Crown Land	12454.13
	Marine Crown Land	211.33
	Tidal Crown Land	1765.25
Private Parcel	Body Corporate	288.96
	Council	1.52
	Freehold Title	44906.97
	Horizontal Strata	238.39
	Multiple Interest	0.20
	Share Title	11.76
	Unknown	2.94
	Vertical Strata	8.96
Reserved Road	Crown Land	144.06
	Freehold Title	0.28
	Unknown	0.53

Parcel Description	Tenure	Area (ha)
Road (type unknown)	Council	0.52
	Crown Land	33.12
	Freehold Title	3.18
	Unknown	850.54
State Fire Commission	Freehold Title	2.78
State Growth (DIER)	Crown Land	34.83
State Growth (Econ Dev)	Freehold Title	2.17
Subdivision Road	Body Corporate	0.13
	Council	20.59
	Crown Land	16.11
	Freehold Title	38.86
	Unknown	1.46
Tasmanian Ambulance Service	Crown Land	0.12
Tasmanian Ports Corporation Pty Ltd	Freehold Title	0.25
TasWater	Freehold Title	12.82
Tramway	Crown Land	5.10
	Unknown	0.78
Transend Networks Pty Ltd	Freehold Title	8.12
University of Tasmania	Crown Land	2.27
User Road	Crown Land	0.17
	Freehold Title	6.92
Walkway	Council	0.14
	Freehold Title	0.08
Water Race	Crown Land	0.12
Total		74458.33

APPENDIX 3 - PRIORITY DECLARED WEEDS IN KINGBOROUGH MUNICIPALITY.

A = WMA A, B = WMA B, li = local infestation, io = infestation outlier, wi = widespread infestation.

Species	Common name	WMA	WONS	Priority Rank	Local zone
<i>Amsinckia sp.</i>	fiddleneck	A	-	2	Ali
<i>Asparagus asparagoides</i>	bridal creeper	A	Yes	1	Aio
<i>Calluna vulgaris</i>	heather	A	-	2	Awi
<i>Carduus nutans</i>	nodding thistle	A	-	1	Ali
<i>Carex spp.</i> (reported but location unknown)		A	-	1	Ali
<i>Cenchrus macrourus</i>	african feather grass	A	-	1	Aio
<i>Coprosma robusta</i>	karamu	A	-	1	Ali
<i>Cortaderia jubata</i>	pink pampas grass	A	-	1	Ali
<i>Cortaderia selloana</i>	common pampas grass	A	-	4	Bwi
<i>Cortaderia sp.</i>	pampas grass	A	-	4	Bwi
<i>Echium plantagineum</i>	paterson's curse	A	-	2	Awi
<i>Hieracium aurantiacum</i>	orange hawkweed	A	-	1	Ali
<i>Hypericum perforatum</i>	St John's wort	A	-	1	Ali
<i>Lepidium draba</i>	white weed	A	-	1	Ali
<i>Marrubium vulgare</i>	horehound	A	-	1	Aio
<i>Nassella tenuissima</i>	mexican feather grass	A	-	1	Ali
<i>Rorippa sylvestris</i>	creeping yellow cress	A	-	1	Aio
<i>Urospermum dalechampii</i>	mediterranean daisy	A	-	1	Aio
<i>Asteraceae sp.</i>	thistle	B	-	4	Bwi
Species	Common name	WMA	WONS	Priority	Local

				Rank	zone
<i>Carduus pycnocephalus</i>	slender thistle	B	-	1	Ali
<i>Carduus tenuiflorus</i>	winged thistle	B	-	1	Ali
<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	boneseed	B	Yes	4	Bwi
<i>Cirsium arvense</i>	californian thistle	B	-	1	Ali
<i>Cytisus scoparius</i>	english broom	B	Yes	4	Bwi
<i>Erica lusitanica</i>	spanish heath	B	-	4	Bwi
<i>Foeniculum vulgare</i>	fennel	B	-	4	Bwi
<i>Genista monspessulana</i>	montpellier broom	B	Yes	4	Bwi
<i>Genista / Cytisus</i>	broom	B	-	4	Bwi
<i>Leycesteria formosa</i>	elisha's tears	B	-	4	Bwi
<i>Lycium ferocissimum</i>	african boxthorn	B	Yes	3	Bli
<i>Nasella trichotoma</i>	Serrated tussock	B	Yes	1	Ali
<i>Rubus fruticosus</i>	blackberry	B	Yes	4	Bwi
<i>Salix cinerea</i>	grey willow	B	Yes	4	Bwi
<i>Salix</i> sp.incl <i>matsudana</i> , x <i>pendulina</i>	willow	B	Yes	3	Bli
<i>Salix</i> x <i>fragilis</i> <i>notho</i>	crack willow	B	Yes	4	bwi
<i>Senecio jacobaea</i>	ragwort	B	-	4	Bwi
<i>Ulex europaeus</i>	gorse	B	Yes	4	Bwi

APPENDIX 4 – ZONE A WEEDS THAT ARE NOT RECORDED IN KINGBOROUGH.

Declared weeds not currently known within Kingborough Municipal Area			
Weed	WMA Zone	Distribution in Council and notes	WON S
<i>Acacia nilotica ssp. indica</i> prickly acacia	Zone A	Not known to occur in Tasmania	YES
<i>Alternanthera philoxeroides</i> alligator weed	Zone A	Only known from gardens within Tasmania	YES
<i>Amaranthus albus</i> tumbleweed	Zone A	No known records in Kingborough	
<i>Amelichloa caudata</i> espartillo	Zone A	No known records in Kingborough	
<i>Annona glabra</i> pond apple	Zone A	Not known to occur in Tasmania	YES
<i>Asparagus scandens</i> asparagus fern	Zone A	No known records in Kingborough	YES
<i>Bassia scoparia</i> Kochia	Zone A	Previously recorded elsewhere in Tasmania	
<i>Berberis darwinii</i> darwin's barberry	Zone A	No known records in Kingborough	
<i>Berkheya rigida</i> african thistle	Zone A	No known records	
<i>Bifora testiculata</i> Bifora	Zone A	Not known to be naturalised in Tasmania	
<i>Cabomba caroliniana</i> cambomba	Zone A	Not known to be naturalised in Tasmania	YES
<i>Carex albula</i> , <i>C. buehneri</i> , <i>C. flagellifera</i> and <i>C. testacea</i> new zealand	Zone A	Reported in Kingborough (location unknown)	
<i>Cenchrus longispinus</i> innocent weed <i>Cenchrus incertus</i> spiny burrgrass	Zone A	Not known to be naturalised in Tasmania	

Declared weeds not currently known within Kingborough Municipal Area			
Weed	WMA Zone	Distribution in Council and notes	WON S
<i>Centaurea calcitrapa</i> star thistle	Zone A	Not known to be naturalised in Tasmania	
<i>Centaurea eriophora</i> mallee cockspur	Zone A	Not known to be naturalised in Tasmania	
<i>Ceratophyllum demersum</i> hornwort	Zone A	Not known to be naturalised in Tasmania	
<i>Chondrilla juncea</i> skeleton weed	Zone A	Not known to be naturalised in Tasmania	
<i>Crupina vulgaris</i> common crupina	Zone A	Not known in Tasmania	
<i>Cryptostegia grandiflora</i> rubber vine	Zone A	Not known to occur in Tasmania	YES
<i>Cuscuta</i> species	Zone A	No known records in Kingborough	
<i>Cynara cardunculus</i> artichoke thistle	Zone A	Previously recorded elsewhere in Tasmania	
<i>Cyperus esculentus</i> yellow nut grass	Zone A	Not known to be naturalised in Tasmania	
<i>Cyperus rotundus</i> purple nut-grass	Zone A	Not known to be naturalised in Tasmania	
<i>Cytisus multiflorus</i> white spanish broom	Zone A	Not known to be naturalised in Tasmania	
<i>Datura</i> species	Zone A	No known records in Kingborough	
<i>Dittrichia viscosa</i> false Yellowhead	Zone A	Not known to be naturalised in Tasmania	
<i>Egeria densa</i> egeria/ dense water weed	Zone A	No known records in Kingborough	
<i>Eichhornia crassipes</i> water hyacinth	Zone A	Not known to be naturalised in Tasmania	

Declared weeds not currently known within Kingborough Municipal Area			
Weed	WMA Zone	Distribution in Council and notes	WON S
<i>Eleocharis parodi</i> parodi	Zone A	Not known to be naturalised in Tasmania	
<i>Elodea canadensis</i> canadian pondweed	Zone A	Occurs in the Coal River and Derwent Valley	
<i>Equisetum</i> species horsetail	Zone A	No known records in Kingborough. Occurs on the Tasman and at Cygnet	
<i>Fallopia japonica</i> japanese knotweed	Zone A	No known records in Kingborough	
<i>Festuca gautieri</i> bear-skin fescue	Zone A	Not naturalised in Australia	
<i>Galium spurium</i> false cleavers	Zone A	Not known to be naturalised in Tasmania	
<i>Galium tricornutum</i> three-horned bedstraw	Zone A	Not known to be naturalised in Tasmania	
<i>Gymnocoronis spilanthoides</i> senegal tea plant	Zone A	Not known to be naturalised in Tasmania	
<i>Heliotropium europaeum</i> common heliotrope	Zone A	Not known to be naturalised in Tasmania	
<i>Heracleum mantegazzianum</i> giant hogweed	Zone A	Not known to be naturalised in Tasmania	
<i>Hydrilla verticillata</i> hydrilla	Zone A	Not known to be naturalised in Tasmania	
<i>Hymenachne amplexicaulis</i> hymenachne	Zone A	Not known to be naturalised in Tasmania	YES
<i>Hypericum tetrapterum</i> square stemmed St John's wort	Zone A	No known records in Kingborough	
<i>Lagarosiphon major</i> oxygen weed	Zone A	Not known to be naturalised in Tasmania	
<i>Lantana camara</i> lantana	Zone A	Not known to be naturalised in Tasmania	YES
<i>Miconia</i> species	Zone	Not known to occur in Tasmania	YES

Declared weeds not currently known within Kingborough Municipal Area			
Weed	WMA Zone	Distribution in Council and notes	WON S
miconia	A		
<i>Moraea species</i> cape tulips	Zone A	No known records in Kingborough	
<i>Nassella hyaline</i> cane needle grass <i>Nassella leucotricha</i> Texas needle grass <i>Nassella charruana</i> Lobed needle grass <i>Nassella neesiana</i> Chilean needle grass	Zone A	No known records in Kingborough	
<i>Oenanthe pimpinelloides</i> meadow parsley	Zone A	No known records in Kingborough – 1 st record in Tasmania late 2013 in the north	
<i>Onopordum species</i> cotton/stemless thistles	Zone A	No known records in Kingborough	
<i>Orobanche species</i> broomrape	Zone A	Not known to be naturalised in Tasmania	
<i>Parkinsonia aculeata</i> parkinsonia	Zone A	Not known to occur in Tasmania	YES
<i>Parthenium hysterophorus</i> Parthenium weed	Zone A	Not known to occur in Tasmania	YES
<i>Pennisetum villosum</i> feathertop	Zone A	No known records in Kingborough	
<i>Prosopis species</i> mesquite	Zone A	Not known to be naturalised in Tasmania	YES
<i>Sagittaria montevidensis</i> arrowhead	Zone A	Not known to be naturalised in Tasmania	
<i>Sagittaria platyphylla</i> sagittaria	Zone A	Not known to be naturalised in Tasmania	YES
<i>Salpichroa organifolia</i> pampas lily of the valley	Zone A	No known records in Kingborough	

Declared weeds not currently known within Kingborough Municipal Area			
Weed	WMA Zone	Distribution in Council and notes	WON S
<i>Salvinia molesta</i> salvinia	Zone A	Not known to be naturalised in Tasmania	YES
<i>Senecio glastifolius</i> holly-leaved Senecio	Zone A	Not known to be naturalised in Tasmania	
<i>Solanum elaeagnifolium</i> silver leaf nightshade	Zone A	Not naturalised but is occasionally recorded within the south east	YES
<i>Solanum sodomaeum</i> apple of sodom	Zone A	Not known to be naturalised in Tasmania	
<i>Striga</i> species witchweed	Zone A	Not naturalised in Tasmania	
<i>Tamarix aphylla</i> athel pine	Zone A	Not known to be naturalised in Tasmania	YES
<i>Trapa</i> species floating water chestnut	Zone A	Not naturalised in Australia	
<i>Tribulus terrestris</i> caltrop	Zone A	Not known to be naturalised in Tasmania	
<i>Zizania</i> species wild rice	Zone A	Previoulsy recorded elsewhere in Tasmania	

APPENDIX 5 – NATIONAL ENVIRONMENTAL ALERT LIST

(Shaded = declared weed or potential to establish)

Species	Common Name	Information
<i>Asystasia gangetica</i>	chinese/philippine violet	Restricted to NSW at this time
<i>Barleria prionitis</i>	barleria, porcupine flower	Prefers wet dry tropics of northern Australia
<i>Bassia scoparia</i>	kochia	Has naturalised parts of temperate Asia and infestations have been recorded near carrot crops near Deloraine and Devonport. Declared Weed
<i>Culluna vulgaris</i>	heather	Known near Kingston and Bruny Island with past observations near Lake Augusta in Central highlands and near Meander in the north. Naturalised in New Zealand Declared Weed
<i>Chromolaena odorata</i>	siam weed	Currently confined to northern Qld
<i>Cynoglossum creticum</i>	blue hound's tongue	Only known from near Eden, NSW
<i>Cyperus teneristolon</i>	sedge, cyperus	Only known from Katoomba, NSW along a creek line
<i>Cytisus multiflorus</i>	white spanish broom	Only definitive records are from 3 sites in central Victoria. May be well adapted to Tasmania's climate Declared Weed
<i>Dittrichia viscosa</i>	false yellowhead	Recorded on the south coast of WA Declared Weed
<i>Equisetum spp.</i>	horetails	Naturalised in NSW, one of the world's worst weeds. Known from some small locations in northern Tasmania and in the south near Tarana. Declared Weed

Species	Common Name	Information
<i>Gymnocarpus spilanthoides</i>	senegal tea plant	Weed of tropical and subtropical areas
<i>Hieracium aurantiacum</i>	orange hawkweed	Known from NSW to Victoria as well as Central Highlands of Tasmania and Fern Tree near Hobart which is the largest infestation. Has also been noted at Snug. Declared Weed
<i>Koelreuteria elegans subsp. formosana</i>	chinese rain tree	Naturalised in subtropical Qld near Brisbane and Noosa to NSW
<i>Lachenalia reflexa</i>	lachenalia	Known from southern WA
<i>Lagarosiphon major</i>	oxygen weed	All previous records are believed to have been eradicated; however, Tasmania is within its potential distribution range. Declared Weed
<i>Nassella charruana</i>	uruguay needle grass	Known from a few small infestations on the northern outskirts of Melbourne. Potential distribution includes north-eastern Tasmania. Declared Weed
<i>Nassella hyalina</i>	cane needle grass	Major infestations occur near Melbourne and central Victoria. Potential Distribution is not yet known but is closely related to serrated tussock and chilean needle grass, care should be taken in Tasmania Declared Weed
<i>Pelargonium alchemilloides</i>	pelargonium	Very localised in south-western Australia
<i>Pereskia aculeata</i>	leaf cactus	Known from scattered sites in coastal south-eastern QLD and NSW. Potential is in sub tropical riparian vegetation

Species	Common Name	Information
<i>Piptochaetium montevidense</i>	uruguayan rice grass	Naturalised at CherryLake, southern Victoria. Tasmania not thought to be within potential distribution range
<i>Praxelis clematidea</i>	praxelis	Known from central and northern QLD
<i>Retama raetam</i>	white weeping broom	Naturalised in SA.
<i>Senecio glastifolius</i>	holly leaves senecio, pink ragwort	Known from WA and central NSW. Is a serious weed of New Zealand. Declared Weed
<i>Senegalia catechu</i>	cutch tree	A weed of the Northern Territory. Prefers tropical and subtropical climates.
<i>Thunbergia laurifolia</i>	laurel clock vine	A weed of tropical and subtropical regions in QLD
<i>Tipuana tipu</i>	pride of Bolivia, tipuana	Invasive in north eastern NSW and QLD. Widely planted tree around Australia.
<i>Trianoptiles solitaria</i>	subterranean cape sedge	Only known from one site in a suburb of Melbourne
<i>Vachellia karroo</i>	karoo thorn	Not known from Tasmania but has considerable potential to become a troublesome weed across a large portion of southern Australia.

APPENDIX 6 – SOUTHERN REGIONAL HIGH PRIORITY WEEDS

BOTANICAL NAME	COMMON NAMES
<i>asparagoides asparagoides</i>	bridal creeper
<i>Asparagus scandens</i>	asparagus fern, climbing asparagus
<i>Hieracium</i> species	hawkweed, orange hawkweed, mouse-ear hawkweed
<i>Salix cinerea</i>	grey willow, wild pussy willow (seeding willows)
<i>Equisetum</i> species	horsetails
<i>Nassella trichotoma</i>	serrated tussock
<i>Rorippa sylvestris</i>	creeping yellowcress
<i>Calluna vulgaris</i>	heather, ling, scots heather
<i>Amaranthus albus</i>	tumble weed, white pigface
<i>Cortaderia</i> species	pampas grasses
<i>Amelichloa caudata</i>	espartillo
<i>Fallopia japonica</i>	Japanese knotweed
<i>Hypericum perforatum</i>	st John's wort
<i>Hypericum tetrapterum</i>	square stemmed st John's wort
<i>Onopordum</i> species	onopordum thistles
<i>Carduus nutans</i>	nodding thistle
<i>Carthamus lanatus</i>	saffron thistle
<i>Coprosma robusta</i>	karamu
<i>Echium plantagineum</i>	paterson's curse
<i>Echium vulgare</i>	viper's bugloss
<i>Eragrostis curvula</i>	african lovegrass
<i>Pennisetum macrourum</i>	african feathergrass
<i>Pennisetum villosum</i>	feathertop

BOTANICAL NAME	COMMON NAMES
<i>Solanum triflorum</i>	cut leaf nightshade
<i>Senecio jacobaea</i>	ragwort
<i>Leycesteria Formosa</i>	himalayan honeysuckle, elisha's tears
<i>Urospermum dalechampii</i>	mediterranean daisy
<i>Lycium ferocissimum</i>	african boxthorn
<i>Erica lusitanica</i>	spanish heath
<i>Amsinckia</i> species	yellow burr weed, amsinckia

**Note this list was created for the 2008 Southern weed mapping project and therefore some weeds are not necessarily a priority within the Kingborough Municipality.

APPENDIX 7 – DECLARED WEED MAPPING WITHIN MUNICIPALITY

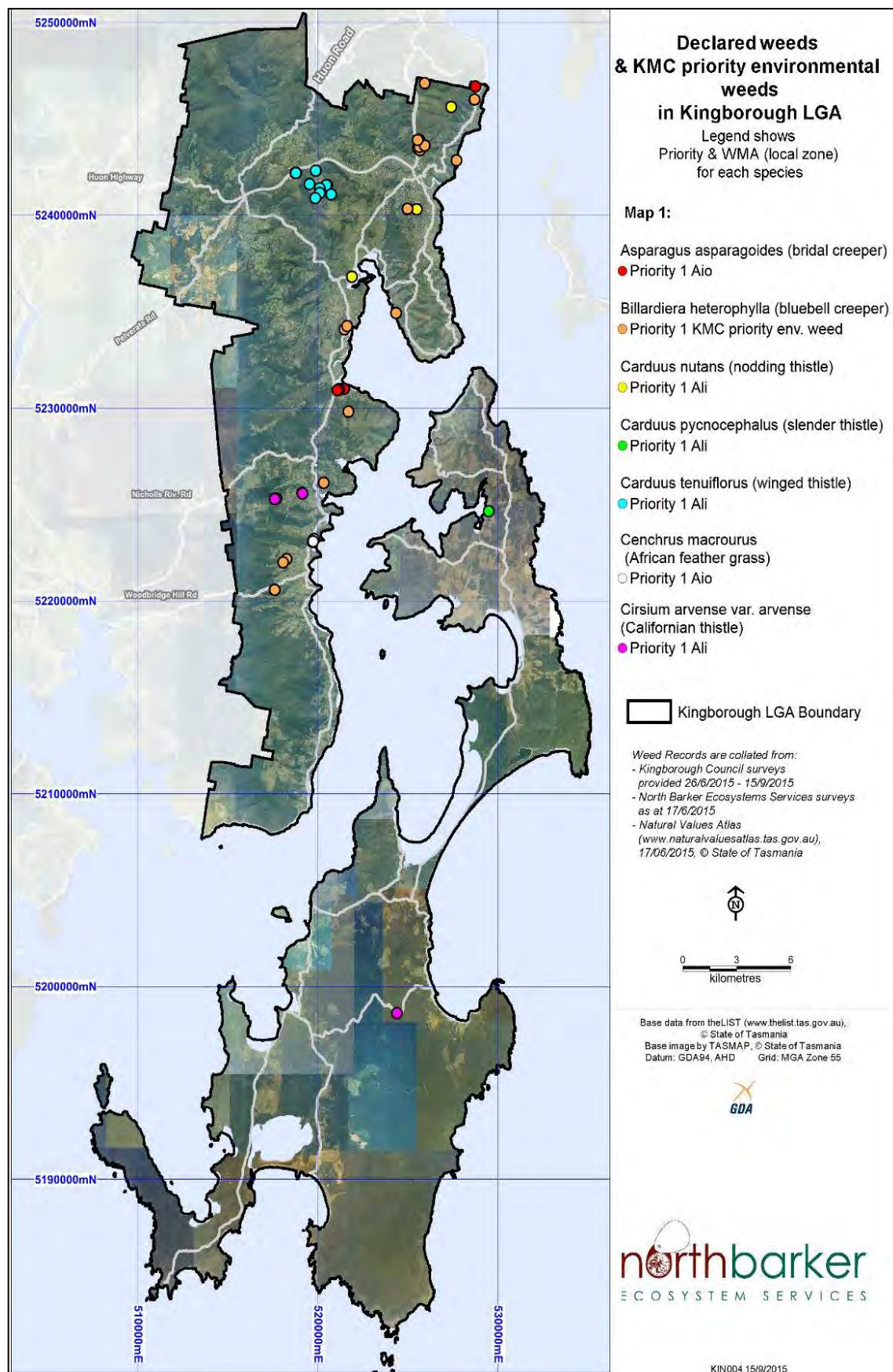


Figure 14 –Declared weeds within Kingborough (Map 1 of 15).

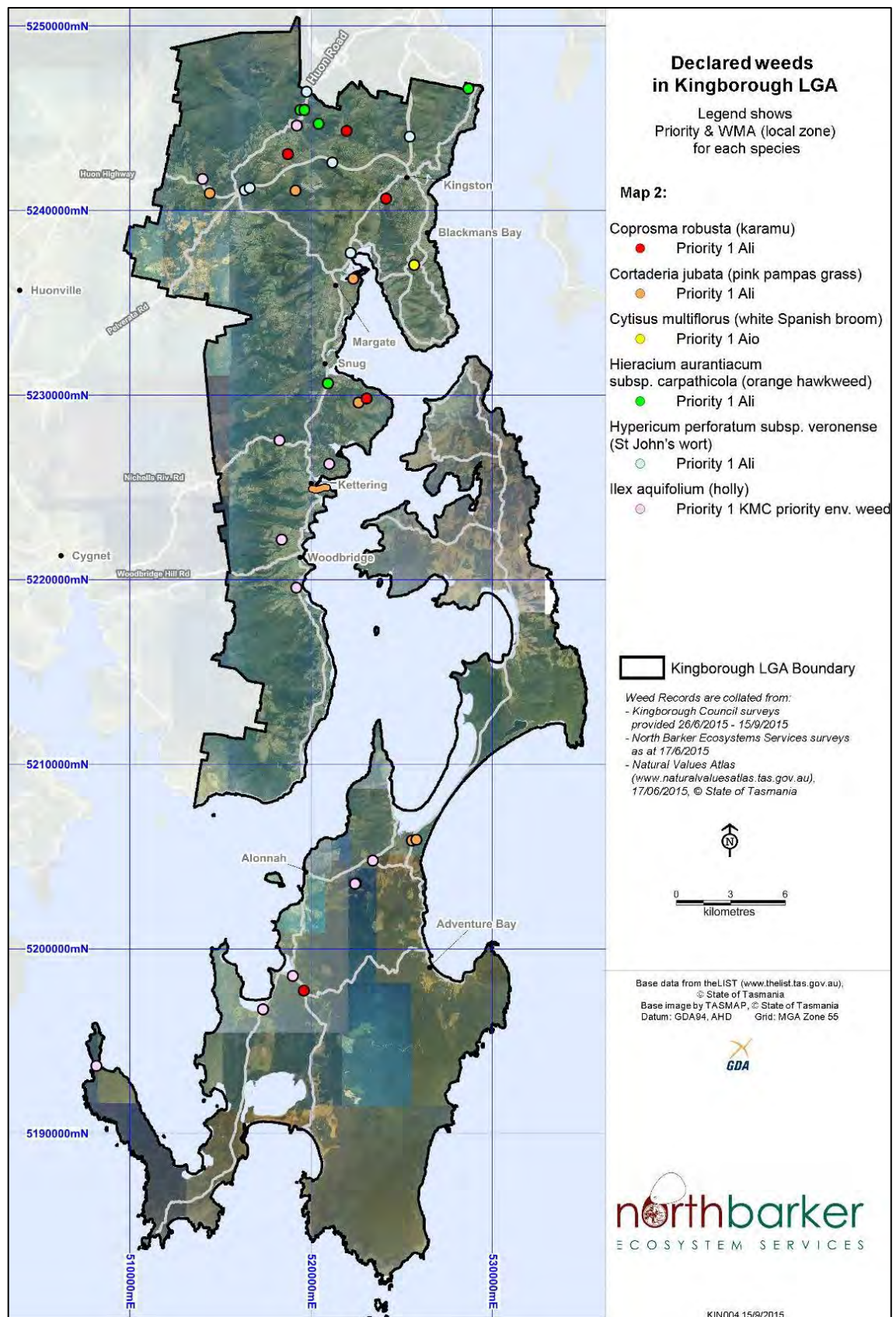
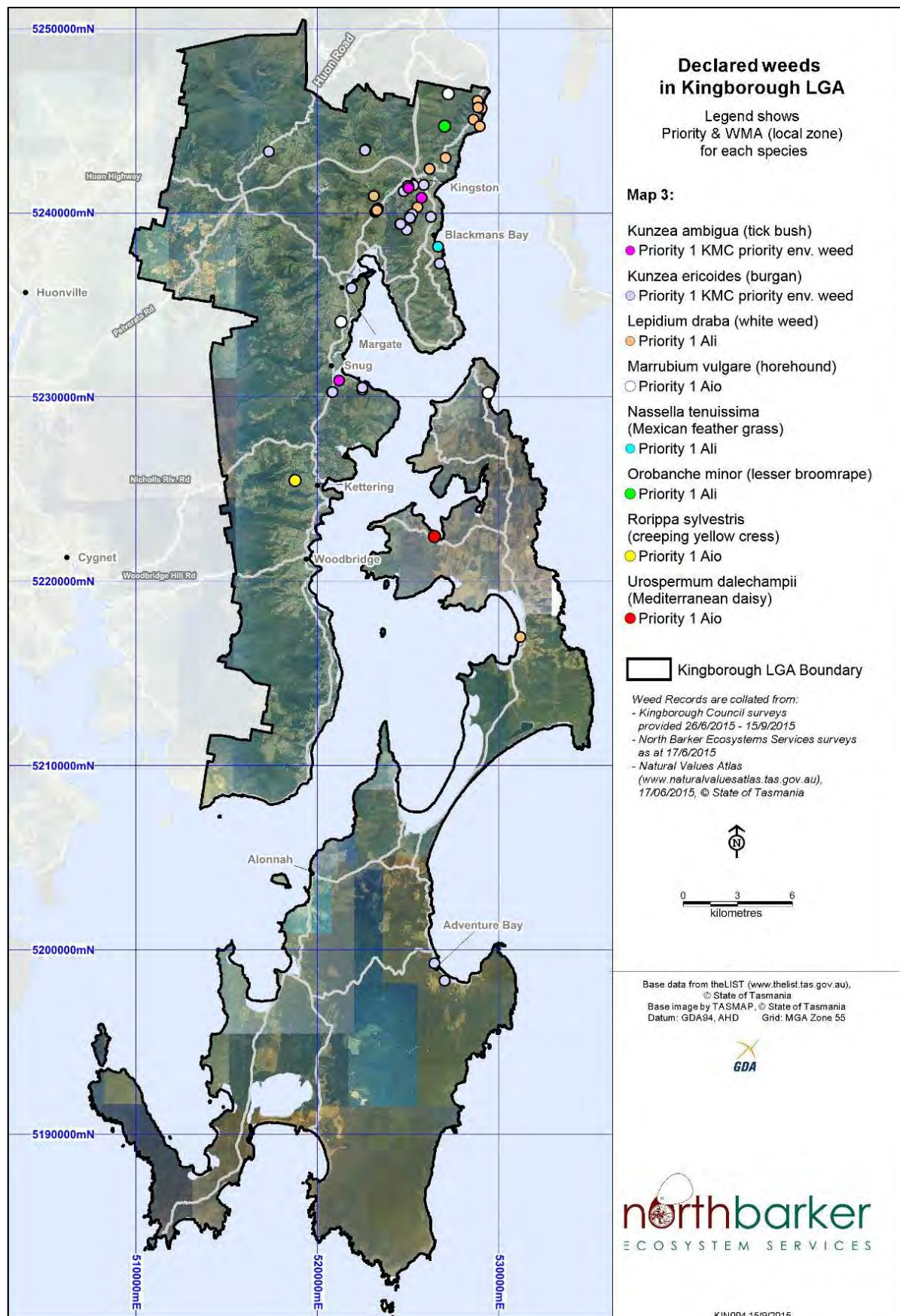


Figure 15 – Declared weeds within Kingborough LGA (Map 2 of 15).



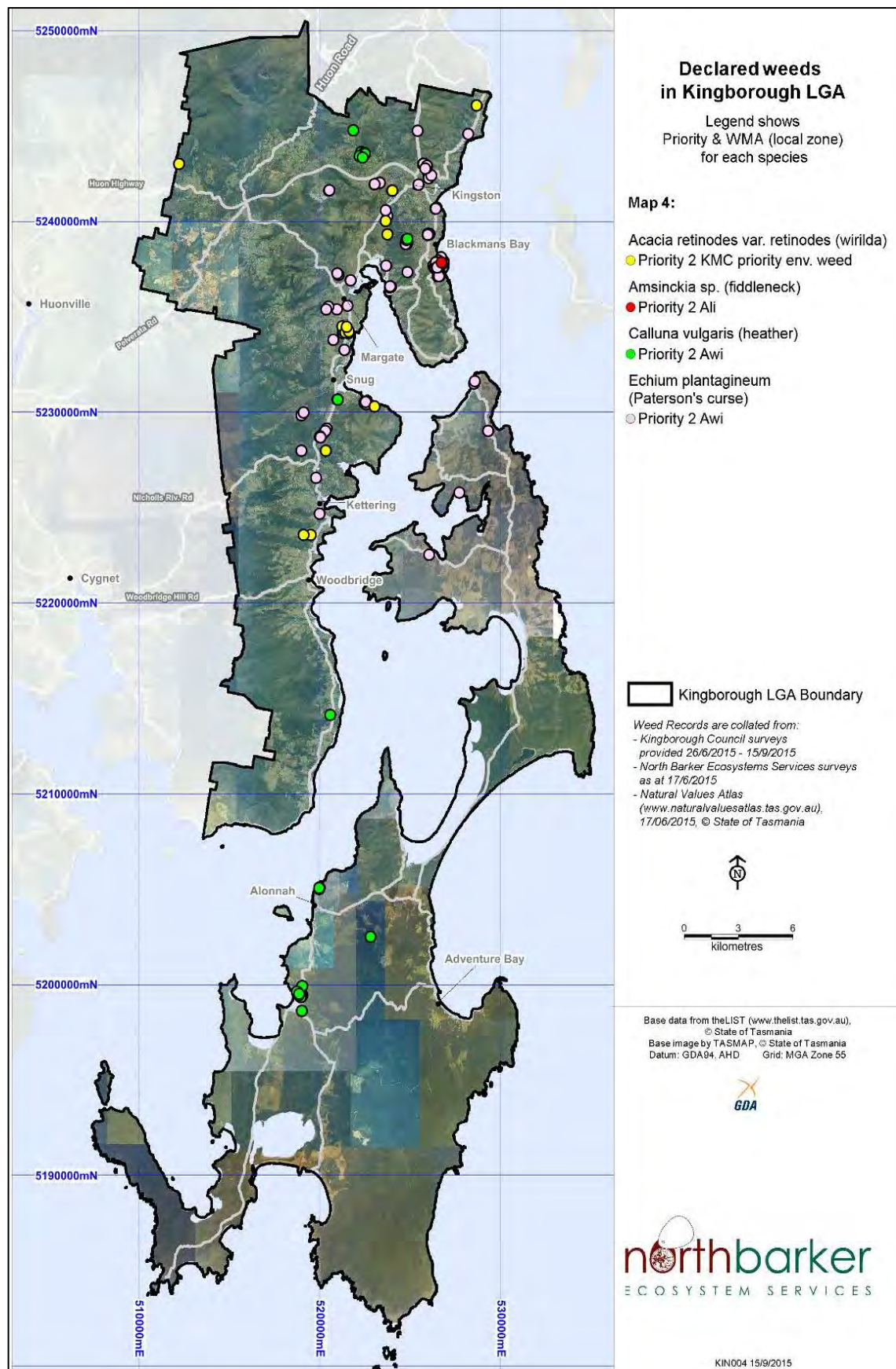


Figure 17 - Declared weeds within Kingborough LGA (Map 4 of 15).

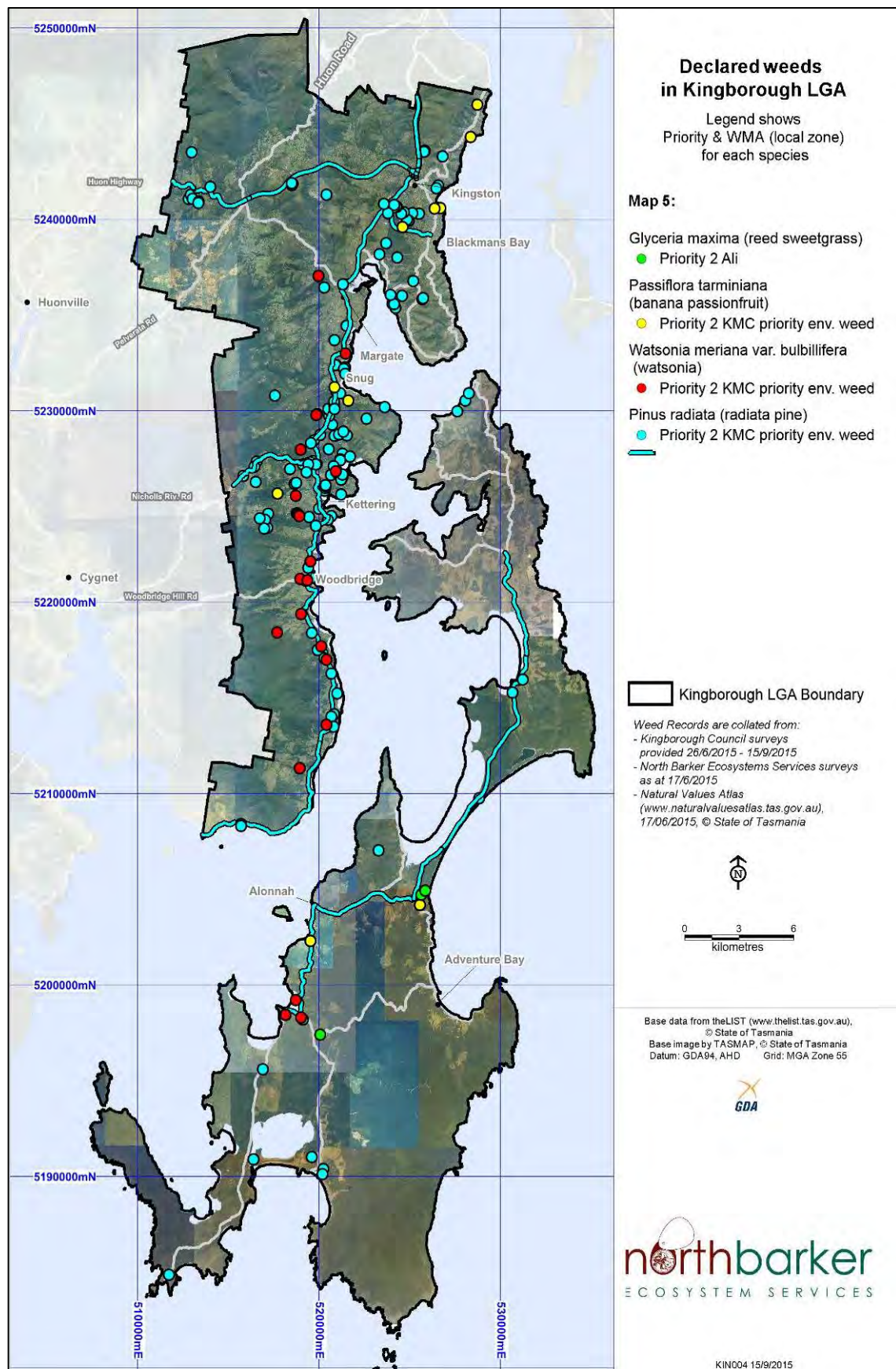


Figure 18 - Declared weeds within Kingborough LGA (Map 5 of 15).

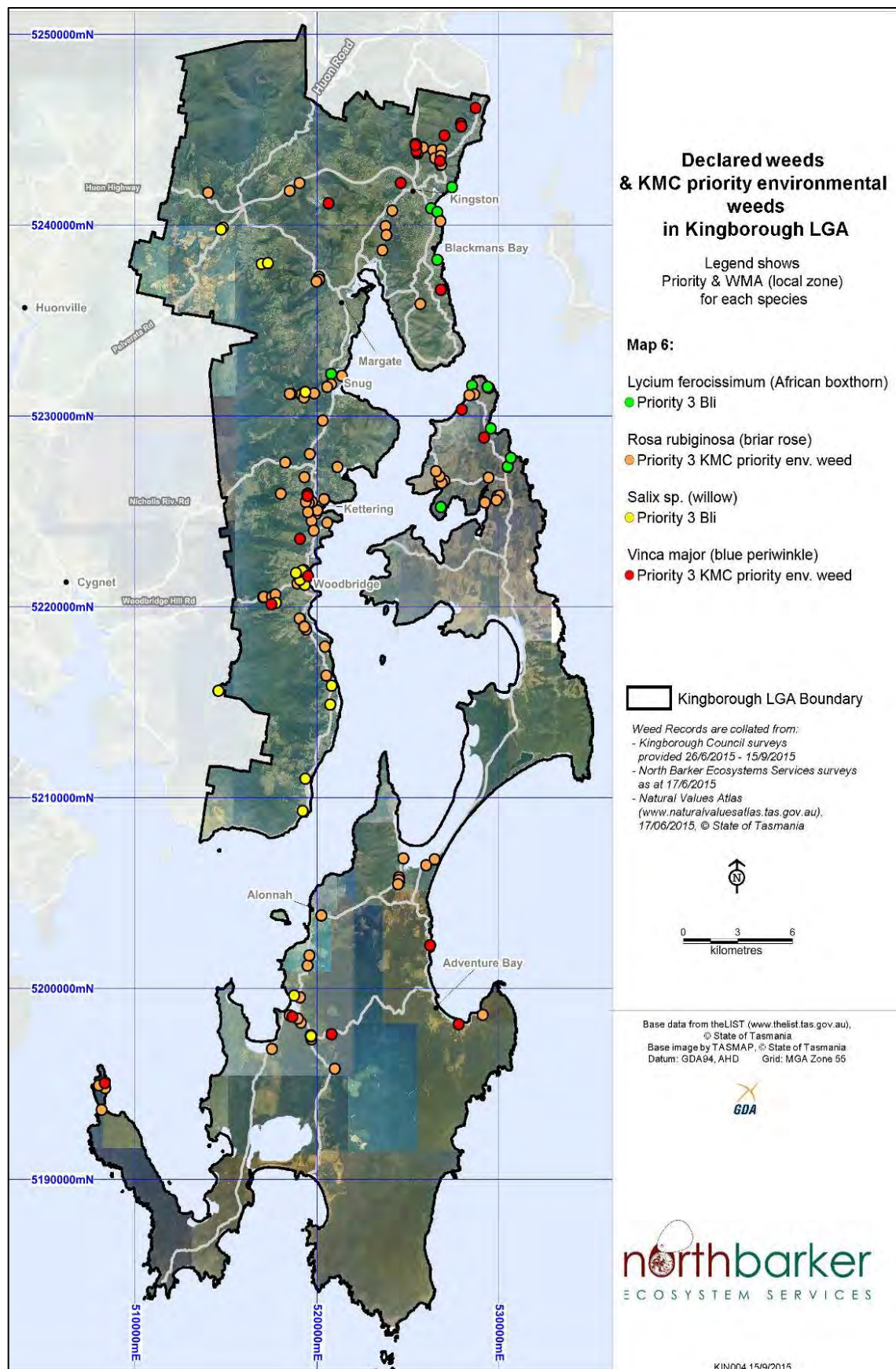


Figure 19 - Declared weeds within Kingborough LGA (Map 6 of 15).

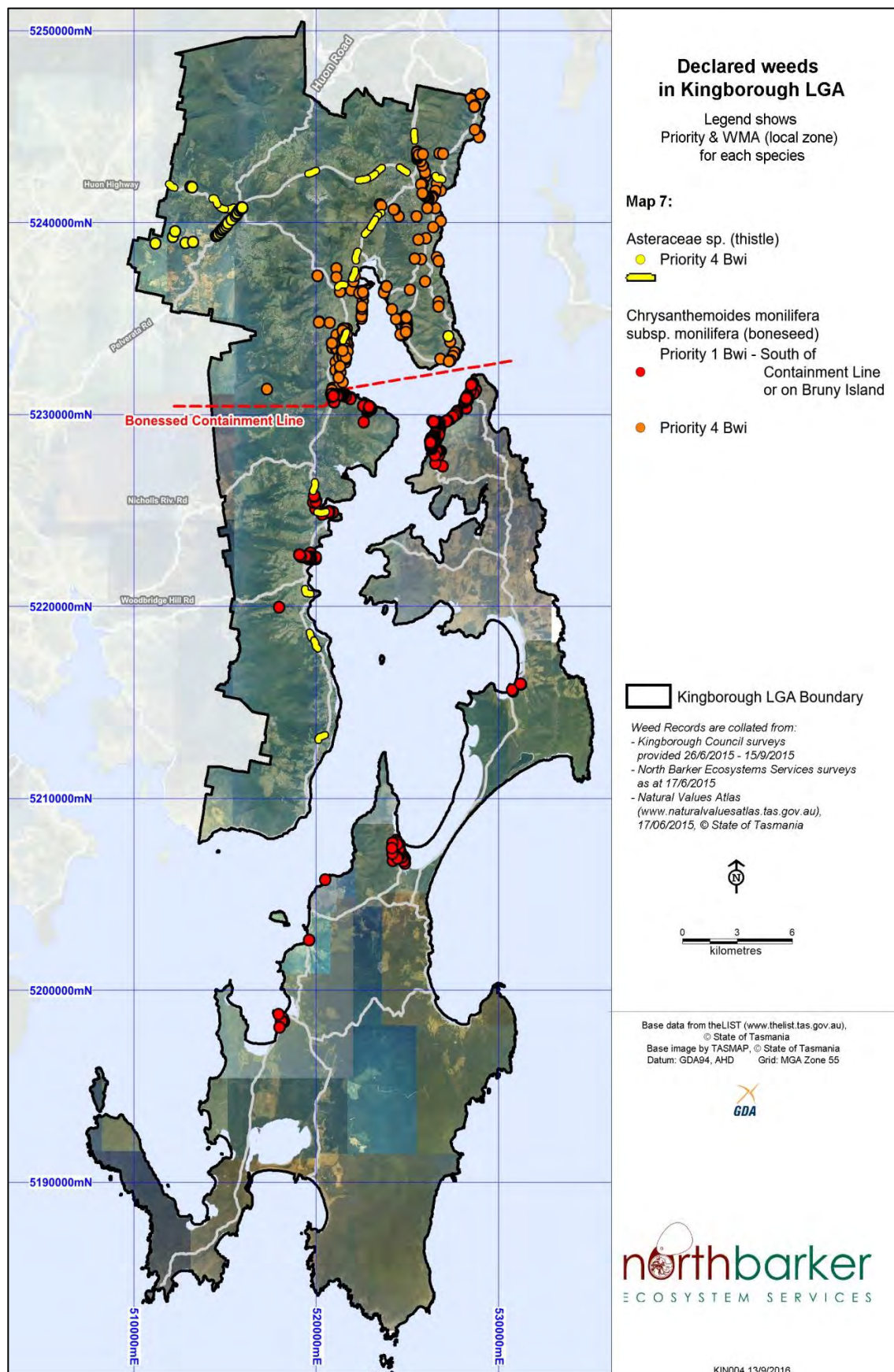


Figure 20 - Declared weeds within Kingborough LGA (Map 7 of 15).

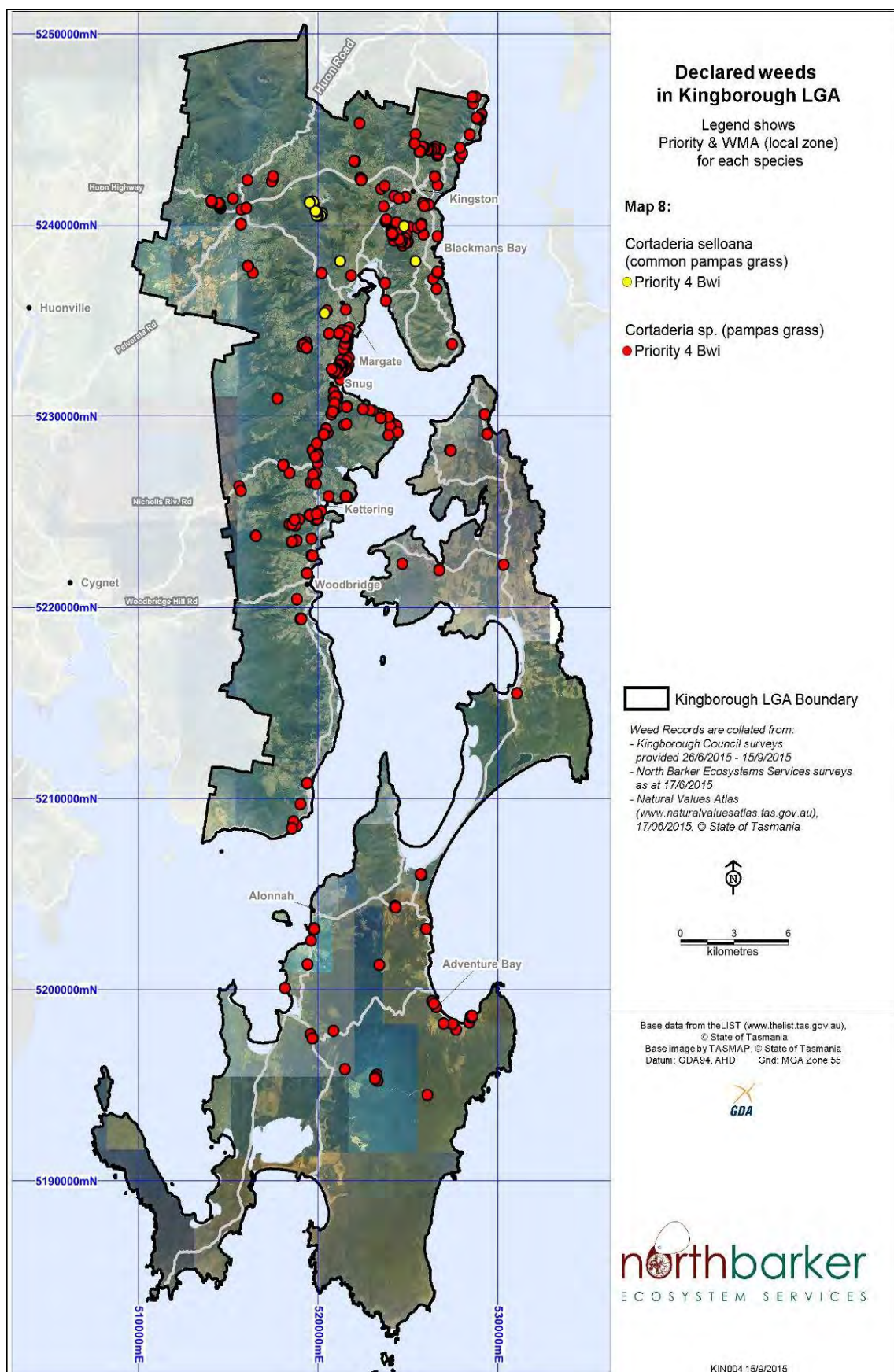


Figure 21 - Declared weeds within Kingborough LGA (Map 8 of 15).

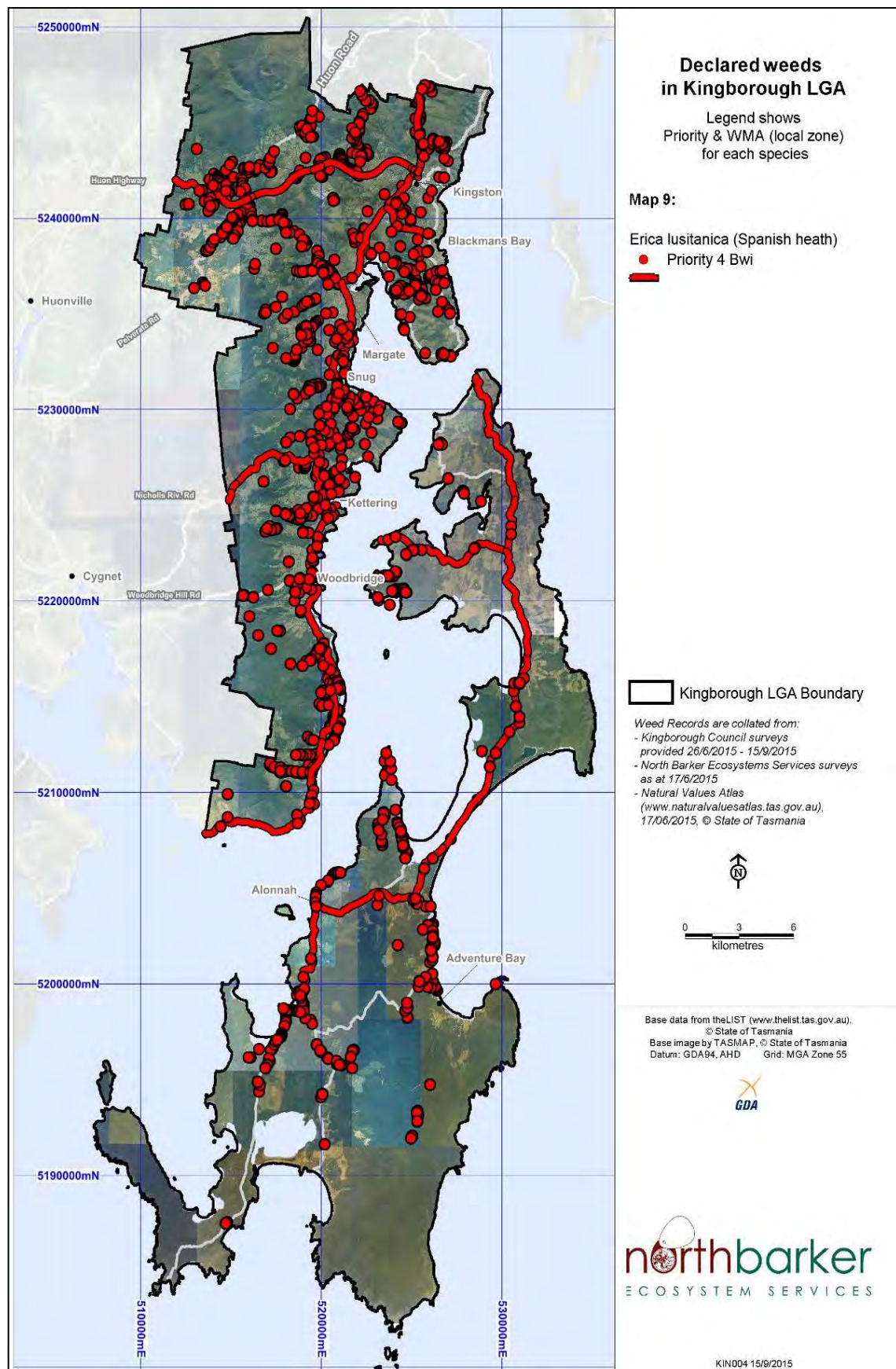


Figure 22 - Declared weeds within Kingborough LGA (Map 9 of 15).

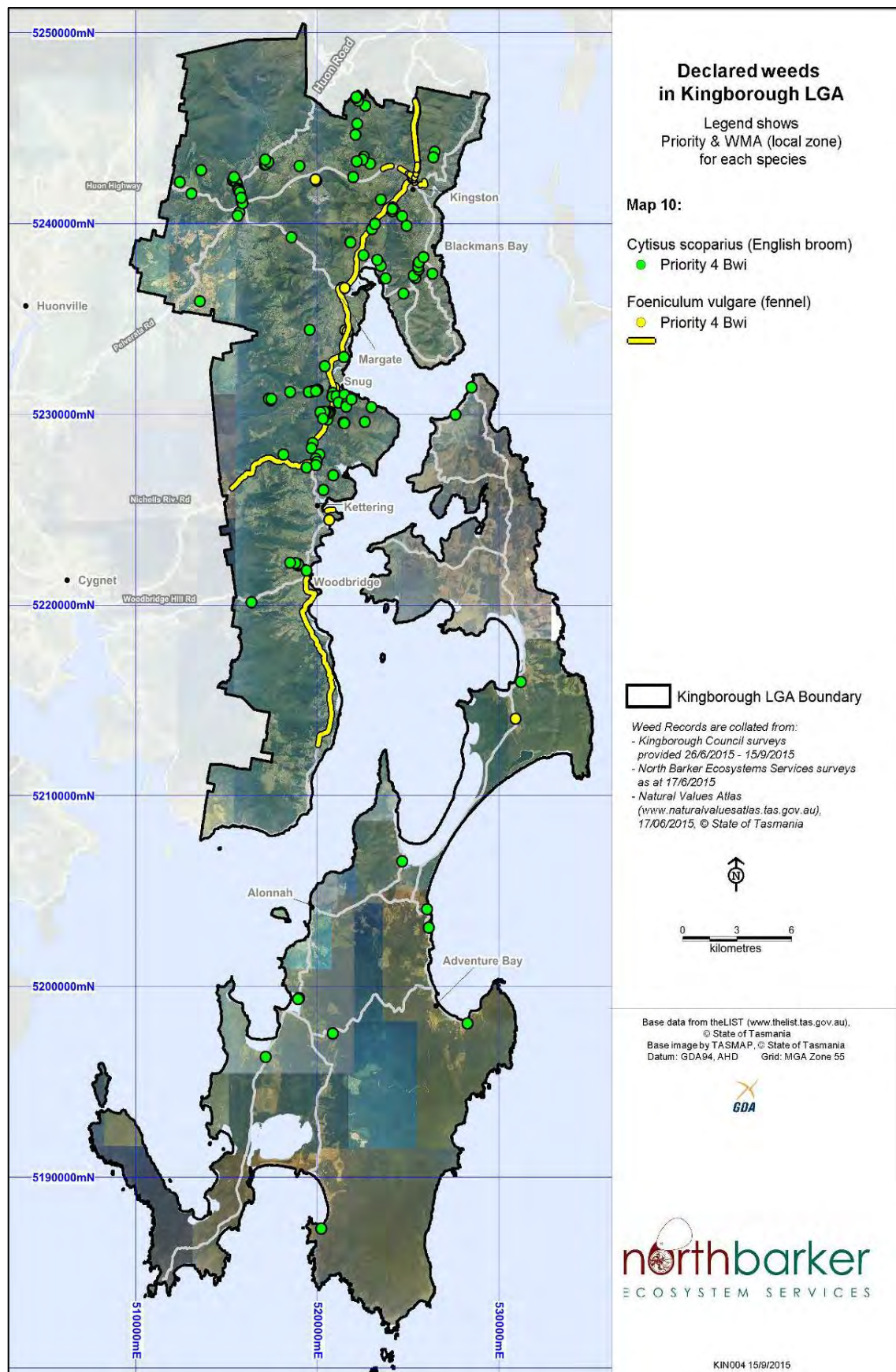


Figure 23- Declared weeds within Kingborough LGA (Map 10 of 15).

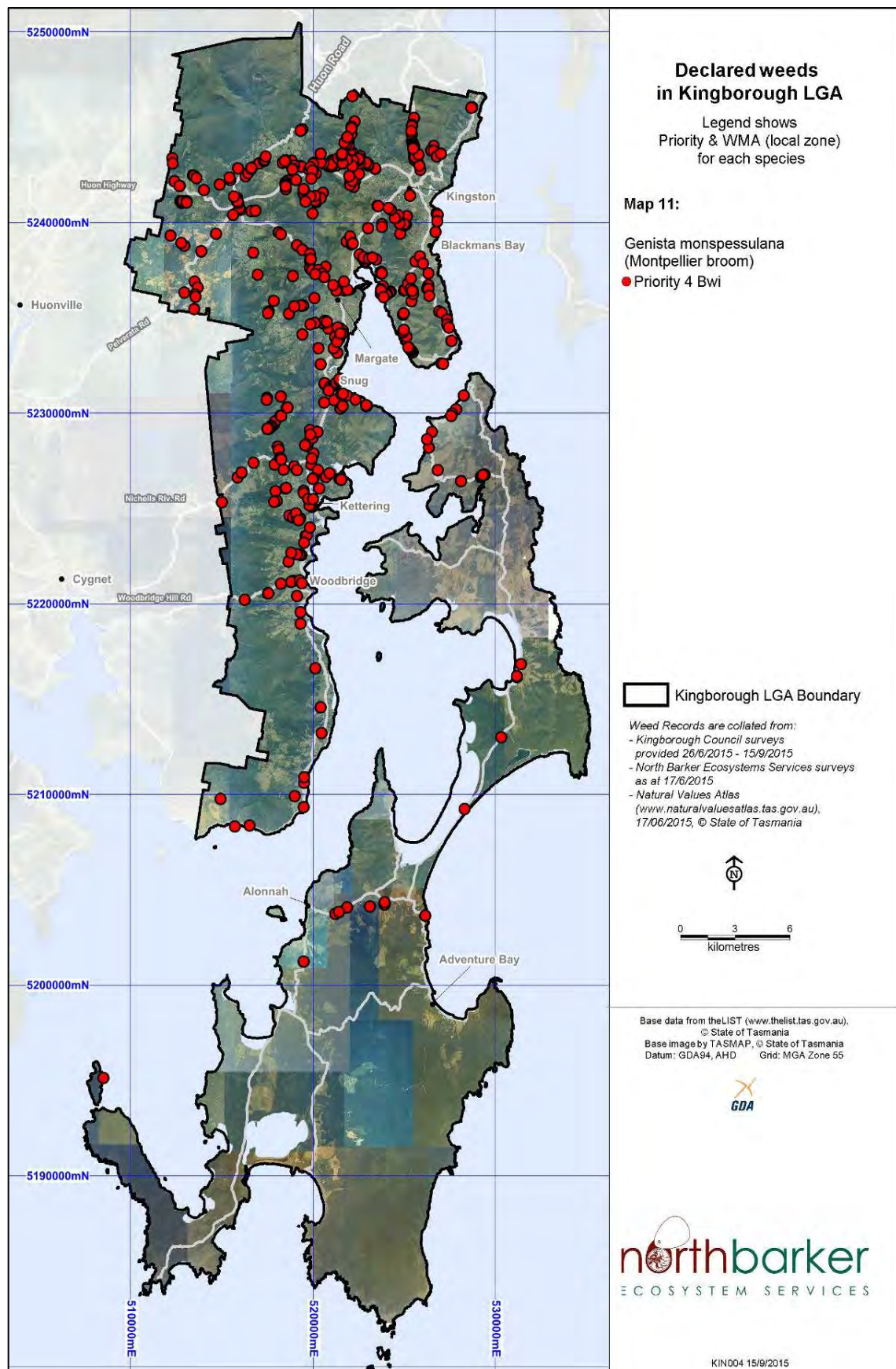


Figure 24 - Declared weeds within Kingborough LGA (Map 11 of 15).

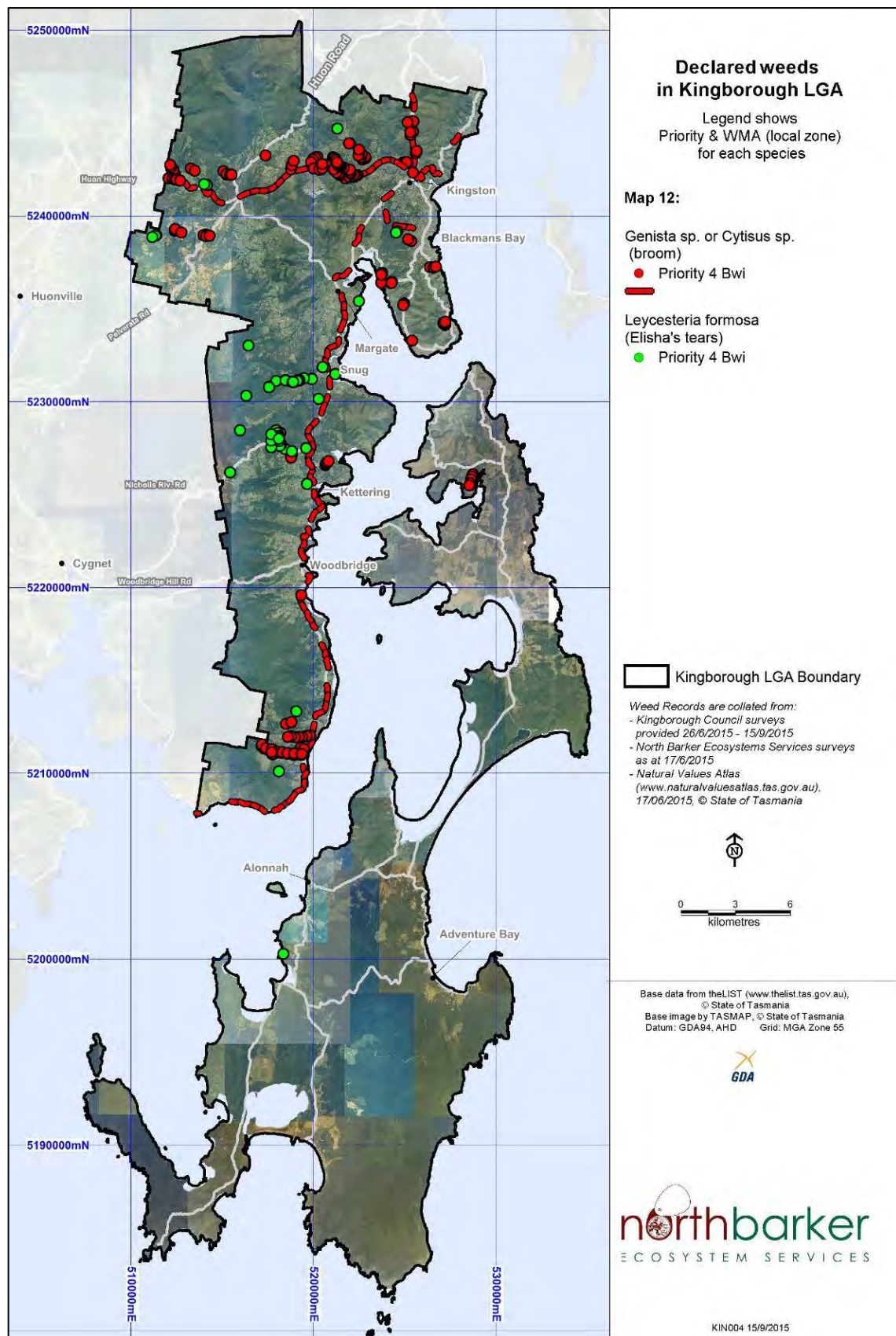


Figure 25 - Declared weeds within Kingborough LGA (Map 12 of 15).

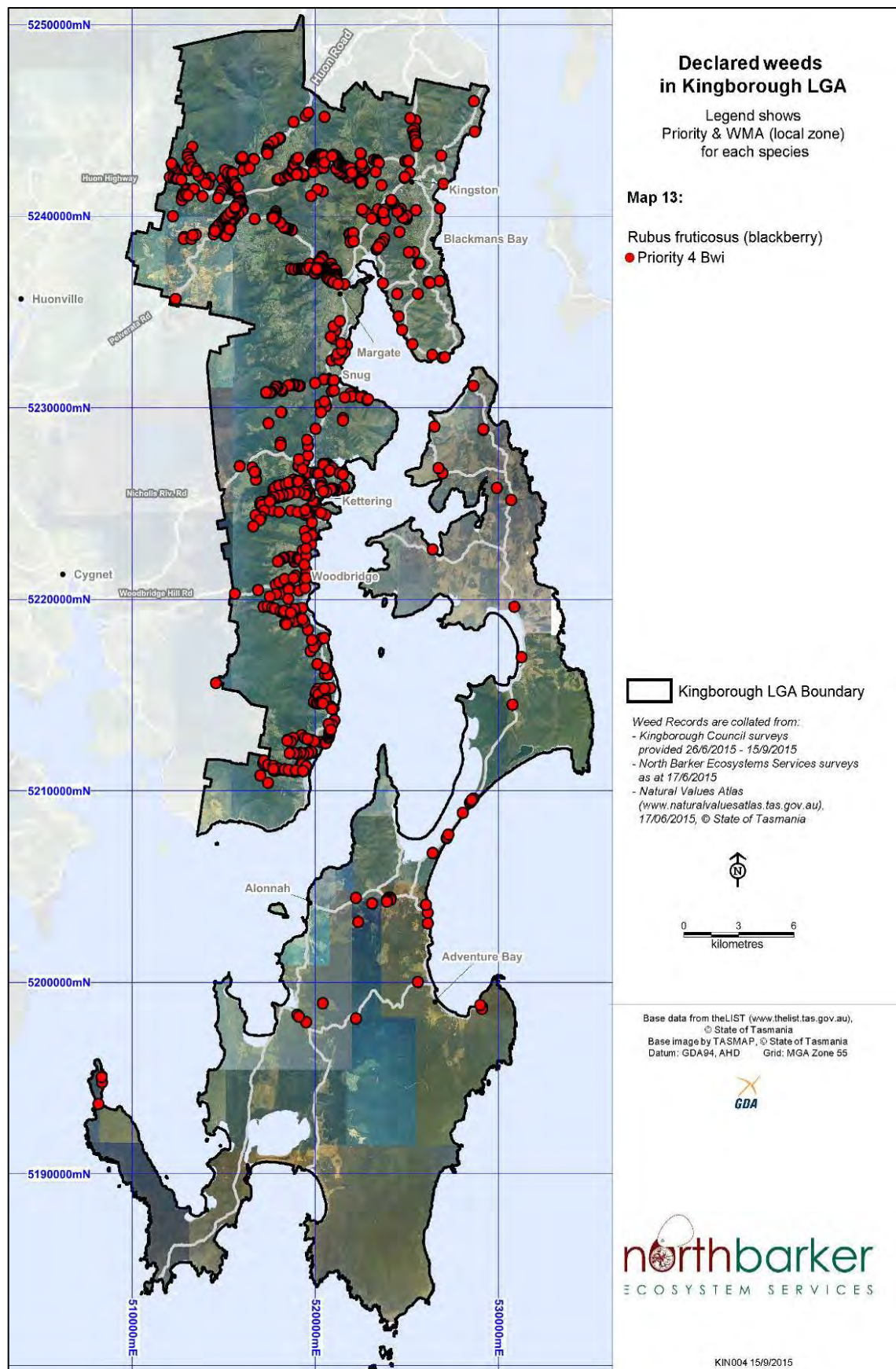


Figure 26 - Declared weeds within Kingborough LGA (Map 13 of 15).

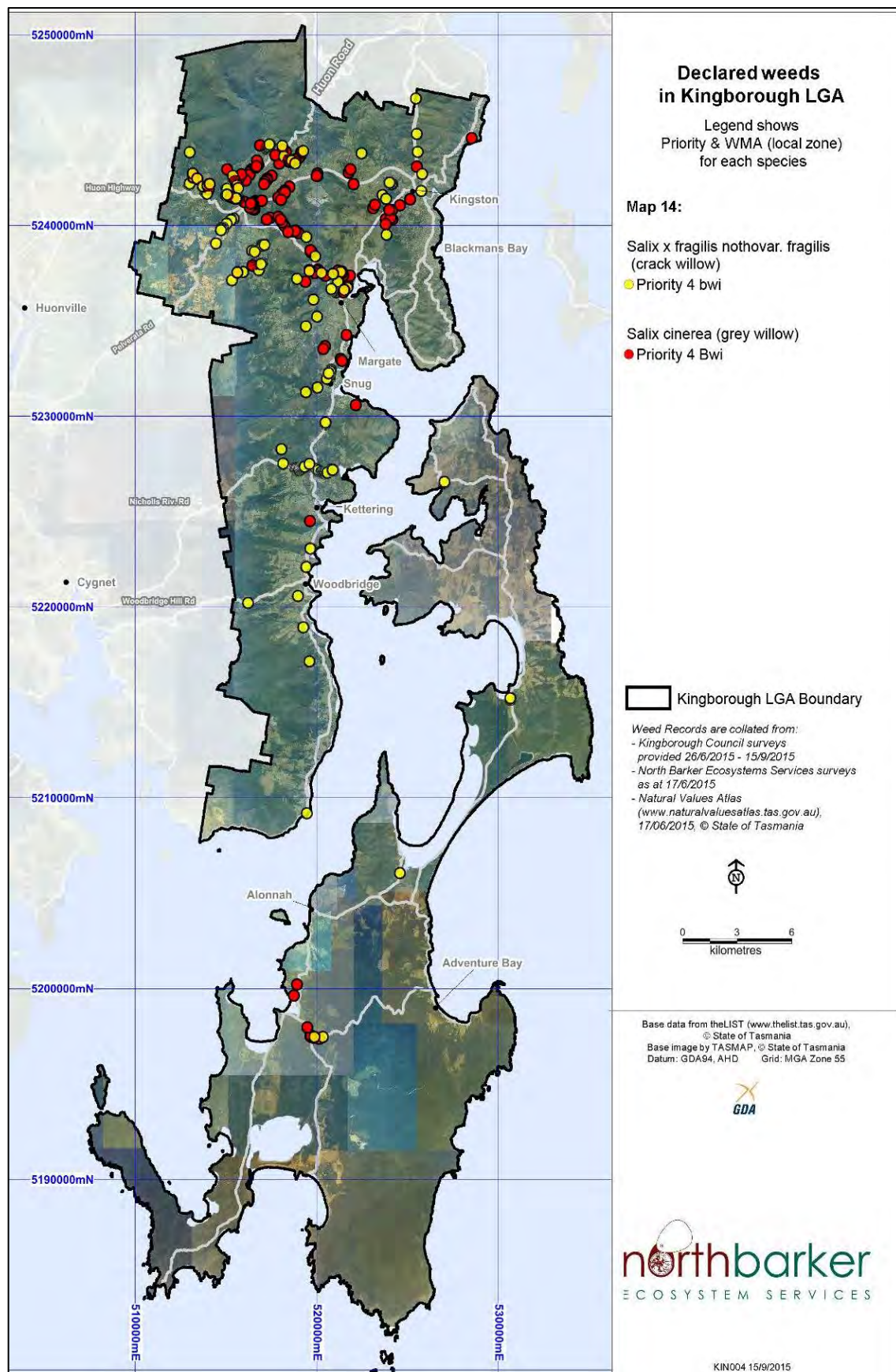


Figure 27 - Declared weeds within Kingborough LGA (Map 14 of 15).

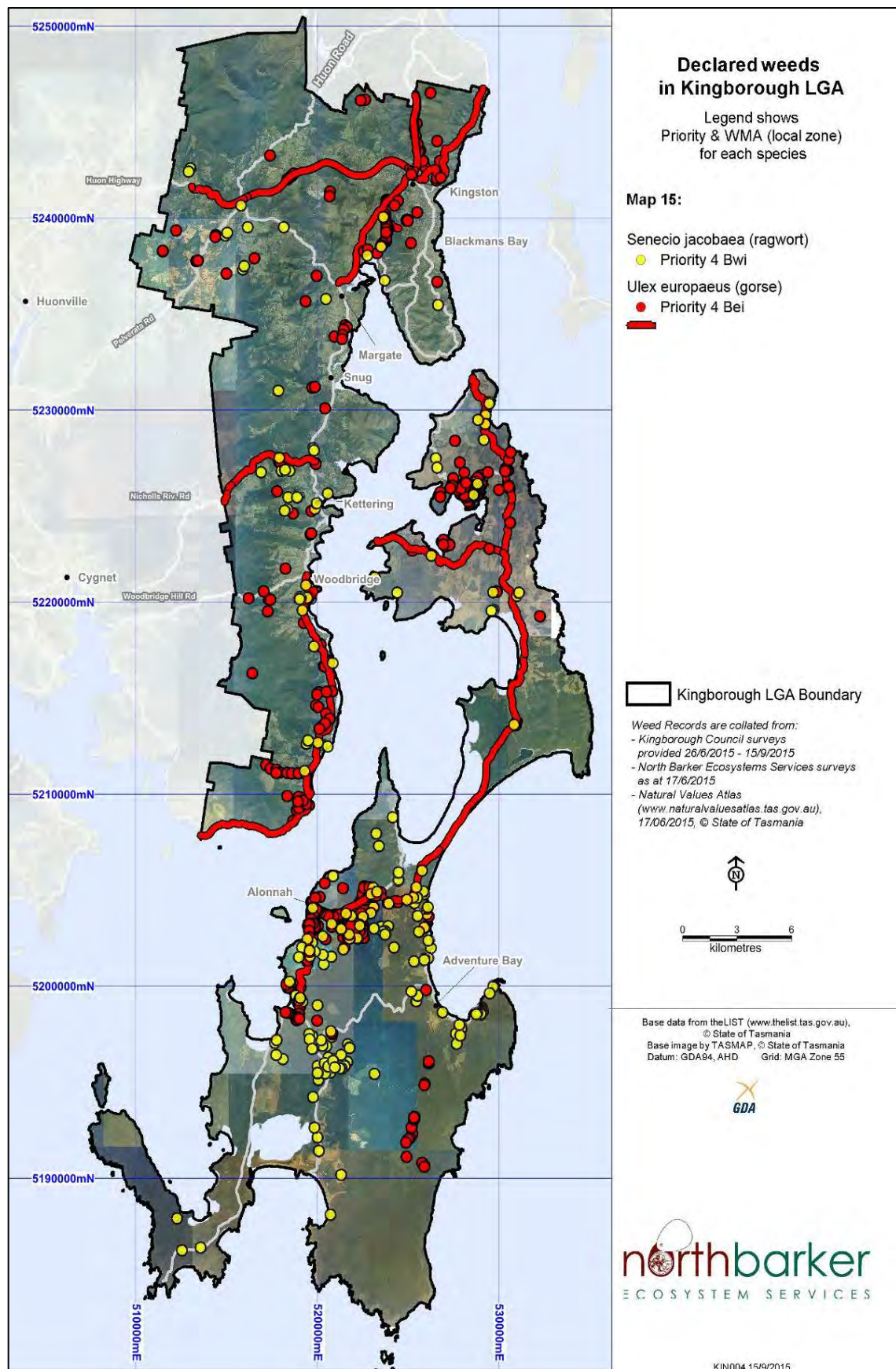


Figure 28 - Declared weeds within Kingborough LGA (Map 15 of 15).

APPENDIX 08 - RECOMMENDED CONTENTS OF WORK AND SITE PLANS

Works Plan Content: Develop and utilise a live electronic information management system based on Exponare or equivalent program.

- Budget for period;
- A site reference that identifies the site through planning, implementation and review processes;
- The management aim is identified – for example: eradication, control, program management;
- Treatment level:
 - Primary
 - Secondary
 - Rehabilitation
 - Monitor and follow up
 - Program treatment (repeated seasonally or regularly)
- Estimated time required this season (hrs/days); and
- Scheduled time (calendar).

Site Treatment Plan Content: Site treatment plan templates must at a minimum include all of the National attributes required for weed mapping:

- Site reference
- Tenure
- Scheduled treatment date (month)
- Zone/limitations
- Location (GPS)
- Predominant weed(s)
- Area of weed(s) present (m²/ ha)
- Cover of predominant weed(s) (Braun-Blanquet)
- Area treated (m² / ha)
- Time to implement treatment (person hrs)
- Source of data/ name of collector
- Management aim:
 - Eradicate
 - Contain
 - Programed control

- Treatment proposed:
 - Spray herbicide
 - Type/rate (from label)
 - Cut and past
 - Burn and treat regrowth
 - Physical removal
 - Mow
 - Landscape access (batter or level)
 - Mulch
 - Rehabilitate
- Hygiene measures required
- Monitoring of implementation
 - Include a photo point of pre-treatment and initial operations
 - Previous treatment plan implemented
 - New treatment plan proposed
 - Update areas and cover abundance
 - Record trend in hours to implement treatment.
 - Calculate cost of treatments.

APPENDIX 9 - TEN YEAR KINGBOROUGH WEED STRATEGY ACTION PLAN

PLANK	SECTION	ACTION	RESPONSIBILITY	TIMING	PERFORMANCE MEASURE	COST	PRIORITY
Plank 1 – Best Practice Management							
1	6.1	Review the Kingborough weed management operation	KC	2017	A written review of the operations effectiveness, efficiency and compliance with ChemCert accreditation and best practice.		H
1	6.1	Develop or source a clear and concise checklist for best practise weed management. Ensure all relevant staff have access to this checklist and understand it. Update checklist with new best practice information when available	KC	2017	All staff have a check best practice check list		H
Plank 2 – Integrated Weed Management							
2	6.2	Train all staff in integrated weed management principals and application	Lead: KC with DPIPWE/NRM South	Ongoing	Staff hold competency in IWM		H
2	6.2	Embed IWM into site treatment plan templates	KC	2017	Site plans contain IWM strategy	KC role	H

PLANK	SECTION	ACTION	RESPONSIBILITY	TIMING	PERFORMANCE MEASURE	COST	PRIORITY
2	6.2	Include management zone mitigation actions in site plans as Integrated Weed Management requirements.	KC	2017	Site plans contain mitigation requirements.	KC role	H
2	6.2	Review implementation of “no spray” areas and use of register	KC	2018	Endorsed process and register	KC role	M
Plank 3 – Planning							
3	6.3	Develop and utilise a live electronic information management system based on Exponare.	KC GIS	2019	Utilised and integrated into all weed data management within 2 years		H
3	6.3	Develop a works plan template and a works plan	KC Weeds Officer	Yearly/ seasonal	Develop a works plan and utilise	KC role	H
3	6.3	Develop a site plan template	KC	2017	Develop a site plans and implement	KC role and weed crew	H
3	6.4	Embed an early detection strategy into the works plan. Utilise a weed scout.	KC	2018 then seasonally	Early detection response effective, sites are treated as appropriate (current season/before flowering). Scout contributing to priorities seasonally.	Weed crew	M

PLANK	SECTION	ACTION	RESPONSIBILITY	TIMING	PERFORMANCE MEASURE	COST	PRIORITY
Plank 4 – Risk Management							
4	6.4	<ol style="list-style-type: none"> 1. Ensure all Zone A weeds in Tasmania that are not known from Kingborough are highlighted on weed information outlets (web page, facebook, hard copy). Ensure weed management staff can identify each species. 2. Engage with DPIPWE to ensure that all new nurseries are required to provide a weed risk assessments for all new species that they wish to import to the state. 3. Engage with DPIPWE to complete risk assessments for weeds predicted to have suitable habitat under climate change models. These should be added to alert lists and to Zone A of the WMA. 	<ol style="list-style-type: none"> 1. KC with associated groups (ie: SCAT, NRM South, Tas Landcare, Greening Australia) 2 and 3. DPIPWE 	Ongoing	Participation in Group committees / communication links		H

PLANK	SECTION	ACTION	RESPONSIBILITY	TIMING	PERFORMANCE MEASURE	COST	PRIORITY
4	6.4	Develop an early detection and response protocol including, a weed alert network with stakeholders, a rapid response system, a weed risk assessment for new nurseries (in approval conditions), a scout role in monitoring, hygiene conditions in the DA approvals process.	DPIPWE, local Councils, KC.	2017-2018	All elements embedded in Council processes.		H
4	6.4	Identify and focus control on satellites of core infestations (Bradley method). Ensure implementation of best practice hygiene management practices for staff/contractors. Develop specific DA conditons for weed control and treatment.	KC	2017-2018	Works plan's reflect core satellite approach DA's contain weed management conditions.		H

PLANK	SECTION	ACTION	RESPONSIBILITY	TIMING	PERFORMANCE MEASURE	COST	PRIORITY
4	6.4	<p>All key land managers to follow the Tasmanian Washdown Guidelines for Weed and Disease Control for machinery⁷, vehicle and equipment hygiene</p> <p>Contractors to adhere to the above (informed as a condition of approval) Washdown guidelines distributed with DA permits.</p> <p>Encourage the use of commercial car washes for washdown. Investigate distribution of wash down facilities and look to inform of facilities, particularly at key entry points to the municipality.</p> <p>Install wheel wash at Depot and at Barretta Tip.</p> <p>Manage green waste to minimise spread of seed.</p>	KC	2018	Car wash bays / wheel wash utilised for washdown		M
4	7.3	Include Weed Management Zone risk management prescriptions in site treatment plan.	KC	2018	All Site treatment plans include relevant WMZ risk management prescriptions.		M
4	8	Map roadside weeds and roadside weed free areas using line maps.	KC	2017-2018	All non sub urban Council roads mapped.		H
4	9	Categorise non-declared weeds using WMACT zone characteristics.	KC	Ongoing	Non-declared weeds categorised as required.		L

⁷ DPIPWE (2015) <http://dpiuwe.tas.gov.au/Documents/Weed%20%20Management%20and%20Hygiene%20Guidelines.pdf>

PLANK	SECTION	ACTION	RESPONSIBILITY	TIMING	PERFORMANCE MEASURE	COST	PRIORITY
Plank 5 – Stakeholder Engagement and Partnerships							
5	6.5	Develop rates rebate strategy. Trial a Land Management Incentives Program for private landowners (land > 2 ha) within a defined area of Kingborough to remove and control priority weeds. Incentives could include an 'opt out' rates rebate ⁸	KC	2017-2020	Rates rebate strategy developed and proposed to Council. Land Management Incentives Program trialled.	KC staff role	M
5	6.5	Reverse Auction – Establish process	KC	2019-2020	Auction once and 10 projects funded.		M
5	6.5	Cooperative Weed Management Agreements	KC	2017-2020	All partners engaged and at least 1 CWMA operational.	KC staff and Weed officer	M
5	6.5	Coordinated Weed Management	KC	2017-2020	All partners engaged and at least 3 coordinated efforts operational.	KC staff and Weed officer	M
5	6.5	Service Agreements	KC	2017-2020	Service Agreement developed and at least 2 clients engaged.	KC staff and Weed officer	M

⁸ For an example see http://www.melton.vic.gov.au/Services/Environment_and_sustainability/Taking_care_of_the_land/Environmental_enhancement_rate_rebate

PLANK	SECTION	ACTION	RESPONSIBILITY	TIMING	PERFORMANCE MEASURE	COST	PRIORITY
5	6.5	Community group partnerships Record volunteer hours	KC	2017-2020	Increase the number of groups that are active. Publish volunteer hours and use include in funding applications.	KC staff and Weed officer	M
5	6.5	Replacement Plant Policy	KC	2017-2020	Policy ratified and at least 1 year of implementation	KC staff and Weed officer	M
Plank 6 – Education and Training							
6	6.6	Education – implement a communications strategy focussed on engagement, understanding and interaction using modern media tools.	KC	2017-2019	Web site updated, facebook or other social media utilised. Evidence of the educational focus being on understanding	Weed officer	H
6	6.6	Implement an initial and biannual training schedule for staff, contractors and regular volunteers.	KC	2017-2019	All staff, contractors and regular volunteers have completed initial and first biannual training.	Training courses	H
6	6.6	Training – Prepare and implement a training schedule for all weed managers. Include Chemcert, equipment use, hygiene principles and practicalities, weed identification and control techniques as well as means of finding information.	KC	2017-2019	All staff have attended training by 2018	Training courses	H

PLANK	SECTION	ACTION	RESPONSIBILITY	TIMING	PERFORMANCE MEASURE	COST	PRIORITY
6	6.6	Develop a weed busters style awareness and activity program for schools and community	KC	2017-2019	1 Activity per year initially.	Support for program	M
Plank 7 - Monitoring and Review							
7	6.7	1. Reconsider the relevance of the Strategy 2. Consider progress against the planks and the Action Plan	KC	2021 and 2027			M
7	6.7	Construct a performance indicator based on the cost of improvement evident in data	KC	2018	All works plans contribute to the PI		M
7	6.7	Audit the adherence to the planning and site treatment plans. Assess the efficacy of the implementation via using the indicator and a review of the raw site data. Include some compliance auditing of weed management conditions and enforcement for DA's	Consultant	2020	Audit complete and reported		M
7	6.7	Train weed staff to maintain and update GIS databases and are able to rerun the metrics that generate the priorities.	Consultant	2018	Staff have capability	Consultant	H

