



**Biodiversity Offset Area –
Land Management Action Plan 2015-16**

Orica Mining Services – Kurri Kurri NSW – July 2015

This Land Management Action Plan was produced for Orica Mining Services in July 2015 to outline the management requirements for the Kurri Kurri site Biodiversity Offset area for 2015-16. The report also outlines the land management works done on the site during 2014-15 as per the previous management plan. These actions not only deal with the weed issues but other matters which are impacting on the biodiversity, soil stability and overall health of the offset area

SUBMITTED	DATE	REVISION
Ryan Bremmell	22/07/2015	Draft 1
Ryan Bremmell	23/07/2015	Final

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SIGNATURE

22/07/2015

DATE

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Cover Photo: Dead Lantana controlled in 2013 and 2014



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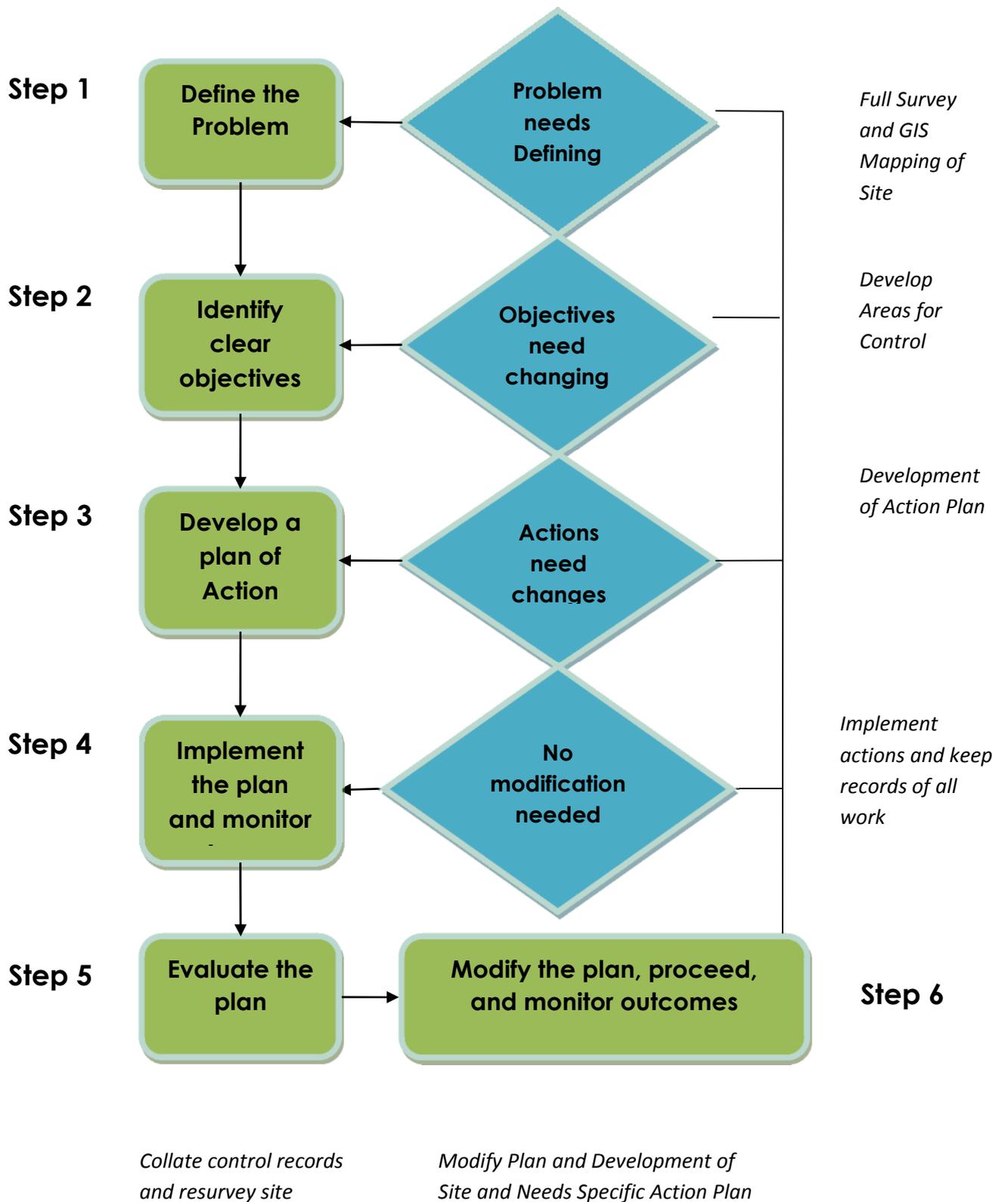
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Introduction

For the past 3 years Hunter Land Management (HLM) carried out weed control at the Orica Biodiversity Offset Area (BOA) at Kurri Kurri NSW (see Figure 1). This includes both primary and secondary treatment of the targeted weeds as identified in the Biodiversity Offset Area Vegetation Management Plan (Umwelt 2012). The most recent weed control was conducted under the 2014-15 Weed Action Plan which was developed in July 2014. The creation of the 2013-14, 2014-15 and this 2015-2016 Land Management Action Plan (LMAP) is an evolution of this plan of management. This LMAP identifies further issues which are not only impacting on the ability to control weeds at the site but broader land management issues which are impacting on the overall health of the BOA.

Hunter Land Management undertook the following methodology to develop this Land Management Action Plan in 2015-16 for Orica Mining services Biodiversity Offset area at Kurri Kurri NSW to observe and record noxious and environmental weeds, erosion, waste, fence condition and any vertebrate pest signs in the area. Other land management issues affecting the health of the biodiversity area were also noted.



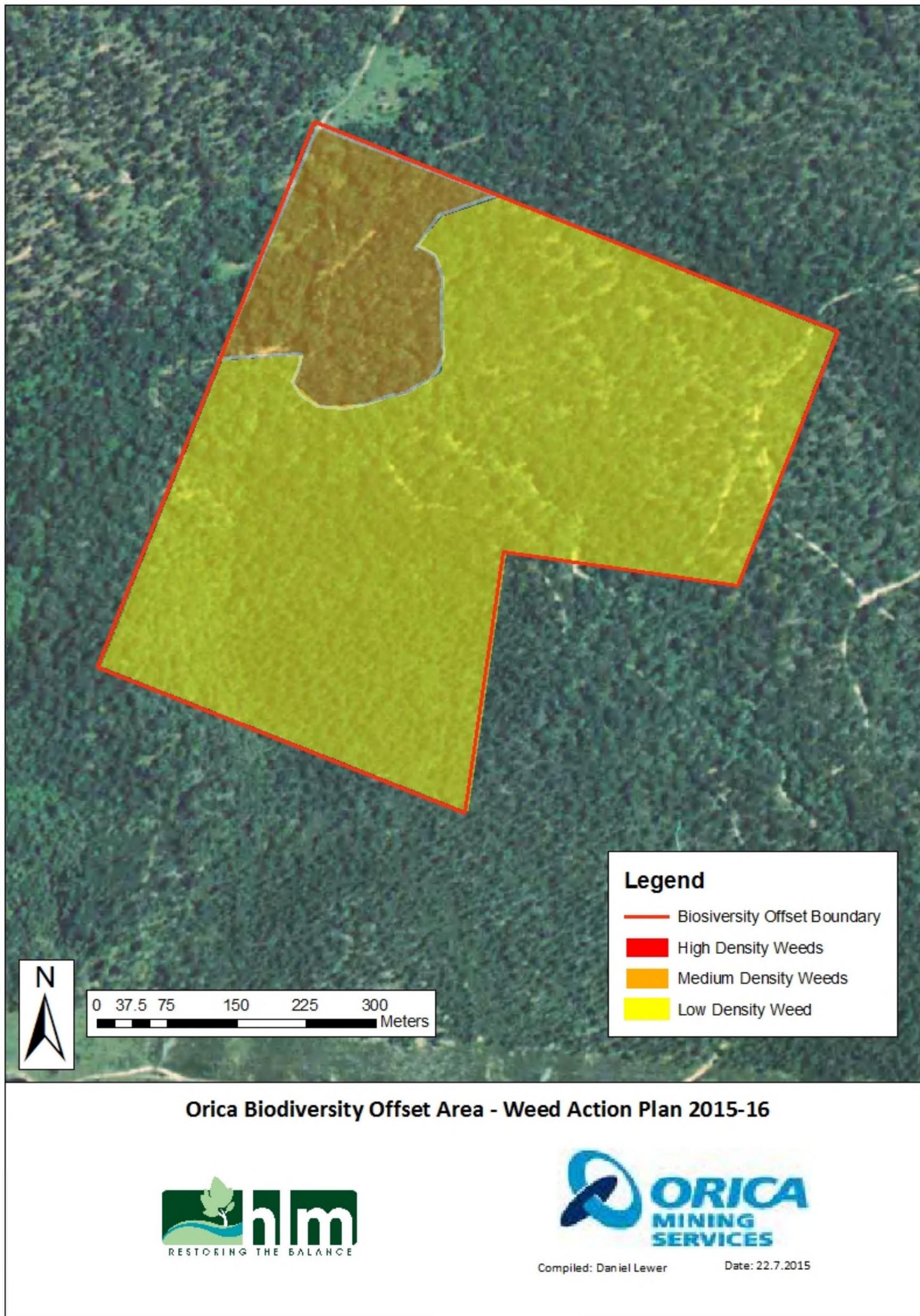


Figure 1: Orca Biodiversity Offset Area – Weed Action Plan 2015-16

1.0 Land Management Actions 2014-15

There are two main land management issues which continue to affect the BOA values of the site. Weeds are the greatest threat to the BOA however as outlined in this section the additional issue of soil erosion is also an issue planned to be rectified in 2015-16. Cattle access to the BOA was no issue in 2014-15 but needs to remain monitored in 2015-16. Waste is no longer a threat due to restriction of public access.

1.1 Weeds

Weed control at the site has been effective over the 2012-15 control period with a large reduction in density and species present. Primary control has seen a major reduction in large volumes of major weeds. Weeds controlled during this control period are listed below:

Green Cestrum	<i>Cestrum parquai</i>
Lantana	<i>Lantana camara</i> (see Plate 1 below)
Blackberry	<i>Rubus fruticosus</i>
Bitou Bush	<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>
Moth Vine	<i>Araujia sericifera</i>
Cobblers Peg	<i>Bidens pilosa</i>
Spear Thistle	<i>Cirsium vulgare</i>
Purple Top	<i>Verbena bonariensis</i>
Wild Tobacco Tree	<i>Solanum mauritianum</i>
Common Passionfruit	<i>Passiflora edulis</i>
Lambs Tongue	<i>Plantago lanceolata</i>
Paddys Lucerne	<i>Sida rhombifolia</i>



Plate 1: Dead Lantana controlled in the 'High Density' area in 2013-14

The 'low density' (see Figure 1) area still remains clean with it being close to weed free, as there were no observed weeds during the monitoring surveys. The size of the area declared as "low density" or weed free has increase in the past 12 months.

The 'medium density' weed area has minor incursions of weeds however is mainly weed free and extends over the previously mapped "high density" weed area due to the successful weed control in the areas. A few new weeds have been observed in this area and will in the future, which have most likely had seed distributed from neighbouring lands via in stream flows. These weeds include one specimen of Pampas Grass (*Cortaderia selloana*) which has been controlled and scattered Fire Weed (*Senecio madagascariensis*) which was also controlled.

The 'high density' area has been removed – see notes above.

1.2 Cattle Access

Cattle access to site has been restricted through a fence repair project undertaken in January 2014. No evidence of cattle entering the site has been found since this work has been completed. Ongoing monitoring of the fence needs to be maintained throughout the next 12 months.

1.3 Creek Erosion

Creek erosion continues to pose a big threat to the biodiversity of the BOA. Bed lowering is continuing to cause undercutting of the banks in the main creek line and head cuts of small tributaries to cause further erosion. This is a natural process however valuable native vegetation is being lost, see Plate 2. In addition to this the aquatic environment is being threatened with sedimentation destroying native vegetation and decreasing the habitat value for native fauna. A long section survey has been undertaken in February 2014 and a stream rehabilitation plan (over page) was be developed in the 2014-2015 management period for implementation in the 2015-16 period.



Plate 2: Creek erosion causing undercutting of banks and loss of native vegetation inspected during 2014-2015

1.4 Waste

Waste is no longer a major issue on the site as a result of the cleanup in 2014. As long as access restrictions are maintained via locked gates and regular inspections this should no longer be an issue for the BOA site.



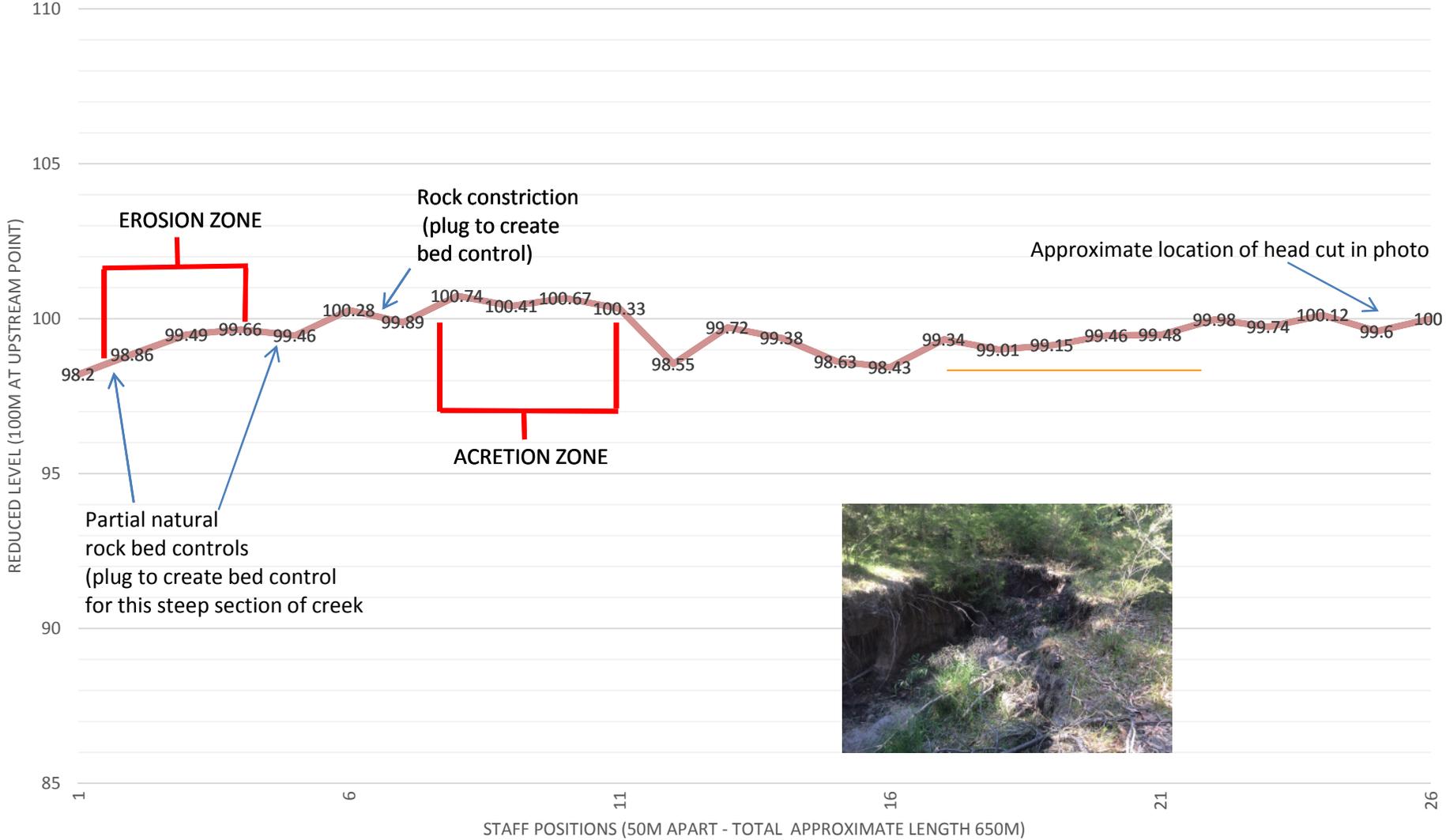
Stream Rehabilitation Plan

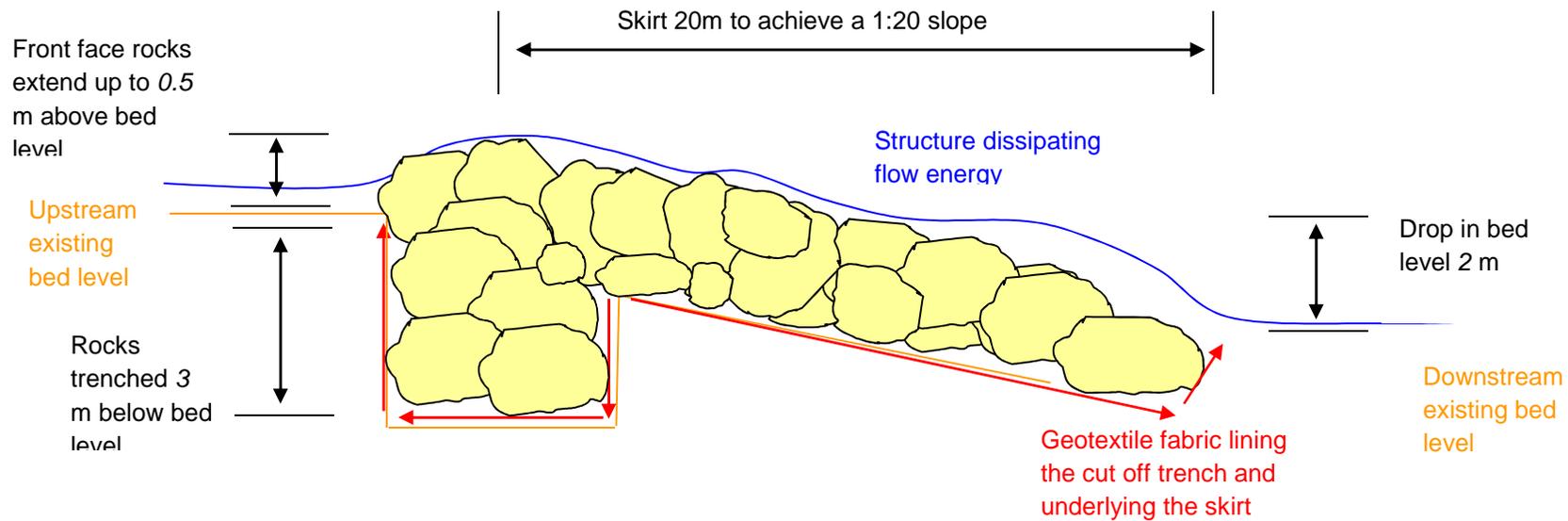
Version 1 - January 2015



Approximate
Headcut and Rock
Chute Location

Orica KurriKurri BOA Creek- Reduced Bed Level





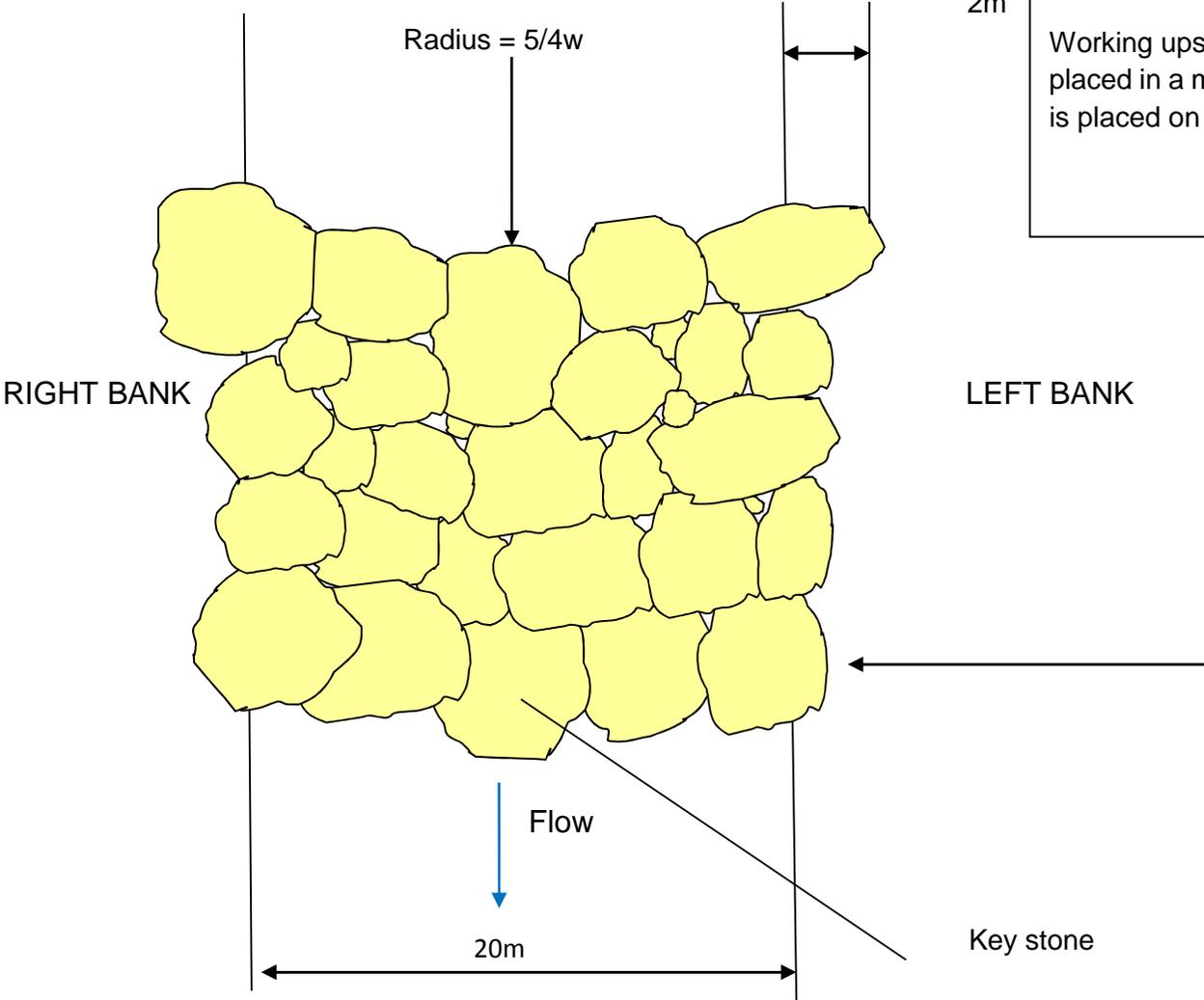
Bill of Quantities (estimates only)

Component	Units	Cost per unit	Total
Rock Chute Structure			
Rock (d50 400mm)	250 m ³ 375 Tonnes (1.5T p/m ³)	\$38 p/m ³ delivered	\$9,500.00
Geotextile	1 x 75x3m roll	\$880 per roll	\$880.00
Excavator	30hrs	\$120 p/hr	\$3,900.00
Equipment Float	2 ways	\$500	\$1,000.00
Supervision	3 days	\$1,100 p/day	\$3,300.00
		Total	\$18,580.00



Rock Chute Standard Design
Long Section

Construct from downstream extent starting with center 'key stone'.
2m
Working upstream and out to each bank. Subsequent rock placed in a manner so as pressure exerted from water flow is placed on the downstream rocks.



Large toe rocks to be bedded into stream bed. Top of rock to meet existing stream bed level

Rock Chute Standard Design
Plan View

RESTORING THE BALANCE

2.0 Land Management Actions 2014-15

This section provides actions to address the issues outlined in the above section. The more holistic approach will help to significantly increase the biodiversity value of the BOA. Some actions have been budgeted for, however some are estimates only as a detailed proposal would need to be prepared by HLM to provide an accurate costing for the works. For example a decision on the extent of fence repairs would need to be done, before accurate costing can be completed.

Table one provides the suggested schedule for action in accordance with this plan.

2.1 Weeds

The control methods to be used for weed management in 2015-2016 include:

Hand Removal Methods

Digging out plants: Plants with bulbs, tubers and corms must be completely removed from the soil by digging out. Often these plants will reproduce from broken off pieces.

Crowning: This technique is useful for weeds such as asparagus fern, which have their growing points below the surface of the soil. (Corms, rhizomes or tufted fibrous root systems).

Hand pulling: Hold the plant stem as close as possible to the base of the plant. Gently tug the plant. This will loosen the soil and allow the plant to come free. The plant may be hung up off the ground or piled in a heap.

Winding up: This process is suitable for plants with surface or climbing runners such as moth vine.

Herbicide Control Methods

Foliar Spraying (High Volume Spray, Low pressure back pack type)

This method requires spot spraying foliage of plants using knock down or selective herbicides.

Splatter Gun

This involves using gas powered splatter guns to distribute high concentration herbicide onto plant foliage.

Cut, Scrape and Paint (Cut Stump)

This is suitable for coppicing and suckering woody weeds such as Privet and Green Cestrum, or any weeds which are too large for hand-pulling or have long taproots. This method provides for no soil disturbance and weed eradication is successful. The cut surface is treated with a systemic herbicide immediately after cutting.

Scrape and Paint

This is a variation of the cut, scrape and paint technique described above, the difference being the plant is not cut but left intact and scraped. This technique is suitable for vines, saplings and other small stemmed weeds as it ensures the translocation of the herbicide throughout the entire plant.

ACTION - Continue weed control focusing on weed list in section '1.1 Weeds' using methods outlined above during the 2015-2016 period.

2.2 Cattle Access

Maintain a vigilant inspection regime of the western and southern portions of the site, even in amongst the thick tea tree vegetation.

ACTION - Conduct regular – monthly – inspections of fencelines surrounding BOA to ensure security from neighbouring cattle

2.3 Vertebrate Pest Control

A 1080 baiting and soft jaw leg hold trapping program should be undertaken on site to reduce feral predators preying on native animals in 2015-16. Motion sensor cameras should also be used through the program. Program should focus control on foxes and feral cats as per DPI guidelines.

ACTION - Conduct a 1080 baiting and soft jaw leg hold trapping program targeting foxes and feral cats

2.4 Creek Erosion

Implementation of the stream remediation plan is to be conducted in the 2015-2016 period as outlined previously in this report. Its construction will halt the sources of the along with ongoing monitoring. The plan built upon the bed level survey completed during 2013-2014 and accurately assessed the requirements for remediation at the site. Plate 5 shows an actively eroding nick point at one of the tributaries of the main creek line to be addressed by the plan. This is a result of ongoing bed lowering erosion of the main creek line, resulting 'hanging tributaries' (e.g. a water fall is a hanging tributary). In the light soils of the site erosion easily occurs moving upstream to try and match the same bed level of the stream into which it is flowing. Hence if the main stream continues to erode the tributaries will also continue to erode.



Plate 3: Active erosion point on tributary to main creek

ACTION – Implement the stream remediation plan for the creek line during 2015-2016

2.5 Waste

Continue to monitor site for secure entry points to prevent illegal dumping.

ACTION – Monitor secure entry points for illegal access and dumping monthly

Table 1: Schedule of works.

	Timing				Budget Est.
	Jul - Sep 2015	Oct - Dec 2015	Jan- Mar 2016	Apr - Jun 2016	
Weed control					\$5,000
Fencing/Access/Rubbish – Monthly Inspection					\$1,000
Creek erosion – remediation plan implementation					\$20,000
Vertebrate Pest Control					\$2,500
Monitor and evaluate – progress reports and 2016-17 management plan					\$3,750
TOTAL (approx.)					\$32,205

*HLM Rates Subject to review each financial year.

**Totals are estimates only and may vary slightly subject to factors such as amount of herbicide used etc.

3.0 Monitoring and Evaluation

Monitoring is a key component of this Management Plan. The main monitoring tool for this site will be the annual inspections conducted after 12 months in June 2016. This inspection forms the basis for ongoing weed monitoring at the site and assessment of effective control established throughout the 2016-17 management period. Weed control data will continue to be collected in the field using GPS technology, which provides the basis for mapping of control areas and planning for future works.

In addition to this all use of herbicide is managed in strict accordance with the label and conditions for spray such as wind, humidity and temperature. The 'Daily Record Sheet' (Appendix 1) is used to record all weather data throughout the day as well as the herbicide usage.

In addition to the annual monitoring inspections site monitoring will be conducted twice throughout the 12 month management period and a brief report provided outlining works completed, still to be done and any additional works which are not identified in the plan. This may include the control of new weeds, further waste, erosion and other issues which may or may not have been raised in this management plan. This report example, as shown below in Table 2, will include details of the works completed and works still to be done.



HLM Land Management Project Report v1

Client	Rio Tinto Hunter Valley Services
Project Name/Number	Job00058 - Mount Pleasant African Boxthorn Control - Week 2
Date or Date Range (including)	09/06/2015 – 22/06/2015
Client Project Manager	Peter Bowman
HLM Staff Involved	John Atkins, Tom Ferguson, David Lewer, Alan Westwood
Relevant Invoice/s	INV-0329 attached
Work Type	<input checked="" type="checkbox"/> Weed Control <input type="checkbox"/> Vertebrate Pest Control <input type="checkbox"/> Revegetation <input type="checkbox"/> Seed Collection <input type="checkbox"/> GIS Mapping <input type="checkbox"/> Fencing <input type="checkbox"/> Erosion Control <input type="checkbox"/> Grounds Maintenance <input type="checkbox"/> APZ Maintenance <input type="checkbox"/> Consulting Project <input type="checkbox"/> Bushfire Management <input type="checkbox"/> _____
Detailed Work Description (including any Site Supervisor Comments)	16/4- had to do a site famil, didn't get to start spraying until 830ish, used 7.5L of roundup ultra max spot spraying areas illustrated on map photos. Went to farmers warehouse got 4 drums of roundup. 17/4- used 11.25L of roundup ultra max spot spraying around sewage area and areas highlighted in pit photo. General weeds targeted.
Photos (if applicable)	
Mapping, GIS Points (if applicable)	n/a – see locations in site supervisor descriptions of work above
Herbicide Application Record Sheets (if applicable)	
Other Land Management Issues encountered (if applicable)	n/a
Recommendations / Further Works / Comments	Follow up weed control will be required in future to maintain control

Appendix 1. Herbicide Application Record Sheet

All chemical applications will require the detailed filling of this record sheet.



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DAILY REPORT SHEET

0001



Date:	Site: <input type="checkbox"/> Mine Site	Supervisor:	Project Manager:
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Job numbers	Times		Hours			
	Start Time	Finish Time	Normal Time	Time and a half	Double time	Total

Equipment/Plant used (tick if used)

Ute <input type="checkbox"/> Unit No:	Quikspray <input type="checkbox"/> Unit No:	Tractor <input type="checkbox"/> Make:	Mine radio: <input type="checkbox"/>	Other: (describe) <input type="checkbox"/>
Drivers/Operators:			Work Request Number	

Daily Breakdown

Time left depot:	Time arrived on site:	Crib break start/finish time:	Lunch break start/finish time:	Time left site:
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Chemical Use Record

Property/Holding: (residential address)													
Applicator's Full Name:													
Sensitive Areas (including distances, buffers): <div style="text-align:center"> <table border="1" style="margin:auto"> <tr><td> </td><td>N</td><td> </td></tr> <tr><td> </td><td>Treated Area</td><td> </td></tr> <tr><td>W</td><td> </td><td>E</td></tr> <tr><td> </td><td>S</td><td> </td></tr> </table> </div>		N			Treated Area		W		E		S		Comments (including risk control measures for sensitive areas):
	N												
	Treated Area												
W		E											
	S												

Application Data

Full Label Product Name:		Rate/Dose:	Water Rate @ L/ha:
Permit No.:	Expiry Date:	Additives/Wetters:	
Total L/kg:	Applicators Initials:	Water quality(pH or description):	
Equipment type:	Nozzle Type:	Nozzle Angle:	Pressure:
Date Last Calibrated:			
Weather Showers <input type="checkbox"/> Overcast <input type="checkbox"/> Light Cloud <input type="checkbox"/> Clear sky <input type="checkbox"/>			
Rainfall (24 hours before and after)			
Before: mm	During: mm	After: mm	
Time (show time in this column)	Temperature °C	Relative Humidity (%)	Wind Speed
Start			
Finish			

Description of day's work completed/issues encountered:	Materials Used:
---	-----------------

HLM Staff Members Used		O/N Allowance
Name:	Sign:	

Comment from / by Client

Client sign:	Client Name:
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Job Completed Job Ongoing Other Works