



**Annual Weed Survey of the Amrun Project Area,  
June 2017**



**Final Report**


*Prepared for*  
Rio Tinto Amrun Project.

12<sup>th</sup> September 2017

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Cover Photo: The weed Grader Grass (*Themeda quadrivalvis*) at Pera Head cliffs

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## **1. Introduction**

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### **1.1 Background and Scope**

Ecotone Flora Fauna Consultants have previously undertaken baseline and annual weed surveys of the Amrun Project Area as required to meet project approvals and site monitoring requirements. These surveys have included:

- a July 2013 Baseline Weed Survey, encompassing all accessible areas of the lease and adjoining area, and including areas surveyed for vegetation classification as part of the EIS for the project;
- a July 2015 Annual Weed Survey, which re-surveyed these access routes, with some additional, more detailed inspections to sites which could not be easily accessed in previous visits;
- a June 2016 Periodic Weed Survey covered the annual weed survey of construction areas and access roads plus the three yearly Periodic survey focussing on areas used for recreation and by Traditional Owners, and other areas where key weed species are most likely to become established, for instance rubber vine along mangrove edges near recreational areas.

The implementation of these weed surveys is outlined in the Land Use Management Plan and Terrestrial Management Plan for the Amrun Project. The objective of these surveys was to determine whether there had been any major changes in the status of exotic weed species within the project area since the previous weed surveys and following targeted treatment of identified weeds conducted in late 2015, and again in late 2016/ early 2017. As a result, these previous surveys have effectively documented the baseline level of incidence of exotic weeds within the project area, associated with limited levels of clearing and site development works by plant and other machinery during the assessment and exploration phases of the project, and along certain tracks re-cleared in 2012 to support field activities.

Alternatively, this year's survey comprises an Annual Weed Survey only, and repeats the weed survey method conducted previously where inspections were undertaken from a slow-moving vehicle along the main tracks and roads, supported by foot based inspections at key locations including recent clearing areas. The objective of the current (June 2017) Annual Weed Survey is to document levels of weed infestation following and during the initial construction stages of the project.

The scope of the current reporting is focused on determining the extent to which any exotic weed species have been unintentionally introduced to the Amrun Project area, and focuses on weed infestations along existing and new tracks, and other cleared and disturbed areas. Any other exotic plant species which may or have been used intentionally for landscaping (turf etc) and other forms of soil stabilisation around site facilities falls outside the scope of the current report.

## **2. Survey Approach**

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The survey utilised the rapid survey method approach of the previous surveys whereby inspections were undertaken from a slow-moving vehicle along the tracks and roads to be inspected, with supporting foot-based inspections at key locations.



The survey recorded all exotic plant species present, including all scheduled weeds and weeds of significance under Queensland and Commonwealth legislation and provisions. Areas included in the Annual Weed Survey are shown in **Figure 2-1** and comprised:

- Boyd Point fly camp and access tracks;
- Main access road and construction camp;
- Accessible parts of the MIA area;
- Tracks developed for construction of the Arraw Dam and associated infrastructure, including
  - 70,000 line;
  - Seismic line;
  - North-south access to watering points, dam bores and dam area;
- Recent additional access tracks cleared for site development, and
- all main access tracks throughout the Amrun Project area including:
  - Beagle Camp-Boyd Bay
  - Seismic line Boyd Bay-Winda Winda Ck
  - Beagle Camp-Amban
  - Waterfall (Ina Ck) track
  - Hey Point track

The scope for the Annual Weed Survey has changed considerably since the commencement of various construction activities across the site. Numerous additional tracks have been made or widened and clearing has been undertaken for mine infrastructure; however, several of the major areas are currently focal areas for heavy machinery activity, and as such could not be accessed safely or easily during the June 2017 site inspections.

The weed survey involved slow vehicle traverses (approx. 20-40km/h depending on conditions) along the tracks observing the vegetation at the side of the tracks and up to 10m in to the woodland. This approach was based on the premise that weed translocation into the area was most likely to occur via vehicles and that weeds, if present, would initially colonise areas where vehicles had been operating especially tracks, laydown areas and parking areas. At discrete locations where there had been intensive vehicle visitation (such as the Boyd Bay fly camp, new construction camp, and Hey River Terminal site), or where there has been a documented history of previous weed infestation (Amban beach camp and outstation, Waterfall Creek coastal areas, Beagle Camp *etc*), these areas were inspected closely on foot. The position of any located weeds was recorded using GPS, and a description of the general weed occurrence was also recorded (including species present, numbers, spatial distribution, growth stage, and any other relevant comments).

The initial identification of exotic weed species was undertaken by Senior Ecologist Jason Searle in the field. Any plants suspected to be potential new weed species were collected and submitted to the Queensland Herbarium for confirmation. This approach allows for any new weeds to the Amrun Project area to be positively identified, and for any unusual looking or otherwise unrecorded plants not regularly encountered in prior surveys of the site to be identified and eliminated from contention as new weed species.





Figure 2-1 Locality Plan for the Amrun Project area

### 3. Results and Discussion

#### 3.1 Weed Species Identification

A list of all known exotic weed species recorded at the Amrun site during recent field surveys (July 2013 onwards) is shown in **Table 3-1** below.

This list formed the baseline “search” list for the current weed surveys with any additional suspected weed species also collected and sent to the Queensland Herbarium for positive identification. An additional 8 species of exotic plants have been recorded at the site in the past 12 months, and these



are indicated in bold in **Table 3-1**. The identification results and accompanying images of weed species are included in **Appendix B**.

**Table 3-1. Summary of Known Exotic Plant Species for the Amrun Area (up to June 2017).**

Scientific Name	Common Name	Herbarium Identification
<i>Andropogon gayanus</i>	gamba grass	Matched with specimens from confirmed infestation at Andoom mine
<b><i>Brachiaria decumbens</i></b>	<b>signal grass</b>	<b>Matched with specimens from confirmed infestation at Weipa mine</b>
<i>Cenchrus pedicellatus</i> subsp <i>unispiculus</i>	mission grass	Confirmed BRI - 571/16, 29 Jul 2016
<i>Cenchrus echinatus</i>	spiny sandbur	Confirmed BRI - 393/17, 13 Jun 2017
<b><i>Chloris gayana</i></b>	<b>Rhodes grass</b>	<b>Matched with specimens from confirmed infestation at Weipa mine</b>
<i>Crotalaria goreensis</i>	rattlepod	Retained BRI - 623/10, 9 Aug 2010
<i>Hyptis suaveolens</i>	stinking Roger	Matched with specimens from confirmed infestation at Weipa mine
<b><i>Echinochloa esculenta</i></b>	<b>Japanese millet</b>	<b>No specimens collected to date, but seen and seed mix used</b>
<b><i>Ipomoea hederifolia</i></b>	<b>Cardinal flower</b>	<b>Retained BRI - 393/17, 13 Jun 2017</b>
<i>Mitracarpus hirtus</i>	tropical girdlepod	Confirmed BRI - 348/16, 10 May 2016
<b><i>Paspalum mandiocanum</i></b>	<b>broad-leaved paspalum</b>	<b>Unconfirmed</b>
<i>Passiflora foetida</i>	stinking passionflower	Matched with specimens from confirmed infestation at Andoom mine
<i>Sida acuta</i>	smooth sida	Retained BRI - 623/10, 9 Aug 2010
<b><i>Sida cordifolia</i></b>	<b>flannel weed</b>	<b>Retained BRI - 393/17, 13 Jun 2017</b>
<i>Stylosanthes scabra</i>	stylo	Matched with specimens from confirmed infestation at Weipa mine
<i>Themeda quadrivalvis</i>	grader grass	Confirmed BRI - 720/15, 27 Aug 2015
<b><i>Tridax procumbens</i></b>	<b>coat buttons</b>	Matched with specimens from confirmed infestation at Weipa mine
<b><i>Triumfetta pentandra</i></b>	<b>burbark</b>	<b>Retained BRI - 393/17, 13 Jun 2017</b>

Of the newly identified exotic species present at the site, 5 were recorded as isolated specimens, and are considered present, but not currently 'established' at the site. These species can therefore be eliminated from the site if controlled urgently. Alternatively, three additional exotic species (*Brachiaria decumbens*, *Echinochloa esculenta* and *Chloris gayana*) have been used intentionally in defined areas for the soils tabilisation purposes and are not reported on further here.

### 3.2 Overall Weed Species Distribution and Abundance

The pattern of weed distribution and abundance over the Amrun Project Area is compared between June 2016 and June 2017 in **Figure 3.1** below. The overall incidence of weeds was lower in the current June 2017 survey, although the overall distribution of the common established weeds was generally similar in the current survey.

In terms of common established weeds, stinking Roger (*Hyptis suaveolens*) appears to have been the most common and persistent species on established tracks and other cleared areas of the site, especially areas which have been more heavily used by construction traffic around the Boyd Bay construction area prior to opening of the bitumen access road. Much of the stinking Roger weed recorded during the current survey period appeared to have been sprayed and may have been killed off, however all stems of this plant were dried off and had a dead appearance and were therefore recorded. As these stems break down over the coming year or so, the results of eradication efforts over the past years will become much clearer. The actual incidence of live stinking Roger across these areas in particular is expected to be low, and reflects the success of weed treatment activities undertaken by the Land and Sea Management Program (LSMP) team. Many of these areas are now being colonised by native grass species (particularly the native millets *Panicum mindanaense* and *Panicum seminudum*), and show a clear benefit of the weed control program now in place.



Figure 3.1 Locations of weeds recorded in June 2016 and June 2017

Alternatively, stylo (*Stylosanthes scabra*) is more well established in the peripheral areas of the site, where it has been less subject to weed treatment activities. This is particularly apparent along the track to Waterfall Creek, especially areas at the end of this track near the beach and cliff line.

The full results of the current weed survey of the Amrun Project area are presented in **Appendix D**. Although these results show a similar weed distribution to previous (July 2015 and June 2016) weed surveys, the overall abundance of weeds has declined considerably over the past twelve months, especially in areas targeted by weed control activities (e.g. Boyd Bay fly camp area, Amban access track and outstation).





### 3.3 Listed Weed Species

This section addresses weeds that are classed as restricted invasive plants under the Queensland *Biosecurity Act 2014*, or are listed as Weeds of National Significance (WoNS) by the Commonwealth Government. The nation's 32 worst weeds are listed under the WoNS Strategy, and are targeted for management under the Biosecurity legislation of the State in which they occur. The Queensland *Biosecurity Act 2014* came into force on 1 July 2016 and replaces previous legislation in which certain weed species were Declared Plants and required various levels of management or intervention by landholders.

Gamba grass (*Andropogon gayanus*) is the only weed species currently listed under the Queensland *Biosecurity Act 2014* which has been recorded within in the Amrun Project area. It's known occurrence on site is restricted to the quarantined weed treatment area at Boyd Bay, which has been subject to periodic reinfestation and treatment since June 2016. Gamba grass was not present at Boyd Bay, or anywhere else across the site during the current survey, and was last treated and removed at Boyd Bay in February 2017.

Gamba grass is now naturalised in northern Australia, and currently occurs in scattered populations estimated to total of 60,000ha across Queensland's north, with most sites on Cape York Peninsula and Atherton Tableland (Queensland Government, 2016). A Management Plan has recently been developed for the control of gamba grass in North Queensland by the Far North Queensland Region of Councils (FNQROC, 2016), highlighting the invasiveness of gamba grass and the sourcing of \$750,000 funding for its control in 2015-2016.

The Queensland *Biosecurity Act 2014* prohibits the release of gamba grass into the environment, and requires all parties to take all reasonable and practical steps to minimise the risks associated with restricted invasive plants on lands under their control (called a general biosecurity obligation, or GBO). The quarantined site and surrounding area at Boyd Bay will therefore need to continue to be monitored for gamba grass as a high priority, and treated if required. It is recommended that this area continue to be monitored and treated for gamba grass at least every six months for a period of at least three years to ensure the current infestation is eradicated. Hand removal of plants provides a valid treatment option for the small number of plants typically occurring there.

Other Weeds of National Significance potentially present<sup>1</sup> or with a higher likelihood of establishing on site within the Amrun Project area include rubber vine (*Cryptostegia grandiflora*), hymenachne (*Hymenachne amplexicaulis*) and several species of exotic asparagus ferns (*Asparagus* spp.) listed under WoNS and Queensland legislation.

### 3.4 Weed Infestation Locations

#### 3.4.1 Boyd Bay Flycamp and Beach Access

This area was previously heavily infested with weeds (*Stylosanthes scabra*, *Hyptis suaveolens*, *Sida acuta*, *Cenchrus pedicellatus*, *Themeda quadrivalvis*), and was the location of the previous Gamba grass (*Andropogon gayanus*) infestation.

The area has been successfully treated for weeds (see **Images C1 and C2, Appendix C**) and these heavy infestations have been controlled. Despite these efforts there are some remnant weeds and isolated regrowth still present, and it is expected that further regrowth of exotic weeds will occur following rain. The level of treatment applied has nonetheless been highly successful in controlling the high incidence of weed infestation at this site, and should be continued following the next period of rain.

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<sup>1</sup> Note: none of these species have currently been recorded within the Amrun Project area



### 3.4.2 Amrun Accommodation Village

Despite the large open area and high number of vehicles accessing this site, the area is still largely weed free. The periphery of the clearing was traversed during the current survey, and was largely bordered with native grassland regrowth. One area of potential concern is the effluent irrigation area to the north of the car park, which is irrigated and heavily vegetated with new regrowth of grass species. Isolated weeds were seen (*e.g. Passiflora foetida*), and other grasses which were not yet distinguishable may include exotic weed species (see **Image C3, Appendix C**).

### 3.4.3 Amrun Access Road and associated borrow pits

The road verges of the main sealed access road have been seeded for soil stabilisation, particularly at the crossing for Winda Winda Creek and areas northwards towards Hey River Terminal. The batters of some of the borrow pits in particular were subject to erosion during the onset of seasonal rains in late 2016, and are intentionally managed with a mix of exotic and native grass ground cover species.

Other areas along the main access road include borrow pit areas which have revegetated naturally with native grasses (*Pseudorhaphis spinescens*; *Heteropogon triticeus*; *Sarga plumosa*) (**Images C4 and C5, Appendix C**), while road verges are naturally colonised by Native Panic (*Panicum seminudum*; *Panicum mindanaense*) (**Image C6, Appendix C**), showing that native grasses are potentially suited to soil stabilisation in these situations.

### 3.4.4 Winda Winda Creek Crossing

The Winda Winda Creek crossing, like other portions of the main access road corridor, was subject to potential erosion during site development, and has been intentionally managed with a mix of exotic and native grass ground cover species. Some portions of this area, notably including parts of the alluvial creek flat includes large areas where the native Spikey Mat Grass (*Pseudorhaphis spinescens*) has revegetated naturally. Similarly, portions of the road verge and batter areas to Winda Winda Creek have been naturally colonised by native panic (*Panicum seminudum*; *Panicum mindanaense*), showing that native grasses are potentially suited to soil stabilisation in these situations.

### 3.4.5 Hey River Terminal

The terminal access road, like much of the northern access road corridor, has been seeded for soil stabilisation in response to potential erosion during the onset of seasonal rains in late 2016. This area is also intentionally managed with a mix of exotic and native grass ground cover species.

The surrounding native bushland around terminal laydown areas and storage facilities area was subject to existing heavy infestations of weeds, especially stinking Roger (*Hyptis suaveolens*). These infestations have been recently treated with heavy applications of herbicides by the LSMP team, and although largely effective will require further follow up works to treat regrowth of this weed infestation (see **Images C7-C9, Appendix C**). The edges of some of this area also now includes stockpiles largely covered in native grass together with some weed growth.

### 3.4.6 Local Access Tracks (Boyd Bay area)

The access tracks around the main site area (*i.e.* 70000 line, seismic line, wash basket loop, ART bore hole access tracks, Arraw Dam access track, lease boundary loop), mostly represent upgraded access tracks that were in use between 2007 and 2012 for local site access. These areas have historically been subject to colonisation by weeds (particularly the established environmental weeds stylo, stinking Roger, grader grass and smooth sida).

These areas now show a low level of weed incidence throughout, and is a positive reflection of the weed management practices initiated on site, notably including:

- Weed treatment activities being undertaken by the LSMP team, evidenced through widespread observation of dead stinking Roger stems and other relicts of herbicide spraying across these tracks;



- Weed washdown practices for new vehicles entering the site; and
- Track verge maintenance, (see **Image C10, Appendix C**) in which side rills are created on the sides of these tracks as they are progressively upgraded. The subsequent mounds of soil left on the verge of the tracks cover and effectively bury established weed growth, but will consequently require ongoing maintenance as new weed habitat has been created by the rill.

Many of these tracks now have established native grasses fringing the track verges (see **Image C11, Appendix C**).

#### **3.4.7 Amban Access Road and Outstation Campsites**

The area around the outstation and beach campsites were previously heavily infested with established weeds (particularly *Hyptis suaveolens* and *Stylosanthes scabra*, but also *Sida acuta*, *Cenchrus echinatus*, *Themeda quadrivalvis* and *Mitracarpus hirtus*), and had additional regular weed incidences (particularly *Stylosanthes scabra*) along the access road in from Beagle Camp. New weeds (*Sida cordifolia* and *Triumfetta pentandra* first recorded in February 2017) were also being discovered at these sites.

This area has been successfully treated by the LSMP team over the past six months, and the heavy infestations of *Hyptis suaveolens* and *Stylosanthes scabra* along the beach front track were mostly dead on recent inspection in June 2017. Some areas of particularly heavy infestation of these weeds at the campground remain, or have already regrown, and highlight the need for regular follow up monitoring and targeted spot weed control (see **Images C12-C14, Appendix C**).

#### **3.4.8 Beagle Camp**

The Beagle camp site clearing, although not within the lease area, is regularly used for site access and turning for heavy vehicles entering the site. This area, including the boundaries of the current truck turning circle, are subject to a particularly dense infestation of numerous weeds (*Hyptis suaveolens*, *Stylosanthes scabra*, *Sida acuta*, *Cenchrus pedicellatus*, *Themeda quadrivalvis*, *Mitracarpus hirtus*, *Ipomoea quamoclit* were recorded at this site in June 2017). As such this area represents a source area for weed introduction to the site, and will continue to impeded effective weed management unless the area is managed effectively.

#### **3.4.9 Waterfall Creek Access Road and Beachfront Sites**

This clifftop, and the beachfront outstation areas on the two Waterfall Creek access points, are subject to ongoing established infestations of weeds. Most notably large clusters of stylo (*Stylosanthes scabra*) of up to 2,000 plants occur in some areas, and regular lower level incidences of stinking Roger (*Hyptis suaveolens*) spread along these tracks, particularly in wetter or more sandy areas (see **Image C15, Appendix C**). Although remote from current mining activities, these areas are within environmental buffer areas and are of high significance to traditional owners, and represent a priority for effective management and weed control. New records of weed colonisation by additional exotic species are occurring in these areas (see **Images C16 and C17, Appendix C**), further highlighting the need for regular ongoing management.

#### **3.4.10 Pera Swamp, Tailings Storage Facility, MIA boundary and access areas.**

These areas were inaccessible during the recent June 2017 survey. Those areas that were accessible or visible from accessible areas, appeared to have newly pushed boundaries and little established edge area for weed development. However, these areas have extensive edge areas and represent key potential locations for weed growth over time, and should be regularly monitored for weed incidence. One area, on the steep batters of the existing dam wall and drainage pits, near the MIA office area, is intentionally managed with a mix of exotic and native grass ground cover species.



### 3.5 Summary, Recommendations and Actions

The extent of potential weed habitat and areas for potential weed infestation within the Amrun Project area have increased considerably over the past 12 to 24 months, as clearing and development of the mine is continuing to unfold and gain momentum. Despite this expansion in area, the incidence of exotic weed species generally remains low, suggesting that existing measures for weed control are effective to date, and that the site can potentially be managed in a relatively weed-free condition into the operational phase of mining operations, particularly if a regular weed monitoring and treatment program continues to be implemented at the site.

Some positive outcomes that were evident during the 2017 surveys, in particular with respect to the past 12 months of weed management activities include:

- The Gamba grass infestation at Boyd Bay has been effectively controlled and prevented from spreading;
- The Boyd Bay flycamp area, Amban Outstation and beach campsites area, and local access tracks around the general areas of construction activity, have each been treated and the previously moderate to heavy infestations largely controlled and minimised, as a direct result of LSMP weed control activities;
- Little evidence of new weed species or large increases in incidence of established weeds are currently evident at the site, despite the increased extent of clearing and large volume of heavy machinery activity on site. This is at least partially, but most likely predominantly, a reflection of weed management practices including weed washdown practices and other weed control protocols currently enforced at the site.

One area of potential improvement of management practices for exotic plant species on site identified in the current survey includes the potential future use of only Japanese millet (which disappears after initial stabilisation growth is complete) and native grassy ground cover species when applying seed for soil stabilisation in response to potential erosion during the onset of seasonal rains in future years (*i.e.* from late 2017 onwards).

This recommended future practice has the distinct advantages of being recognised as current environmental best practice, and minimises the chance of any legacy issues (and the associated potential cost) of having to remove these exotic species at future mine closure. The main risk associated with implementing this recommendation (*i.e.* that soil stabilisation will be inadequate using native species alone, and serious soil erosion issues will occur on site), although very real during the initial management stage in 2015-2016, is now largely ameliorated by what has recently been learned from the performance of Japanese millet and a variety of suitable native species.

Significantly, several native species (notably including *Pseudorhaphis spinescens*, *Schizachyrium fragile* and *Thaumatococcus pubescens/major/rariflora*) have now been identified as good ground cover species for stabilising the soil surface in these situations. It is strongly recommended that these native species be fully utilised with an initial cover crop of Japanese millet in any future soil stabilisation works.

Other recommended actions and priorities for weed management and control on site include:

- Continue to implement prioritised early wet-season treatment and ongoing routine monitoring of gamba grass and other exotic plant species at and in the vicinity of the Boyd Bay quarantine area. This area should again be treated as a priority once the first new growth commences in the early wet-season of late 2017;
- Targeted weed control should be prioritised for Hey River Terminal, Waterfall Creek and Beagle Camp to remove remaining large source areas of weeds and minimise future spread. These areas have high incidence of weed infestation requiring more immediate action. In addition, Beagle Camp and Waterfall Creek both fall outside the current area subject to strict weed quarantine activities, and are more vulnerable to further infestation;



- Resurvey the effluent disposal area at the Accommodation Camp later in the year to confirm weed species occurrence, and develop appropriate control measures where required;
- Ensure an appropriate weed monitoring and treatment program is put in place across the broader project area to detect any increased incidences of weeds or new weed infestations, and act on these early to prevent broad-scale infestation during the construction and early operational stages of minesite development in the Amrun Project area;
- Undertake maintenance-level weed control along existing tracks and access points to control and reduce the incidence of established non-listed weed species (especially *Themeda quadrivalvis*, *Stylosanthes scabra* and *Hyptis suaveolens*), particularly in those locations where they are known to occur (as shown in **Figure 3-1**). In this regard, the more peripheral areas (notably Waterfall Creek, Ina Creek track heads; Amban and Pera Swamp campsite areas) should be a focus point to control these species. It may be useful to target perennial woody weeds (*Stylosanthes scabra*, *Sida acuta*, *Hyptis suaveolens*) in the short-term as these appear to have persisted most stubbornly over the last 12 months. Each of these woody weeds have hairy leaf surfaces and may have been less responsive to recent treatment, and higher levels of surfactant may be appropriate when the herbicide is applied in future treatments;
- Continue training and skill development for the LSMP rangers in weed identification and control. The work done by these rangers to date is impressive in terms of the volume and effectiveness of areas treated. Broad scale application and control will have been an initial priority for many areas given the high incidence of weeds present. However further training and skill development in weed (vs similar native plant) species identification, and ongoing targeted spot spraying will be valuable to gain the best results into the future.





## 4. References

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- Queensland Government (2016a).** Queensland Government Business & Industry Portal Website, Declared Weeds. <https://www.business.qld.gov.au/industry/agriculture/species/declared-pests/weeds/gamba-grass>. Accessed 17 July 2016.
- Queensland Government (2016b).** Queensland Government Business & Industry Portal Website, Declared Weeds. <https://www.business.qld.gov.au/industry/agriculture/species/declared-pests/weeds/gamba-grass>. Accessed 17 July 2016.



## **5. Appendices**

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**Appendix A    Schedule of Data Deliverables**

**Appendix B    Weed Species Identification Data**

**Appendix C    Survey Site Images**

**Appendix D    Survey Results – Amrun Project Area**

**Appendix E    Distribution Maps for Individual Weed Species**



## Appendix A Schedule of Data Deliverables

<b>Data Type</b>	<b>Filename</b>
Raw survey data	<i>Amrun Weed Survey 15Jun17.xlsx</i>
Summary species list	N/A
Survey site locations	<ul style="list-style-type: none"><li>- <i>Amrun Construction Camp;</i></li><li>- <i>Boyd Point flycamp and beach access;</i></li><li>- <i>Hey Point Terminal area;</i></li><li>- <i>Amrun Access Road;</i></li><li>- <i>Arraw Dam Access Road;</i></li><li>- <i>Amrun Managed Tracks;</i></li><li>- <i>Amban outstation, camping grounds;</i></li><li>- <i>Waterfall Creek access tracks</i></li></ul>
Survey trackers	N/A
Survey coverage polygons (flora and fauna)	N/A
Polyline tracks/Waypoints	N/A
GIS map output files	<i>Weed_locations_2017.shp</i> <i>Access_tracks_2017.shp</i>
Reference images	<i>Included as deliverables in folder "Amrun Weed Survey Photo Images 2017"</i>
Details of Herbarium/Museum specimen	N/A; <i>included in report</i>
Flora fauna data	N/A



## Appendix B Weed Species Identification Results



Department of  
**Science, Information  
Technology and Innovation**

### Queensland Herbarium

Brisbane Botanic Gardens Mt Coot-tha • Toowong 4066 Queensland • Australia  
Telephone +61 7 3896 9326 • Facsimile +61 7 3896 9624  
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<http://www.qld.gov.au/herbarium>

Enquiries Chris Pennay  
Telephone 07 3896 9318  
Your reference  
Our reference CP.mh 393/17

13 June 2017

Jason Searle  
57 Fifteenth Street  
PALM BEACH Qld 4221

Dear Jason

The botanical specimens received by the Queensland Herbarium on 30 May 2017 have been identified as:

JS17000	* <i>Stachytarpheta jamaicensis</i>
JS17003	#* <i>Sida cordifolia</i>
JS17004	#* <i>Triumfetta pentandra</i>
JS17005	* <i>Cenchrus echinatus</i>
JS17001	<i>Amylothea dictyophleba</i>
JS17002	# <i>Vallisneria nana</i>
JS17001	<i>Polygala rhinanthoides</i>
JS17006	# <i>Crepidium marsupichilum</i>

\*Naturalised, non-native species

# These specimens have been kept for incorporation into the Herbarium collection, with thanks.

Yours sincerely

G.P.Guymmer  
**Director**

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<https://data.qld.gov.au/dataset/census-of-the-queensland-flora-2016>

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## Appendix C Images



Image C1. Boyd Bay fly camp area. This area has been treated and large infestations of weeds have largely been killed off. Isolated weeds remain or have sprouted regrowth.



Image C2. Gamba grass (*Andropogon gayanus*) quarantine area at Boyd Bay. All weeds in this area have been treated and the last observed incidence of Gamba grass was in February 2017.





Image C3. Effluent Irrigation Area at Amban Accommodation Village. This area is heavily vegetated with new regrowth of grass species. Isolated weeds were seen (e.g. *Passiflora foetida*), and other grasses were not yet distinguishable to species and may include exotic weed species.



Image C4. Borrow pit batters intentionally stabilised and managed with a mix of exotic and native grass ground cover species. Native spikey mat grass (*Pseudorhaphis spinescens*) is present in most of these managed areas, seen here on the lower vegetated portion of the batter slope.





Image C5. Borrow pit batters stabilised naturally with native grasses (including the locally dominant *Heteropogon triticeus* and *Sarga plumosa*).



Image C6. Main access road verges colonised naturally with the native panic grasses (*Panicum seminudum* and *Panicum mindanaense*).





Image C7. Native panic (*Panicum seminudum* / *Panicum mindanaense*) dominating stockpiled soil at Hey River Terminal. Isolated signal grass (*Brachiaria decumbens*) is also present.



Image C8. Treated stinking Roger (*Hyptis suaveolens*) infestation at Hey River Terminal, with all mature weeds dead.





Image C9. Heavy infestation of stinking Roger (*Hyptis suaveolens*) on northern clearing at Hey River Terminal, adjoining native vine scrub. Mature stems have been killed by herbicide application, and dense regrowth of young stinking Roger is now evident.



Image C10. Upgraded lease boundary access track. Road verges are recently widened with a fresh side rill, effectively burying any established weed cover.





Image C11. Seismic line track with low weed incidence and natural regrowth of native grasses (especially native panics *Panicum mindanaense*/ *Panicum seminudum*).



Image C12. Heavy infestation of stinking Roger (*Hyptis suaveolens*) and stylo (*Stylosanthes scabra*) along the beach access track to Amban campsite has been successfully treated by LSMP rangers.





Image C13. Treatment of heavy infestations of weeds at Amban campsite area has been largely effective, particularly stylo (*Stylosanthes scabra*) and stinking Roger (*Hyptis suaveolens*) in open areas.



Image C14. Although heavily treated, some areas of weeds remain or have regrown at Amban campsite, including this infestation of stylo (*Stylosanthes scabra*) and stinking Roger (*Hyptis suaveolens*) under the collapsed roofing.





Image C15. Stylo (*Stylosanthes scabra*) infestation on cliff top areas at the end of Waterfall Creek access track. Up to 2000 plants were recorded in some heavily infested areas along the clifftop portion of this area.



Image C16. Large tall exotic grass (probably *Paspalum mandiocanum*) at its only know incidence in the mining lease, at Waterfall Creek outstation.





Image C17. Coat buttons (*Tridax procumbens*) forming a ground cover on the open beach area at Waterfall Creek outstation, the only known occurrence of this exotic species in the mining lease.



# **Appendix D Weed Survey Results – Amrun Project Area (June 2017 Survey)**

Waypoint	Exotic Species	Zone	X Coord	Y Coord	Comments
1847	Brachiaria decumbens	54	8570884.79	569345.23	extensive on N side for soil stabilisation, 40m wide, 800m long, start
1848	Brachiaria decumbens	54	8571118.48	570132.95	extensive on N side for soil stabilisation, 40m wide, 800m long, end
1849	Brachiaria decumbens	54	8571820.13	571461.37	5x5m patch, S side
1850	Brachiaria decumbens	54	8571737.1	571323.27	20x50m patch, S side
1851	Stylosanthes scabra	54	8573834.5	579639.09	iso plant, N side
1852	Stylosanthes scabra	54	8573826.89	579634.94	isol plant , S side
1853	Stylosanthes scabra	54	8573848.65	579681	5 plants, N side
1854	Stylosanthes scabra	54	8573801.06	579577.15	isol plant, S side
1855	Hyptis suaveolens	54	8568547.67	581305.7	isol plant
1856	Hyptis suaveolens	54	8568560.16	581306.17	5 plants, E side
1857	Hyptis suaveolens	54	8568602.4	581307.6	40 plants, both sides
1858	Hyptis suaveolens	54	8569441.38	581307.46	isol plant, E side
1859	Waltheria indica	54	8573884.69	580492.75	5 plants, S side
1860	Waltheria indica	54	8573774.75	580495.25	40 plants, rill E side
1861	Panicum seminum	54	8574957.34	582947.48	Native millet extensive on both sides main access Rd
1862	Panicum seminum	54	8575632.27	584976.63	Native millet extensive on both sides main access Rd
1863	Hyptis suaveolens	54	8576415.16	587697.08	20 plants, intersection, both sides
1864	Hyptis suaveolens	54	8576335.13	587685.65	10 plants, E side
1865	Hyptis suaveolens	54	8576172.64	587692.73	100 plants, E side
1866	Hyptis suaveolens	54	8575652.4	587690.88	10 plants, W side
1867	Hyptis suaveolens	54	8573403.54	587689.22	isol plant, W side
1868	Hyptis suaveolens	54	8573347.02	587690.57	10 plants, E side
1869	Hyptis suaveolens	54	8573340.83	587690.44	10 plants, E side
1870	Hyptis suaveolens	54	8573294.93	587691.05	10 plants, W side
1871	Hyptis suaveolens	54	8573179.58	587691.01	10 plants, W side
1872	Hyptis suaveolens	54	8572689.6	587666.04	10 plants, E side
1873	Hyptis suaveolens	54	8572472.79	587643.98	50 plants, both sides



Waypoint	Exotic Species	Zone	X Coord	Y Coord	Comments
1874	Hyptis suaveolens	54	8572442.03	587648.33	50 plants, E side
1875	Hyptis suaveolens	54	8572409.83	587652.89	300 plants, both sides
1876	Hyptis suaveolens	54	8572368.59	587648.86	100 plants, both sides
1877	Hyptis suaveolens	54	8572325.34	587650.89	100 plants, both sides
1878	Hyptis suaveolens	54	8572287.75	587648.6	50 plants, both sides
1879	Hyptis suaveolens	54	8571841.93	587580.15	isol plant, W side
1880	Hyptis suaveolens	54	8571690.16	587553.42	100 plants, E side
1881	Hyptis suaveolens	54	8571317.61	587538.9	50 plants, W side
1882	Hyptis suaveolens	54	8570681.88	587475.28	5 plants, W side
1883	Hyptis suaveolens	54	8570652.79	587474.87	50 plants, localised opening
1884	Hyptis suaveolens	54	8566917.21	587143.43	10 plants, E side
1885	Stylosanthes scabra	54	8575098.31	583589.24	isol plant, on mound, S side
1886	Hyptis suaveolens	54	8570664.98	580097.67	5 plants, N side
1887	Hyptis suaveolens	54	8570668.14	579960.56	5 plants, both sides
1888	Hyptis suaveolens	54	8570669.05	579489.75	50 plants, N side
1889	Hyptis suaveolens	54	8570661.76	578864.99	50 plants, N side
1890	Hyptis suaveolens	54	8570666	578228.22	5 plants, N side
1891	Hyptis suaveolens	54	8570661.31	578163.88	5 plants, N side
1892	Hyptis suaveolens	54	8570664.72	577972.42	5 plants, N side
1893	Hyptis suaveolens	54	8570662.86	576295.73	isol plant, N side
1893	Stylosanthes scabra	54	8570662.86	576295.73	isol plant, N side
1894	Stylosanthes scabra	54	8570660.94	576106.21	5 plants, N side
1895	Stylosanthes scabra	54	8570661.14	573152.19	200 plants, both sides
1896	Stylosanthes scabra	54	8570662.41	572879.48	5 plants, S side
1897	Stylosanthes scabra	54	8570661.09	571684.35	5 plants, middle
1898	Stylosanthes scabra	54	8570664.46	571493.98	100 plants, N side
1899	Stylosanthes scabra	54	8570659.41	571221.14	50 plants, N side
1900	Stylosanthes scabra	54	8570662.55	571204.12	5 plants, N side
1901	Hyptis suaveolens	54	8570664.88	570071.38	5 plants, N side





Waypoint	Exotic Species	Zone	X Coord	Y Coord	Comments
1901	Themeda quadrivalvis	54	8570664.88	570071.38	5 plants, N side
1902	Hyptis suaveolens	54	8570998.35	570798.83	30 plants, N side
1903	Hyptis suaveolens	54	8571277.19	571692.13	30 plants, N side
1904	Stylosanthes scabra	54	8564663.21	585202.72	50 plants, both sides
1905	Stylosanthes scabra	54	8564582.18	585190.65	50 plants, both sides
1906	Stylosanthes scabra	54	8564496.95	585179.87	100 plants, both sides
1907	Stylosanthes scabra	54	8561120.51	586540.2	Beagle camp, heavy infestation of numerous weed species
1907	Themeda quadrivalvis	54	8561120.51	586540.2	Beagle camp, heavy infestation of numerous weed species
1907	Themeda quadrivalvis	54	8561120.51	586540.2	Beagle camp, heavy infestation of numerous weed species
1907	Hyptis suaveolens	54	8561120.51	586540.2	Beagle camp, heavy infestation of numerous weed species
1907	Sida acuta	54	8561120.51	586540.2	Beagle camp, heavy infestation of numerous weed species
1907	Ipomoea quamoclit	54	8561120.51	586540.2	Beagle camp, heavy infestation of numerous weed species
1907	Crotalaria goorensis	54	8561120.51	586540.2	Beagle camp, heavy infestation of numerous weed species
1907	Passiflora foetida	54	8561120.51	586540.2	Beagle camp, heavy infestation of numerous weed species
1908	Stylosanthes scabra	54	8561046.28	586263.76	isol plant, S side
1909	Stylosanthes scabra	54	8560507.26	585152.16	isol plant, S side
1910	Stylosanthes scabra	54	8560456.77	585061.67	100 plants, N side
1911	Stylosanthes scabra	54	8552443.23	581309.73	10 plants, N side
1912	Stylosanthes scabra	54	8550723.34	581310.48	isol plant, middle track
1913	Stylosanthes scabra	54	8550686.62	581310.48	20 plants, 30m stretch
1914	Stylosanthes scabra	54	8550454.46	581313.91	20 plants, both sides
1915	Stylosanthes scabra	54	8550427.37	581312.31	20 plants, E side
1916	Stylosanthes scabra	54	8548384.43	581313.07	20 plants, E side
1917	Stylosanthes scabra	54	8548234.78	581314.57	isol plant, E side
1918	Stylosanthes scabra	54	8548096.1	581314.81	isol plant, W side
1919	Stylosanthes scabra	54	8545366.02	579128.1	20 plants, W side
1920	Stylosanthes scabra	54	8545247.23	579019.05	10 plants, E side
1921	Stylosanthes scabra	54	8544216.93	578091.28	10 plants, both sides
1922	Stylosanthes scabra	54	8543950.53	577851.01	20 plants, W side



Waypoint	Exotic Species	Zone	X Coord	Y Coord	Comments
1923	Stylosanthes scabra	54	8543766.41	577686.51	isol plant, W side
1924	Stylosanthes scabra	54	8543420.58	577374.82	isol plant, middle track
1925	Stylosanthes scabra	54	8542631.38	576663.94	isol plant, N side
1926	Stylosanthes scabra	54	8541373.21	575529.28	10 plants, N side
1927	Stylosanthes scabra	54	8541153.45	575331.78	10 plants, N side
1928	Stylosanthes scabra	54	8540810.9	575022.97	isol plant, middle track
1929	Stylosanthes scabra	54	8540558.6	574791.57	5 plants, both sides
1930	Stylosanthes scabra	54	8539955.34	574253.21	isol plant, N side
1931	Stylosanthes scabra	54	8539919.71	574220.82	5 plants, both sides
1932	Stylosanthes scabra	54	8539803.2	574116.05	isol plant, middle track
1933	Stylosanthes scabra	54	8539607.6	573938.78	isol plant, middle track
1934	Stylosanthes scabra	54	8539557.95	573895.19	isol plant, middle track
1934	Hyptis suaveolens	54	8539557.95	573895.19	isol plant, middle track
1935	Stylosanthes scabra	54	8539297.39	573649.93	5 plants, middle track
1935	Hyptis suaveolens	54	8539297.39	573649.93	5 plants, middle track
1936	Stylosanthes scabra	54	8539055.2	573438.19	200 plus plants on cliff edge
1937	Stylosanthes scabra	54	8539080.61	573410.52	5 plants, middle track
1938	Stylosanthes scabra	54	8539141.74	573339.17	1 plant cliff edge
1939	Stylosanthes scabra	54	8539263.52	573005.22	isol plant, middle track
1940	Stylosanthes scabra	54	8539262.06	572973.04	5 plants, middle track
1941	Stylosanthes scabra	54	8539186.58	572828.18	10 plants, middle track
1942	Stylosanthes scabra	54	8539149.38	572758.73	20 plants, middle track
1943	Stylosanthes scabra	54	8539152.8	572719.74	20 plants, middle track
1944	Stylosanthes scabra	54	8539216.69	572567.02	20 plants, middle track
1945	Stylosanthes scabra	54	8539251.58	572547.17	isol plants
1945	Hyptis suaveolens	54	8539251.58	572547.17	isol plants
1946	Hyptis suaveolens	54	8539319.26	572466.19	isol plants, campsite
1947	Hyptis suaveolens	54	8539467.99	572266.57	patchy in native Anisomeles
1948	Stylosanthes scabra	54	8539577.23	572197.29	2000 plus plants over 200m, start



Waypoint	Exotic Species	Zone	X Coord	Y Coord	Comments
1949	Stylosanthes scabra	54	8539827.93	572076.7	2000 plus plants over 200m, end
1950	Stylosanthes scabra	54	8539902.04	572030.74	200 plants, scattered for 100m, start
1951	Stylosanthes scabra	54	8540090.03	571872.28	100 plants, scattered for 200m, start
1952	Stylosanthes scabra	54	8540671.3	573372.67	30 plants, both sides
1953	Stylosanthes scabra	54	8540678.59	572551.74	isol plant, middle track
1954	Stylosanthes scabra	54	8540663.33	572509.87	isol plant, middle track
1955	Stylosanthes scabra	54	8540667.28	572061.7	5 plants on track
1956	Stylosanthes scabra	54	8540669.55	571957.03	10 plants on track
1957	Stylosanthes scabra	54	8540667.57	571868.17	5 plants on track
1958	Stylosanthes scabra	54	8540667.31	571799.79	100 plants, both sides
1959	Stylosanthes scabra	54	8540667.6	571648.74	30 plants, both sides
1960	Stylosanthes scabra	54	8540670.35	571570.94	10 plants, both sides
1960	Stylosanthes scabra	54	8540670.35	571570.94	10 plants, both sides
1961	Stylosanthes scabra	54	8540961.45	571310.99	10 plants, both sides
1961	Stylosanthes scabra	54	8540961.45	571310.99	10 plants, both sides
1962	Stylosanthes scabra	54	8541014.06	571242.86	50 plants, both sides
1963	Hyptis suaveolens	54	8541298.79	571092.87	10 plants, both sides
1964	Hyptis suaveolens	54	8541335.44	571076.28	10 plants, both sides
1965	Stylosanthes scabra	54	8541395.3	571023.01	100 plants, over 100m
1965	Hyptis suaveolens	54	8541395.3	571023.01	100 plants, over 100m
1966	Stylosanthes scabra	54	8541565.23	570915.96	200 plants, 50m stretch
1966	Hyptis suaveolens	54	8541565.23	570915.96	200 plants, 50m stretch
1967	Hyptis suaveolens	54	8541606.88	570889.84	200 plants, over 100m
1968	Hyptis suaveolens	54	8541689.32	570787.43	1000 plus plants, over 100m, edge of rainforest, start
1968	Stylosanthes scabra	54	8541689.32	570787.43	1000 plus plants, over 100m, edge of rainforest, start
1968	Cenchrus pedicellatus	54	8541689.32	570787.43	1000 plus plants, over 100m, edge of rainforest, start
1969	Hyptis suaveolens	54	8541773.42	570686.11	1000 plus plants, over 100m, edge of rainforest, end
1969	Stylosanthes scabra	54	8541773.42	570686.11	1000 plus plants, over 100m, edge of rainforest, end
1969	Cenchrus pedicellatus	54	8541773.42	570686.11	1000 plus plants, over 100m, edge of rainforest, end



Waypoint	Exotic Species	Zone	X Coord	Y Coord	Comments
1970	Hyptis suaveolens	54	8541797.43	570551.15	100 plus plants, isolated in rainforest
1971	Passiflora foetida	54	8575250.41	578283.64	isol plant
1972	Brachiaria decumbens	54	8575292.43	578286.69	isol plants? or Mnsithea roetboelloides
1973	Hyptis suaveolens	54	8575257.15	578246.66	isol plant, E side
1974	Hyptis suaveolens	54	8571294.1	570090.65	5 plants, E side
1975	Hyptis suaveolens	54	8571478.88	570100.77	scattered patches
1975	Cenchrus pedicellatus	54	8571478.88	570100.77	scattered patches
1975	Mitracarpus hirtus	54	8571478.88	570100.77	scattered patches
1975	Themeda quadrivalvis	54	8571478.88	570100.77	scattered patches
1975	Stylosanthes scabra	54	8571478.88	570100.77	scattered patches
1976	Hyptis suaveolens	54	8571628.16	570061.99	sprayed, some regrowth
1977	Hyptis suaveolens	54	8571644.61	569985.87	20 plants, W side, sprayed
1977	Themeda quadrivalvis	54	8571644.61	569985.87	20 plants, W side, sprayed
1978	Hyptis suaveolens	54	8571652	569862.98	20 plants, W side, sprayed
1978	Themeda quadrivalvis	54	8571652	569862.98	20 plants, W side, sprayed
1979	Hyptis suaveolens	54	8571664.73	569769.61	10 plants, W side, sprayed, cscattered gregrowth
1979	Themeda quadrivalvis	54	8571664.73	569769.61	10 plants, W side, sprayed, cscattered gregrowth
1980	Hyptis suaveolens	54	8571685.09	569631.56	denser patch W side, sprayed
1981	Themeda quadrivalvis	54	8571790.24	569419.41	scattered regrowth
1982	Themeda quadrivalvis	54	8571893.92	569267.36	denser regrowth
1983	Hyptis suaveolens	54	8571946.45	569223.99	thicker stretch for 200m then sparse
1984	Hyptis suaveolens	54	8572086.28	569249.94	isol regrowth
1985	Hyptis suaveolens	54	8572412.01	569190.32	Gamba exclusion area, dense Stylo sprayed, Hyptis at back carpark sprayed
1986	Stylosanthes scabra	54	8558153.58	579170.34	isol plants, N side
1987	Stylosanthes scabra	54	8558048.38	578792.92	isol plants, S side
1988	Hyptis suaveolens	54	8557424.59	576489.62	5 plants, N side
1989	Hyptis suaveolens	54	8557392.58	576387.71	5 plants, S side
1990	Hyptis suaveolens	54	8556317.38	572466.51	10 plants, N side
1991	Stylosanthes scabra	54	8555857.24	570793	isol plants, N side





Waypoint	Exotic Species	Zone	X Coord	Y Coord	Comments
1992	Stylosanthes scabra	54	8555746.45	570396.44	30 plants, both sides for 30m
1993	Stylosanthes scabra	54	8555623.38	569953.77	10 plants, N side
1994	Hyptis suaveolens	54	8555476.05	569395.03	20 plants, S side
1995	Hyptis suaveolens	54	8555368.6	569025.27	20 plants, N side
1996	Hyptis suaveolens	54	8555336.64	568893.68	10 plants, S side
1997	Hyptis suaveolens	54	8555305.73	568782.69	10 plants, N side
1998	Hyptis suaveolens	54	8555274.47	568677.88	10 plants, both sides
1999	Hyptis suaveolens	54	8555247.34	568558.55	30 plants, both sides
2001	Hyptis suaveolens	54	8555197.45	568386.26	200m stretch, both sides
2002	Hyptis suaveolens	54	8555111.28	568082.47	50m stretch, 10 plants, N side
2003	Stylosanthes scabra	54	8555053.74	567870.92	10 plants, S side
2004	Stylosanthes scabra	54	8555034.68	567796.82	10 plants, S side
2005	Stylosanthes scabra	54	8554988.66	567622.05	100 plants, S side, sprayed
2006	Hyptis suaveolens	54	8554958.93	567525.16	100 plants both sides for 100m
2006	Stylosanthes scabra	54	8554958.93	567525.16	100 plants both sides for 100m
2006	Stylosanthes scabra	54	8554958.93	567525.16	100 plants both sides for 100m
2007	Hyptis suaveolens	54	8554941.73	567458.66	20 plants
2007	Stylosanthes scabra	54	8554941.73	567458.66	20 plants
2007	Stylosanthes scabra	54	8554941.73	567458.66	20 plants
2008	Stylosanthes scabra	54	8554880.06	567352.91	20 plants, E side
2009	Hyptis suaveolens	54	8554604.16	567295.75	100s plants, scattered over 100m
2010	Stylosanthes scabra	54	8554199.81	567212.79	plants sprayed
2011	Hyptis suaveolens	54	8554007.02	567132.75	dense from turn S, sprayed
2012	Hyptis suaveolens	54	8553470.59	567064.87	dense, sprayed
2013	Hyptis suaveolens	54	8553420.59	567115.27	dense, sprayed
2013	Stylosanthes scabra	54	8553420.59	567115.27	dense, sprayed
2013	Sida acuta	54	8553420.59	567115.27	dense, sprayed
2014	Hyptis suaveolens	54	8553355.21	567033.26	sparser, sprayed w Hyptis, stylo, sida
2014	Stylosanthes scabra	54	8553355.21	567033.26	sparser, sprayed w Hyptis, stylo, sida



Waypoint	Exotic Species	Zone	X Coord	Y Coord	Comments
2014	Sida acuta	54	8553355.21	567033.26	sparser, sprayed w Hyptis, stylo, sida
2015	Stylosanthes scabra	54	8553270.04	566946.97	continious for 50m
2016	Stylosanthes scabra	54	8553093.98	566897.11	continious for 50m
2017	Stylosanthes scabra	54	8552986.8	566859.44	patch for 200m
2018	Stylosanthes scabra	54	8552556.97	566704.13	end patch 200m
2019	Stylosanthes scabra	54	8555904.21	567283.75	continious for 50m
2020	Hyptis suaveolens	54	8555903.1	567285.38	isolated live plant
2021	Hyptis suaveolens	54	8555980.99	567274.18	20 plants, E side
2022		54	8548675.59	570101.77	Bore site, no weeds
2023	Brachiaria decumbens	54	8576755.98	588829.44	20x20m patch, road drainage pit
2024	Brachiaria decumbens	54	8577125.88	590187.85	Dense seeded area, with Rhodes Grass, S extent
2025	Brachiaria decumbens	54	8576863.81	589831.1	Dense seeded area, with Rhodes Grass, extent denser area
2026	Brachiaria decumbens	54	8577469.3	590864.98	Dense seeded area, with Rhodes Grass, N extent
2027	Hyptis suaveolens	54	8577799.61	592528.03	isolated patch, E side
2028	Hyptis suaveolens	54	8577873.61	592725.77	5 plants, W side
2029	Themeda quadrivalvis	54	8578204.52	593784.77	isolated patch, E side
2030	Brachiaria decumbens	54	8583684.03	595630.77	isol patches
2031	Brachiaria decumbens	54	8584574.01	595857.61	borrow pit with isol patches
2032	Brachiaria decumbens	54	8585169.03	595889.28	seeded for soil stabilisation S end
2033	Brachiaria decumbens	54	8585628.4	595873.69	seeded for soil stabilisation N end
2034	Brachiaria decumbens	54	8586772.44	595835.48	34 to 35, borrow pit seeded for soil stabilisation, also native Pseudorhaphis etc
2035	Brachiaria decumbens	54	8587260.07	595801.21	35 to 36, scattered among native Pseudorhaphis etc
2036	Brachiaria decumbens	54	8587689.62	595804.31	36 to 37, scattered W side
2037	Brachiaria decumbens	54	8587878.17	595810.38	37 to 38, dense for soil stabilisation, E side
2038	Brachiaria decumbens	54	8588784.98	596030.79	38 to 39, both sides seeded for soil stabilisation
2039	Brachiaria decumbens	54	8589189.81	596178.94	39 to 40, both sides seeded for soil stabilisation, dense 30m wide both sides
2040	Brachiaria decumbens	54	8589908.46	596411.54	39 to 40, both sides seeded for soil stabilisation, dense 30m wide both sides
2041		54	8590371.14	596396.63	open cleared laydown area, no weeds currently
2042	Brachiaria decumbens	54	8590563.39	596514.32	41 to 42, seeded on both sides for soil stabilisation



Waypoint	Exotic Species	Zone	X Coord	Y Coord	Comments
2043	Brachiaria decumbens	54	8590591.39	596541.12	42 to 43, seeded on both sides for soil stabilisation to security entrance
2044	Hyptis suaveolens	54	8590652.39	596493.02	on stock piles
2045	Hyptis suaveolens	54	8591076.16	596439.21	clumps N of lease
2046	Brachiaria decumbens	54	8590546.14	596708.8	isol Signal on mounds with native panicum
2047	Hyptis suaveolens	54	8590570.45	596714.86	isol plants
2048	Brachiaria decumbens	54	8590633.32	596765.34	isol plants
2049	Hyptis suaveolens	54	8590670.7	596765.25	dense, sparayed but dense regrowth
2050	Hyptis suaveolens	54	8590679.57	596757.46	dense, sparayed but dense regrowth



## Appendix E Distribution Maps for Individual Weed Species

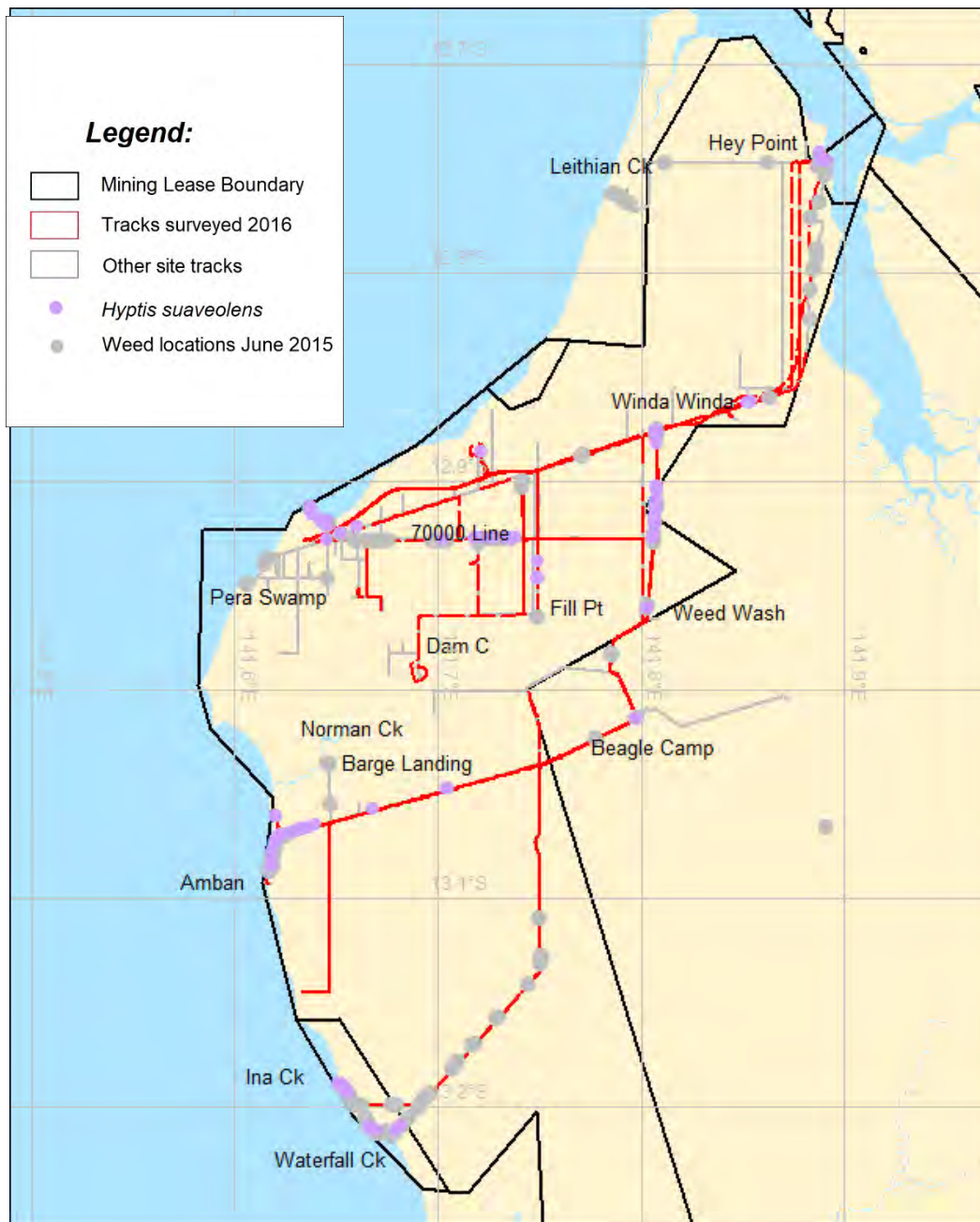


Figure E-1 Location of stinking Roger within the Amrun Project area (June 2017)



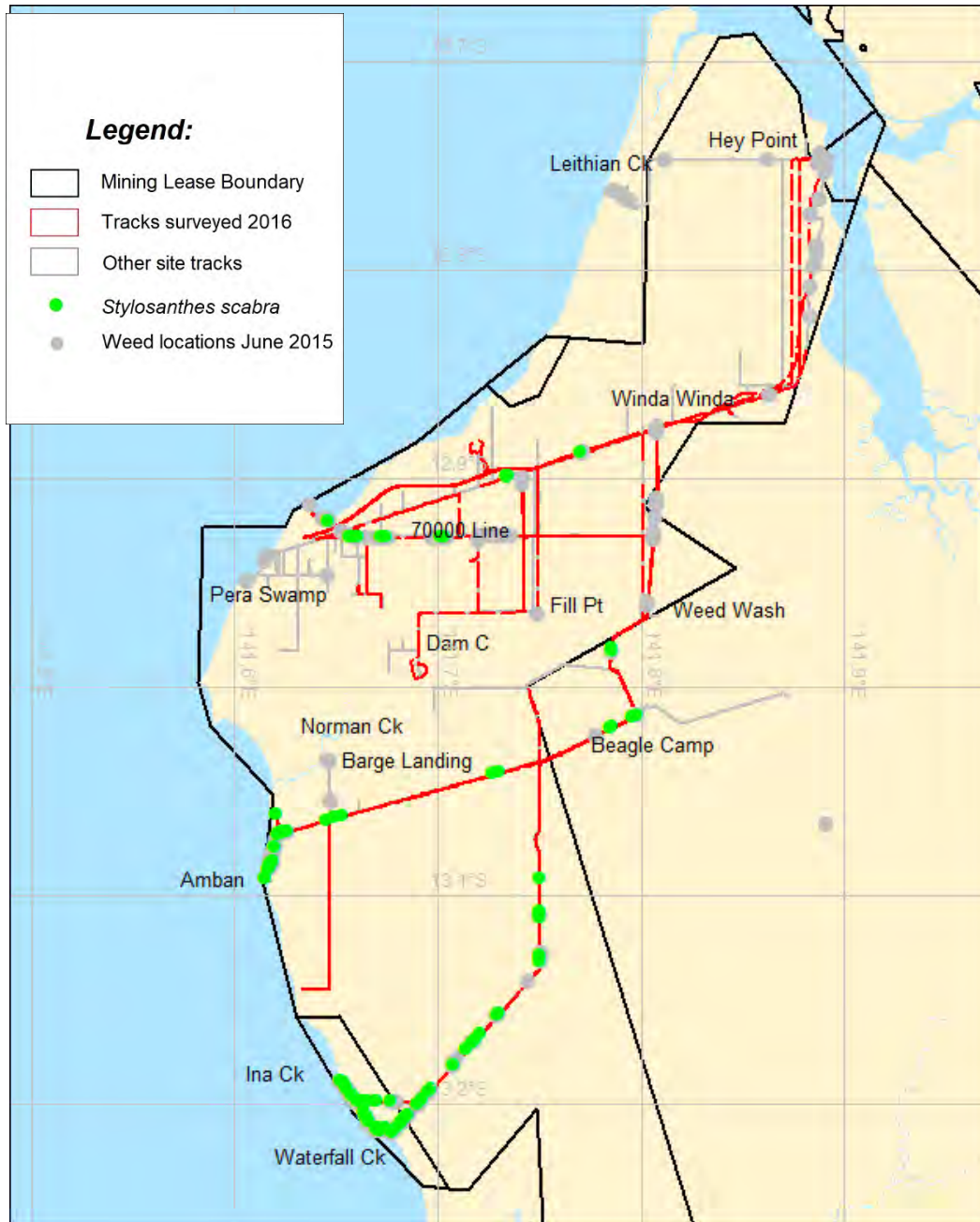


Figure E-2 Location of stylo within the Amrun Project area (June 2017)

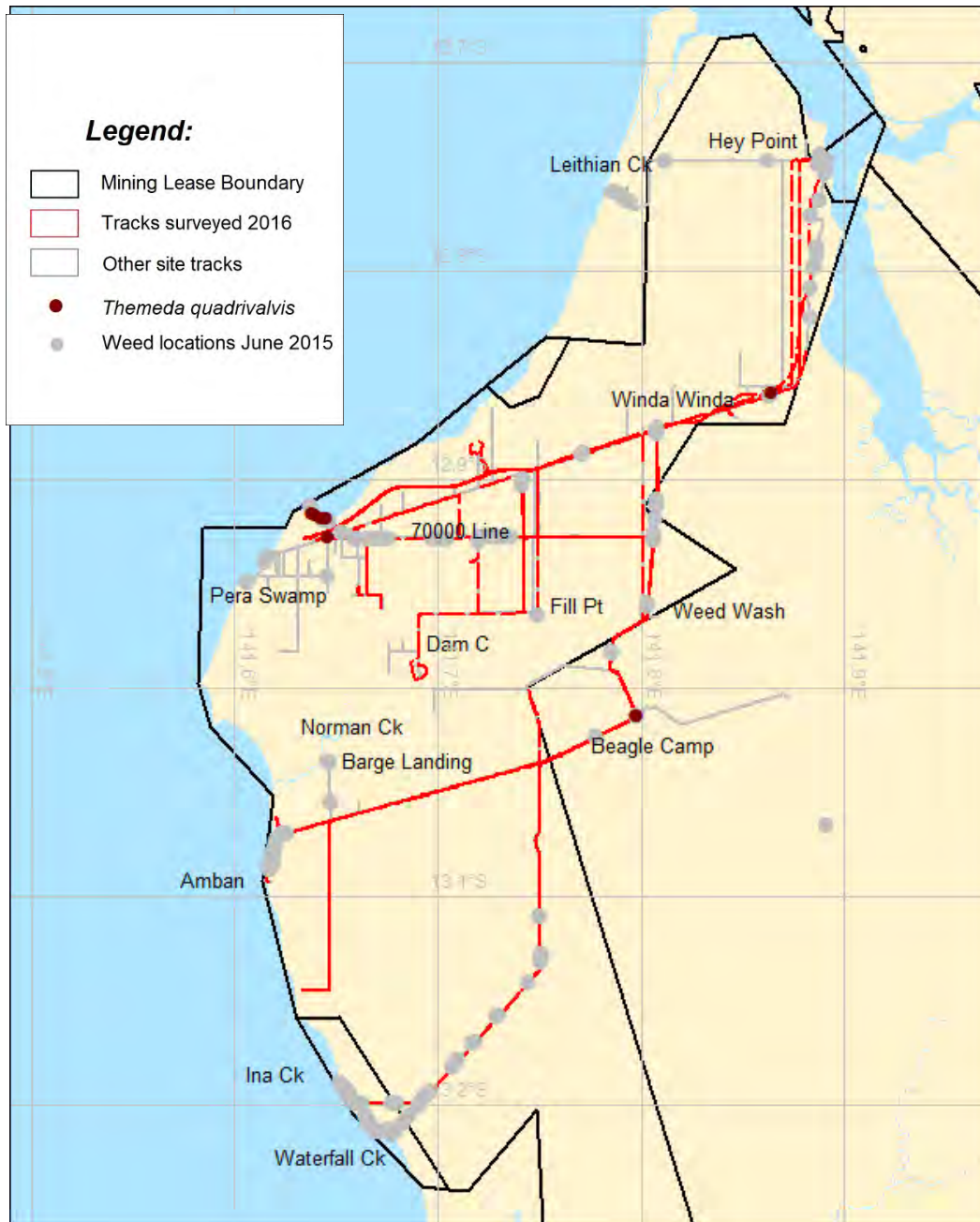


Figure E-3 Location of grader grass within the Amrun Project area (June 2017)



Figure E-4 Location of mission grass within the Amrun Project area (June 2017)



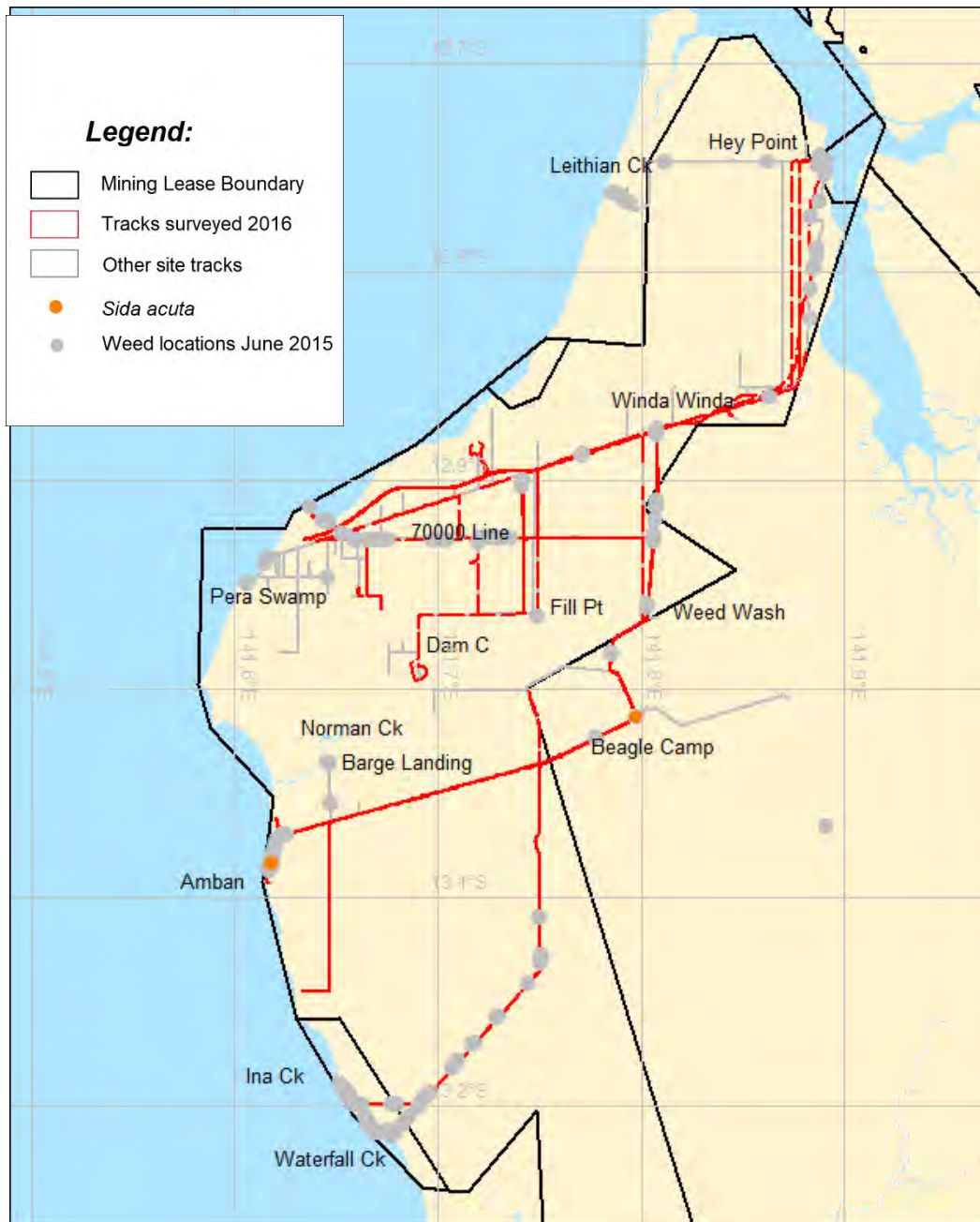


Figure E-5 Location of smooth sida within the Amrun Project area (June 2017)

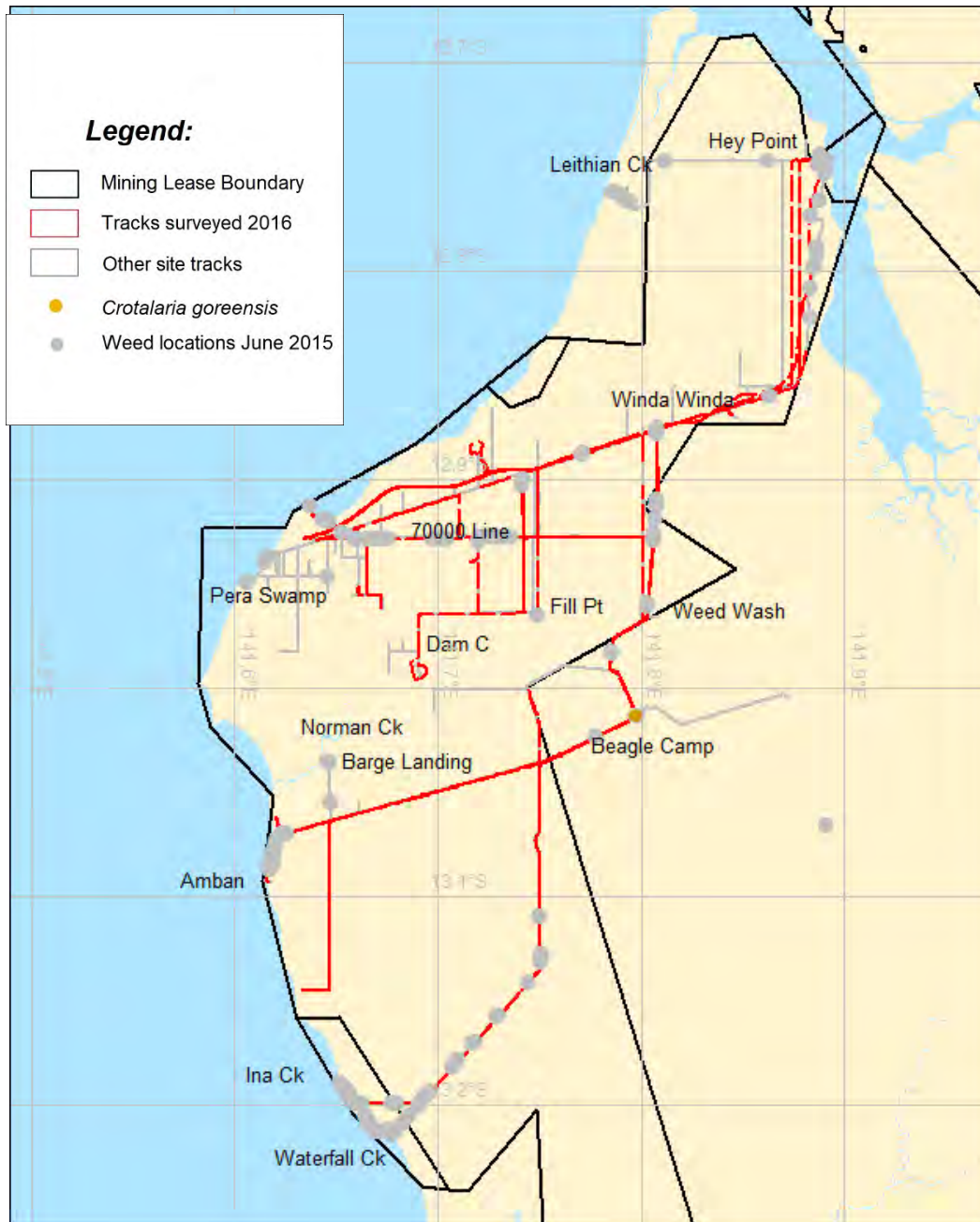


Figure E-6 Location of rattlepod within the Amrun Project area (June 2017)



Figure E-7 Location of tropical girdlepod within the Amrun Project area (June 2017)





Figure E-8 Location of stinking passionflower within the Amrun Project area (June 2017)



Figure E-9 Location of Star-of-Bethlehem vine within the Amrun Project area (June 2017)

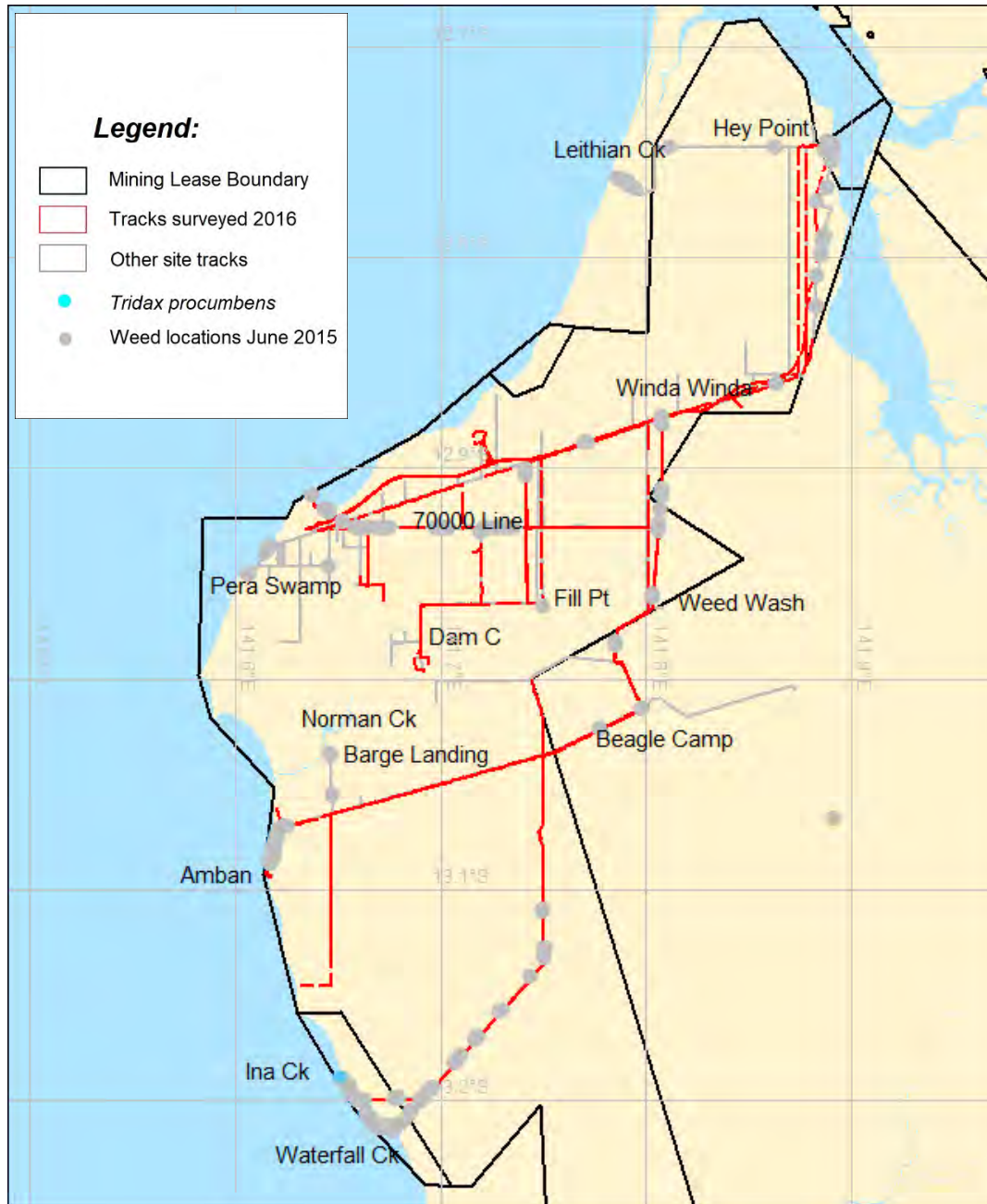


Figure E-10 Location of coat buttons within the Amrun Project area (June 2017)





Figure E-11 Location of broad-leaved paspalum within the Amrun Project area (June 2017)



Figure E-12 Location of flannel weed within the Amrun Project area (June 2017)

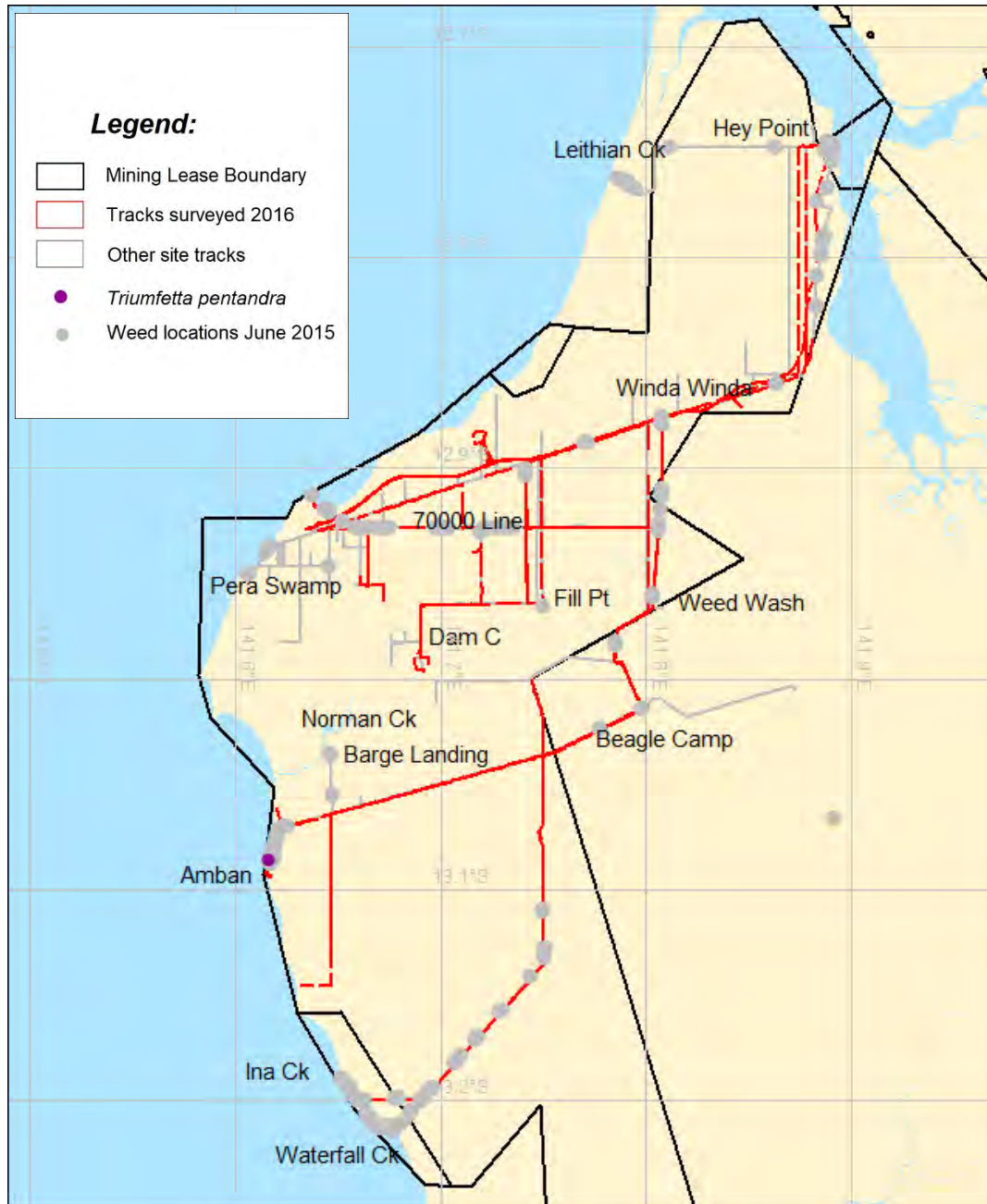


Figure E-13 Location of burbark within the Amrun Project area (June 2017)