ABN 34 008 675 018

ILUKA RESOURCES LIMITED

TECHNICAL REPORT

JACINTH-AMBROSIA PROJECT

Mining and Rehabilitation Compliance Report 2010

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Date: 30 March 2011

ILUKA

This revision of the specification was:

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Revision	Date	Purpose
A	29 February 2011	Working document
B	8 April 2010	Review Revision
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1. INTRODUCTION

1.1 Background

Construction activities on the Mining Leases (ML), Miscellaneous Purpose Leases (MPL) and Extractive Mineral Licences (EML) at Jacinth Ambrosia commenced in August 2008 and were completed in September 2009. Mining activities commenced in September 2009 with the pre-stripping of vegetation, topsoil and overburden and the commissioning of the Wet Concentrator Plant (WCP), Tails Storage Facility (TSF), Heavy Mineral Concentrate (HMC) storage area and Mining Unit Plant (MUP). Processing of ore commenced in November 2009. Steady state production has occurred for the whole of 2010. A plan of the Jacinth Ambrosia mine site and infrastructure is presented in Appendix 13.1, Figure 26 and Figure 27.

1.2 Purpose

The purpose of this Mining and Rehabilitation Compliance Report (MARCR) is to meet reporting conditions associated with the granting of mineral tenements and authorisation of activities on these tenements under the Mining Act 1971, as identified below.

Specifically this MARCR addresses compliance with Mining and Rehabilitation Programs (MARP's) for mining operational activities on the mining leases, miscellaneous purposes licenses and extractive mineral leases:

- ADP 2009/04 - Jacinth-Ambrosia Mining and Rehabilitation Program (MARP) for ML 6315, EML 6316, MPL 110, MPL 111.
- ADP 2008/021 - MARP for Extractive Mineral Leases EML 6325 – 6326, EML 6330 – 6334.

The reporting period is 1st January 2010 to 31st December 2010.

1.3 Report Summary

Iluka implemented and maintained Environmental Management Systems throughout 2010 and supported several community programs to deliver on MARP commitments. Section 2 summarises 2010 mining activity and section 4 describes the Environmental Management System supporting mining activity to minimise the impacts of operations on environmental, social and heritage aspects.

Iluka inducted all personnel and contractors to inform them of their environmental obligations for operating at the Jacinth Ambrosia mine site. Personnel reported 66 environmental incidents relating to flora, fauna, pests, soils, waste, air, quality and compliance.

Section 5 examines the performance of implemented systems against the outcomes and commitments of the MARP's, ADP 2009/04, ADEP 2008/021. Iluka is compliant with 18/19 ML and MPL MARP outcomes and 5/7 EML MARP outcomes. No discernible trends appear at JA regarding the abundance or condition of flora, fauna and animal pests where data collection is at an early stage. Weed diversity and abundance has increased in the reporting period, despite extensive and prolonged weed control activities. Water discharge into the off- path tailings facility resulted in a

local rise in groundwater at the Tailings Storage Facility. Iluka implemented a study into the chemistry and fate of groundwater following the rise in groundwater and the discovery of heavy metals in September 2010.

An amendment to the MARP on the 11th November 2009 included additional commitments relating to consultations with the Far West Coast Native Title Group. In July 2010 an amendment to the MARP for an additional HMC storage area, plus minor MARP revisions to accommodate the RO pre-treatment pond and system, and overburden dump heights were submitted to PIRSA.

Iluka and Kalari visited communities and schools to deliver a message about road safety through the Road Train Safety Program; and several community groups visited Jacinth Ambrosia to gain an understanding about Jacinth operations.

1.4 Exclusions

Compliance reporting for the following documents is excluded from this report and will be reported separately:

- Jacinth-Ambrosia Project Ooldea Road North and Ooldea By-Pass - Rehabilitation Plan, July 2008
- Jacinth-Ambrosia Project Ooldea Road North and Ooldea By-Pass – Environmental Management (Construction) Plan, Appendix A Dust Management Sub-Plan, July 2008, and
- Pre-construction feasibility activities carried out on Exploration Leases.

2. DESCRIPTION OF MINING ACTIVITIES

Name of the mine	Jacinth-Ambrosia
Tenement numbers	ML 6315 EML 6316, 6325, 6326, 6330, 6331, 6332, 6333, 6334, MPL 110, 111
Name of the mine owner and operator	Iluka Resources
Person accepting responsibility for the report	Shane Tilka
Dates of the reporting period for the report	1st January to 31st December 2010
Date of preparation of the report	March 30, 2011

ML Mining Lease, EML Extractive Mineral Lease, MPL Miscellaneous Purposes Licence

2.1 Mining Activities 2010

Mining activities over 2010 consisted of:

- Processing of 9,621.6 kilotonnes (kt) of ore through the mining unit plant (MUP), starting from the centre of the Jacinth pit and progressing southward (Table 1).
- During 2010, approximately 8,933 kt of tailings were placed into the off-path tailings storage facility (TSF). Plans to construct the first in-pit TSF (Cell 1) were finalised in late 2010 and construction began in December. Both areas are displayed in Appendix 13.1, Figure 27.
- Approximately 628.3 kt of heavy mineral concentrate (HMC) was produced, with 513 kt transported by truck to the Port of Thevenard and shipped to the processing plant at Narngulu, WA.

Table 1: 2010 Mining summary – ore, overburden and heavy mineral concentrate.

Material	Tenement	Quantity (kt)
Ore	ML 6315	9,621.6
Overburden	ML 6315	1,276
HMC	ML 6315	628.3
ModCod Tailing	ML 6315	8,933
Calcrete	EML 6332	3,880
Calcrete	6325, 6326, 6330, 6331, 6316, 6333, 6334,	0

3. ORE RESERVES AND MINE LIFE

Iluka conducted edge definition drilling along the current mine pit as well as some further greenfields drilling. Resources at Jacinth remained virtually unchanged but better ore definition was gained in areas. An updated cost optimisation increased ore reserves slightly but in general there was an overall depletion due to mining.

At current rates of mining Jacinth has a remaining life of just over 7 years.

Proven and probable ore reserves are summarised in Table 2.

Table 2: JA Ore Reserves.

Deposit	Ore Reserve Category	Overburden (kbcm)	Ore tonnes (kt)	2010 InSitu HM (t)	2009 InSitu HM (t)
Jacinth	Proved	15,519	65,923	4,573	4,850
	Probable	-	6,727	273	64
Ambrosia	Proved	13,298	33,582	1,531	1,401
	Probable	-	889	22	50
Total	Proved	28,817	99,505	6,104	6,251
	Probable	-	7,616	295	114
Grand Total		**28,817**	**107,121**	**6,399**	**6,365**

4. REHABILITATION AND ENVIRONMENTAL MANAGEMENT ACTIVITIES

4.1 Iluka Environmental Management Systems

Jacinth Ambrosia implemented and maintained systems for managing and measuring aspects of the environment through 2010. Iluka's EHS Management System (EHSMS) policy outlines twelve corporate standards and their associated procedures, guidelines, forms and training that describe the minimum requirements for all Iluka operations

The Iluka EHSMS and associated programs align with Iluka corporate standards and contribute to monitoring environmental impacts and managing compliance with stated MARP outcomes.

Table 3: Iluka Corporate standards and associated environmental management systems.

	Corporate Standards	Policy & Systems
1.	Leadership and Policy	- EHS policy
2.	Organisation and Responsibility	- Delegated environmental team of 4 personnel for JA
3.	Communication	- Inductions - Intranet
4.	Contractor Management	- Contractor approval process - Inductions
5.	Risk and Hazard Management	- Take two - Job Safety & Environment Assessments
6.	Incident Investigation and Reporting	- Safety & Environment Observations - Inspections
7.	Emergency and Crisis Preparedness	- Emergency Response Plan
8.	Procedures and Training	- Procedures for key areas - Inductions - Weekly toolbox meeting
9.	Operational Management	- Management plans exist for key areas
10.	Environmental Management	- Environmental Management System in place
11.	Monitoring	- Monitoring undertaken for environmental aspects
12.	Auditing and Assurance	- Internal & external audits

4.2 Incident Reporting

Iluka personnel and contractors reported 141 incidents relating to impacts on key environmental aspects – flora, fauna, hydrocarbons, soils, waste and weeds. This table summarises the incidents reported through the Loss Control Card system and the Fauna Sighting Register. Iluka tables further details, key learnings and strategies for managing these environmental incidents under their relevant areas in Section 5 Compliance with Outcomes.

Table 4: Summary of environmental incident reports for 2010.

Incident Type	Qty	Summary	Section
Fauna – road kill	72	Incidents occurred on the transport route between Jacinth and Ceduna	Section 5.2
Fauna - drowning	10	Incidents occurred early in 2010 prior to the fencing of water bodies	Section 5.2
Fauna - unknown	6	-	Section 5.2
Fauna - observation	4	Observation of dingoes and other fauna	Section 5.2
Flora	15	Impacts to vegetation from water spillage	Section 5.1
Hydrocarbon Storage	2	Poor storage of hydrocarbons	Section 5.11
Soils	10	Impacts to soils from water spillage or stockpile management	Section 5.5
Waste Management	6	Poor recycling or storage of waste	Section 5.10
Weeds	16	Introduction of new weeds or weed observations	Section 5.3
Total	**141**		

4.3 Rehabilitation Summary

This section presents a summary of 2010 rehabilitation activities and proposed works for 2011. The disturbed and rehabilitated areas for the MARCR reporting area are summarised in Table 5 for domains 2, 3 and 4, the locations of which are displayed in Appendix 13.1, Figure 26. A total area of 60.61 ha was cleared and stripped of soil in accordance with the Jacinth Ambrosia Vegetation Removal and Soil Management Procedure, PRC 5061. The disturbed areas are shown in Appendix 13.1, Figure 28.

Table 5: Operations summary table.

Domain	2008/09		2010		2011	
	Last Reporting Period		Current Reporting Period		Proposed Next 12 Months	
	Disturbed (ha)	Rehab (ha)	Disturbed (ha)	Rehab (ha)	Disturbed (ha)	Rehab (ha)
2: MLP 110 Airfield & Village						
Airfield	40.09	0	0	0	0	0
Village	10.59	0	0	2.96	0	0
3: MPL110 Borefield & Access Rd						
Tank Farm 1	3.02	0	0	3.02	0	0
Turkey's Nests	9.99	0	0	0	0	4.66
EML's, Borrow Pits	14.22	0	0	2.36	0	0
Infrastructure	125.68	0	0	0	0	0
4: ML6316 Mine Site						
Jacinth Pit	52.83	0	27.33	0	45	0
Soil Stockpiles	37.08	0	26.34	0	7	0
Tailings Storage Facility (inc stockpiles)	122.69	0	0	0	0	0
Infrastructure	34.92	0	6.94	0	0	0
Total Area	**450.95**[1]	**0**	**60.61**	**8.34**	**52**	**4.66**

[1] Total disturbed area reported in 2009 MARCR = 440.29, compared to 450.95 in Table 5. Accuracy has increased due to an increase in surveyed infrastructure and updated aerial photography.

4.4 2010 Rehabilitation Progress 2010, Plans 2011

Rehabilitation work for 2010 was scheduled in five areas within the MARCR reporting area (4.4.1 – 4.4.5). Progress was achieved in all areas except the off-path Tailings Storage Facility, which will remain in intermittent use until at least 2012 to provide tailings operational flexibility.

Rehabilitation activities included various combinations of infrastructure removal, gravel removal, subsoil and topsoil reapplication, ripping, weed control and regeneration.

Regeneration monitoring, using Landscape Function Analysis (LFA), vegetation surveys and weed control will continue on rehabilitated areas until interim completion criteria for landform stability and ecosystem reestablishment are achieved.

NB: detail regarding interim closure criteria to be discussed with PIRSA/DENR during 2011.

4.4.1 Domain 2B, Canberra Camp (1.4 ha)

2010 Progress: Infrastructure & gravel removed, ripped, weed control.

Evidence: Photo points (Figure 1), LFA (Figure 2).

2011 Plans: Septic & pipe to be removed. Continue monitoring & weed control.

Figure 1: Photo point C20NW, Canberra camp, left: during operation, right: after rehabilitation.

Figure 2: LFA transects, Canberra camp, left: impact site, right: analogue site.

4.4.2 Domain 2B, Contractor Camp (1.51 ha)

2010 Progress: Rehabilitation on 0.38 ha only, infrastructure removed, ripped, weed control. Topsoil suspected saline. Remaining 1.13 ha remains in use as Lucas laydown. Septic and lighting to remain in case of camp extension.

Evidence: Photo points (Figure 3).

2011 Plans: Area to be used in research program for vegetation salt tolerance & tracking salt movement through soil profile.

Figure 3: New photopoints at Contractor camp.

4.4.3 Domain 3E, Tank Farm 1 (3.02 ha)

2010 Progress: Infrastructure removed, ripped, weed control.

Evidence: Photo points (Figure 4), LFA (Figure 5), Yr 1 only, data not presented.

2011 Plans: Continue monitoring & weed control.

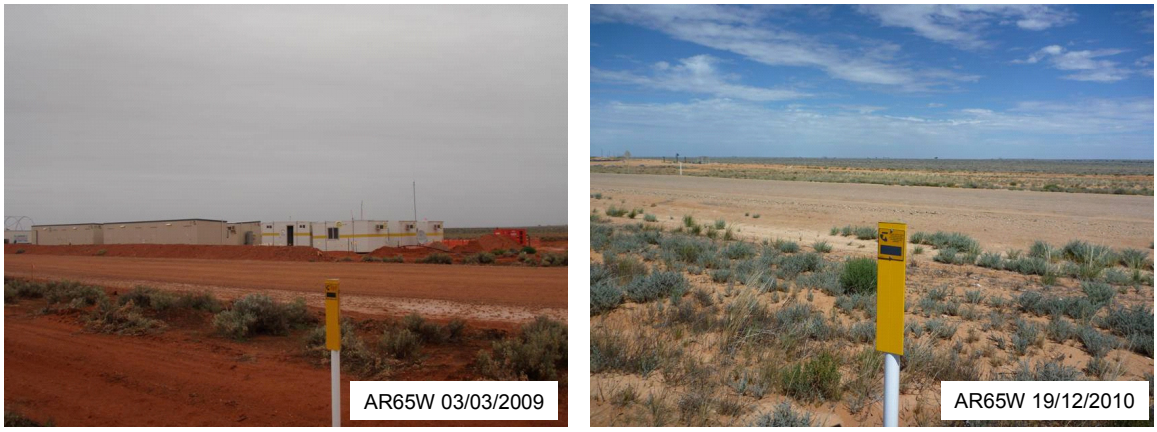

Figure 4: Photo point AR65W, Tank Farm 1, left: during operations, right: after infrastructure removal & soil restoration.

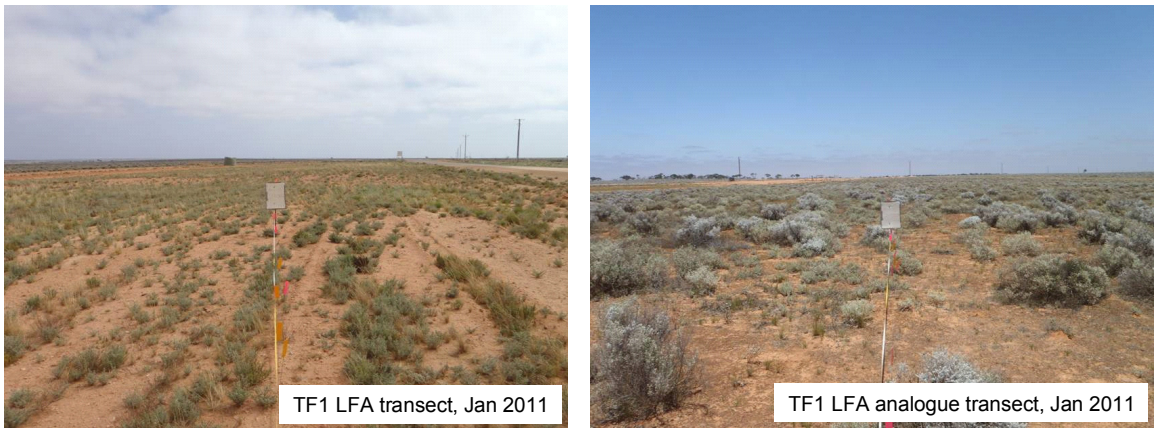

Figure 5: LFA Transects, Tank Farm 1, left: impact site, right: analogue site.

4.4.4 Domain 3F, Borrow Pit, EML 6325 (2.36 ha)

2010 Progress: Filled, subsoil and topsoil replaced, ripped, recontoured, weed control.

Evidence: Photo points (Figure 6).

2011 Plans: Establish LFA transect, continue monitoring & weed control.

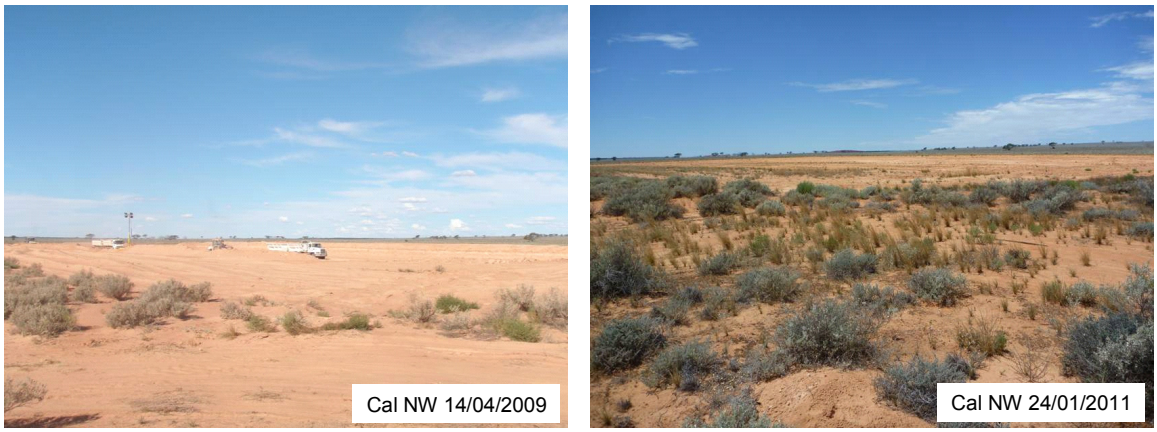

Figure 6: Photo point Cal NW, EML 6325, left: during operations, right: after rehabilitation.

4.4.5 Domain 4C, Tailings Storage Facility (TSF) (122.68 ha)

2010 Progress: Predicted in 2009 MARCR that TSF would be partially rehabilitated during 2010. However due to operational changes the TSF will remain in intermittent use until 2012. During 2010 the soil and vegetation stockpiles surrounding the perimeter of the TSF were managed for weeds and rabbits.

Evidence: Photo points (Figure 7).

2011 Plans: Continue monitoring & weed and rabbit control around the perimeter.

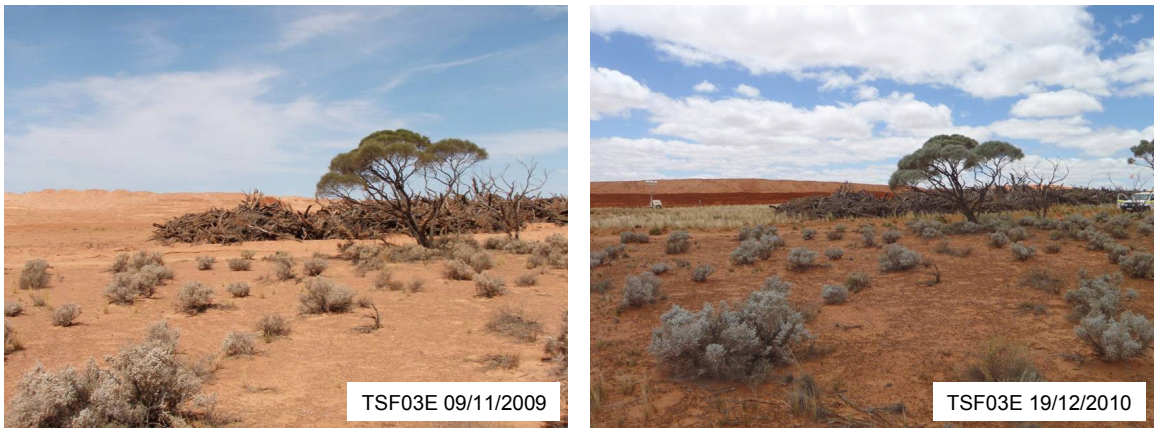

Figure 7: Photo point TSF 03E, tailings storage facility, left: 1 month after construction, right: 14 months after construction.

4.5 Seed Collection Program

As a result of the 2009 and 2010 seed collection programs, the J-A seed store contains 44 species from 15 families (Table 6). Seed is stored in a dedicated, climate controlled container at J-A and it will be cleaned, weighed and repackaged after an upgrade on the J-A Rehabilitation Facility is finished in April 2011. Seed is collected from within the ML and other adjacent areas of the Yellabinna Regional Reserve with approval from DENR. For material collected outside of the ML a Native Seed Collection Annual Return is submitted annually to the Fauna Permits Unit, as per Seed Collection Permit conditions. Collection locations and notes are captured using a Trimble Nomad and are maintained in a GIS database.

As in 2009, seed collection was supported by casual employees from both the Yalata and Ceduna indigenous communities (Figure 8).

Figure 8: Left: assessing ripeness of *Austrostipa nitida* prior to picking. Right: assessing drying *Eriochiton sclerolaenoides*.

Table 6: J-A seed collection program, species collected.

Family	Genus	Species	2009	2010
Aizoacea	*Tetragonia*	*eremaea*	*	
Amaranthaceae	*Ptilotus*	*obovatus*	*	
Chenopodiaceae	*Atriplex*	*vesicaria*	*	*
	Enchyaleana	*tomentosa*		*
	Eriochiton	*sclerolaenoides*	*	*
	Maireana	*erioclada*	*	*
	Maireana	*integra*	*	*
	Maireana	*pentatropis*	*	*
	Maireana	*radiata*	*	*
	Maireana	*trichoptera*	*	*
	Maireana	*turbinata*	*	*
	Rhagodia	*parabolica*	*	
	Rhagodia	*spinescens*	*	
	Salsola	*kali*	*	
	Sarcocornia	*species*	*	

Family	Genus	Species	2009	2010
	Scleroleana	*obliquicuspis*		*
	Scleroleana	*patenticuspis*	*	*
Compositae	*Brachyscome*	*ciliaris var. ciliaris*	*	
	Cephalipterum	*drummondii*	*	*
	Cratystylis	*conocephala*	*	
	Pycnosorus	*pleiocephala*	*	
	Rhodanthe	*floribunda*	*	
	Vittadinnia	*cervicularis*	*	*
Cruciferae	*Lepidium*	*phlebopetalum*	*	
	Arabidella	*glaucescens?*		*
Frankeniaceae	*Frankenia*	*species*	*	*
Goodeniaceae	*Goodenia*	*pinnatifida*	*	
Gramineae	*Austrodanthonia*	*caespitosa*	*	*
	Austrostipa	*elegantissima?*	*	*
	Austrostipa	*eremophila*	*	*
	Austrostipa	*nitida*	*	*
	Eragrostis	*dielsii?*	*	
Leguminoseae	*Acacia*	*papyrocarpa*	*	*
	Senna	*artemisioides ssp. coriacea*	*	
	Senna	*cardiosperma ssp. gawlerensis*	*	
Malvaceae	*Radyera*	*farragei*	*	
Myoporaceae	*Eremophila*	*latrobei ssp. glabra*	*	
Myrtaceae	*Eucalyptus*	*oleosa*	*	
Santalaceae	*Santalum*	*acuminatum*	*	
	Santalum	*spicatum*	*	
Sapindaceae	*Dodonaea*	*viscosa ssp. angustissima*	*	
Zygophyllaceae	*Zygophyllum*	*aurantiacum*	*	*
	Zygophyllum	*eremaeum*	*	*
	Zygophyllum	*ovatum*	*	*

4.6 Rehabilitation Research and Monitoring Programs

These programs have developed to address the priority issues identified from the J-A rehabilitation research planning exercise conducted in 2009 and include issues that have been identified as operations have progressed. Projects are grouped into categories with a major aim and each project is described using title, type of work, collaborators and progress. Post 2011, it is envisaged that a brief research summary will be produced annually to update progress key program outcomes. At the conclusion of each project, results will be analysed and written up to a level relevant to the work conducted.

4.6.1 Salinity Migration

AIMS: to understand the potential extent and impact of saline water upward migration and lateral and downward seepage from mining tails.

- **Potential for salt migration from tailings (consultancy)**

  SRK Consulting, Douglas Partners, Iluka Resources

  Progress: Scope of works and consultancy selection process in 2010/2011, field work Phase 1 scheduled began March 2011.

- **Water and salt movement in ModCod (JA field trial)**

  Iluka Resources, SRK Consulting

  Progress: Experiment designed, work scheduled to begin March/April 2011.

- **Potential effect of saline water seepage on deep rooted vegetation (J-A field monitoring)**

  Iluka Resources

  Progress: Monitoring transects established March 2011.

4.6.2 Soil Management

AIMS: to regularly assess the quantity and quality of soil material available for rehabilitation and thereby maximise its contribution to the creation of sustainable landscapes.

- **Soil tracking and condition monitoring (JA survey)**

  Iluka Resources

  Progress: GIS database of insitu and stockpile locations and soil type, annual condition monitoring.

- **Comparison of insitu and disturbed soil characteristics and how these will impact rehabilitation outcomes (Soil survey consultancy, 2008)**

  SWC Consultants

  Progress: Review and verify this initial soil survey work into mini field trials, 2011.

- **Rehabilitation soil resource balance (Annual JA planning activity)**

  Iluka Resources, JA Mine Engineers & Survey, Perth Closure Planning Group

Progress: Initial modelling included in MARP rehab plan, first review scheduled in April 2011.

- **Stabilisation of process water dam wall (J-A field experiment)**

  Iluka Resources

  Progress: Experiment designed to assess steep slope water erosion control methods, to be implemented April 2011.

4.6.3 Landscape Design

AIMS: to investigate key components of insitu landscape arrangements from landscape to microtopography level, to create sustainable rehabilitation landforms.

- **Landscape Function Analysis (J-A site surveys)**

  Iluka Resources

  Progress: Surveys begun in 2010 on analogue and rehabilitation areas and to assess Chenopod and Mallee landscape arrangements (Figure 9).

David Tongway & Wendy Williams, Lake Ifould, J-A

Figure 9: David Tongway (ex CSIRO) and Wendy Williams (UQ), 2010 J-A LFA training.

4.6.4 Vegetation Water Use

AIMS: to investigate the water requirements and survival strategies of key J-A vegetation types and match these requirements to rehabilitated soil profiles in order to create sustainable vegetation associations.

- **Root mapping of J-A vegetation (JA field survey)**

  Iluka Resources

  Progress: Field mapping of tree root types, depths, locations and soil types began in 2010 and continuing 2011 (Figure 10).

- **What is the minimum soil profile depth and characteristics to sustain Western Myall and their associated plant communities?**

  University of Adelaide, Iluka Resources

  Progress: Initial planning visit, project proposed to begin in 2011.

Figure 10: In-situ roots, Jacinth pit 2010.

4.6.5 Vegetation Salt Tolerance

AIMS: to investigate the actual tolerance to soil salinity of J-A vegetation species at various life stages.

- **Seed germination of five arid plant species under salinity and water stress (PhD – 1 chapter)**

  E Steggles, J Facelli, P Ainsley, L Pound: Botanic Gardens of Adelaide, University of Adelaide.

  Progress: In writing.

- **Tolerance of J-A vegetation to salinity, germination & seedling Stage (BG glasshouse experiment)**

  J Guerin: Botanic Gardens of Adelaide

  Progress: Established in Feb 2011.

- **Tolerance of J-A vegetation to salinity, germination & seedling stage (field survey)**

  Iluka Resources

Progress: Regeneration and direct seeding monitoring transects to be established on salinised soil at Lucas Camp in April 2011.

- **Tolerance of J-A vegetation to salinity, mature stage (JA field surveys)**

  Iluka Resources

  Progress: Opportunistic soil and vegetation health measurements on areas affected by saline water spillage.

- **Tolerance to saline 'slime' coating for dust control (J-A field experiment)**

  Iluka Resources

  Progress: 2010 trial data capture complete, new trial to be established March 2011 (Figure 11).

- **Does saline water runoff affect vegetation along Ooldea Road? (field survey)**

  Iluka Resources

  Progress: Data captured and draft analysis complete.

Figure 11: *Atriplex vesicaria* **from J-A slime coating trial, left: immediately after slime application, right: 7 months after application.**

4.6.6 Biological Soil Crust (BSC)

AIMS: to determine the extent and function of BSC at J-A and their potential for use as an initial rehabilitation resource.

- **Biological soil crusts at the Jacinth-Ambrosia Mine: can they be used to improve ecosystem rehabilitation outcomes? (Honours)**

  University of Queensland, Iluka Resources

  Progress: Honours Thesis complete. Further work due to begin in March 2011.

- **Influence of biological soil crust and seedling emergence and seed germination (PhD – 1 chapter)**

  E Steggles, J Facelli, P Ainsley, L Pound: Botanic Gardens of Adelaide, University of Adelaide.

  Progress: draft in circulation.

- **BSC re-establishment from topsoil scalping (J-A mini field trial)**

  Iluka Resources, University of Queensland

  Progress: Due to begin April 2011.

- **BSC re-establishment from cyanobacteria culture (J-A glasshouse, mini field trial)**

  University of Queensland, Iluka Resources

  Progress: Due to begin April 2011.

Figure 12: Crushed and watered topsoil showing cyanobacterial filament growth.

4.6.7 Soil Seed Banks

AIMS: to investigate the behaviour of native seeds in both insitu and soil stockpile situations to guide rehabilitation topsoil replacement and direct seeding strategies and rehabilitation outcome monitoring.

- **Investigating soil seed banks in *Acacia papyrocarpa* woodland (PhD chapter)**

  E Steggles, J Facelli, P Ainsley, L Pound: Botanic Gardens of Adelaide, University of Adelaide.

  Progress: Draft in circulation (Figure 13).

- **Seed longevity in storage and stockpiles (BG lab experiment)**

  J Guerin, P Ainsley: Botanic Gardens of Adelaide

  Progress: Established in Feb 2011.

- **Regeneration on soil stockpiles (J-A field monitoring).**

  Iluka Resources

  Progress: Annual data collection & analysis continuing.

- **Physiological seed dormancy of three species of Enneapogon (PhD chapter)**

  E Steggles, J Facelli, P Ainsley, L Pound: Botanic Gardens of Adelaide, University of Adelaide.

  Progress: In writing

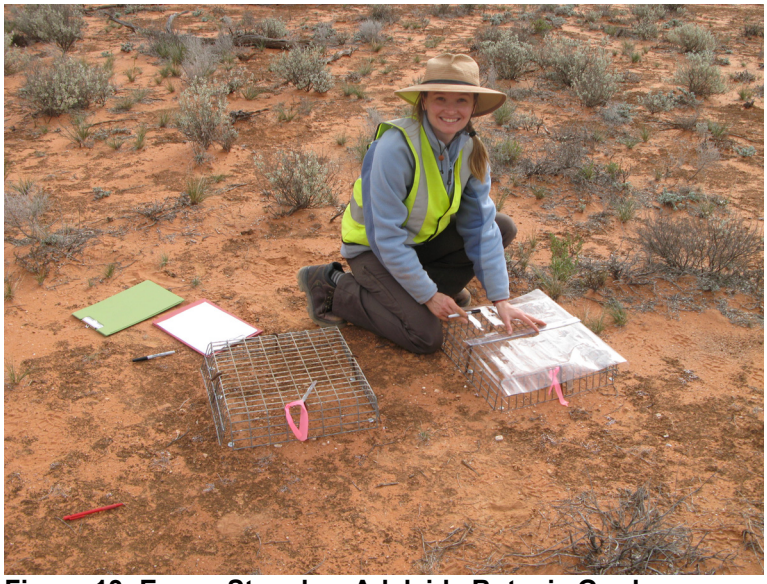

Figure 13: Emma Steggles, Adelaide Botanic Gardens, assessing soil seed bank experiment, J-A 2010.

4.6.8 Vegetation Characteristics – Other

AIMS: to provide a responsive research program to address issues of importance to future J-A rehabilitation outcomes.

- ***Atriplex vesicaria* dieback on Nullarbor Plain (J-A field investigation)**

  Iluka Resources

  Progress: borer activity identified & insect samples collected, initial helicopter survey conducted. DENR & UA offers of assistance to investigate in 2011.

- **Effect of dust smothering on *Maireana sedifolia* (J-A field monitoring)**

  Iluka Resources

  Progress: field work to be finalised April 2011

- **Growing bullock bush from root shoots (J-A field investigation)**

  Iluka Resources

  Progress: 2010 plantings sprouted well but were eaten by rabbits, and then required relocation to new research site – all died. New plantings scheduled for April 2011.

- **Tolerance of native vegetation to relocation (J-A field investigation)**

  Iluka Resources

  Progress: *A. papyrocarpa, A. oswaldii* & *M. sedifolia* juveniles transplanted Feb 2011.

- **Aging JA Myall communities (J-A field survey)**

  University of Adelaide, Iluka Resources

  Progress: vertical tree samples being collected for analysis by UA in 2011/12 & field survey using UA ageing categories planned for May 2011.

5. COMPLIANCE WITH OUTCOMES

This section reports on compliance against the lease conditions and the environmental and socio-economic outcomes prescribed in the Mining and Rehabilitation Plan (MARP). Each section describes the measurement criteria and provides a summary of the data supporting the compliance statement.

Selected raw data is supplied in the Appendices and where not supplied it can be made available upon request.

5.1 Flora

ML & MPL MARP Outcomes	Criteria	Compliance
All clearance of native vegetation is authorised under appropriate legislation.	Demonstrate that actual clearance boundaries are within authorised clearance boundaries (output from GIS).	Compliant
No uncontrolled fires caused by mining operations.	Demonstrate that actual clearance boundaries are within authorised clearance boundaries (output from GIS).	Compliant

EML MARP Outcomes	Criteria	Compliance
Outcomes as per ML MARP	Survey and mapping of actual clearance boundaries versus authorised clearance boundaries (output from GIS).	Compliant
	Monitor dust and vegetation health around an active borrow pit as outlined in the Air Quality Management Plan.	Non Compliant (see 6.1 for discussion)

5.1.1 Measurement of compliance

1) *Clearance within authorised boundaries*: Iluka reconcile survey clearance data with an aerial photograph and calculate the difference between clearances permitted through the Vegetation Clearance Procedure and actual clearance as a measure of compliance to procedures.

2) *Uncontrolled fires*: Iluka use the Loss Control Card reporting system to record incidents of uncontrolled fire.

3) *Incident Reporting*: Iluka personnel report flora related incident through the Loss Control Card reporting system.

4) *Flora Monitoring*: Iluka conduct annual flora surveys to determine the effects of operations on flora for three community types (Mallee, Chenopod and Myall). Flora survey sites appear in Appendix 13.1, Figure 29.

5.1.2 Summary of key measurements

5.1.2.1 Clearance within authorised boundaries

There were zero breaches of Iluka's Vegetation and Heritage Clearance Procedure in 2010 where clearance totalled 60.61 ha and Iluka authorised clearance permits totaling 71.86 ha (Table 7). The objects of procedure ensured that in 2010:

- Vegetation clearance occurred within authorised clearance boundaries;
- All vegetation clearance was authorised internally through the Vegetation Clearance permit system;
- Vegetation clearance records were maintained.

The total clearance at Jacinth for the three year period to 2010 is 511.57 ha, approximately 50 ha less than the clearance endorsed through the Jacinth Vegetation Clearance Permit system (Table 7).

All vegetation clearance for 2010 occurred in Domain 4 within authorised clearance boundaries (Appendix 13.1, Figure 28).

Vegetation clearance during 2010 was within the SEB offset forecast.

Table 7: Actual clearance vs vegetation clearance permit areas.

	Area Cleared (ha)			
	2008-09	2010	2011	Total
Vegetation Clearance Permits (Ha)	487.85	71.86	52	611.71
Actual Disturbance (Ha)	450.96	60.61		511.57
Difference between Approved and Actual (Ha)	-36.89	-11.25		-48.14

5.1.2.2 Uncontrolled fires

Iluka report *No Uncontrolled Fires* resulting from mining operations for 2010. Aerial photos taken in January 2011 show no fire scars.

5.1.2.3 Incident Reporting – Flora

Iluka personnel reported 13 flora related incidents for the reporting period. All incidents reported were within approved clearance boundaries. Most of the reports concern water overflowing from the process plant onto or near vegetation resulting from technical or procedural problems. Problems with water spillage include the failure of level probes in hoppers, spray nozzle blockages, spillage from belts and inadequate bunding. Iluka addressed technical problems and implemented changes in procedures in an effort to reduce spillage (Table 8).

Table 8: Flora incidents reported by Jacinth personnel via the Loss Control Card system.

Report type	Qty	Date	Details	Key learning and strategies
Saline water spill potential to impact native vegetation	1 1 1 1	31/10/2010 24/09/2010 21/09/2010 27/06/2010	Water from process plant overflow Water from process plant overflow Water from process plant overflow Water from process plant overflow	- Fix and adjust level probes - Adjust and clean nozzle sprays - Skirting attached to belts to prevent overflow - Increased focus on bunding - Environmental team monitor areas of vegetation impacted by saline water Refer to Section 4.6
Saline water spill onto native vegetation	1 1 1 1 1 1 1 1	19/10/2010 19/09/2010 04/07/2010 22/06/2010 21/05/2010 08/04/2010 01/04/2010 22/02/2010 15/01/2010	Water overflow onto vegetation Water overflow onto vegetation Water overflow onto vegetation Minor tailings spill onto vegetation Water overflow onto vegetation Water overflow onto vegetation Water overflow onto vegetation Water overflow onto vegetation Water overflow onto vegetation	
Off road driving	1	22/12/2010	Impact to vegetation	
Vegetation die back	1	30/09/2010	Die back of Bladder Saltbush	Refer to Section 4.6 Research Programs
	15			

5.1.2.4 Flora Surveys 2010

Iluka contracted EBS to conduct an annual flora monitoring program at Jacinth since 2009, with the aim of establishing an accurate understanding of the impacts of mine operation on native vegetation. Data from control sites (> 5km from the impact zone surrounding the mine) and impact sites will be used to determine trends in flora diversity and abundance. The program also aims to assist future rehabilitation work by developing an understanding of typical vegetation community structures and compositions and how these respond over a range of seasonal conditions. The survey team employs methods outlined in the *Guide to the Native Vegetation Survey Using the Biological Survey of South Australia* (EBS 2011).

As discussed in MARCR 2009, long-term monitoring requires multiple datasets (usually 3–5 years) to detect environmental change, so no definitive conclusions can be drawn with current information. At this stage the potential indirect impacts of mining activities on vegetation at the Jacinth/Ambrosia site cannot be distinguished from environmental factors such as seasonal variation and rainfall patterns. When several datasets of the flora monitoring have been obtained, more reliable information associated with trends and possible impacts may become evident in the analysis of the data. EBS indicated in their 2010 report that it will be unlikely they can fit any statistically valid models to the flora survey data until 2012/13.

The 2010 field survey was conducted from 22-25 October (report available upon request). Highlights of the 2010 survey included:

- Significant rainfall prior to the survey resulted in vegetative growth and fruiting of most perennial species, in particular *Maireana* species were able to be positively identified due to the presence of fruit.
- Species Richness: 71 native flora species were recorded within the three vegetation communities across all 18 survey sites. Chenopodiaceae (chenopods) was the most diverse family represented with 18 species followed by Compositae (daisies and everlastings) with 13 species (Appendix 13.2, Table 28, Figure 36).
- Distribution: *Eriochiton sclerolaenoides* (Wool-fruit Bluebush) was the most widely distributed species (Appendix 13.2, Table 29 Figure 37.
- Community structure and composition: all three vegetation associations recorded similar species richness with 43 species recorded at Chenopod sites, 45 at Myall sites and 49 at Mallee sites. Although species richness was similar, composition and life-form characteristics were different (Figure 14).
- Trends between control and impact zones: data capture over several years is required before trends can be analysed between control and impact zones.

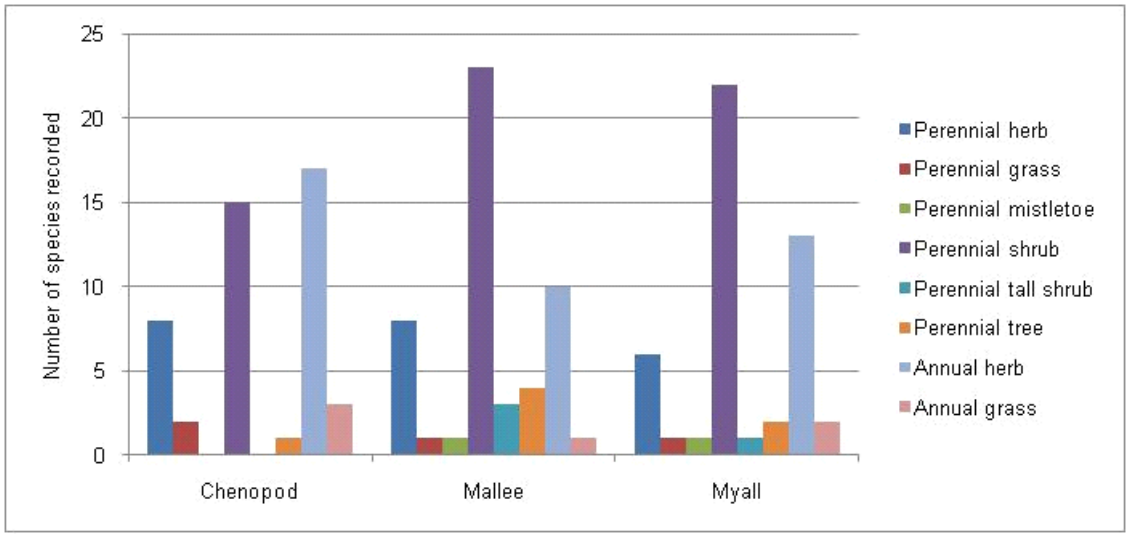

Figure 14: Life form/life cycle diversity and composition of the vegetation communities recorded during the October 2010 survey (EBS 2010, data source 100m quadrats).

5.2 Fauna

ML & MPL MARP Outcomes	Criteria	Compliant or Non compliant?
There are no net adverse impacts from the site operations on native fauna abundance or diversity in the lease area and in adjacent areas.	Fauna diversity and abundance trends to be consistent with impact zone expectations (as per the Fauna Management Plan). Fauna recovery during habitat re-establishment post closure to be consistent with baseline data and control site trends (as per the Fauna Management Plan)	Compliant
All sick and injured fauna must be managed as per the requirements of the Prevention of Cruelty to Animals (Animal Welfare) Act 1985.	Records indicating compliance with the requirements of the Prevention of Cruelty to Animals (Animal Welfare) Act and Regulations Demonstrated that fauna management procedures are consistent with the Act	Compliant

EML MARP Outcomes	Criteria	Compliance
Outcomes as per ML MARP	Annual fauna survey will include observations around borrow pit areas.	Compliant

5.2.1 Measurement of compliance

1) Iluka conducted the annual fauna survey to determine the effects of mining operations on fauna.

2) Iluka personnel recorded observations of fauna using the Lost Control Card system. Kalari and Lucas (road haulage and maintenance contractors) provide reports on road kill.

3) Iluka maintained a register of fauna related incidents.

5.2.2 Summary of key measurements

5.2.2.1 EBS Fauna Surveys

Iluka contracted EBS to conduct an annual fauna monitoring program at Jacinth since 2009, with the aim of monitoring the potential impact of mine construction and operation on local fauna populations, and to generate a dataset to assist the generation of mine closure criteria. Data from control sites (> 5km from the impact zone surrounding the mine) and impact sites will be used to determine trends in the abundance of the species present, and classify which species can be considered permanent residents, and which species can be considered transients. An additional aim of the program is to document typical fauna community structures, including species diversity, community composition, and habitat requirements of fauna, to assist rehabilitation work programs.

As discussed in MARCR 2009, Iluka view this outcome as one aimed at fauna recovery following cessation of mining activities. Not enough data has been collected for robust statistical analyses; therefore any results alluding to the effects of mining impacts on fauna populations are also likely to be heavily confounded by season and general trap-capture variations. Consequently, at this early stage of data analysis, interpretation of results cannot be specifically related back to mining

operations. Over time as the dataset increases, the variation in the data will be reduced due to recognition of natural trends in trap-captures and seasonal climatic variation, allowing possible impacts of the mine site and associated activities to be separated from other influencing variables.

The 2010 field survey was conducted 22-30 October, targeting mammals, reptiles, birds and invertebrates. The survey followed standardised techniques at eight established trapping, bat and bird sites within two of the three vegetation associations at J-A, Myall and Chenopod. Additional sites were added to increase the data set, four bird sites, four bat sites and four spotlighting sites.

Detailed results are available upon request. Due to the preliminary nature of this work only species diversity summaries are presented as highlights from the 2010 survey:

- At the time of the survey all sites were considered to be in excellent condition as a result of recent seasonal conditions.
- A total of 4,200 trap nights (one trap night equates to one trap opened for one night) were completed and all sites were trapped for eight consecutive nights (Appendix 13.3, Table 30).
- Terrestrial Mammals: Eight native and three exotic terrestrial mammal species representing seven families were recorded through captures, direction observations or detection of fresh scats at active burrows (Table 9).
- Bats: five bat species were recorded with certainty either due to distinguishable calls or identified captures (Appendix 13.3, Table 31).
- Reptiles: thirty-five reptile species representing eight families were caught or observed during the October 2010 survey (Appendix 13.3, Table 32).
- Birds: fifty-two native bird species and no exotic species, representing 29 families were recorded during the survey though survey observation, opportunistic observations and captures (Appendix 13.3, Table 33).
- Invertebrates: over 10,000 invertebrate specimens collected during the 2010 survey were identified to an appropriate level (Appendix 13.3, Table 34).

Table 9: Terrestrial mammal species recorded during monitoring surveys 2008–2010.

Family	Species	Common name	Conservation status		Year		
			EPBC	NPW	2008	2009	2010
Native mammals							
Burramyidae	*Cercartetus concinnus*	Western Pygmy-possum	-	-	×	✓	×
Canidae	*Canis lupus dingo*	Dingo	-	-	✓	×	✓
Dasyuridae	*Sminthopsis crassicaudata*	Fat-tailed Dunnart	-	-	✓	✓	✓
	Sminthopsis dolichura	Little Long-tailed Dunnart	-	-	✓	✓	✓
	Sminthopsis psammophila	Sandhill Dunnart	EN	V	×	✓	×
Macropodidae	*Macropus rufus*	Red Kangaroo	-	-	✓	×	✓
Muridae	*Notomys mitchellii*	Mitchells Hopping Mouse	-	-	✓	✓	✓
	Pseudomys bolami	Bolam's Mouse	-	-	×	✓	✓
	Pseudomys hermannsburgensis	Sandy-inland Mouse	-	-	✓	✓	✓
Vombatidae	*Lasiorhinus latifrons*	Southern Hairy-nosed Wombat	-	-	×	×	✓
Exotic mammals							
Camelidae	*Camelus dromedarius*	One-humped Camel	-	-	Trace	×	×
Felidae	*Felis catus*	Feral Cat	-	-	✓	×	✓
Leporidae	*Oryctolagus cuniculus*	Rabbit	-	-	✓	✓	✓
Muridae	*Mus musculus*	House Mouse	-	-	✓	✓	✓

EPBC Act status: EN = Endangered; NPW Act status: V = Vulnerable; Trace = species recorded only through tracks, not believed to be present at the time of survey; Note: 2009 includes both April and October surveys, therefore survey effort is double that of 2008 and 2010.

5.2.2.2 Fauna Incidents

Iluka personnel and contractors reported 92 fauna related incidents for the reporting period (Table 10). Personnel reported 72 road kill incidents on the transport route between Jacinth and Ceduna. Personnel reported 10 fauna deaths by drowning for the reporting period including four dingoes. Three dingo drowning deaths occurred early in 2010 prior to fencing improvements, and one dingo drowned in a bore field dam when an electric fence became faulty.

5.2.2.3 Implementation of Fauna Management Systems

Iluka installed electric or permanent fencing at all turkeys nests between March and April 2010 (Figure 15). The fencing of water bodies has seen a marked decreased in the number of mammals drowning in dams (Table 10).

Iluka increased the number of water body and fence inspections. Personnel inspect water bodies and fences every two days.

Iluka installed eight animal road signs at 20 km intervals along Ooldea road in an effort to reduce road kill incidents involving fauna (Figure 16).

Table 10: Summary of fauna related incidents at Jacinth and along transport route.

	Road kill*	Drowning	Cause of death unknown	Observations	Total
Wombat	35	0	0	0	35
Snake	4	0	0	0	4
Dingo	1	4	0	3	8
Kangaroo	21	0	0	0	21
Birds	7	6	6	1	20
Other	4	0	0	0	4
	72	10	6	4	92

**data from the entire 300 km haulage route, including Eyre Highway.*

Figure 15: Left - cyclone mesh fencing at turkey nest; right – electric fencing at turkey nest.

Figure 16: Road sign heading south at 20km along the haul road.

5.3 Pest Plants and Animals

ML & MPL MARP Outcomes	Criteria	Compliant or Non compliant?
No introduction of new weeds, plant pathogens or pests (including feral animals), nor increase in abundance of existing weed or pest species in the lease area and adjacent areas caused by mining operations.	Comparison of results against baseline data and/or control site(s) and implementation of weed management activities (as identified in Weed Management Plan)	Non - Compliant

5.3.1

EML MARP Outcomes	Criteria	Compliance
Outcomes as per ML MARP	Undertake annual weed monitoring (weed type and distribution). Comparison of results against the baseline weed survey to demonstrate no long term unmanageable introduction of new weed species or increase in abundance within the lease/licence area.	Non - Compliant

5.3.2 Measurement of compliance

Weeds – measures of compliance

Iluka use three methods for managing weed outcomes:

1) The Iluka Weed Management Program places a large effort on weed reporting, mapping and weed control in and adjacent to the mining lease.

2) EBS report on weeds and pest animals observed during annual flora surveys. The surveys aim to determine the effect of mining operations on the abundance and distribution of weeds and pest animals. EBS also maintains a record of weeds and pests sighted opportunistically during annual site surveys.

3) Iluka personnel record weeds observed on site using the Loss Control Card reporting system. Personnel report on general weed observations, new weeds and vehicle hygiene (Table 12).

Pest Animal – measures of compliance

Iluka use three methods to examine the effects of mining operations on pest animals:

1) EBS conduct annual fauna surveys, part of which records feral animal abundance and diversity.

2) State agencies provide information on trends in pest numbers.

3) Iluka personnel report on pest animals and information is stored in the Fauna Sightings register.

5.3.3 Summary of key measurements - weeds

5.3.3.1 Iluka Weed Management Program

Since 2009 Iluka report an increase in weed distribution and diversity at J-A, with 85 ha managed and a total of 12 new weed species registered (Table 11). As

discussed at the 2009 MARCR report meeting, the achievability of the existing weed outcomes requires further discussion with PIRSA/DENR during 2011.

Limited surveys conducted by Badman Environmental (2005, 2006) and EBS (2008) form the only baseline of weed information available for the area. In addition to the original weeds mapped, both surveys recognised landscape features with the potential to host weed populations, such as areas that provide more soil moisture and/or less native plant competition. Lack of resources, accessibility and clarity of future mine infrastructure locations all limited the extent of these early surveys.

At the beginning of mining operations in 2009 a field program was initiated to locate and manage weeds within and adjacent to the mine lease, camp, bore field, access road and Ooldea Rd. During 2010 Iluka committed new resources towards weed management programs, including an Environmental/Rehabilitation Technician, a Polaris ATV with mounted boom and a Trimble Nomad for mapping. Seasonal conditions over much of South Australia in 2010 were amongst the best ever recorded and these high rainfall and cool summer conditions translated into an extended weed control program from May until December.

Observations from a range of rehabilitation field work activities (weed operations, seed collection, research) indicate that weed populations prior to mining disturbance were more extensive and diverse than those reported in the original Badman and EBS surveys. There are many occurrences of weed populations unrelated to the mining footprint, usually located in landscape features that the original surveys had predicted, e.g. old wombat and rabbit warrens, creek lines, landscape depressions, ruts in tracks and sand dunes. To date there has been little effort to map or control the weeds outside of the immediate footprint due to the extended seasonal conditions in 2010.

Weed distribution has increased since operations (Appendix 13.4). The weed seed sources at J-A have expanded due to the original scattered weed seed source movement through soil, wind and animal transport. This increase in seed source combined with soil disturbance, lack of competition from native vegetation clearance and above average seasonal conditions have a combined to provide excellent conditions for weed growth in 2010.

Weed diversity has also increased since operations (Table 11) and Appendix 13.4). Out of a total of 24 weed species registered on site since J-A Operations began; seven were first recorded in 2009 and an additional 12 in 2010. The three most common weeds in 2009, Wild Turnip, Ward's Weed and Milk Thistle, continue to be the most common in 2010. Despite a stringent Weed Hygiene Procedure, the hot spots for increased diversity are related to vehicle movements, the car park at the main camp and the truck route around the HMC loading area. A review of the procedure is required to manage this trend. One increase in diversity is temporary and due to the oats and weeds introduced during the 2010 rabbit baiting program, all of which were subsequently controlled.

The weed species of greatest concern are the records of Buffel Grass (1 individual) at camp and Ruby Dock (< 20 individuals) along the creek and on two separate soil stockpiles. Each of these weeds were discovered and controlled well prior to seed set, however with 4,500 ha of largely inaccessible vegetation to monitor there can never be a guarantee that all such individuals will be found and controlled prior to becoming larger infestations. As mentioned in the 2009 MARCR report, both Buffel Grass and Ruby Dock are abundant along the railway line and through various communities to the north of J-A. Rehabilitation staff have met with the AWNRM

representatives for Pests and Weeds and the new Buffel Grass Officer and aim to work with these resources to proactively manage the threat of Buffel Grass to J-A.

The weed management response in 2010 was commensurate with the scope of the issue with 85 ha managed, nearly all of which was revisited and re-managed on multiple occasions (Appendix, 13.4). Management techniques included boom spraying large accessible areas, e.g. borrow pits and road sides, and spot spraying and hoeing isolated or inaccessible areas, e.g. stockpiles, creek lines and banks, sand dunes. Despite multiple visits to every known site within the footprint area, there were still many occasions where mature seed baring individuals or populations needed to be picked and physically removed from site to prevent seed set. The extended nature of the 2010 season meant that efforts were continually focussed on the immediate footprint area with minimal proactive effort extended along other creek lines or towards Ambrosia. The 2010 program was regularly supplemented with supervised local casual labour (Figure 17).

Figure 17: Weed management program 2010, removing mature, seed-loaded turnip.

Table 11: Summary of Weed Diversity for J-A MARCR Reporting Area.

MARCR Reporting Area Summary: Mine Lease, Camp, Access Rd, Borefield Rd		Yr Registered			
Common Name	***Scientific Name***	2010	2009	2008	2005-06
Wards Weed	*Carrichtera annua*	*	*	*	*
Turnip	*Brassica tournefortii*	*	*	*	*
Oats - domestic[1]	*Avena sativa*	*			
Canola	*Brassica napus*				
London Rocket	*Sisymbrium sp*	*	*		
Milk Thistle	*Sonchus oleraceus*	*	*		
Barley Grass	*Hordeum sp*	*	*		
Wild Oats	*Avena sp*	*	*		
Iceplant	*Mesembryanthemum crystallinum*	*			
Ruby Dock	*Acetosa vesicaria*	*			
False Sowthistle	*Reichardia sp*	*	*		
Horehound	*Marrubium vulgare*				
Fleabane	*Conyza sp*	*	*		
Cape Weed	*Arcotheca calendula*	*			
Buffel Grass	*Cenchrus ciliaris*	*			
Saffron Thistle	*Carthamus lanatus*	*	*	*	
Blackberry Nightshade	*Solanum nigrum*	*			
Wild Lettuce	*Lactuca serriola*	*			
Rye Grass	*Lolium sp*	*			
Wild Radish	*Raphanus raphanistrum*	*			
Medic	*Medicago sp*	*			
Fat Hen	*Chenopodium sp*	*			
Couch[1]	*Cynodon dactylon*	*			
Onion Weed	*Asphodelus fistulosus*				
Paddy Melon	*Citrullus sp*		*		
Sea Rocket	*Cakile maritima*				
Common Heron's Bill	*Erodium cicutarium*			*	*
Native Tobacco	*Nicotania megalosifium*			*	

[1] Rabbit baiting program

Number of polygons where weed species managed (this is a reflection of abundance, not an actual measure and does not apply to pre 2009 surveys):

* = 20+ locations, * = 5-20 locations, * = <5 locations

5.3.3.2 EBS flora survey, weed results

Four exotic species were recorded as opportunistic sitings during the annual vegetation surveys, *Reichardia tingitana* (False Sow Thistle), *Sonchus oleraceus* (Sow Thistle), *Carrichtera annua* (Wards Weed) and *Brassica tournefortii* (Wild Turnip), none of which are declared under the Natural Resources Management Act

2004. However the latter three species are considered environmental weeds and are of concern due to their known ability to degrade habitats by out-competing native species.

All species recorded in the EBS survey have also been recorded and managed as part of the J-A weed management program.

5.3.3.3 Weeds – incident reporting

Iluka personnel reported 16 weed related incidents through the Loss Control Card system including 11 new species (Table 12).

Table 12: Weed incidents reported by Jacinth personnel via the Loss Control Card system.

		Date	Detail
Weed observation	1	13/11/2010	Stockpiles, process area, pit, village
	1	13/11/2010	
	1	05/11/2010	
	1	31/10/2010	
	1	19/10/2010	
New weed	1	20/12/2010	5 new weeds
	1	17/10/2010	1 new weed – wild radish
	1	15/09/2010	1 new weed – buffel grass at village
	1	15/09/2010	Rye grass & wild oats
	1	02/09/2010	Ruby dock, ryegrass, ice plant
Vehicle hygiene	1	18/12/2010	Unclean pipes transported to JA
	1	15/09/2010	Branch on vehicle at village
	1	09/06/2010	Hygiene clearance breach
	1	29/06/2010	Unclean vehicle
	1	08/05/2010	Unclean recycled HMC from Pt Thevenard
	1	01/02/2010	Unclean recycled HMC from Pt Thevenard
	16		

5.3.4 Summary of key measurements - pests

5.3.4.1 EBS fauna survey results

Pest abundance and diversity: Ecological and Biodiversity Services (EBS) conducted a fauna survey at Jacinth in October 2010, part of which was an assessment of pest animals. Surveyors captured two pest species during the program, 114 mice and one rabbit (EBS 2011). In addition, the survey team observed fresh cat tracks near one survey site (Table 13).

Indicators that rabbits are on the rise at Jacinth align with rabbit trends on the Far West Coast and in other parts of the State (ABC News 2011). Thus, the increase in mouse and rabbit numbers at Jacinth throughout 2009 and 2010 is not the result of mining activities. Domestic mice numbers increased at the Jacinth site through March to August 2010 at a time when the Eyre Peninsula and the West Coast experienced mice plagues (ABC 2010).

Table 13: Pest animal species observed or detected at Jacinth 2006 - 2010.

Pest Species	2006 SKM	2008 EBS	2009 EBS	2010 EBS
Fox	x			
Camel	x	x	x	
Cat	x		x	x
Rabbit	x	x	x	x
Mouse	x	x	x	x

5.3.4.2 Pest animal – incident reporting

Iluka report one pest animal through the Loss Control Card System; Kalari reported a domestic / wild cat road kill.

5.3.4.3 Pest management activities

Mice baiting: in response to rising mouse numbers inside buildings over the second quarter of the year, a baiting program was implemented inside and immediately exterior to the process plant offices and the accommodation village. This program comprised three periods of bait laying and follow up inspection, and was implemented following consultation with the DENR Mining Ranger.

Cat trapping: no specific cat management activities were undertaken

Rabbit baiting: a rabbit baiting program was undertaken in April 2010 with technical support from both EPNRM and AWNRM representatives. A grain bait layer and 1080 treated oats were obtained through EPNRM and untreated oats was purchased from a local farmer. The risk of new weed introduction in the oats was minimised by using a certified oat source (certification relates to variety, however low tolerances of weed seed are also a standard requirement), a seed source with a similar weed spectrum to J-A (Nundroo), and mapping oat distribution areas for later control activities.

Baiting locations were selected based on visual rabbit activity; distinct short grazing of native vegetation, rabbit tracks, scratchings and scats. Locations were linked with three landscape features, sand dunes, old wombat holes and adjacent to the vegetation stockpiles created as part of the mining process. A total of 3.7 km of oat trails were laid (Appendix 13.1, Figure 35).

Post the baiting program, rabbit activity was eliminated in some areas and much reduced in others. However, activity has risen across preferred landscape features towards the end of 2010 in response to excellent seasonal conditions. Baiting has not occurred over the 2010/2011 summer due to the abundance of fresh feed in the environment, however future integrated management programs are still under consideration.

5.4 Indigenous Heritage and Non-Indigenous Heritage

ML & MPL MARP Outcomes	Criteria	Compliant or Non compliant?
No disturbance to Aboriginal artefacts or sites of significance unless prior approval under the relevant legislation is obtained	GIS figure/map demonstrating that no work/activity has been undertaken in areas for which heritage clearance has not been gained. Demonstration of compliance with regulatory requirements (through internal incident reporting procedures and requirements.	Compliant

EML MARP Outcomes - Heritage	Criteria	Compliance
Outcomes as per ML MARP	Heritage site surveys completed for all EML areas.	Compliant

5.4.1 Measurement of compliance

Iluka measures compliance against Heritage & Non-Indigenous Heritage outcomes in several ways including program implementation, mapping and incident reporting.

Sites of indigenous heritage significance are located in and around the Jacinth-Ambrosia site. Representatives of the Far West Coast Native Title Claimants surveyed and cleared all areas for Aboriginal artefacts and sites of significance and relocated several artefacts prior to mining.

5.4.2 Summary of Key Measurements

Iluka reported no disturbance to heritage sites for the reporting period.

All 2010 vegetation clearances occurred within approved clearance boundaries for the reporting period. All vegetation clearance for 2010 occurred in Domain 4 (Appendix 13.1, Figure 26). Representatives of the Far West Native Title group surveyed and cleared the mine lease areas prior to the commencement of mining operations in 2009.

Iluka maintained the site Vegetation and Heritage Clearance Procedure to ensure that heritage sites are not disturbed.

Iluka maintained a register of clearance permits, survey records and approvals.

5.5 Soil

ML & MPL MARP Outcomes	Criteria	Compliant or Non compliant?
Migration or infiltration of any spillage or leakage to the surrounding environment is prevented (in conformance with relevant Environment and Protection Authority guidelines). All clearance of native vegetation is authorised under appropriate legislation.	Demonstrate that facilities are designed in accordance with EPA Guidelines (via a post construction audit). Demonstrate that actual clearance boundaries are within authorised clearance boundaries (output from GIS).	Compliant

5.5.1 Measurement of compliance

Iluka measures compliance against soil outcomes in several ways including:

1) Inspections, facility maintenance and incident reporting.

2) Iluka records saline water, chemical and hydrocarbon spillage using the Loss Control Card Reporting system.

5.5.2 Summary of key measurements

Inspections: Bunding for fuel and chemical storage conform to specifications. Iluka EHS personnel inspected hydrocarbon and Flocculant Plant storage areas to confirm the constructions comply with the requirements of the Environmental Protection Authority (EPA) and Australian Standard (AS).

Incident Reporting: Iluka personnel reported 10 incidents for the reporting period relating to soil impacts. Hydrocarbon spillages account for 5 reports where hydrocarbon leaks from machinery occur periodically due to wear. Two action reports identified poor procedure (Table 14).

Iluka implemented bunding improvements to accommodate the level of chemical storage required at Jacinth. Iluka improved signage and reiterated the elements of the topsoil management procedure to contractors after a single breach in managing topsoils.

Table 14: Details of soil related incidents reported by personnel via the Loss Control Card system.

Type	Qty	Date	Details	Action
Hydrocarbon	1	12/11/2010	Split hydraulic hose on grader	- Spill kit used to absorb oil. - Contaminated soil removed off site.
Saline water	1	10/10/2010	Soil erosion due to water run off	- Erosion fixed
Topsoil removal	1	30/09/2010	Topsoil stockpile impacted	- Issue site notice - Improve signage on stockpile
Hydrocarbon	1	31/08/2010	Hydraulic leak from 4WD.	- Spill kit used to absorb oil and disposed in waste.

Type	Qty	Date	Details	Action
Saline water	1	22/05/2010	Soil stockpile sprayed with saline water	- Personnel and contractors informed on Iluka obligations to maintain topsoils
Hydrocarbon	1	08/04/2010	Hydrocarbon spill while filling dozer	- Change procedure to fill via top tank of dozer
Hydrocarbon	1	02/04/2010	Unsealed 20 litre container of oil tipped over on ute tray top.	- Spill kit used to absorb oil and disposed in waste.
Chemical	1	12/03/2010	Chlorine drum slipped during unloading – drum split – 40 litres lost	- Spillage contained. - Access to lay down yard re-assessed
Hydrocarbon	1	11/02/2010	Small leak from excavator hose	- Excavator tagged out. - Soil disposed in waste.
Saline water	1	23/01/2010	Saline water spill from truck fill point	- Fix worn camlock rings
	10			

5.6 Surface Water Quality

ML & MPL MARP Outcomes	Criteria	Compliant or Non compliant?
The post mining ecosystem and landscape function is resilient, self sustaining and indicating that the pre-mining ecosystem and landscape function will ultimately be achieved.	Pre-mining flow regimes are re-established post mining.	To be determined
Ecosystems are not damaged by release of contaminated water off lease	Water turbidity and EC measurements along creek lines up and downstream of lease boundary, demonstrate no release of contaminated water from operations.	To be determined

5.6.1 Measurement of compliance

Two small catchment zones (north & south) feed the creek running west from Jacinth and out through the plains toward Lake Ifould. The mine pit currently terminates the creeks. The creeks do not hold or trap water for any length of time because the catchment is very small, the sandy creek bed is porous and the water flows readily out onto the plain. Field personnel must sample from the creek when it is raining or immediately after rain. Field personnel find it very difficult to conduct sampling in wet conditions; moving a 4WD through Jacinth surrounds when wet is difficult and a safety risk.

Iluka resolve to set up a system to capture water along creek lines up and downstream of the lease boundary in 2011.

5.6.2 Summary of key measurements

There were two opportunities to grab surface water samples in 2010, neither of which fulfils MARP surface water outcome criteria. Field personnel collected one sample from runoff water that pooled at the base of a main mine site haul road (sample point 02), and a second sample (sample point 01) from a minor mine site haul road (Appendix 13.1, Figure 33). Mine personnel regularly spray the main mine site haul road with highly saline water (~66,900 ЧS), hence the high conductivity reading for sample point 02 (Table 15). The minor haul road receives less saline water.

Table 15: Surface water sampling results 2011 (Australian Water Quality Centre).

	Units	Point 01	Point 02
Inorganic Chemistry - Physical			
pH	pH units	8.4	7.7
Conductivity	uS/cm	489	21,900
Turbidity	NTU	460	12

5.7

5.8 Groundwater

ML & MPL MARP Outcomes	Criteria	Compliant or Non compliant?
The extraction and use of groundwater does not adversely affect environmental processes that are reliant on that groundwater system.	Ground water levels/ drawdown as measured are the same or better as predicted.	Compliant
Groundwater systems outside of the extent of the mine workings are not altered by the disposal of process water in the pit.	Groundwater levels in areas adjacent to and surrounding the mine site do not exceed standing water levels determined to result in adverse impacts* **Standing water levels to be determined in consultation with regulatory agencies and based on surrounding groundwater environmental and vegetation associations*	Compliant

5.8.1 Measurement of compliance

Iluka installed three monitoring bores at the bore field (Appendix 13.1, Figure 31) and ten monitoring bores over the mine site (Appendix 13.1, Figure 32) during the second quarter of 2009. Groundwater extraction at the bore field commenced in August 2009 and water discharge into the external, off-path Tailings Storage Facility (TSF) commenced in September 2009. Iluka monitor groundwater levels and quality to assess compliance to the MARP outcomes.

*Iluka are investigating vegetation root depth and water requirements as part of the research program outlined in Section 4.6 with a view to determining a standing water level (SWL) above which groundwater may affect adjacent native vegetation. Iluka re-calibrated the existing groundwater flow models of the bore field and external, off-path TSF in March 2011. In 2009 Iluka developed a 3D groundwater flow model. Work commenced in late 2010 on upgrading and calibrating this model with actual field data. This work will also include running predictive scenarios and generating hydrographs for each ground watering monitoring bore. This information combined with an improved understanding of root zone depths will provide a basis for recommending a standing water level above which groundwater should not rise.

1) *Groundwater levels*:

Bore field monitoring bores intercept a single aquifer at three locations and personnel measure water draw down quarterly (Appendix 13.1, Figure 31). Iluka aims to expand monitoring to include water level measurements in dip-bores installed in the borehole-casing annulus of respective production boreholes.

At the mine site, Iluka installed three pairs of nested wells (one shallow and one deep at each location) (Appendix 13.1, Figure 32). Shallow and deep wells were screened in the Cainozoic sediments and Proterozoic granites/gneisses, respectively. Groundwater was only intercepted in two deep wells (MB2D and MB6D) at the time of installation.

2) *Ground Water quality*: Iluka conduct chemical analyses (EC, metals) of bore field and mine site groundwater at 6 month intervals.

5.8.2 Summary of key measurements

5.8.2.1 Bore field groundwater drawdown

Groundwater drawdown during 2010 from the bore field monitoring bores ranged from 1.2 metres to 3.8 metres (Figure 18). Groundwater drawdown at the closest monitoring point (MB5) to the extraction bores was 3.78 metres. In comparison, drawdown at 1.8 kilometres from the bore field (MB3) was 1.19 metres (Table 16). The calibrated groundwater flow model estimates there is sufficient groundwater within the paleochannel aquifer the bore field intercepts to meet supply requirements for the duration of mining.

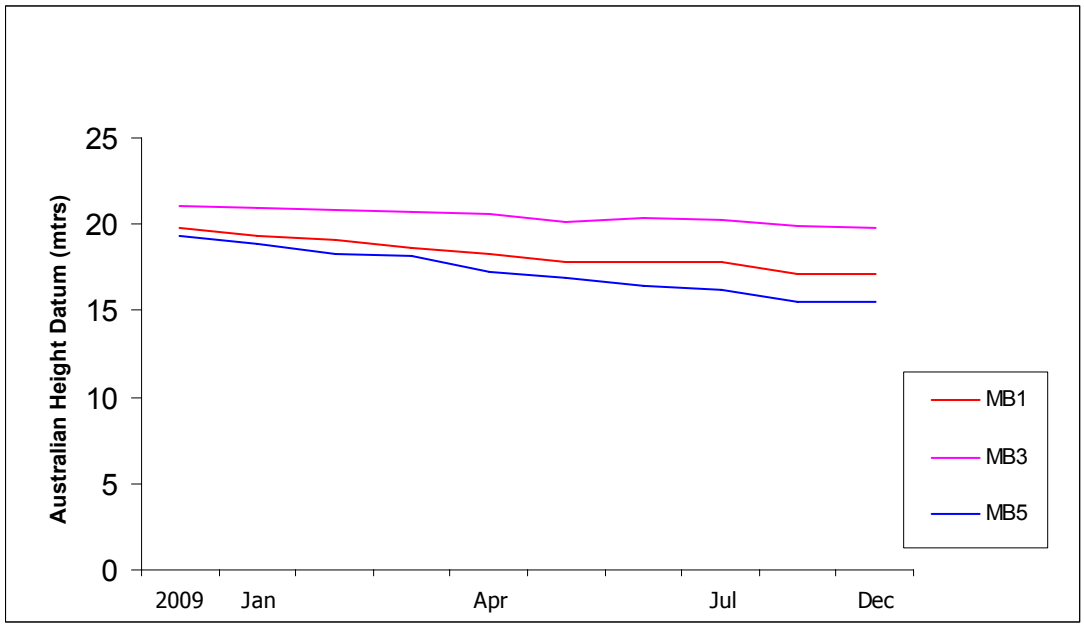

Figure 18: Ground water levels at three bores at the JA bore field (AHD metres)

Table 16: Groundwater draw-down against predicted.

Monitor well	Distance from closest bore (km)	2009 Drawdown at 3 months after start of mining (m)	2010 Drawdown (m)	Predicted drawdown at 1 km after 1 year* (m)
MB 1	0.2	1.4	2.65	3.96
MB 3	1.8	0.2	1.19	
MB 5	0.18	1	3.78	

from Table 3.2 Hydrological Environmental Impact Assessment, Jacinth Ambrosia Project (21 August 2007)

5.8.2.2 Mine site groundwater levels

Mine site monitoring well data show groundwater levels rising in response to seepage from the Tailing Storage Facility (TSF) (Table 17). Notably, groundwater levels at MB2D rose consistently at a rate of ~0.8 metres per month shortly after tailings discharge commenced in November 2009. Field personnel detected water in MB3, which is screened in the Cainozoic sediments, eight months after the

commencement of deposition into the TSF. This report does not discuss monitoring bores in the area surrounding the pit and TSF that remain dry.

Table 17: Change in mine site groundwater levels 2009 to 2010 (m AHD).

	MB2D	MB3	MB6S	MB6D
Dec 2009	91.74	101.47	99.54	94.06
Dec 2010	101.41	103.22	99.49	94.5
Difference 2009 - 2010	9.67	1.75	-0.05	0.44

5.8.2.3 Groundwater Quality

Iluka contractor LBW Environment Pty Ltd conducted groundwater monitoring (levels & quality) at Jacinth Ambrosia (JA) mine site on the 23rd September 2010. LBW sampled groundwater at six locations in two regions at Jacinth:

- JA mine site & process area - three monitoring bores (Table 18 & Appendix 13.1, Figure 32).
- JA well field 30 km west of the JA mine site - three production bores (Appendix 13.1, Figure 31).

This subset of bore field bores was chosen because groundwater quality within the paleochannel is likely to be relatively consistent and the subset at the mine were the only bores containing groundwater.

Table 18: Groundwater quality sampling locations Sept 2010.

Sample Id	Location	Description
MB2D	Mine site	Tails Storage Facility (TSF)
MB3	Mine site	Tails Storage Facility (TSF)
MB6D	Mine site	1 km north of active mine pit
PB2	Well field 30km west of JA	Production bore
PB6	Well field 30km west of JA	Production bore
PB10	Well field 30km west of JA	Production bore

ALS laboratory group conducted testing on the samples on the 27th September 2010 and Iluka received the report on the 21st October 2010. Test results reveal that concentrations of metals (cadmium, lead, mercury, nickel and zinc) exceed Water Quality Environment Protection Policy (EPP) 2003 criteria guidelines for potable, freshwater ecosystem and irrigation. Cadmium, lead, nickel and zinc levels at two mine site bores (MB3 TSF & MB6D) are notably higher than the MB2D (mine site TSF) and the three production bore samples (Appendices, section 0). Heavy metal concentrations in groundwater samples from these mine site bores triggered a reporting obligation in accordance with Section 83 A of the SA Environment Protection Act.

Iluka reported the groundwater metal anomalies to the EPA on the 18th of November 2010 and subsequently held a meeting with EPA technical advisors. Iluka continue to work with the EPA on this issue. Ongoing works for examining groundwater issues include:

- The existing monitoring regime for measuring groundwater levels.

- Six monthly monitoring of ground water quality.
- The development of a scope of works for undertaking an assessment of the fate of the possible sources of heavy metals observed in groundwater.
- Evaluation of Jacinth topography, selected environmental receptors, and site infrastructure to determine locations for future monitoring bores.
- Awarding a tender for installing nested bores into Cainozoic sediments and the basement at selected locations.
- Apply for well permits to conduct bore drilling.

5.9 Dust and Air Quality

ML & MPL MARP Outcomes	Criteria	Compliant or Non compliant?
All clearance of native vegetation is authorised under appropriate legislation.	Demonstrate that actual clearance boundaries are within authorised clearance boundaries (output from GIS).	Compliant
All fuel burning equipment is operated in accordance with the requirements of the EPA.	Evidence demonstrates emissions from generators to comply with EPA requirements (design reports, audits, inspections, sampling results).	Compliant

EML MARP Outcomes	Criteria	Compliance
Dust levels do not create unsafe driving conditions.	Air quality complaints logged and responded to. Nil incidents due to low visibility.	Compliant

5.9.1 Measurement of compliance

1) Dust depositional gauges are located within the JA site (mine site and camp area). Annual biological surveys for flora (EBS 2010) have been undertaken to monitor changes in abundance, composition or condition of control sites and impact sites.

2) A suite of operational dust management and monitoring activities are implemented annually, including timing of soil movement and soil stabilisation with a water truck.

3) Specific monitoring of site issues regarding dust on an as needed basis. Over 2009/2010 *Maireana sedifolia* was been monitored as a focus species.

3) Air dispersion modelling was carried out on the proposed power station design. On the basis of these modelling results EPA approval was given to build and operate the power station.

5.9.2 Summary of key measurements

5.9.2.1 Dust deposition gauge network & flora survey

During the JA construction phase dust deposition gauges were located in the southern portion of the ML (7) and either side of the haul road at Main Camp (2).

The dust gauge network is an inherited feature from construction that has not yet been updated to capture information that will be relevant to the operational phase of

the mine. The logic behind the number and placement of the gauges, the gauge monitoring schedule and the supporting measurements all need to be reviewed to ensure data is captured that can be interpreted in relation to the effect of dust on native vegetation. This review is scheduled for June 2011.

Dust monitoring gauge data is not presented in this report because plant health monitoring has not been conducted in close vicinity to each dust gauge. Measurements of plant health have been taken at the EBS vegetation survey sites in 2009 and 2010. In 2010 EBS stated that "All sites during the survey were in excellent condition and many species were either flowering or fruiting", indicating robust plant health at these vegetation survey sites. Proximity of dust monitors to these vegetation survey sites is displayed in Appendix 13.1, Figure 34.

5.9.2.2 Operational dust management

Operational dust at J-A is managed with the following tools:

- Clearance of fragile topsoil and subsoils primarily during the period of highest soil moisture, May to September annually.
- Stabilisation of soil stockpiles with non-saline water occurs during and after stockpile construction.
- Once finished, soil stockpiles are bunded and closed to traffic and allowed to regenerate naturally as a result of seasonal rainfall. In the past two seasons stockpiles have been monitored and have achieved a healthy covering of vegetation and are well protected (Figure 19).
- Dust from the pit is managed with water trucks.

Figure 19: Topsoil stockpile TS08, showing development of cover, left: December 2009, right: December 2010 (photos from soil stockpile monitoring program), program details 4.6.2.

5.9.2.3 *Maireana sedifolia* dust monitoring

During the construction phase of the mine in 2009, dust was generated during building of the tailings storage facility (TSF). It was noted that dust was most persistent on *Maireana sedifolia* (Pearl Bluebush) as the leaves were covered by microscope hairs. To assess if the dust was causing any health impacts on this species a monitoring transect was established from the edge of the TSF to approximately 1 km east (locations displayed in Appendix 13.1, Figure 34). Plants were monitored monthly for five months using replicated photo points (6 distances x site overview photo and 4 focus bush photos).

The photo series showed plants completely covered in dust and then washed clean following rainfall (e.g. Figure 20). Given the rapid recovery of the bushes after rainfall, monitoring frequency changed to once per year to pick up longer term trends to plant health. Two more data captures are left, 2011 and 2012, prior to this transect succumbing to the mining path. A new transect to the north of the TSF (out of the mining path) will be established in 2011 to provide LOM data.

Figure 20: *Maireana sedifolia* at photopoint location AR62Ebush, left: 18/08/2009, right: 17/01/2010.

5.9.2.4 Power station

The power station design and subsequent construction had not changed since information was provided, which underpinned the assumptions upon which air plume dispersion predictions were made, and upon which EPA approval was given for constriction and operation of the facility. There was no visual evidence to suggest non-compliance with the predictions.

5.10 Solid Waste

ML & MPL Outcomes	Criteria	Compliant or Non compliant?
No demolition, industrial or solid domestic wastes (other than treated sewerage) are to be disposed on site	Site register contains records of all waste movements from site. Audit and inspection records demonstrate waste correctly stored and managed on site (in accordance with Waste Management Plan)	Compliant

5.10.1 Measurement of compliance

Iluka measures compliance against solid waste outcomes in several ways including: *1) record management, 2) program implementation* and *3) incident reporting.*

5.10.2 Summary of key measurements

Record Management: Iluka maintained a site register that details waste types, weights and bin contamination. Iluka removed demolition, industrial and domestic wastes offsite. Ceduna Recycling is the waste management contractor for Jacinth. Ceduna Recycling run Multi Hook lift trucks for the transportation of waste and recyclables from the site and records the type and weight of waste removed from site (Appendix 13.6).

The total waste generated at Jacinth for the 2010 reporting period was 288 tonnes, down ~134 tonnes from 2009 (Table 19). The reduction in onsite personnel from ~160 to 200 people during construction and the completion of construction activities account for a proportion of the difference between 2009 and 2010 data. Recycled waste (113 tonnes) accounted for 39% of waste removed from Jacinth and landfill (175 tonnes) made up 61% of the total waste. Table 20 summarise Jacinth waste and weight by category.

Program Implementation: Iluka implemented several improvements in 2010 for managing waste. Iluka now process all oil waste through the Power Station oil recycling unit where contractors then remove the waste from site for resale. Improved signage at the Waste Transfer Station clearly informs personnel about where to place rubbish (Figure 21 and Figure 22).

Reporting: Site personnel reported two waste related incidents and Ceduna Recycling monthly summaries highlighted areas of opportunity to improve waste management (Table 21). The Jacinth environmental team is reporting on Jacinth waste management performance to site personnel.

Table 19: Summary of landfill & recycled waste generated at Jacinth.

Type of Waste	2009	2010	Total (Tonnes)
Landfill	253.95	174.4	428.35
Recycled	167.23	113.14	280.37
	421.18	287.54	708.72

Table 20: Waste in tonnes removed from site by category.

	Tyres	Scrap Metal	Paper and Cardboard	Waste Oil and Grease	Timber	Batteries	General waste
Disposal	Recycled	Recycled	Recycled	Recycled	Recycled	Landfill	Landfill
2009	10.5	119	21.98	15.75		0.6	253.35
2010	4.5	37.3	40.04	2.1	29.2		175.4

Table 21: Waste management issues raised via the Loss Control Card system and Ceduna Waste Recycler reports.

Type	Qty	Date	Details	Action
Contractor Waste Report	1	31/12/2010	Recycling bin had only 5% contamination.	
Waste disposal - oil	1	21/12/2010	Uncapped / unsealed waste oil container left at Waste Transfer Station	- Site notice and education targeting workshop personnel - New procedure for managing oil waste - All oil waste recycled through Power Station recycling unit, removed from site for resale
Contractor Waste Report	1	11/10/2010	Increase in Quarter 3 waste due to Lay down site cleanup	
Recycling contamination	1	05/08/2010	Oily waste & metal filing disposed in recycling bins	- Spill kit used. - Contaminated soil removed off site.
Contractor Waste Report	1	10/03/2010	- March recycling bins have a marked decrease in contamination. - Tippler bin in trial stages at warehouse.	

Recycling contamination (Contractor Waste Report)	1	11/01/2010	- Recycling Bin still subject to contamination with food waste, grease cartridges. - Education required - Better signage required	- Tippler bins installed at warehouse - Signage placed on bins
	6			

Figure 21: Waste transfer station recycling signage.

Figure 22: Waste transfer station landfill and recycling bins.

5.11 Hydrocarbon and Chemical Storage

ML & MPL Outcomes	Criteria	Compliant or Non compliant?
Migration or infiltration of any spillage or leakage to the surrounding environment is prevented (in conformance with relevant Environment Protection Authority guidelines).	Demonstrate that facilities are designed in accordance with EPA Guidelines or as otherwise agreed with EPA (via a post construction audit). Records indicate all spills on site are managed in accordance with Spill Containment and Clean Up Procedure (as contained in the Emergency Response Plan).	Compliant

5.11.1 Measurement of compliance

Iluka measures compliance against solid waste outcomes in several ways including: *1) inspections and 2) incident reporting*.

Iluka EH&S personnel conducted environmental and safety visits and inspected chemical storage units. Personnel report on hydrocarbon and chemical storage incidents through the Lost Control Card system.

5.11.2 Summary of key measurements

Inspections: Iluka EH&S personnel 2009 inspections confirm that diesel, flocculant and lubricant storage facilities comply with Australian Standards (AS1940). AS1940 is consistent with EPA guidelines for chemical storage. The maintenance of appropriate chemical containment facilities was achieved through attention to housekeeping (i.e. making sure the bunds are not full of silt) or not over capacity (too many containers within the bund). Appropriate chemical storage was also included in the EHS and workplace inspections.

See Appendix 13.8 for facility completion sign off documents for:

- Bulk Diesel Storage area
- Flocculant storage
- Lubricant storage–Iluka (Figure 23) and Exact (Figure 24)

Incident Reporting: Personnel reported one incident where chemicals were not stored appropriately (Table 22). Iluka purchased and installed hydrocarbon storage units in July 2010 to increase chemical storage capacity.

Table 22: Hydrocarbon storage incidents reported via Loss Control Card system.

Type	Date	Details	Action
Storage	08/08/2010	Tap dripping outside chemical storage bund	- Advise contractor of compliance obligations - Position tap inside bund
Storage	21/05/2010	Chemicals stored without bund	- Chemicals moved to area with lower risk. - Bunding pallets and hydrocarbon storage unit purchased

Figure 23: Iluka hydrocarbon storage unit.

Figure 24: Exact Earthmoving hydrocarbon storage unit.

5.12 Public Safety

ML & MPL MARP Outcomes	Criteria	Compliant or Non compliant?
There are no public injuries and or deaths resulting from mine operations traffic, dust generation or unauthorised entry to mine site that could have been reasonably prevented.	Incident investigation report concludes that the incident was not a result of mine operations or could not have been reasonably prevented.	Compliant
No uncontrolled fires caused by mining operations.	Incident investigation report concludes that the incident was not a result of mine operations or could not have been reasonably prevented	Compliant

EML MARP Outcomes	Criteria	Compliance
There are no public injuries and/or deaths resulting from construction traffic, dust generation or unauthorised entry to construction zones that could have been reasonably prevented.	Investigation evidence (record, reports, etc).	Compliant

5.12.1 Measurement of compliance

Iluka use Incident Investigation report findings to monitor compliance.

5.12.2 Summary of key measurements

Iluka report no public injuries or deaths, or uncontrolled fires attributed to mining operations for during the reporting period.

5.13 Socio Economic

ML & MPL MARP Outcomes	Criteria	Compliant or Non compliant?
There are no socio-economic impacts associated with the project that could have been reasonably prevented.	Implementation of closure plan / exit strategy that addresses socio-economic issues	NA

5.13.1 Measurement of compliance

The measures of compliance against Socio Economic outcomes take into account several key indicators: 1) Employment, 2) Community Engagement - Iluka provide data on the number of community visits and the numbers of individuals attending programs.

In 2009, Iluka conducted a Social and Cultural impact assessment that outlined a range of issues concerning the community. An amendment to the MARP on 11 November 2009 included additional commitments relating to consultations with the Far West Coast Native Title Group. Progress is detailed in Table 25.

5.13.2 Summary of key measurements

Employment: Iluka employ 65 people at Jacinth Ambrosia, ten of which are local Indigenous personnel, accounting for 15.4% of the Jacinth work force. Local employees (Indigenous & non-Indigenous) make up 46.2% of the Jacinth work force. In addition, Iluka employ an Indigenous Liaison Officer who manages Indigenous operations for Iluka Operations Australia wide.

Table 23: Summary of employees at Jacinth - local and other.

Iluka Employees	Number	%
Other	35	53.8
Local non-indigenous	17	26.2
Local Indigenous permanent	10	15.4
Local Indigenous casual	3	4.6
Total	65	100

Community Engagement: Iluka held or attended several community events in 2010 to engage over 3500 people from 24 communities (Table 24). The Road Train safety awareness and SACOME education programs reached over 1300 local children. Seven hundred people from ten communities visited Jacinth in 2010. Appendix 13.9 presents details on Iluka Community events and programs for 2010.

Table 24: Summary of communities visited and individuals attending Iluka events and programs.

	Communities 2009	Number of individuals attending 2009	Communities 2010	Number of individuals attending 2010	Total number of Individuals 2009 - 2010
Ceduna Oysterfest	1	>700	1	>700	>1400
Cleve field day	0	0	1	>500	>500
Road Train Safety Awareness Program 2009 and 2010	4	545	4	150	695
JA Site visits 2010	0	0	10	297	297
SACOME education program	0	0	5	618	618
Scholarship road show	0	0	3	260	0
	5	1245	24	>2525	>3510

Table 25: Summary and compliance assessment of socio-economic criteria addressed 2010.

Outcomes – Socioeconomic	Criteria	Activities	Compliant or Non compliant?
There are no socio-economic impacts associated with the project that could have been reasonably prevented.	Implementation of closure plan / exit strategy that addresses socio-economic issues		NA
Iluka maintains its focus on providing information support and dialogue with Aboriginal People and agencies in the area through its presence of Human, Community and Indigenous Relations personnel.	Employment of Indigenous Liaison Officer	Employment of fulltime Indigenous Relations Advisor, Community Relations, Human Resources Officer – based in Adelaide office with regular visits to Ceduna, J-A and surrounding communities.	Compliant
Community concerns are to be communicated through the Liaison Committee, and where agreed Iluka will communicate these concerns to relevant authorities.		All liaison meetings are minuted. If an issue requires communication to external authorities this is recorded in the minutes.	Compliant
Iluka develop cultural guidelines for all mine staff, including employers and sub contractors employing Aboriginal people, to ensure respectful work practices are followed.		Iwara Nindini developed and implemented cultural guidelines for Iluka and all contractors. Respect for Traditional Owners, cultural heritage,	Compliant

Outcomes – Socioeconomic	Criteria	Activities	Compliant or Non compliant?
		sites of significance and the country is one of the Iluka's "Golden Rules" enforced by management at J-A (including exploration and corporate staff). Iwara Nindini deliver Cultural Awareness Training quarterly to Iluka staff and contractors employed for a period greater than three months.	
Iluka consider developing an information digital story highlighting the relationship, its Agreement process, activities, opportunities and future aspirations for Far West Coast Claimants, School children and government.		SA Works developed an Aboriginal employment at J-A mine video Iluka is developing a Native Title Agreement presentation (for internal use) and facts sheet (for external distribution) Iluka are preparing case studies of successful scholarship awardees.	Compliant
Iluka consider developing an interpretive display– to be centrally located i.e. the Aboriginal Arts and Culture Centre or Town centre. The interpretive display could also be used to link the FWC story with the Cultural Awareness training course.		Cultural Awareness Training, conducted by local business Iwara Nindini is delivered quarterly to all Iluka staff and contractors who will be employed for a period greater than three months. Native Title Agreement: establishment of Cultural Heritage fund provides access to funding for FWC Claimants for cultural events, activities etc.	Compliant
Iluka continue to update the Liaison Committee on potential employment opportunities for FWC people haulage mining and camp services.		Iluka distribute all job vacancies to communities through the Indigenous Relations Advisor; notification in quarterly Liaison Committee meetings; put in the local paper *The Sentinel* and on Iluka website and seek.com.	Compliant
The FWCNTCG to provide ongoing transparent communication and engagement with Aboriginal communities to keep community members abreast of the Agreement and any outcome of discussions with Iluka Resources.		Regular visits to communities, presentations, awareness roadshows. Quarterly Liaison Committee meetings with Iluka and FWC representatives. Ongoing liaison with FWC Traditional Lands Association.	Compliant

Outcomes – Socioeconomic	Criteria	Activities	Compliant or Non compliant?
		Complaints form and process for the FWCNTCG implemented February 2011.	
Once the mine is operational – from 2010 onwards, Iluka Resources host a series of site visits for community people, including school children, to learn about the mine and Iluka Resources activities.		Yalata Community visit – Nov 2010 Oak-Valley Community visit – May 2011 Crossways Lutheran and Yalata school visit October 2010 Streaky Bay Primary School – Port Thevenard and Kalari depot tour Adult Activity Centre - Port Thevenard and Kalari depot tour Public mine tour – June 2010 Government Stakeholder mine tour – June 2010 PIRSA executive mine tour – July 2010 DENR mine tour – October 2010 Vintage Car Club mine tour – July 2010 AW NRM board mine tour – August 2010	Compliant
Consideration be given to undertaking an evaluation in three years time of those strategies implement post the SIA/CIA process to gauge perceptions and provide insight into further strengthening relationships.		Three years have not elapsed since the SIA/CIA process.	
Consideration be given to providing financial advice and/or counselling to those working at the mine who are interested in good financial management for their family.		Discussions have been had regarding this being part of the mentoring program.	Compliant

6. RECTIFICATION OF NON-COMPLIANCES

6.1 Non-compliance

All MARP outcomes during the reporting period are compliant except:

- ML & MPL MARP: “No introduction of new weeds, plant pathogens or pests (including feral animals), nor increase in abundance of existing weed or pest species in the lease area and adjacent areas caused by mining operations”. Issues and actions regarding the weed component of this outcome were briefly discussed at a 2009 MARCR presentation via teleconference between Iluka and PIRSA/DENR on January 25, 2011 and further detail is presented in Section 5.3 and Appendix 13.4 of this report. Further dedicated discussion on the realistic achievement of this outcome is required with PIRSA/DENR in 2011.
- EML MARP: “Monitor dust and vegetation health around an active borrow pit as outlined in the Air Quality Management Plan”. This activity was not conducted at EML 6332 to which the EML MARP outcome applies and which is only in occasional use. Iluka consider that any potential impact on vegetation from dust would be more likely within the ML and that information generated from dust monitoring activities within that area would be relevant to this EML MARP outcome.

6.2 Action list from 2010 MARCR

Future actions to complete or improve operational outcomes have been identified within the 2010 MARCR. Whilst these actions do not demonstrate non-compliance they do require resolution:

- Dust monitoring: review gauge placement, schedules and supporting measurements (June 2011)
- Surface water: establish a system to sample creek flow above and below lease boundary (2011).
- Groundwater: root mapping, vegetation water use research and groundwater modelling and groundwater quality testing to continue in 2011.
- Weeds: discussion with PIRSA/DENR re: realistic achievement of current outcome.
- Closure criteria: negotiation with PIRSA/DENR re: interim closure criteria.

6.3 PIRSA/DENR Feedback from 2009 MARCR

Comments on the review of the Jacinth Ambrosia 2009 MARCR were received from PIRSA in January 2011. Responses to the requests for further information from this review are outlined in Table 26.

Table 26: 2009 MARCR review comments and Iluka responses.

Items	Responsible	Due	Response in 2010 MARCR
Appendix A does not clearly show disturbed vs approved areas.	Iluka	Next MARCR	Maps presented in clearer format.
No definition of 'significant fauna" – provide definition.	Iluka	Next MARCR	DENR have supplied a list of priority species for the FWC region. Term omitted in 2010 MARCR .
Fauna drowning in Turkey's Nest Dams – requires some additional checks to ensure fences remain operable.	Iluka	Ongoing	Fencing improvements and addition checks on water bodies for 2010 - See Section 5.2
Demonstrate that facilities are designed in accordance with EPA Guidelines (via a post construction audit). Provision of the checklist/signoff as an appendix.	Iluka	End October 2010	Post construction audit and sign off, Section 5.11 and Appendix 13.8
Turbidity or equivalent (upstream and downstream of the mine site) – Stated: no rainfall events, no opportunistic sampling. Photos in Appendix B illustrate a flood in December 2008 – confirm no stream flow, or testing results.	Iluka	End October 2010	See Section 5.6
"it is noted that a water level deemed to create an adverse impact is yet to be agreed between Iluka and PIRSA" - make agreement. Iluka to present information and recommendation on this issue. PIRSA decision reliant on the timely provision of suitable information. Outcome to be reported in the 2010 MARCR.	PIRSA/Iluka	Next MARCR	Refer to section 3.7 of this report.
Iluka State: "it is considered that this outcome is one which can only be achieved following mine closure…" for a number of plant and animal outcomes and the socio economic outcome - this is not the intent of the conditions - provide feedback to Iluka – should be integrated into operation plan. Meeting with Iluka required to finalise this issue.	PIRSA	ASAP	Discussion with PIRSA required.
No records provided to demonstrate appropriate waste disposal and segregation –provide records (table of dates/time and checklist used).	Iluka	Next MARCR	See Appendix 13.6
Designated storage areas maintained in accordance with commitments - No mention of maintenance - require demonstration that this is completed.	Iluka	Next MARCR	See Section 5.11 and Appendix 13.7

7. MANAGEMENT SYSTEMS REVIEWS

Iluka's EHS Management System (EHSMS) consists of twelve corporate standards and associated procedures, guidelines, forms and training that describe the minimum requirements for all Iluka operations. The standards are listed below:

1. Leadership and Policy
2. Organisation and Responsibility
3. Communication
4. Contractor Management
5. Risk and Hazard Management
6. Incident Investigation and Reporting
7. Emergency and Crisis Preparedness
8. Procedures and Training
9. Operational Management
10. Environmental Management
11. Monitoring
12. Auditing and Assurance

A verification audit of the EHSMS implementation at the Eucla Basin operation was conducted between the 29th November and 3rd December 2010. It was undertaken by Paul Gentles, Senior Safety Advisor – Jacinth Ambrosia, Jeff Waghorn, Senior Safety Advisor – Processing Narngulu and Matthew Harding – Senior Environmental Advisor Jacinth Ambrosia. The scope of the audit included the Jacinth-Ambrosia Mine site. Audit results are summarised in table Table 27 and are detailed in Appendix 13.7. The audit did not identify any potentials issues which could lead to non-compliance with approved environmental outcomes. No PIRSA compliance audits or formal enforcements actions were undertaken during the reporting period.

Table 27: Audit Results Summary

Standard	Score	Maximum	% Compliant
Leadership and Policy	60	69	87%
Organisation and Accountability	379	417	91%
Communication	66	72	92%
Contractor Management	67	81	83%
Risk and Hazard Management	63	69	91%
Incident Investigation and reporting	100	108	93%
Emergency and Crisis Preparedness	86	96	90%
Procedures and Training	81	90	90%
Operational Management	48	60	80%
Environmental Management	229	300	76%
Monitoring	83	111	75%
Auditing and Assurance	74	84	88%
Overall Compliance	**1336**	**1557**	**86%**

8. FITNESS FOR PURPOSE REVIEWS OF PLANT, EQUIPMENT, INFRASTRUCTURE AND OTHER FACILITIES

Guidelines require reviews at least once every five years. Copies of practical completion sign off for a range of infrastructure and equipment are in Appendix 13.8.

9. NEW ENVIRONMENTAL HAZARDS

Atriplex vesicaria dieback – a large area of dead/severely impacted vegetation, specifically *Atriplex vesicaria*, was identified extending to the horizon on either side of bore field road 2010 (Figure 25). A brief helicopter survey confirmed the area extended more than 13 km beyond the bore field road. Follow up preliminary investigations showed intensive borer activity in the roots of dead plants and grubs in the roots of barely live plants. The area was reported to the DENR Mining Ranger and the issue was briefly discussed at the 2009 MARCR Review Meeting in January 2011. Both DENR and the University of Adelaide have expressed interest in investigating this issue further. Iluka also needs to understand whether this phenomenon could have potential impact on the success of *Atriplex vesicaria* in future mine rehabilitation.

Figure 25: *Atriplex vesicaria* **(left: landscape, right: close up) on the bore field road, 2010.**

10. ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT REPORTING

An EPBC referral was prepared and submitted to the Department of Environment and Natural Resources (DENR) for all aspects of the J-A project. DENR subsequently advised that the project was “Not a Controlled Action” under the EPBC Act.

11. OTHER INFORMATION

Nil

12. REFERENCES

ABC News (2011) Rabbit 'plagues' hit Eyre Peninsula [Accessed Online 13th March 2011] http://www.abc.net.au/news/stories/2011/02/28/3150824.htm

ABC News (2010) Mouse plague threatens SA crops [Accessed Online 13th March 20101] http://www.abc.net.au/news/stories/2010/04/30/2886646.htm

EBS (2008), Jacinth Ambrosia Fauna Monitoring, December 2008, EBS Ecology for Iluka Resources Limited.

EBS (2009a), Jacinth Ambrosia Fauna Monitoring, April 2009, EBS Ecology for Iluka Resources Limited.

EBS (2009b), Jacinth Ambrosia Fauna Monitoring, October 2009 -DRAFT, EBS Ecology for Iluka Resources Limited.

EBS (2010), Jacinth Ambrosia Flora Monitoring, March 2010, EBS Ecology for Iluka Resources Limited.

EBS (2010), Jacinth Ambrosia Vegetation Monitoring, October 2010, EBS Ecology for Iluka Resources Limited.

Rural Solutions (2009), Far West Coast – Social and Cultural Impact Assessment Study, Ooldea Road Yalata Community to Port Thevenard Ceduna, June 2009.

13. APPENDICES

13.1. Maps

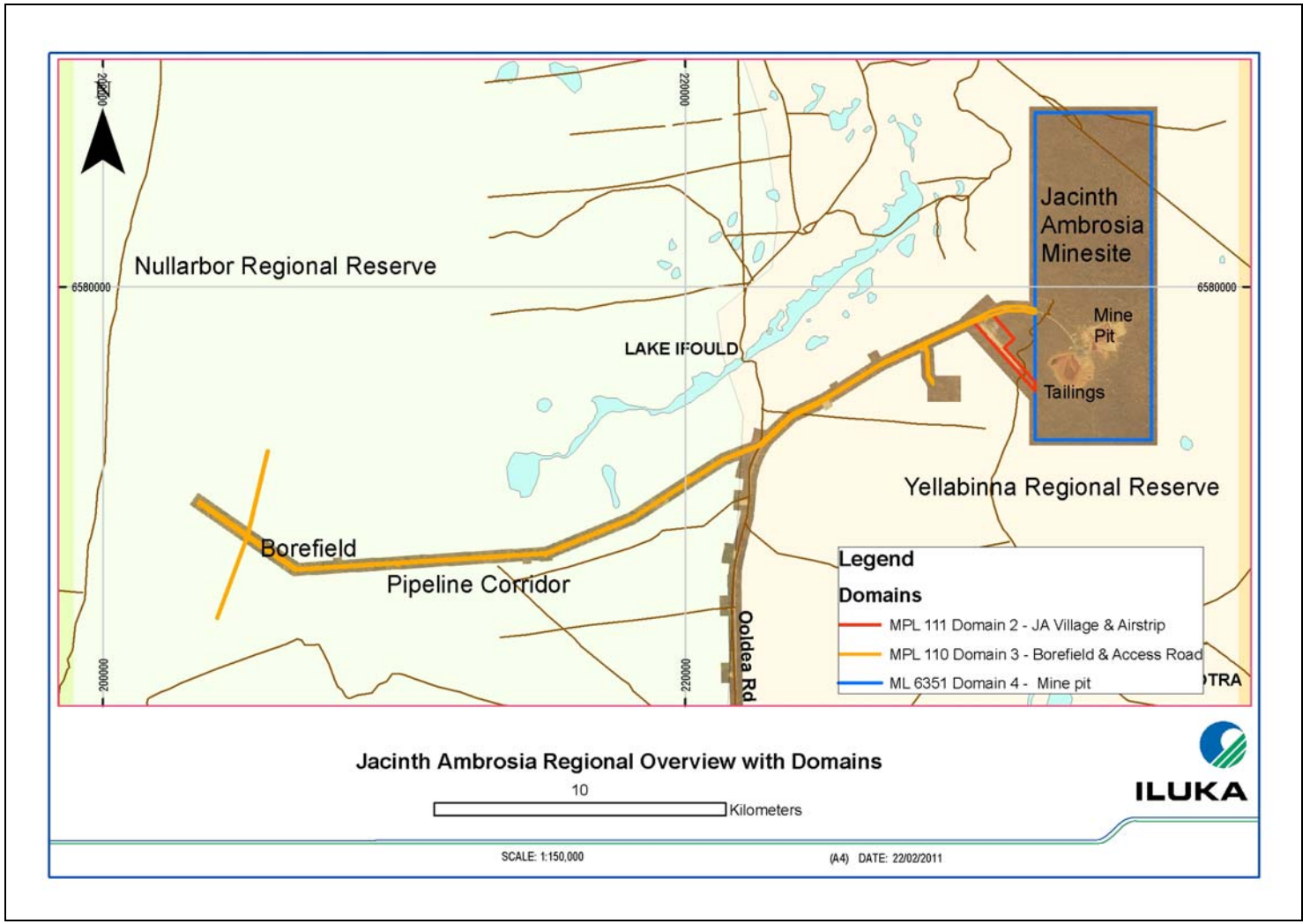

Figure 26: Jacinth Ambrosia regional overview with domains.

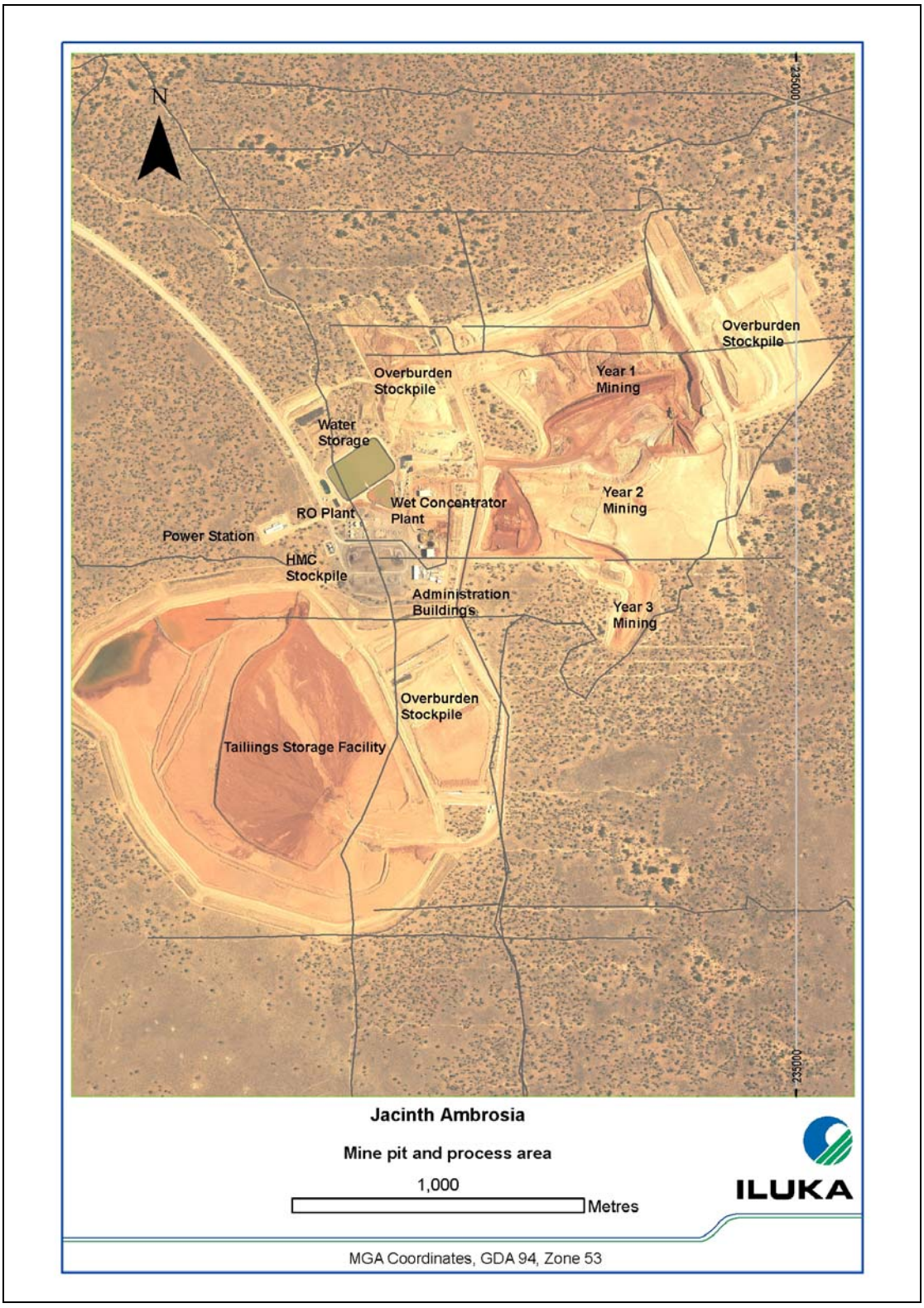

Figure 27: Jacinth Ambrosia mine pit and process area.

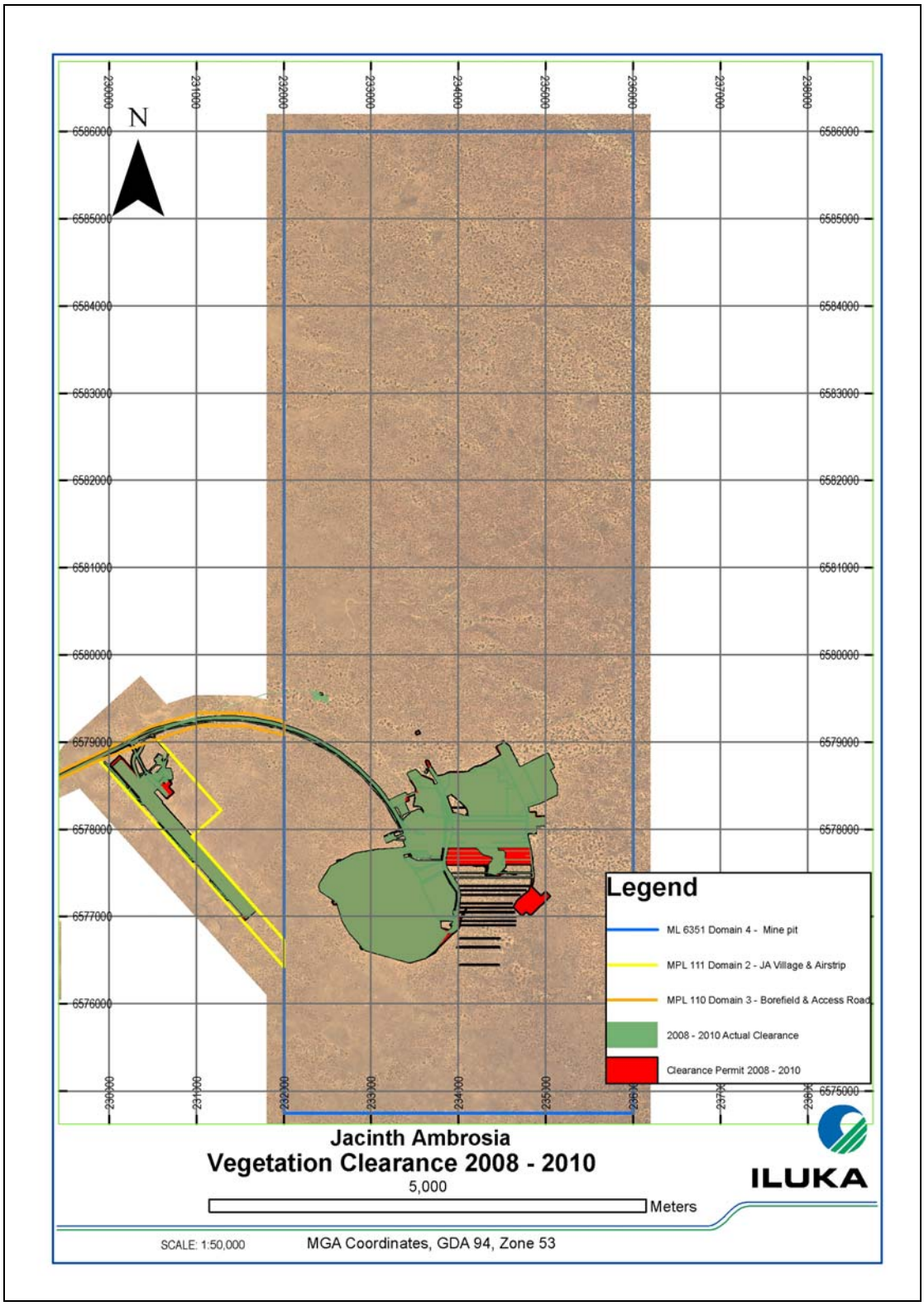

Figure 28: Vegetation clearance at Jacinth 2008 -2010 within MPL & ML Boundaries.

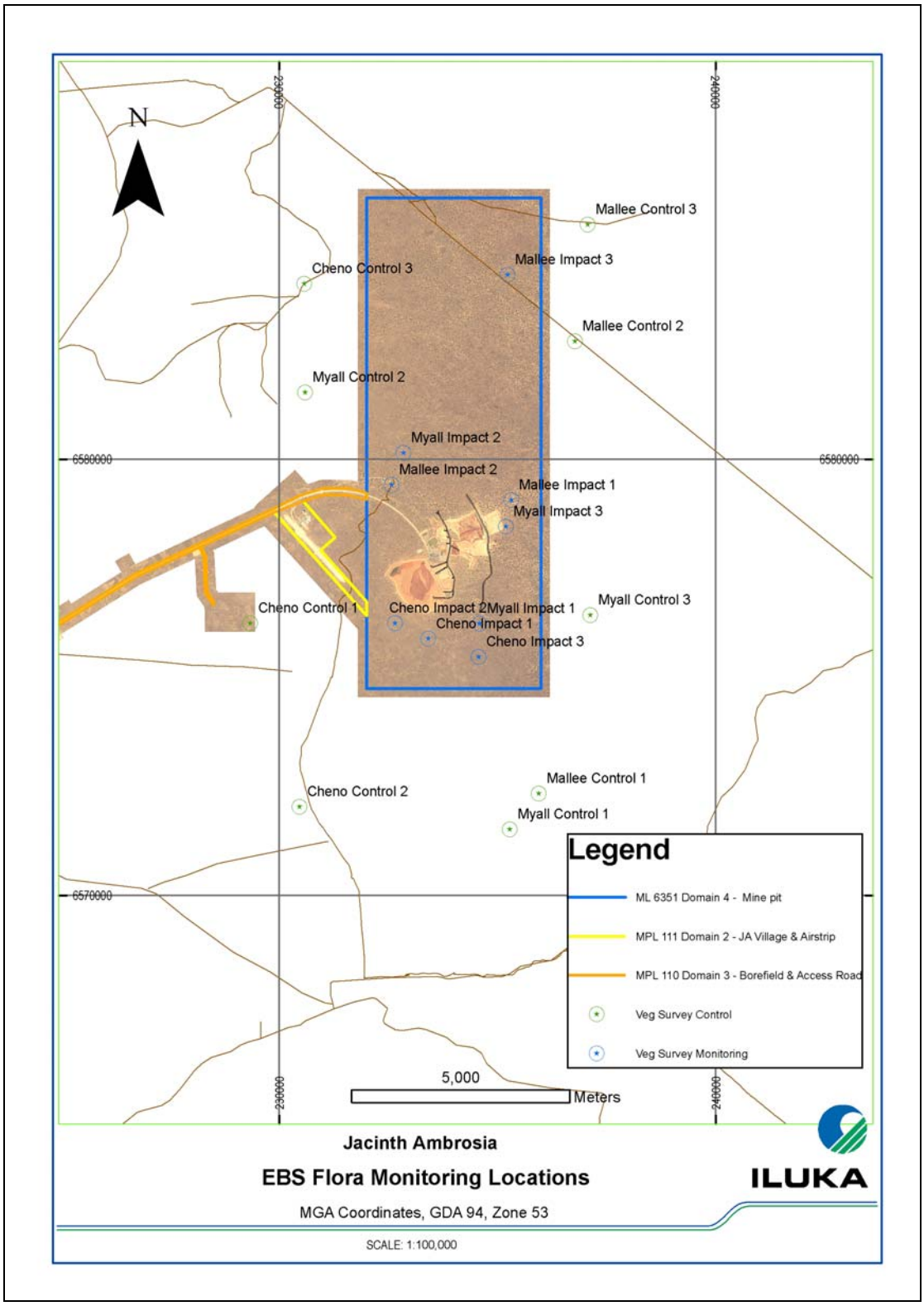

Figure 29: EBS Flora monitoring locations.

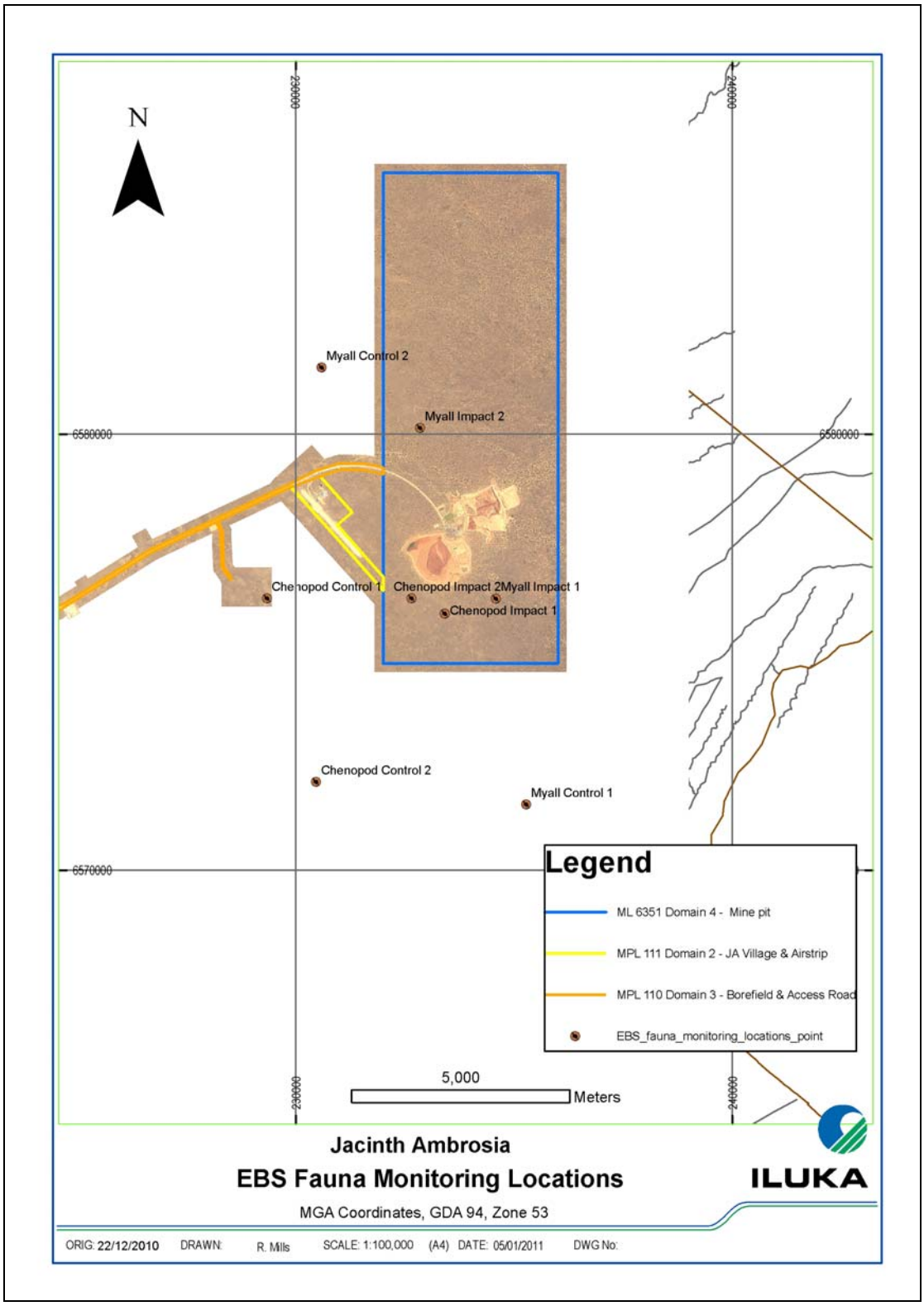

Figure 30: EBS Fauna monitoring locations.

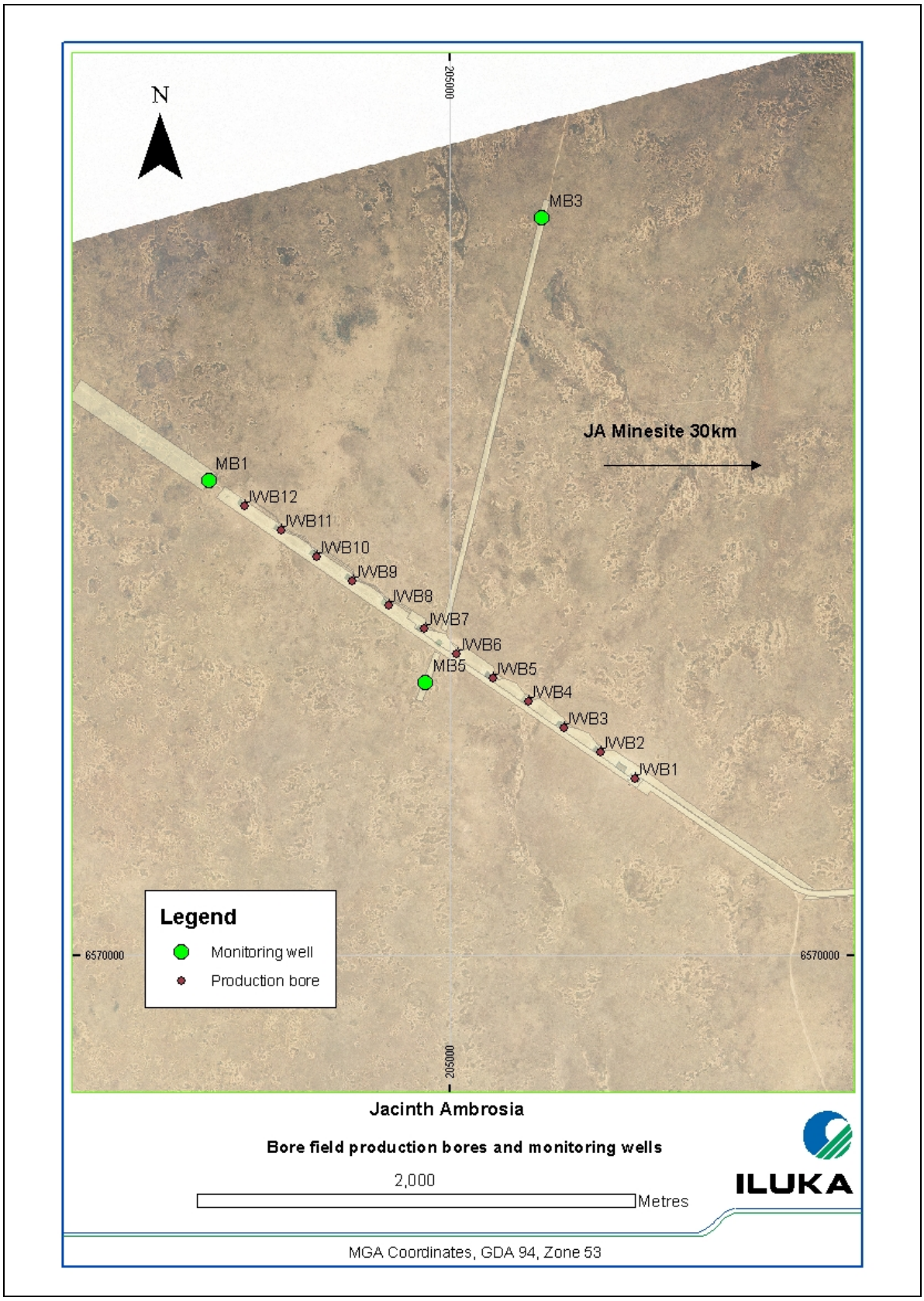

Figure 31: Bore field production bores and monitoring wells.

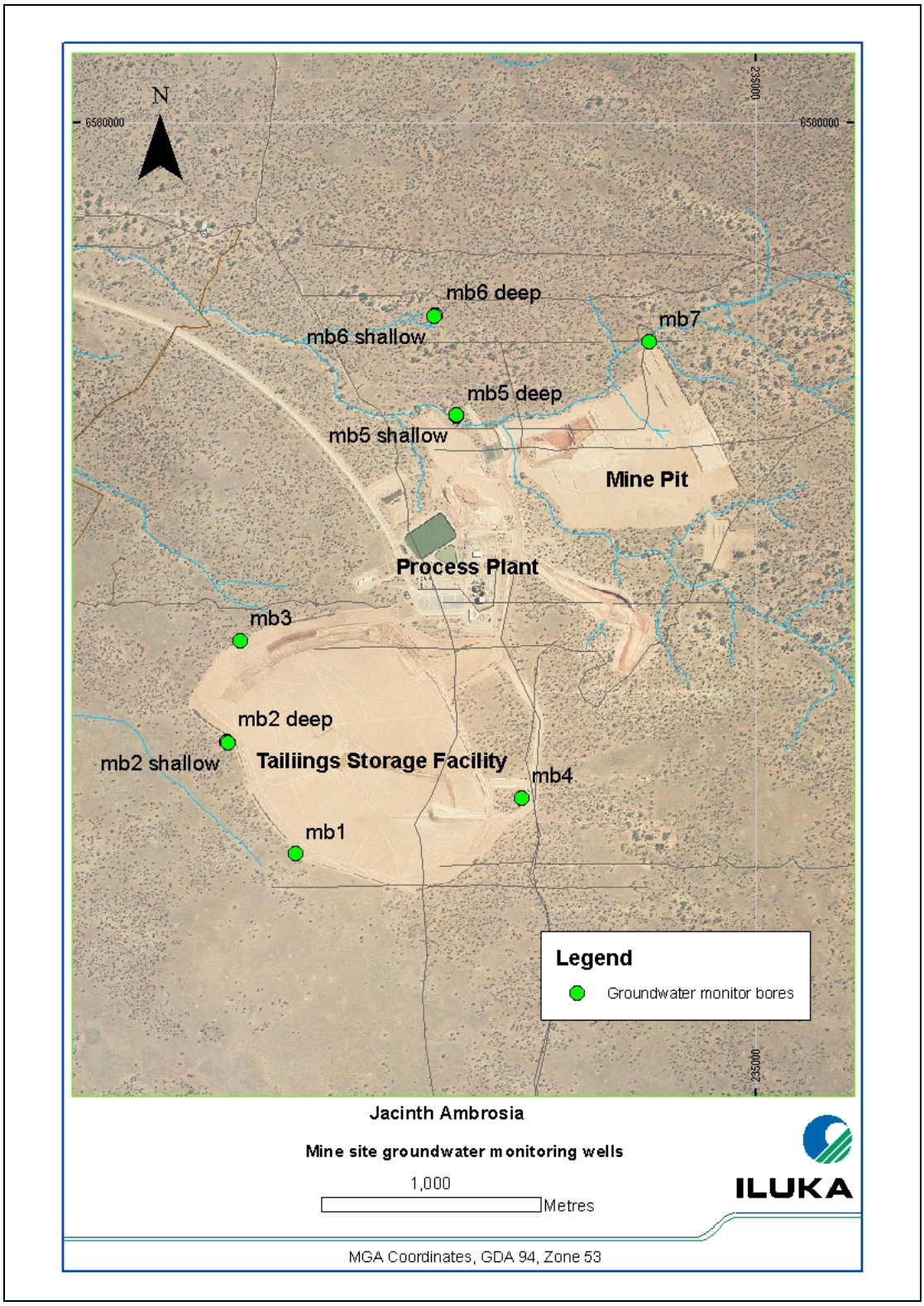

Figure 32: Mine site groundwater monitoring wells.

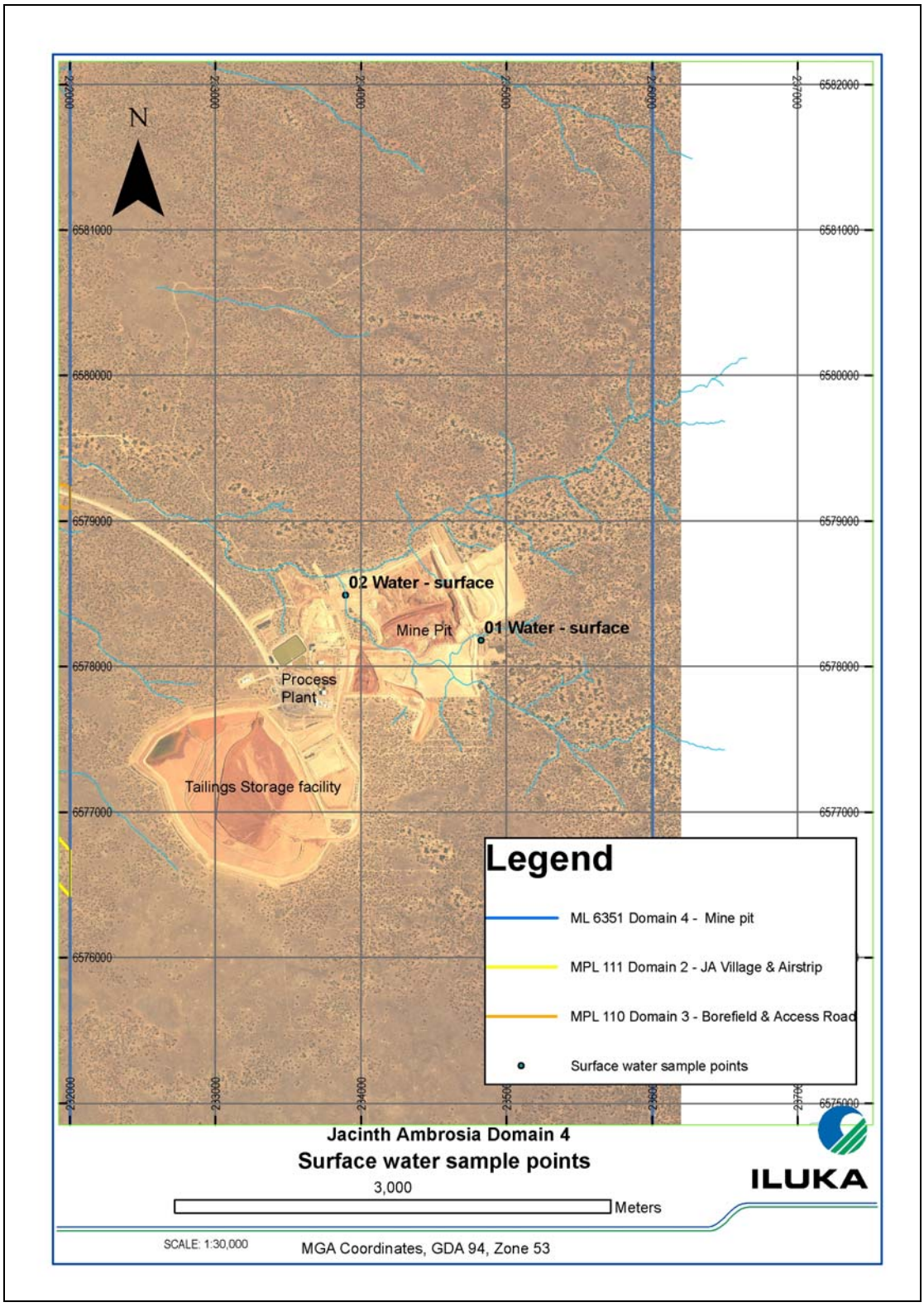

Figure 33: Surface water sample points.

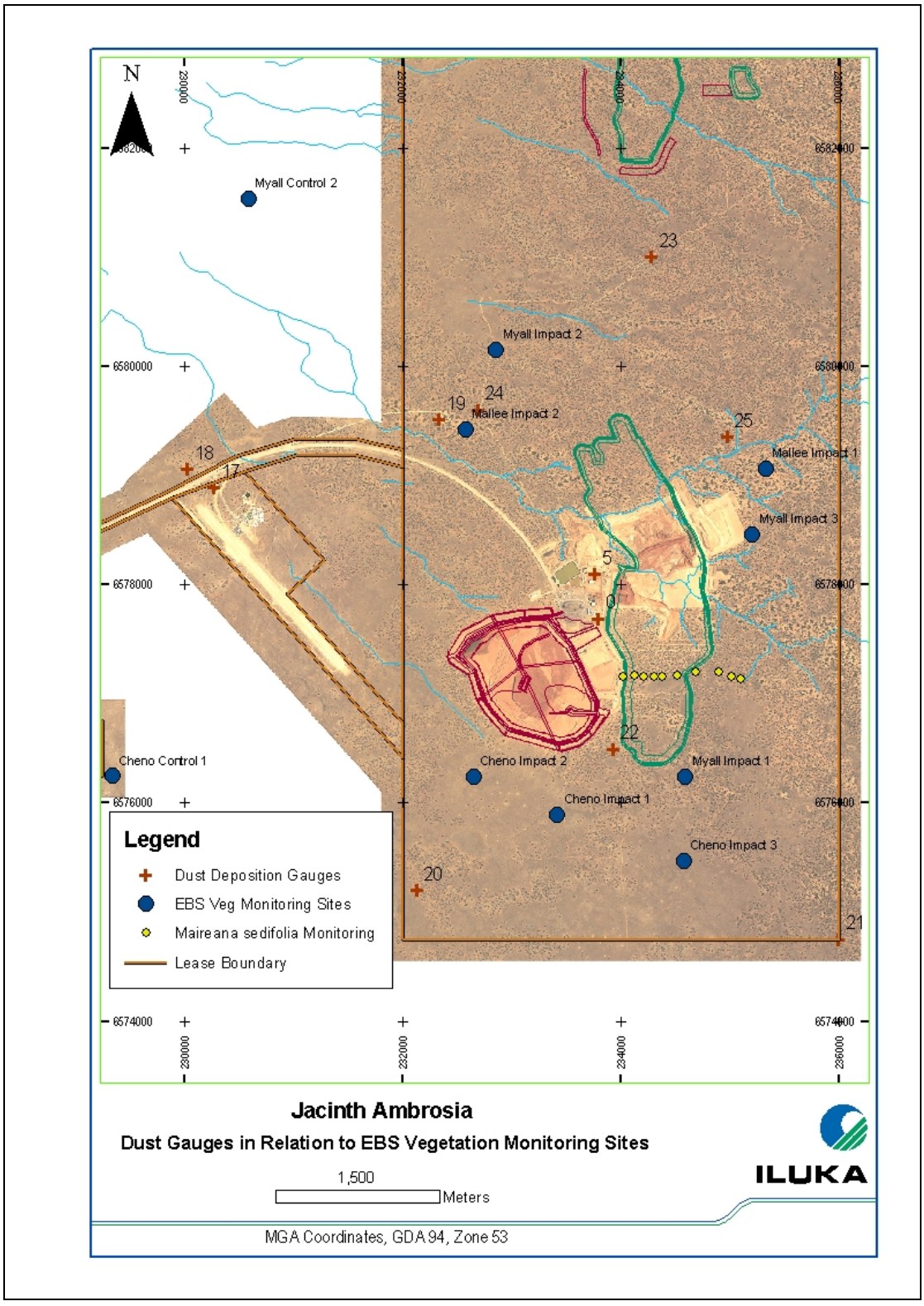

Figure 34: Dust deposition gauges in relation to EBS vegetation survey sites.

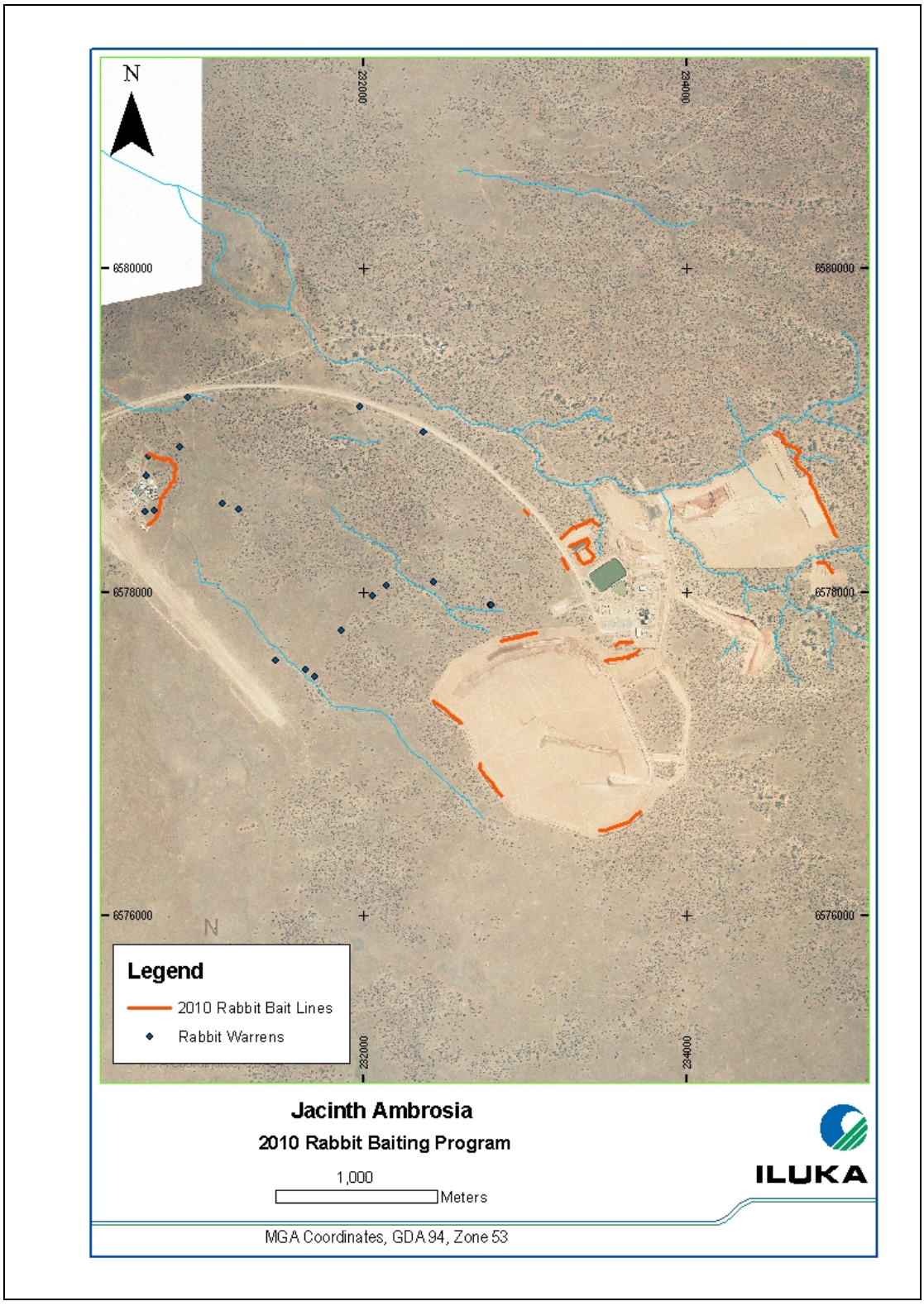

Figure 35: 2010 Rabbit baiting locations.

13.2. Extracts from EBS Jacinth-Ambrosia Vegetation Monitoring: October 2010

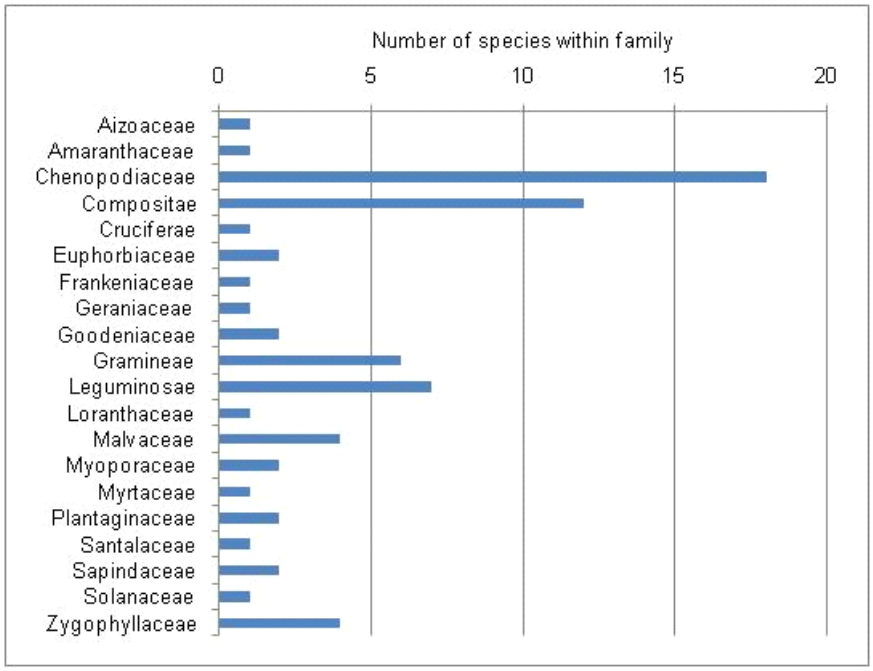

Figure 36: Diversity of native species with families recorded during the November 2010 survey.

Table 28: Flora species recorded during the October 2010 survey.

Family	Species	Common name	Aus status	SA status	Life cycle	Form
Aizoaceae	*Tetragonia moorei*	New Zealand Spinach	-	-	Perennial	Herb
Amaranthaceae	*Ptilotus obovatus*	Silver Mulla Mulla	-	-	Perennial	Shrub
Chenopodiaceae	*Atriplex vesicaria*	Bladder Saltbush	-	-	Perennial	Shrub
	Chenopodium curvispicatum	Cottony Goosefoot	-	-	Perennial	Shrub
	Enchylaena tomentosa	Ruby Saltbush	-	-	Perennial	Shrub
	Eriochiton sclerolaenoides	Woolly-fruit Bluebush	-	-	Perennial	Herb
	Maireana appressa	Pale-fruit Bluebush	-	-	Perennial	Shrub
	Maireana erioclada	Rosy Bluebush	-	-	Perennial	Shrub
	Maireana pentatropis	Erect Mallee Bluebush	-	-	Perennial	Shrub
	Maireana radiata	Radiate Bluebush	-	-	Perennial	Shrub
	Maireana sedifolia	Bluebush	-	-	Perennial	Shrub
	Maireana trichoptera	Hairy-fruit Bluebush	-	-	Perennial	Shrub
	Maireana triptera	Three-wing Bluebush	-	-	Perennial	Shrub
	Maireana turbinata	Top-fruit Bluebush	-	-	Perennial	Shrub
	Rhagodia spinescens	Spiny Saltbush	-	-	Perennial	Shrub
	Rhagodia ulicina	Intricate Saltbush	-	-	Perennial	Shrub
	Salsola tragus	Buckbush	-	-	Perennial	Herb
	Sclerolaena diacantha	Grey Bindyi	-	-	Perennial	Shrub
	Sclerolaena obliquicuspis	Oblique-spined Bindyi	-	-	Perennial	Shrub
	Sclerolaena patenticuspis	Spear-fruit Bindyi	-	-	Perennial	Shrub
Compositae	*Brachyscome ciliaris*	Variable Daisy	-	-	Annual	Herb
	Calotis multicaulis	Woolly-headed Burr-daisy	-	-	Annual	Herb
	Cephalipterum drummondii	Pompom Head	-	-	Annual	Herb
	Chrysocephalum eremaeum	Sand Button-bush	-	-	Annual	Herb
	Helichrysum sp	Everlasting	-	-	Annual	Herb
	Minuria cunninghamii	Bush Minuria	-	-	Perennial	Shrub
	Minuria leptophylla	Minnie Daisy	-	-	Annual	Herb
	Pycnosorus pleiocephalus	Soft Billy-buttons	-	-	Annual	Herb
	Pycnosorus sp	Billy-buttons species	-	-	Annual	Herb
	*Reichardia tingitana**	False Sowthistle	-	-	Annual	Herb
	Rhodanthe floribunda	White Everlasting	-	-	Annual	Herb
	*Sonchus oleraceus**	Common Sow-thistle	-	-	Annual	Herb
	Trichanthodium skirrophorum	Woolly Yellow-heads	-	-	Annual	Herb
	Vittadinia sp	New Holland Daisy	-	-	Perennial	Herb
Cruciferae	*Brassica tournefortii**	Wild Turnip	-	-	Annual	Herb
	*Carrichtera annua**	Ward's Weed	-	-	Annual	Herb
	Lepidium phlebopetalum	Veined Peppercress	-	-	Annual	Herb

Family	Species	Common name	Aus status	SA status	Life cycle	Form
Euphorbiaceae	*Chamaesyce drummondii*	Chamaesyce drummondii	-	-	Perennial	Herb
	Euphorbia tannensis eremophila	Desert Spurge	-	-	Annual	Herb
Frankeniaceae	*Frankenia sp*	Sea-heath	-	-	Perennial	Shrub
Geraniaceae	*Erodium sp*	Herons-bill species	-	-	Annual	Herb
Goodeniaceae	*Goodenia pinnatifida*	Cut-leaf Goodenia	-	-	Perennial	Herb
	Scaevola spinescens	Spiny Fanflower	-	-	Perennial	Shrub
Gramineae	*Austrodanthonia caespitosa*	Common Wallaby-grass	-	-	Perennial	Grass
	Austrostipa elegantissima	Feather Spear-grass	-	-	Perennial	Grass
	Austrostipa eremophila	Rusty Spear-grass	-	-	Perennial	Grass
	Austrostipa nitida	Balcarra Spear-grass	-	-	Annual	Grass
	Enneapogon avenaceus	Common Bottle-washers	-	-	Annual	Grass
	Eragrostis sp	Love-grass	-	-	Annual	Grass
Leguminosae	*Acacia oswaldii*	Umbrella Wattle	-	-	Perennial	Tall shrub
	Acacia papyrocarpa	Western Myall	-	-	Perennial	Tree
	Senna artemisioides coriacea	Broad-leaf Desert Senna	-	-	Perennial	Shrub
	Senna artemisioides petiolaris	Desert Senna	-	-	Perennial	Shrub
	Senna cardiosperma gawlerensis	Gawler Ranges Senna	-	-	Perennial	Shrub
	Senna phyllodinea	Senna species	-	-	Perennial	Shrub
	Swainsona oliveri	Swainson-pea	-	-	Annual	Herb
Loranthaceae	*Amyema quandang quandang*	Grey Mistletoe	-	-	Perennial	Mistletoe
Malvaceae	*Sida ammophila*	Sand Sida	-	-	Perennial	Herb
	Sida cunninghamii	Ridge Sida	-	-	Perennial	Herb
	Sida fibulifera	Pin Sida	-	-	Perennial	Herb
	Sida petrophila	Rock Sida	-	-	Perennial	Shrub
Myoporaceae	*Eremophila scoparia*	Broom Emubush	-	-	Perennial	Shrub
	Myoporum platycarpum	False Sandalwood	-	-	Perennial	Tree
Myrtaceae	*Eucalyptus oleosa*	Red Mallee	-	-	Perennial	Tree
Plantaginaceae	*Olearia muelleri*	Muellers Daisy-bush	-	-	Perennial	Shrub
	Plantago sp	Plantain	-	-	Annual	Herb
Santalaceae	*Santalum acuminatum*	Quandong	-	-	Perennial	Tall shrub
Sapindaceae	*Alectryon oleifolius canescens*	Bullock Bush	-	-	Perennial	Tree
	Dodonaea viscosa	Sticky Hop-bush	-	-	Perennial	Tall shrub
Solanaceae	*Lycium australe*	Australian Boxthorn	-	-	Perennial	Shrub
Zygophyllaceae	*Zygophyllum apiculatum*	Pointed Twinleaf	-	-	Perennial	Herb
	Zygophyllum aurantiacum	Shrubby Twinleaf	-	-	Perennial	Herb
	Zygophyllum eremaeum	Twinleaf	-	-	Annual	Herb
	Zygophyllum ovatum	Dwarf Twinleaf	-	-	Annual	Herb

Table 29: Eight most widely distributed species during the October 2010 survey.

Species	Common name	Life cycle	Number of sites recorded at
Eriochiton sclerolaenoides	Woolly-fruit Bluebush	Perennial	18
Maireana sedifolia	Bluebush	Perennial	16
Salsola tragus	Buckbush	Perennial	17
Sclerolaena obliquicuspis	Oblique-spined Bindyi	Perennial	17
Rhodanthe floribunda	White Everlasting	Annual	17
Austrostipa nitida	Balcarra Spear-grass	Annual	17
Zygophyllum aurantiacum	Shrubby Twinleaf	Perennial	17
Atriplex vesicaria	Bladder Saltbush	Perennial	16

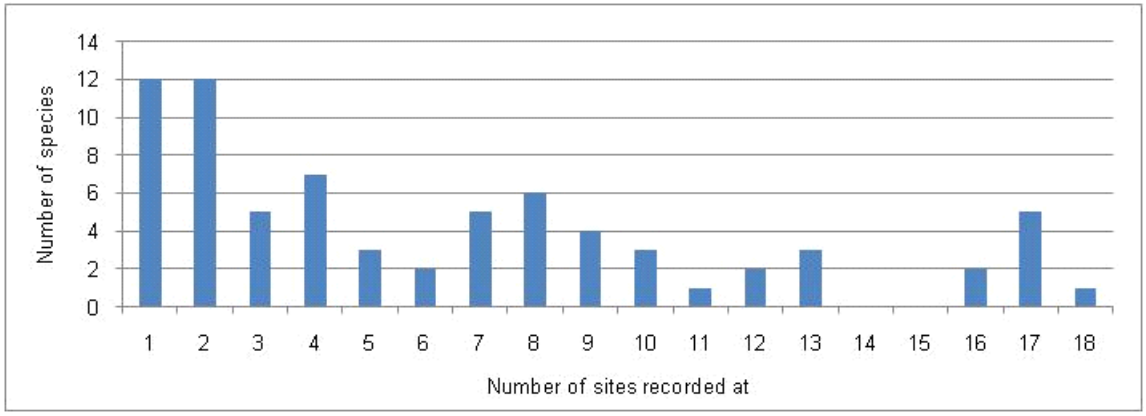

Figure 37: Frequency distribution of native species.

13.3. Extracts from EBS Jacinth-Ambrosia Fauna Monitoring: October 2010

Table 30: Trap effort conducted during the October 2010 survey.

	Chenopod Impact 1	Chenopod Impact 2	Chenopod Control 1	Chenopod Control 2	Myall Impact 1	Myall Impact 2	Myall Control 1	Myall Control 2
Trapping start date	21-Oct-10	21-Oct-10	20-Oct-10	21-Oct-10	21-Oct-10	20-Oct-10	21-Oct-10	20-Oct-10
Trapping end date	28-Oct-10	28-Oct-10	27-Oct-10	28-Oct-10	28-Oct-10	27-Oct-10	28-Oct-10	27-Oct-10
Total no. nights	8	8	8	8	8	8	8	8
Total no. trap nights	528	528	520	512	528	528	528	528
Pit	288	288	280	288	288	288	288	288
Elliott	144	144	144	144	144	144	144	144
Cage	32	32	32	16	32	32	32	32
Funnel	64	64	64	64	64	64	64	64
Cat	8	8	8	8	8	8	8	8

Cat trap effort is not included in the total trap nights as it is a highly targeted method. Note traps were open day and night, but trap nights are used as a standard across fauna surveys as an indication of trap effort.

Table 31: Bat species recorded during the monitoring surveys 2008–2010.

Family	Species	Common name	EPBC status	NPW status	2008	2009	2010
Molossidae	*Tadarida australis*	White-striped Freetail-bat	-	-	×	✓	✓
	Mormopterus sp 4	Inland Freetail-bat	-	-	✓	✓	✓
	Chalinolobus gouldii	Gould's Wattled Bat	-	-	✓	✓	✓
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat	-	-	×	?	×
	Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	?	✓	?
	Nyctophilus major tor	Western Long-eared Bat	-	-	?	✓	×
	Scotorepens balstoni	Inland Broad-nosed Bat	-	-	×	?	×
	Vespadelus baverstocki	Inland Forest Bat	-	-	?	✓	✓
	Vespadelus regulus	Southern Forest Bat	-	-	?	✓	✓

Table 32: Reptile species recorded during the monitoring surveys 2008 – 2010.

Species	Common name	Conservation status		2008	2009	2010
		EPBC	NPW			
Family: Agamidae (Dragon Lizards)						
Ctenophorus cristatus	Crested Dragon	-	-	✓	✓	✓
Ctenophorus fordi	Mallee Dragon	-	-	✓	×	×
Ctenophorus nuchalis	Central Netted Dragon	-	-	×	✓	×
Ctenophorus pictus	Painted Dragon	-	-	✓	✓	✓
Moloch horridus	Thorny Devil	-	-	✓	×	✓
Pogona minor	Dwarf Bearded Dragon	-	-	✓	✓	✓
Pogona nullarbor	Nullarbor Bearded Dragon	-	-	×	✓	✓
Tympanocryptis houstoni	Nullarbor Earless Dragon	-	-	✓	✓	✓
Family: Carphodactylidae (Odd-tailed Geckos)						
Nephrurus levis	Smooth Knob-tailed Gecko	-	-	✓	✓	✓
Nephrurus milii	Barking Gecko	-	-	✓	✓	✓
Family: Diplodactylidae (Australasian Geckos)						
Diplodactylus calciolus	South Coast Gecko	-	-	×	✓	✓
Diplodactylus vittatus complex	Gecko (revised species)	-	-	✓	✓	×
Diplodactylus wiru	Desert Wood Gecko	-	-	×	✓	×
Lucasium bungabinna	Southern Sandplain Gecko	-	-	×	✓	✓
Lucasium damaeum	Beaded Gecko	-	-	✓	✓	✓
Lucasium stenodactylum	Sandplain Gecko	-	-	×	×	✓
Rhynchoedura ornata	Beaked Gecko	-	-	✓	×	✓
Strophurus intermedius	Southern Spiny-tailed Gecko	-	-	✓	✓	✓
Family: Elapidae (Elapid Snakes)						
Brachyurophis fasciolatus	Narrow-banded Snake	-	-	×	×	✓
Brachyurophis semifasciatus	Half-girdled Snake	-	-	✓	✓	✓
Demansia reticulata	Desert Whipsnake	-	-	×	✓	✓
Parasuta spectabilis	Mallee Black-headed Snake	-	-	×	✓	✓
Pseudonaja aspidorhyncha	Patch-nosed Brown Snake	-	-	✓	×	×
Pseudonaja modesta	Five-ringed Snake	-	-	×	×	✓
Simoselaps bertholdi	Desert Banded Snake	-	-	✓	✓	✓
Family: Gekkonidae (Typical Geckos)						
Gehyra variegata	Tree Dtella	-	-	✓	✓	✓
Heteronotia binoei	Bynoe's Gecko	-	-	✓	✓	✓
Family: Pygopodidae (Legless Lizards)						
Pygopus nigriceps	Black-headed Scaly-foot	-	-	✓	×	×
Family: Scincidae (Skinks)						
Cryptoblepharus australis	Desert Wall Skink	-	-	✓	×	×
Ctenotus orientalis	Spotted Ctenotus	-	-	×	✓	×
Ctenotus regius	Eastern Desert Ctenotus	-	-	✓	✓	✓
Ctenotus schomburgkii	Sandplain Ctenotus	-	-	✓	✓	✓
Ctenotus sp	Skink species	-	-	×	×	✓

Species	Common name	Conservation status		2008	2009	2010
		EPBC	NPW			
Hemiergis initialis	Western Earless Skink	-	-	✓	×	×
Lerista bipes	Western Two-toed Slider	-	-	×	✓	×
Lerista dorsalis	Southern Four-toed Slider	-	-	×	✓	✓
Lerista edwardsae	Myall Slider	-	-	✓	✓	✓
Lerista labialis	Eastern Two-toed Slider	-	-	✓	✓	✓
Lerista terdigitata	Southern Three-toed Slider	-	-	×	✓	×
Lerista timida	Dwarf Three-toed Slider	-	-	✓	✓	×
Liopholis inornata	Desert Skink	-	-	✓	✓	✓
Menetia greyii	Dwarf Skink	-	-	✓	✓	✓
Morethia adelaidensis	Adelaide Snake-eye	-	-	✓	✓	✓
Tiliqua rugosa	Sleepy Lizard	-	-	✓	✓	✓
Family: Typhlopidae (Blind Snakes)						
Ramphotyphlops bituberculatus	Rough-nosed Blind Snake	-	-	×	✓	✓
Ramphotyphlops endoterus	Centralian Blind Snake	-	-	✓	✓	✓
Ramphotyphlops sp	Blind Snake species	-	-	×	×	✓
Family: Varanidae (Goannas)						
Varanus gilleni	Pygmy Mulga Goanna	-	-	×	×	✓
Varanus gouldii	Sand Goanna	-	-	✓	✓	✓

Table 33: Bird species observed during the monitoring surveys 2008-2010.

Species	Common name	Conservation status		2008	2009	2010
		EPBC	NPW			
Family: Acanthizidae (Field wrens)						
Acanthiza apicalis	Inland Thornbill	-	-	✓	✓	✓
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	-	-	✓	×	✓
Acanthiza iredalei iredalei	Slender-billed Thornbill	VU	R	×	✓	✓
Acanthiza uropygialis	Chestnut-rumped Thornbill	-	-	✓	✓	✓
Aphelocephala leucopsis	Southern Whiteface	-	-	✓	✓	✓
Calamanthus campestris	Rufous Fieldwren	-	-	×	✓	✓
Family: Accipitridae (Kites)						
Accipiter fasciatus	Brown Goshawk	-	-	×	×	✓
Aquila audax	Wedge-tailed Eagle	-	-	×	✓	×
Elanus axillaris	Black-shouldered Kite	-	-	✓	×	×
Falco cenchroides	Nankeen Kestrel	-	-	×	✓	✓
Haliastur sphenurus	Whistling Kite	-	-	×	✓	×
Family: Alcedinidae (Kingfishers)						
Todiramphus pyrrhopygia	Red-backed Kingfisher	-	-	✓	✓	✓
Todiramphus sanctus	Sacred Kingfisher	-	-	×	✓	✓
Todiramphus sp	Kingfisher species	-	-	×	×	✓
Family: Artamidae (Woodswallows)						
Artamus cinereus	Black-faced Woodswallow	-	-	✓	✓	✓
Artamus cyanopterus	Dusky Woodswallow	-	-	×	×	✓
Artamus personatus	Masked Woodswallow	-	-	×	✓	×
Artamus superciliosus	White-browed Woodswallow	-	-	✓	×	×
Cracticus torquatus	Grey Butcherbird	-	-	✓	✓	✓
Gymnorhina tibicen	Australian Magpie	-	-	×	✓	✓
Family: Cacatuidae (Cockatoos)						
Cacatua leadbeateri	Major Mitchells Cockatoo	-	R	✓	×	×
Cacatua roseicapilla	Galah	-	-	✓	✓	✓
Family: Campephagidae (Cuckoo-shrikes)						
Coracina maxima	Ground Cuckoo-shrike	-	-	✓	✓	✓
Coracina novaehollandiae	Black-faced Cuckoo-shrike	-	-	✓	✓	✓
Lalage tricolor	White-winged Triller	-	-	✓	✓	✓
Family: Climacteridae (Australopapuan treecreepers)						
Climacteris picumnus	Brown Treecreeper	-	-	×	✓	×
Family: Corvidae (Crows)						
Corvus mellori	Little Crow	-	-	✓	✓	✓
Family: Cuculidae (Cuckoos)						
Chrysococcyx osculans	Black-eared Cuckoo	-	-	✓	×	×
Cuculus pallidus	Pallid Cuckoo	-	-	×	✓	✓
Family: Estrildidae (Finches)						
Taeniopygia guttata	Zebra Finch	-	-	×	✓	✓

Species	Common name	Conservation status		2008	2009	2010
		EPBC	NPW			
Family: Falconidae (Falcons)						
Falco berigora	Brown Falcon	-	-	✓	✓	✓
Falco longipennis	Australian Hobby	-	-	×	✓	×
Family: Hirundinidae (Swallows)						
Cheramoeca leucosternus	White-backed Swallow	-	-	✓	✓	×
Hirundo neoxena	Welcome Swallow	-	-	×	✓	✓
Petrochelidon nigricans	Tree Martin	-	-	×	×	✓
Family: Maluridae (Fairy-wrens)						
Malurus lamberti	Variegated Fairy Wren	-	-	✓	✓	✓
Malurus leucopterus	White-winged Fairy-wren	-	-	✓	✓	✓
Family: Meliphagidae (Honeyeaters)						
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	-	-	✓	✓	✓
Anthochaera carunculata	Red Wattlebird	-	-	×	✓	×
Epthianura aurifrons	Orange Chat	-	-	×	✓	×
Epthianura tricolor	Crimson Chat	-	-	×	✓	✓
Lichenostomus ornatus	Yellow-plumed Honeyeater	-	-	×	✓	✓
Lichenostomus penicillatus	White-plumed Honeyeater	-	-	×	×	✓
Lichenostomus virescens	Singing Honeyeater	-	-	✓	✓	✓
Manorina flavigula	Yellow-throated Miner	-	-	✓	✓	✓
Purnella albifrons	White-fronted Honeyeater	-	-	×	✓	×
Family: Meropidae (Bee-eater)						
Merops ornatus	Rainbow Bee-eater	-	-	×	✓	✓
Family: Monarchidae (Magpie-lark)						
Grallina cyanoleuca	Magpie-lark	-	-	×	×	✓
Family: Motacillidae (Pipits)						
Anthus novaeseelandiae	Australasian Pipit	-	-	✓	✓	✓
Family Necariniidae						
Dicaeum hirundinaceum	Mistletoebird	-	-	×	✓	×
Family: Neosittidae (Sittella)						
Daphoenositta chrysoptera	Varied Sittella	-	-	×	✓	✓
Family: Otididae (Bustard)						
Ardeotis australis	Australian Bustard	-	V	✓	✓	✓
Family: Pachycephalidae (Whistlers)						
Colluricincla harmonica	Grey Shrike-thrush	-	-	×	✓	✓
Oreoica gutturalis	Crested Bellbird	-	-	✓	✓	✓
Pachycephala rufiventris	Rufous Whistler	-	-	×	✓	✓
Family: Pardalotidae (Pardalotes)						
Pardalotus striatus	Striated Pardalote	-	-	×	×	✓
Pomatostomus superciliosus	White-browed Babbler	-	-	×	×	✓
Pyrrholaemus brunneus	Redthroat	-	-	×	✓	✓
Family: Petroicidae (Robins)						

Species	Common name	Conservation status		2008	2009	2010
		EPBC	NPW			
Melanodryas cucullata	Hooded Robin	-	-	✓	✓	✓
Microeca fascinans	Jacky Winter	-	-	✓	✓	✓
Petroica goodenovii	Red-capped Robin	-	-	×	✓	✓
Family: Pomatostomidae (Babblers)						
Podargus strigoides	Tawny Frogmouth	-	-	✓	×	×
Family: Pomatostomidae (Babblers)						
Pomatostomus superciliosus	White-browed Babbler	-	-	✓	✓	✓
Family: Psittacidae (Parrots)						
Barnardius zonarius	Australian Ringneck	-	-	✓	✓	✓
Northiella haematogaster	Blue Bonnet	-	-	✓	×	×
Psephotus varius	Mulga Parrot	-	-	✓	✓	✓
Family Psophodidae						
Cinclosoma cinnamomeum	Cinnamon Quail-thrush	-	-	×	✓	×
Family: Rhipiduridae (Wagtails)						
Rhipidura leucophrys	Willie Wagtail	-	-	×	✓	✓
Family: Sylviidae (Songlarks)						
Cincloramphus cruralis	Brown Songlark	-	-	×	×	✓
Family Turnicidae						
Turnix velox	Little Button-quail	-	-	×	✓	×

Table 34: Collected invertebrates identified from the October 2010 survey.

Class	Order	Suborder/ Superfamily / Infraorder	Family / Subfamily	Common name	Total
Arachnida	Araneae	Mygalomorphae		Ancient Spiders	9
		Araneomorphae		Modern Spiders	106
Arachnida	Scorpiones		Scorpionidae	Scorpion	6
	Pseudoscorpionida			Pseudoscorpion	3
Arachnida	Acarina	Acariformes		Mite	665
Arachnida	Acarina	Acariformes		Red Mite	55
Collembola		Arthropleona		Springtail	1589
	Blattodea			Cockroach	7
Insecta	Coleoptera		Caribidae	Ground Beetle	22
			Curculionidae	Weevil	1
			Scarabidae	Scarab Beetle	25
Insecta	Coleoptera			Larvae	9
Insecta	Diptera			Fly	15
Insecta	Hemiptera			Bug	12
Insecta	Hymenoptera	Apocrita	Formicidae (Nothomyrmeciinae)	Ant	20
			Formicidae (Formicinae)	Ant	280
			Formicidae (Ponerinae)	Ant	130
			Formicidae (Dolichoderinae)	Ant	7755
			Formicidae (Myrmicinae)	Ant	10
Insecta	Hymenoptera	Apocrita		Wasp	44
Insecta	Lepidoptera			Moth	1
Insecta	Lepidoptera			Caterpillar	8
Insecta	Mantodea			Preying Mantid	2
Insecta	Mecoptera			Scorpion Fly	1
Insecta	Orthoptera	Caelifera		Grasshopper	4
Insecta	Orthoptera	Ensifera	Tettigonoidea	Cricket	14
Chilopoda	Scolopendromorpha		Scolopendridae	Centipede	4
	Scutigeromorpha		Scutigeridae	House Centipede	3
Malacostraca	Isopoda			Slaters/Wood Lice	53
	Gastropoda			Snail	17
	Thysanura			Silverfish	25
Insecta	Phasmatodea			Stick Insects	1

13.4. Weed Mapping and Management Program

J-A Weed Distribution Case Study

The increase in weed distribution (and therefore abundance) and some of the issues driving that increase can best be demonstrated by focussing on a case study area and comparing disturbance footprint and weed distribution over time. The case study area discussed in this report covers the Process Plant, Jacinth Pit and Tailings Storage Facility.

2008 (Figure 38): a network of drill tracks and sites crossed the area and the only recent disturbance was the start of the haul road. EBS conducted a weed survey on two sections of the creek system (displayed in yellow hashing) but no other areas were assessed. However, EBS did note landscape features that could become weedier – sand dunes, water courses, open water storage areas. No area estimate of weed distribution can be estimated from this data.

2009 (Figure 39): construction was initiated and completed with mining operations commencing in October. The area of open and disturbed land increased as did the ability to survey and map weeds, both leading to an increase in the recorded extent of weeds. The J-A IWM Program began and management activities were conducted with a backpack and hoe and recorded with hand held GPS. During 2009 several issues started to become obvious, 1) creek weeds were far more extensive than the original EBS mapping showed, and the 2008 flood had transported existing weed seed throughout the creek and flood plain system, 2) seed sources were already common in areas where EBS predicted they may occur - dunes, landscape depressions, burrows, etc. 3) biological soil crust were playing many important roles, one of which was to minimise weed seed germination. Data was captured in a point format and no area managed has been estimated.

2010 (Figure 40): the mining footprint continued to expand and the soil disturbed or stockpiled in 2009 experienced its first winter germination and growth conditions. La Nina delivered one of the wettest seasons on record for much of south eastern Australia, including J-A. Weeds germinated early and continued to grow and germinate right through until December. Additional resources were dedicated to the issue including an Environmental/Rehabilitation Technician, a Polaris ATV and small boom and hand wand for management and a Trimble Nomad for mapping. Over 450 hours were spent on the weed program up until 12/9/10. The rain and the weed program continued until December, largely based around revisiting the same sites first managed earlier in the year. Data was captured in a polygon format and a total surface area of approximately 85 ha was been estimated.

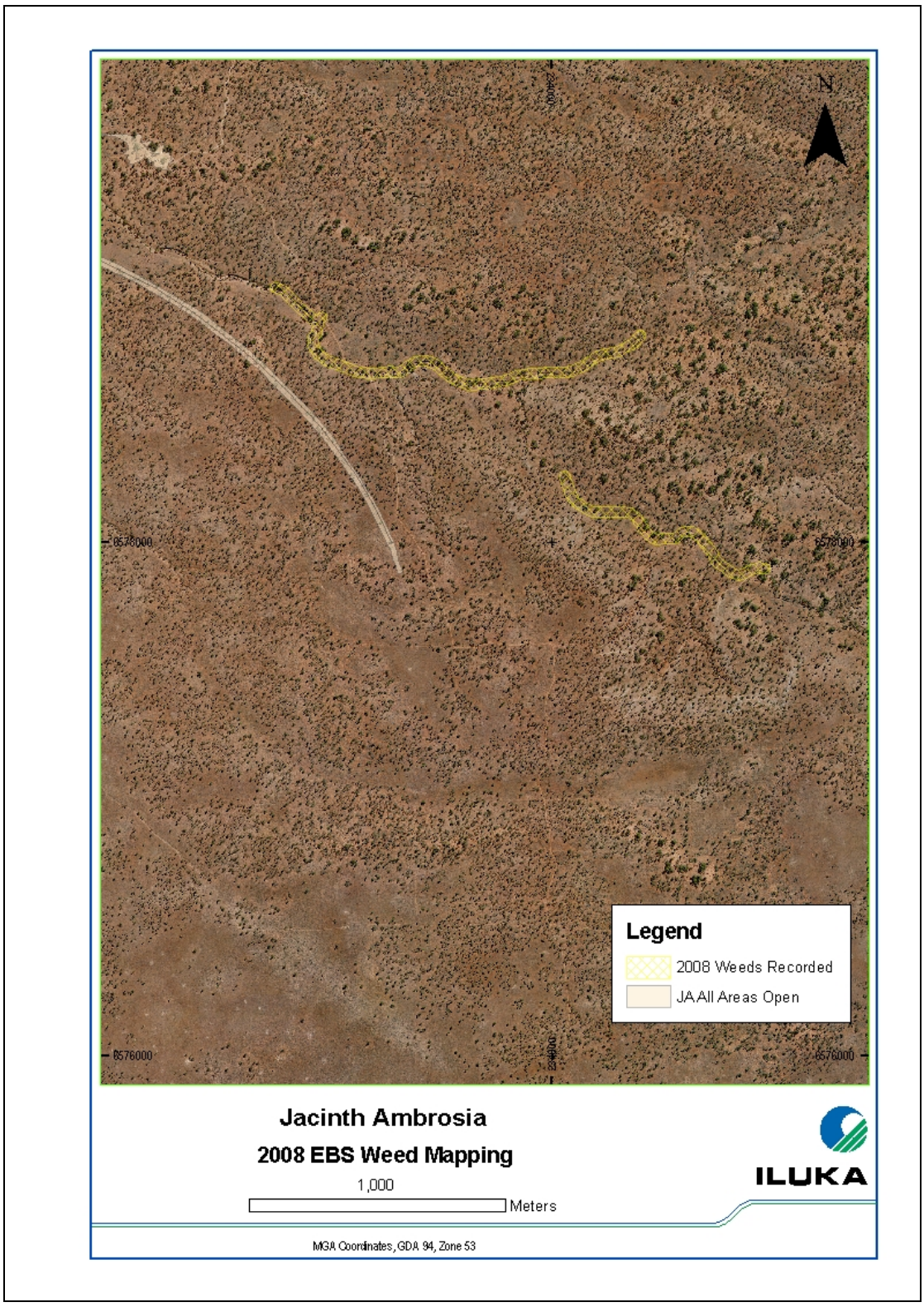

Figure 38: 2008 J-A weed distribution case study - disturbance and weed distribution.

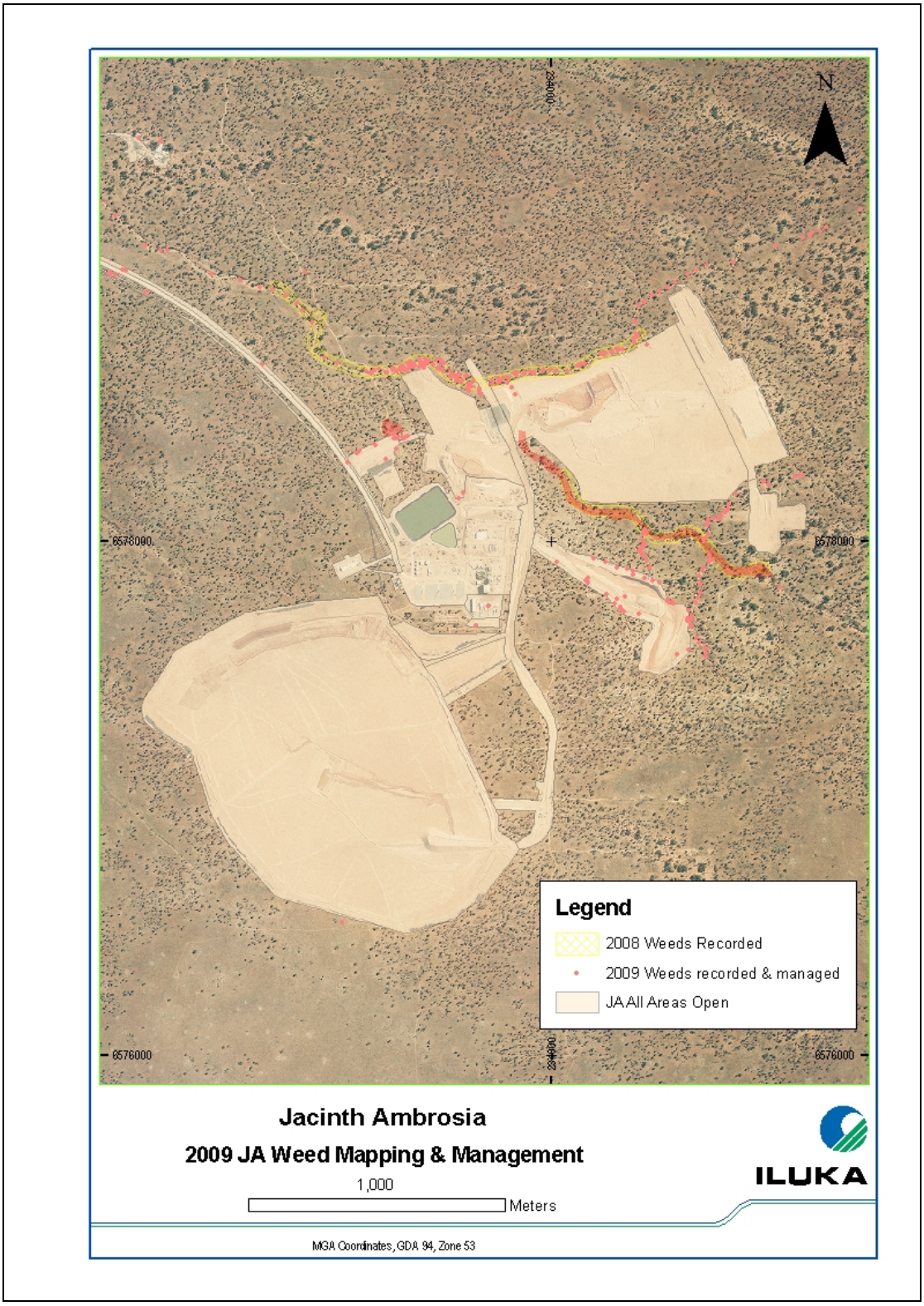

Figure 39: 2009 J-A weed distribution case study - disturbance and weed distribution.

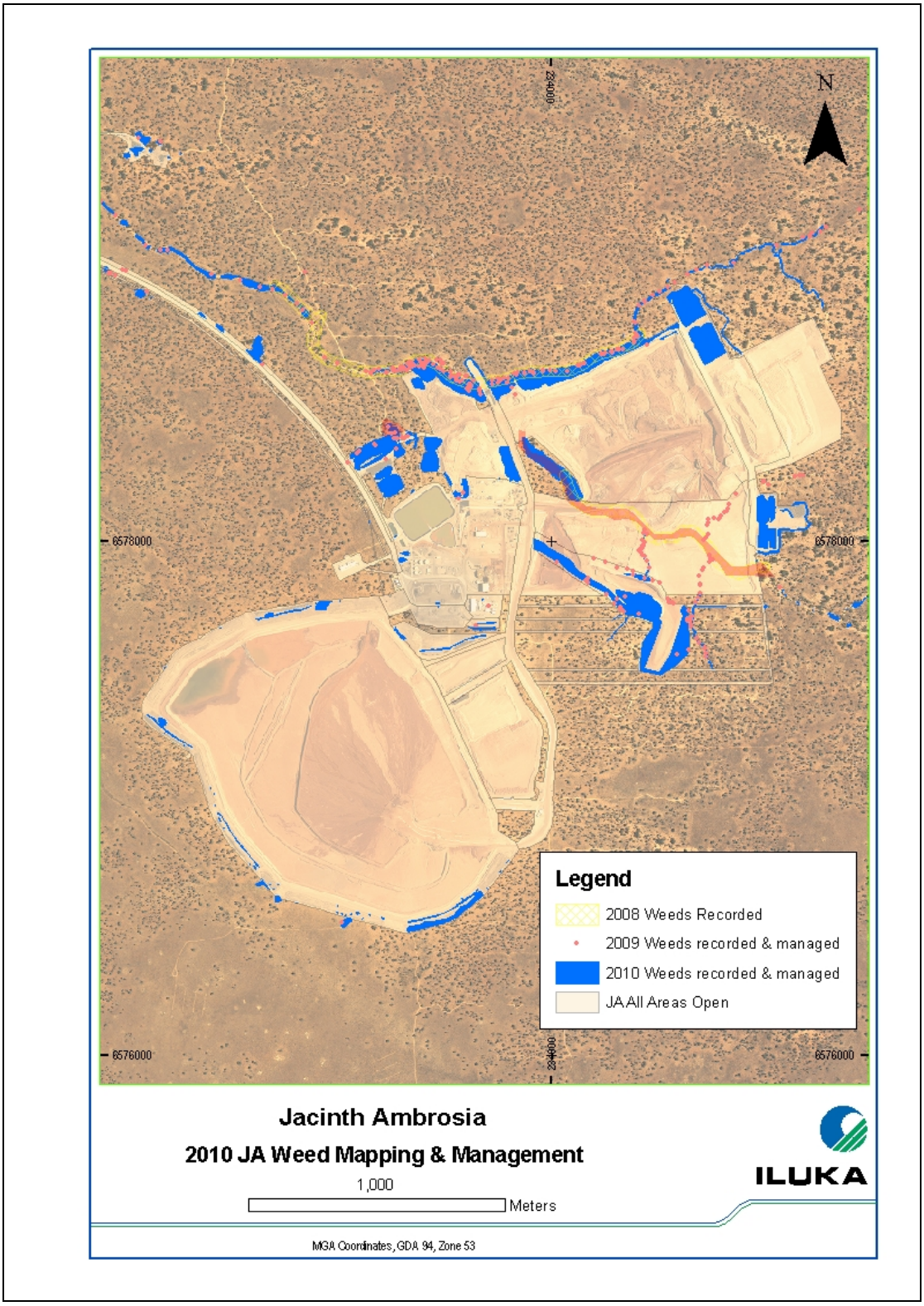

Figure 40: 2010 J-A weed distribution case study - disturbance and weed distribution.

J-A Weed Diversity and Distribution x Domain

Weed species, abundance, location and management were recorded for all areas managed during 2010 using a Trimble Nomad and ArcPad software. Records are maintained in a GIS data base and the diversity (Table 35 - Table 38) for each MARCR reporting domain is reported here. Distribution maps are only displayed for Domain 3 and 4. (Figure 41 and Figure 42). These results are discussed in more detail in section 5.3 of the main MARCR document.

Table 35: Weed diversity summary, Domain 4 Mine Lease.

Mining Lease (4 - ML, 4 - ML OOL)		Yr Registered							
		4 - ML				4 - ML OOL			
Common Name	***Scientific Name***	2010	2009	2008	2005-06	2010	2009	2008	2005-06
Wards Weed	*Carrichtera annua*	*	*	*	*	*			
Turnip	*Brassica tournefortii*	*	*	*	*	*			
Oats - domestic[1]	*Avena sativa*	*							
Canola	*Brassica napus*								
London Rocket	*Sisymbrium sp*	*				*			
Milk Thistle	*Sonchus oleraceus*	*	*			*			
Barley Grass	*Hordeum sp*	*							
Wild Oats	*Avena sp*	*	*						
Iceplant	*Mesembryanthemum crystallinum*	*							
Ruby Dock	*Acetosa vesicaria*	*				*			
False Sowthistle	*Reichardia sp*	*	*						
Horehound	*Marrubium vulgare*								
Fleabane	*Conyza sp*	*	*						
Cape Weed	*Arcotheca calendula*								
Buffel Grass	*Cenchrus ciliaris*								
Saffron Thistle	*Carthamus lanatus*	*	*	*					
Blackberry Nightshade	*Solanum nigrum*	*							
Wild Lettuce	*Lactuca serriola*	*							
Rye Grass	*Lolium sp*	*							
Wild Radish	*Raphanus raphanistrum*					*			
Medic	*Medicago sp*	*							
Fat Hen	*Chenopodium sp*								
Couch[1]	*Cynodon dactylon*	*							
Onion Weed	*Asphodelus fistulosus*								
Paddy Melon	*Citrullus sp*		*						
Sea Rocket	*Cakile maritima*								
Common Heron's Bill	*Erodium cicutarium*			*	*				
Native Tobacco	*Nicotania megalosifium*			*					

*OOL = out of lease

[1] Rabbit baiting program

Number of polygons where weed species managed (this is a reflection of abundance, not an actual measure and does not apply to pre 2009 surveys): * = 20+ locations, * = 5-20 locations, * = <5 locations.

Table 36: Weed diversity summary, Domain 3 Airfield & Village.

Airfield/Village (2 - AV)		Yr Registered			
Common Name	***Scientific Name***	2010	2009	2008	2005-06
Wards Weed	*Carrichtera annua*	*			
Turnip	*Brassica tournefortii*	*			
Oats - domestic[1]	*Avena sativa*	*			
Canola	*Brassica napus*				
London Rocket	*Sisymbrium sp*	*	*		
Milk Thistle	*Sonchus oleraceus*	****	*		
Barley Grass	*Hordeum sp*	*	*		
Wild Oats	*Avena sp*	*			
Iceplant	*Mesembryanthemum crystallinum*	*			
Ruby Dock	*Acetosa vesicaria*				
False Sowthistle	*Reichardia sp*	*			
Horehound	*Marrubium vulgare*				
Fleabane	*Conyza sp*	****			
Cape Weed	*Arcotheca calendula*	*			
Buffel Grass	*Cenchrus ciliaris*	*			
Saffron Thistle	*Carthamus lanatus*				
Blackberry Nightshade	*Solanum nigrum*				
Wild Lettuce	*Lactuca serriola*	*			
Rye Grass	*Lolium sp*				
Wild Radish	*Raphanus raphanistrum*				
Medic	*Medicago sp*				
Fat Hen	*Chenopodium sp*	*			
Couch[1]	*Cynodon dactylon*				
Onion Weed	*Asphodelus fistulosus*				
Paddy Melon	*Citrullus sp*				
Sea Rocket	*Cakile maritima*				
Common Heron's Bill	*Erodium cicutarium*				
Native Tobacco	*Nicotania megalosifium*				

[1] Rabbit baiting program

Number of polygons where weed species managed (this is a reflection of abundance, not an actual measure and does not apply to pre 2009 surveys): **** = 20+ locations, * = 5-20 locations, * = <5 locations

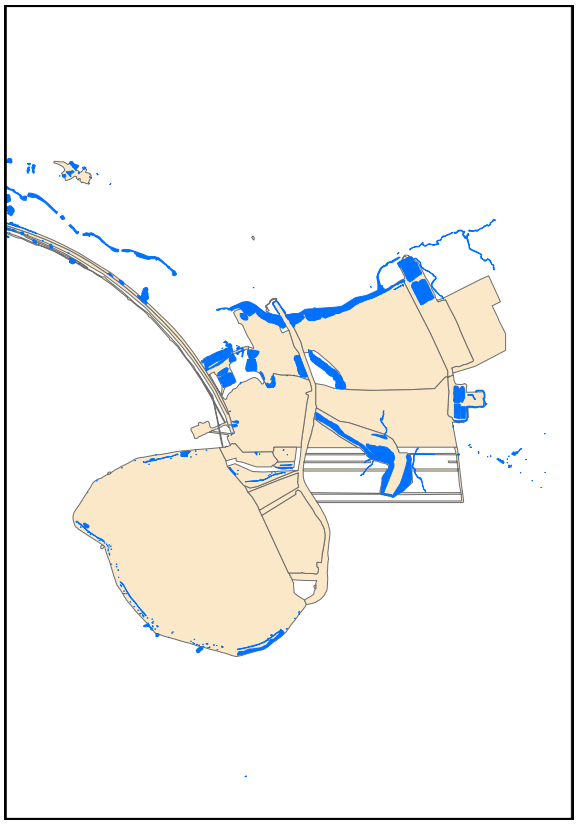

Figure 41: Areas of weed management 2010 (blue), disturbed areas (cream) Domain 4 Mine Lease (scale: 1:14,000).

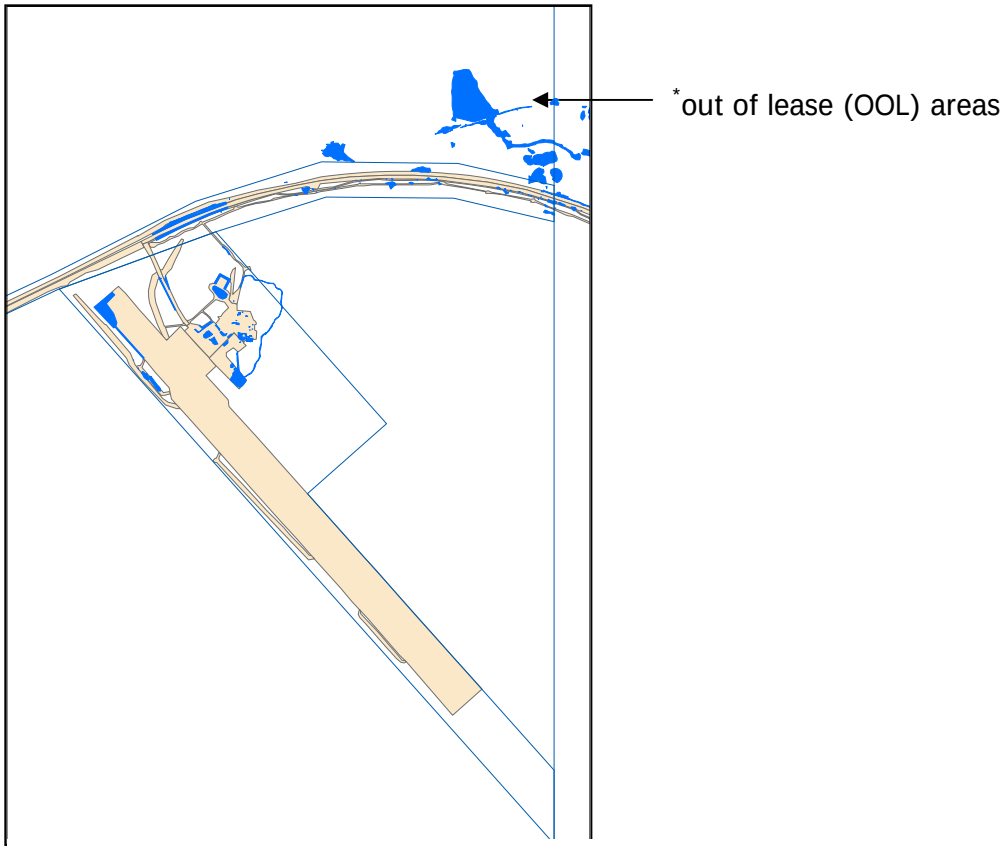

Figure 42: Areas of weed management 2010 (blue), disturbed areas (cream) Domain 3 Airfield & Village (scale: 1:8,000).

Table 37: Weed diversity summary, Domain 2 Access Rd.

Access Rd (3 - AR, 3 - AR OOL, 3 - ARBP)		Yr Registered											
		3 - AR				3 - AR OOL				3 - ARBP			
Common Name	***Scientific Name***	2010	2009	2008	2005-06	2010	2009	2008	2005-06	2010	2009	2008	2005-06
Wards Weed	*Carrichtera annua*	*	*							*			
Turnip	*Brassica tournefortii*	*	*			*				*			
Oats - domestic[1]	*Avena sativa*	*											
Canola	*Brassica napus*												
London Rocket	*Sisymbrium sp*	*	*							*			
Milk Thistle	*Sonchus oleraceus*	*	*			*				*			
Barley Grass	*Hordeum sp*	*											
Wild Oats	*Avena sp*	*	*										
Iceplant	*Mesembryanthemum crystallinum*	*											
Ruby Dock	*Acetosa vesicaria*												
False Sowthistle	*Reichardia sp*	*											
Horehound	*Marrubium vulgare*												
Fleabane	*Conyza sp*												
Cape Weed	*Arcotheca calendula*												
Buffel Grass	*Cenchrus ciliaris*												
Saffron Thistle	*Carthamus lanatus*												
Blackberry Nightshade	*Solanum nigrum*												
Wild Lettuce	*Lactuca serriola*												
Rye Grass	*Lolium sp*	*											
Wild Radish	*Raphanus raphanistrum*												
Medic	*Medicago sp*												
Fat Hen	*Chenopodium sp*												
Couch[1]	*Cynodon dactylon*												
Onion Weed	*Asphodelus fistulosus*												
Paddy Melon	*Citrullus sp*												
Sea Rocket	*Cakile maritima*												
Common Heron's Bill	*Erodium cicutarium*												
Native Tobacco	*Nicotania megalosifium*												

*OOL = out of lease
**BP = borrow pit
[1] Rabbit baiting program

Number of polygons where weed species managed (this is a reflection of abundance, not an actual measure and does not apply to pre 2009 surveys): ***** = 20+ locations, * = 5-20 locations, * = <5 locations

Table 38: Weed diversity summary, Domain 2 Borefield.

Borefield Road (3 - BFR)		Yr Registered			
Common Name	***Scientific Name***	2010	2009	2008	2005-06
Wards Weed	*Carrichtera annua*	*	*	*	
Turnip	*Brassica tournefortii*	*	*		
Oats - domestic[1]	*Avena sativa*				
Canola	*Brassica napus*				
London Rocket	*Sisymbrium sp*				
Milk Thistle	*Sonchus oleraceus*	*	*		
Barley Grass	*Hordeum sp*				
Wild Oats	*Avena sp*	*			
Iceplant	*Mesembryanthemum crystallinum*				
Ruby Dock	*Acetosa vesicaria*				
False Sowthistle	*Reichardia sp*				
Horehound	*Marrubium vulgare*				
Fleabane	*Conyza sp*				
Cape Weed	*Arcotheca calendula*				
Buffel Grass	*Cenchrus ciliaris*				
Saffron Thistle	*Carthamus lanatus*		*		
Blackberry Nightshade	*Solanum nigrum*				
Wild Lettuce	*Lactuca serriola*				
Rye Grass	*Lolium sp*				
Wild Radish	*Raphanus raphanistrum*				
Medic	*Medicago sp*				
Fat Hen	*Chenopodium sp*				
Couch[1]	*Cynodon dactylon*				
Onion Weed	*Asphodelus fistulosus*				
Paddy Melon	*Citrullus sp*				
Sea Rocket	*Cakile maritima*				
Common Heron's Bill	*Erodium cicutarium*				
Native Tobacco	*Nicotania megalosifium*				

Number of polygons where weed species managed (this is a reflection of abundance, not an actual measure and does not apply to pre 2009 surveys): ***** = 20+ locations, * = 5-20 locations, * = <5 locations

13. 5 LBW Groundwater Quality Report September 2010

Iluka - Jacinth Ambrosia
Groundwater Chemical Testing Data

L·B·W environment

Concentration in water — METALS & METALLOIDS

Analytes			Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Thorium	Uranium	Zinc	Mercury
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
Assessment Criteria												
EPP 2003	Potable		7	2	-	2000	10	20	-	20	-	0.001
EPP 2003	Freshwater Ecosystems		50	2	-	10	5	15	-	-	50	0.0001
EPP 2003	Irrigation		100	100	1000	10	200	200	-	10	2000	0.002
EPP 2003	Livestock		500	100	1000	500	100	1000	-	200	20000	0.002
Method Practical Quantitation Limit												
ALS Laboratory Group			0.5	0.2	0.5	1	0.2	0.5	0.1	0.1	5	0.0001
Sample ID	**Sample date**	**QC code**										
MB2D	23/09/2010		2.5	<0.2	1.4	1	2.7	10.2	0.4	0.4	23	<0.0001
MB3	22/09/2010		4.5	2.9	7.7	14	57.2	176	0.8	7.1	186	0.0003
MB6D	22/09/2010	FD	2	2.8	0.5	3	71.8	939	0.3	0.4	248	<0.0001
PB2	22/09/2010		0.9	<0.2	<0.5	<1	3.2	9.8	0.3	<0.1	55	<0.0001
PB6	22/09/2010		1.8	<0.2	<0.5	<1	0.5	7.1	1.6	<0.1	92	<0.0001
PB10	22/09/2010		0.9	<0.2	<0.5	<1	0.2	3.4	0.6	<0.1	64	<0.0001
Quality Control Samples												
MB6D	22/09/2010		2	2.8	0.5	3	71.8	939	0.3	0.4	248	<0.0001
QC2	22/09/2010	FD	2.4	2.8	0.5	2	69	967	0.4	0.4	258	<0.0001
RPD %			*-18.2%*	*0.0%*	*0.0%*	*40.0%*	*4.0%*	*-2.9%*	*-28.6%*	*0.0%*	*-4.0%*	^
Rinsate Samples												
QC1	22/09/2010	RINSE	<0.2	<0.05	<0.2	1	<0.1	<0.5	<0.1	<0.05	13	<0.0001

Concentration in water — CATIONS / ANIONS / IONIC BALANCE / ALKALINITY / PHYSICAL / MISC

Analytes			CATIONS Sodium	CATIONS Potassium	CATIONS Magnesium	CATIONS Calcium	ANIONS Chloride	ANIONS Sulphate	IONIC BALANCE Total Anions	IONIC BALANCE Total Cations	IONIC BALANCE Ionic Blance	ALKALINITY Bicarbonate	ALKALINITY Carbonate	ALKALINITY Hydroxide	ALKALINITY Total Alkalinity	PHYSICAL pH	PHYSICAL Total Dissolved Solids	MISC Silica	MISC Sulfide as S2
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	$mgCaCO_3/L$	$mgCaCO_3/L$	$mgCaCO_3/L$	$mgCaCO_3/L$	pH Unit	mg/L	mg/L	mg/L
Assessment Criteria																			
EPP 2003	Potable		-	-	-	-	-	500	-	-	-	-	-	-	-	6.5-8.5	-	-	-
EPP 2003	Freshwater Ecosystems		-	-	-	-	-	-	-	-	-	-	-	-	-	6.5-9	-	-	0.002
EPP 2003	Irrigation		-	-	-	-	-	1000	-	-	-	-	-	-	-	4.5-9	-	-	-
EPP 2003	Livestock		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Method Practical Quantitation Limit																			
ALS Laboratory Group			1	1	1	1	1	1	0.01	0.01	0.01	1	10	1	1	0.01	5	0.1	0.1
Sample ID	**Sample date**	**QC code**																	
MB2D	23/09/2010		9300	256	1310	607	16400	3050	529	549	1.8	200	<1	<1	200	7.02	32700	16.4	<0.1
MB3	22/09/2010		15100	335	1830	816	24800	3610	774	859	5.14	<1	<1	<1	<1	4.04	48000	91.1	<0.1
MB6D	22/09/2010	FD	11000	330	1580	612	21500	2550	660	646	1.08	14	<1	<1	14	5.64	36000	50.5	<0.1
PB2	22/09/2010		14600	398	1300	455	22300	4870	730	774	2.9	22	<1	<1	22	5.8	36800	12	<0.1
PB6	22/09/2010		14800	406	1320	428	22000	4940	723	786	4.2	<1	<1	<1	<1	4.59	36200	12.7	<0.1
PB10	22/09/2010		15600	418	1410	453	21900	5410	730	830	6.37	<1	<1	<1	<1	4.64	37600	8.4	<0.1
Quality Control Samples																			
MB6D	22/09/2010		11000	330	1580	612	21500	2550	660	646	1.08	14	<1	<1	14	5.64	36000	50.5	<0.1
QC2	22/09/2010	FD	11500	354	1640	638	22100	2680	680	678	0.15	20	<1	<1	20	5.54	36400	52.3	<0.1
RPD %			*-4.4%*	*-7.0%*	*-3.7%*	*-4.2%*	*-2.8%*	*-5.0%*	*-3.0%*	*-4.8%*	*151.2%*	*-35.3%*	^	^	*-35.3%*	*1.8%*	*-1.1%*	*-3.5%*	^
Rinsate Samples																			
QC1	22/09/2010	RINSE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Notes
Concentration exceeds criterion - Potable EPP 2003
Concentration exceeds criterion - Freshwater EPP 2003
Concentration exceeds criterion - Irrigation EPP 2003
Concentration exceeds criterion - Livestock EPP 2003
RPD% exceeds recommended +/-20%
- No data collected
\# Not appropriate to calculate RPD, due to units of data
^ RPD could not be calculated due one or both duplicate concentrations <PQL
Data from ALS report - EM1005426

QC Codes
FD = field duplicate, intra-laboratory

13.6 Waste Movement Records

Ceduna Recycling MONTH July

Waste stream reporting sheet

CUSTOMER **ILUKA Jacinth Ambrosia**

Date	Bin In	Bin Out	Waste Stream	Gross	Tare	Net	% recyclble	Contanimation	COMMENTS	Driver
5/7/10	13	13	Solid/putrescible	15.750	14.4	1.35.	NIL	✓		D.G.
9/7/10	13	15.	Solid/Putrescible	15.9	14.7	1.2	2%	STEEL.	EXACT MINING STEEL TAKEN OUT.	D.G.
13/7/10	15.	13	Solid/putrescible	16.2	14.4	2.2.	NIL	✓		D.G.
14/7/10	13	20	CARDBOARD/Recycling	16.7	14.7	2.	95%	5%	food waste Bags Grease Cartridges.	D.G.
19/7/10	20	20	CARDBOARD/Recycling	15.7	14.7	1	100%		PLASTIC DRUMS / 60 Mls COOKING OIL / 60 LTRS WASTE OIL.	D.G
20/7/10	20	13	Solid/putrescible	16.8	14.2	2.6.	✓	✓		D.G.
22/7/10	13	15	Solid/putrescible	15.7	14.4	1.5	✓	✓		D.G
27/7/10	15	13	STEEL.	18.9	14.2	4.7.	100%	NIL.	excellent	D.G.
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Ceduna Recycling MONTH AUGUST

Waste stream reporting sheet

CUSTOMER **ILUKA Jacinth Ambrosia**

Date	Bin In	Bin Out	Waste Stream	Gross	Tare	Net	% recyclble	Contanimation	COMMENTS	Driver
2/8/10	13	20	Recycling	15.5	14.7	.800	90%	food.	food WASTE IN CARDBOARD BIN	D.G
3/8/10	20	13	Solid/putrescible	17.1	14.4	2.7	✓	✓	✓	D.G.
5/8/10	13	15	Solid/putrescible	16.8	14.4	2.4	✓	✓	✓	D.G
11/8/10	15	13	Solid/putrescible	16.9	14.4	2.5	✓	✓	✓	D.G.
16/8/10	13	20	Recycling	16.6	14.7	2.1	90%	Grease	Grease Cartridges/food WASTE (REPORTED)	D.G.
17/8/10	20	15	Solid/putrescible	16.8	14.4	2.4	5%	Plastic	Plastic Drums Removed for Recycl.	DG
26/8/10	15	20	Solid/putrescible	19.1	14.4	2.3	✓	✓	—	D.G
28/8/10	20	13	Solid/putrescible	17.9	14.7	3.2	✓	✓	✓	D.G
30/8/10	13	20.	Recycling	15.9	14.7	1.2.	100%.	✓	Excellent	D.G.
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Ceduna Recycling MONTH September

Waste stream reporting sheet

CUSTOMER **ILUKA Jacinth Ambrosia**

Date	Bin In	Bin Out	Waste Stream	Gross	Tare	Net	% recyclble	Contanimation	COMMENTS	Driver
7/9/10	20	15	Solid/Putrescible	16.8	14.4	2.4	/	/	—	D.G
8/9/10	15	13	Solid.	18.1	14.4	3.7	5%	EXACT MINING.	STEEL BEARINGS REMOVED FOR RECYCLING	D.G
13/9/10	13	13	Solid/putrescible	17.1	14.1	3	/	/	/	D.G
14/9/10	13	20	Recycling	17.8	14.8	3.	100	NIL	LAYDOWN AREA CLEANUP. STAFF ONSITE	D.G
15/9/10	20	15	Solid.	20.1	14.4	63			LAYDOWN AREA CLEANUP	D.G
16/9/10	15	20	Timber.	19.1	14.4	4.7	15%		BEARERS/RECYCLED. ~200 Kg.	D.G.
17/9/10	20	13	Solid	19.4	14.4	5			LAYDOWN CLEANUP	D.G
17/9/10	13	20	Timber	17.4	14.4	3.			LAYDOWN CLEANUP	D.G
18/9/10	20	15	Timber	17.1	14.4	2.7	/	/	WASTE TRANSFER STATION.	D.G
19/9/10	15	15	Solid/putrescible	16.4	14.4	2.	/	/	WTS	D.G
20/9/10	15	20	Timber	17.5	14.4	3.1			LAYDOWN AREA	D.G
22/9/10	20	15	Solid	15.5	14.4	1.1	15%	PLASTIC.	PLASTIC fitting Recycled ~200 kg	D.G
23/9/10	15	20	Timber	17.5	14.1	3.4	/	/	LAYDOWN.	D.G
24/9/10	20	15	STEEL	22.1	14.	8.1	100%		— LAYDOWN	D.G
25/9/10	15	10	STEEL	20.1	14.	6.1	100%	—	— LAYDOWN	D.G
25/9/10	10	15	Putrescible WASTE	15.8	14.8	2	—	—	WTS	D.G
26/9/10	10	15	Timber	18.8	15.1	3.7	—	—	LAYDOWN.	D.G
28/9/10	15	20	Recycling	15.8.	14.7	1.1	90%	10%	WTS. food WASTE	D.G

Ceduna Recycling MONTH OCTOBER

Waste stream reporting sheet

CUSTOMER **ILUKA Jacinth Ambrosia**

Date	Bin In	Bin Out	Waste Stream	Gross	Tare	Net	% recyclble	Contanimation	COMMENTS	Driver
3/10/10	20	15	Solid/PUT.	17.4	14.4	3	—	—	WTS	D.G
11/10/10	15	20	Solid.	18.8	14.4	4.	—	—	LAYDOWN AREA	D.G
12/10/10	20	20	Recycling	16.5	14.8	1.7	80%	food.	food WASTE/Grease	D.G
17/10/10	20	15	Timber	20.1	14.4	5.7			LAYDOWN AREA	
18/10/10	15	15	CONTANIMATED SAND.	18.1	14.1	4	100%	STONES. →	STORAGE SITE THEVENARD RETURN TO MINE	D.G
18/10/10	15	15	Putrescible	16.5	14.4	2.1.	—	—	WTS	D.G
21/10/10	15	13	Solid.	16.8	14.4	2.1.			LAYDOWN	D.G
22/10/10	13	15	General WASTE.	16.8	14.4	1.4	—	—	—	D.G
28/10/10	15	20	Solid/putrescible	17.1	14.8	2.3.			LAYDOWN	D.G
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Ceduna Recycling MONTH November

Waste stream reporting sheet

CUSTOMER **ILUKA Jacinth Ambrosia**

Date	Bin In	Bin Out	Waste Stream	Gross	Tare	Net	% recyclble	Contanimation	COMMENTS	Driver
3/10/10	15	15	Putrescible/Solid	16.4	14.4	2	—	—	WTS	DG
8/11/10	15	20	Recycling	15.6	14.6	1	80%	food	food waste foam	D.G
9/11/10	20	15	Solid/putrescible	16.1	14.4	1.7	—	—	WTS.	D.G
12/11/10	15	13	Solid	16.9	12.4	2.5	—	—	WTS	D.G
24/11/10	15	13	Solid/putrescible	15.1	12.4	2.700	—	—	—	D.G
27/11/10	13	20	Timber	16.8	14.1	2.7	10%		Bearers 150kg.	DG
29/11/10	20	20	Recycling	16.4	14.4	2.	100%		Excellent	DG
30/11/10	20	15	Solid/putrescible	17.7	14.4	2.8	—	—	—	D.G
17/11/10	15	15	Sand movement						UNLOAD IN INCLEMENT Stockpile NO MOVEMENT	DG.
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Ceduna Recycling MONTH December

Waste stream reporting sheet

CUSTOMER **ILUKA Jacinth Ambrosia**

Date	Bin In	Bin Out	Waste Stream	Gross	Tare	Net	% recyclble	Contanimation	COMMENTS	Driver
8/12/10	15	15	Solid/putrescible	17.6	14.4	3.2	—	—	—	D.G
14/12/10	15	20	Recycling	17.1	14.8	2.3	85%	food	food WASTE/GREASE CARTRIDGE FUEL FILTER	D.G
16/12/10	20	15	Solid/putrescible	16.4	12.4	2.	—	—	WTS —	D.G
21/12/10	15	15	Timber	17.1	12.8	2.2	10%		Bearers 80kg.	D.G.
22/12/10	15	13	Solid	16.4	12.4	2	—	—	WTS —	D.G
23/12/10	13	20	Recycling	15.6	12.4	1.2	99%	food	Slight Contanimation.	D.G.
24/12/10	20	15	STEEL	20.8	14.4	6.4	100%		WTS	D.G.
31/12/10	10	15	Putrescible	16.6	14.4	2.2	—	—	WASTE TRANSFER STATION	D.G.
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13.7 Management systems review

A summary of the major findings of the audit is in the table below:

Table 39: Audit Findings Summary

Major Findings: Leadership and Policy
There are obvious signs that there is strong leadership in EH&S through visible demonstration and participation in activities such as safety visits and OH&S Committee meetings. There are a few opportunities to further strengthen EH&S Leadership. Formal EH&S training for Supervisors and Managers is limited however this should be addressed with the roll out of internal training. It is also advised that a recognition program is established to promote innovation and solutions to EH&S issues.
Major Findings: Organisation and Accountability
An EHS plan should be developed for the site. The plan should cascade from the site business plan and consider EHS risks form the site register, audit findings etc. *TRIM is the Iluka process for records management. Documentation both, soft and hard, should be controlled within this system.* *Many Position descriptions appear to be out date and in need for review* *Overdue actions exist for the site. Accountability and expectation to complete actions within allocated timeframes should have an increased focus.*
Major Findings: Communication
A key communication tool is the use of the intranet. It is a tool provided to allow access to information that may assist individuals to complete their role and also to communicate relevant information as required for the site. The Iluka standard requires that completed ICAM investigations to be published on the intranet for information and reference. This currently does not exist. A dedicated person should be nominated to ensure ICAMS are published. *Access to the intranet should also be provided to key site contractors - eg Exact Mining* *A daily Production meeting occurs on site consisting of all supervisors, Superintendents & Operations manager. A dedicated Management meeting should be considered - perhaps weekly*
Major Findings: Contractor Management
Systems and processes have ensured that current key contractors have been prequalified and EHS plans in place. KPI's have been established for contractors which are reviewed at contractor performance reviews. Given that contracts have just exceeded a duration of 1 year it advisable that EH&S plans are audited and reviewed.
Major Findings: Risk and Hazard Management
The last site risk review was conducted on the 28th October 2009. The standard requires this to be reviewed at least annually. Risks identified in the register must be considered during the annual business planning process. No evidence of this exists. *A high level of JSEA's are still being conducted for regular and /or routine tasks. Many of these JSEA's could be developed into SWI's* *The site visitors Induction includes some hazards applicable to the site. A review of this should identify more relevant hazards relevant to a visitor; eg Dust, hazardous materials* *Being able to identify hazards and manage the risk they present is the foundation of any EHSMS. Some persons have received JSEA training but formal Hazard & Risk training should be provided to all permanent personnel and be a mandatory component for their training needs on site. Strong consideration should be given to the implementation of this process.*
Major Findings: Incident Investigation and Reporting

Incident and investigation reporting on site is to be commended as no outstanding investigation reports or investigations were evident at the time of audit. The incident reporting process is currently communicated via the induction but to further enhance the knowledge of this process the use of the existing online training package (ELMO) could be useful

The number of trained ICAM facilitators for the site needs to be increased. Currently there is a risk of possibly a 1 week delay if all existing facilitators are offsite.

A formal process should be implemented to communicate findings from completed investigations to all site personnel and contractors.

Many corrective actions are generated via investigations, inspections, Hazard reports etc. These are assigned to a responsible person and completed by a due date. Consideration should be given to the verification of the effectiveness of these actions in the work place.

Major Findings: Emergency and Crisis Preparedness

An effective Emergency Response Plan exists for the site. Areas of weakness include; There is no audible evacuation alarm in place in the event of an emergency. There is a reliance on radio communication and personnel to check all areas if evacuation is required. Fire Warden training for these people should also be introduced.

The Emergency response plan is out of date (11/7/08) including the contact list.

All personnel on site should be able to use a fire extinguisher in the event of a small fire. Currently no training exists.

Major Findings: Procedures and Training

The Iluka Generic induction is required to be completed by all persons including contractors. Currently only Iluka employees complete this induction. A Village gym induction process should also be introduced.

A mandatory training gap is evident in the site training matrix. Hot work, Fire extinguisher and Fire Warden training are deficient areas. Consideration should be given to the delivery and resourcing of this training. The ELMO (Electronic Learning Module) process on the intranet has many online training packages available to assist.

Finding EHS information on the intranet was a common weakness identified by many interviewees throughout the audit.

Major Findings: Operational Management

The residual risk at the completion of the construction phase should be considered when a project goes into operation. These risks should be assessed as part of any operational risk assessments and possibly included in the site risk register. No evidence suggests this has occurred

A change management process exists on site but appears to be rather adhoc. The Iluka Change Management process should be implemented to ensure alignment with Corporate expectation

Major Findings: Environmental Management

Resource efficiency

Implementation of the EEO program needs to be carried out.

An opportunity exist for the implementation and use of water efficiency targets

A process is required to encourage staff to identify and implement opportunities for saving water.

Promotion of a philosophy of energy efficiency through education and purchasing programs could be carried out.

Review of the current site Waste Management Plan is required.

Improvement in the collection of energy use data could be made.

Water management

There is no water efficiency target to improve water recycling.

There is no contingency plan in case current disposal methods are threatened.

There are no contingency plans for process water supply failures.

Require a process to enable consideration of opportunities for water to be recycled and saved.

Frequency, use and content (i.e. whether to include chemistry as well) of site water balances to be reviewed to enable management use of data to aid in achievement of improved water efficiencies, environmental impact prediction and supply prediction.

Other items

Improvement in closure planning integration with mine operations could be made; with a goal to reduce actual closure costs in the long term.

Improvements could be made in the way JA could learn from previous projects - e.g. HMC dust control and site drainage.

Major Findings: Monitoring

Risk assessment required to determine health hazards requiring monitoring & formalisation and communication of non-radiological health hazard monitoring program.

Technical Work Instruction required for calibration of equipment, data collection, analysis and management.

Process to asses physical and mental capacity of employees when they are transferred from one role to another with different physical demands does not exist.

Exit medicals not carried out.

Increased health assessment of management and ERT personnel not conducted.

Formal training in PPE use is required.

Major Findings: Auditing and Assurance

A Compliance Register exists for the operation but is currently still in draft. This needs to be completed and approved. An annual review of the register should occur thereafter.

As part of the annual business planning process recent audit findings should be a consideration.

13.8 Designated Storage Areas Completion Documents

1) Diesel Tanks
2) Flocculant Storage
3) Lubricant Store

Diesel Storage Sign Off

ILUKA

PUNCH LIST

CONTRACTOR:	MONODELPHOUS	DATE:	16/6/09
PROJECT TITLE:	DIESEL TANKS	ORIGINATOR:	CHIA LEONG
SYSTEM:			

PLANT AREA (No and Description): Diesel Fuel Farm

Installed equipment

No.	Remedial Work Description	Category (A or B)	Action by	Due Date	Contractor Signed Off	Iluka Rep.
1	Paint coating on 1/3 of each tank not sufficient and not in accordance with Iluka paint specifications. To be repainted with spray coating.	A	Monodelphous	Done		
2	Striker plates for dip stick not in both tanks.	A	Monodelphous	TBC		
3	Interconnecting platform should be white.	A	Monodelphous Not Reqd	TBC		
4	Tank should have ID Stencils as per ETS 010. JACI-WHO-TK161 JACI-WHO-TK 162 (Tank with stairway)	A	~~Monodelphous~~ JAA	TBC		
5	Tanks to have "Diesel Storage Tank" ID Stencil.	A	~~Monodelphous~~ JAA	TBC		
6	Monodelphous to issue MDR Folder	A	Monodelphous	TBC	REC'D 7/7/09	

LEGEND

Category

A Incomplete work, unsatisfactory work, or unsafe to operate. (Commissioning cannot commence)

B Other work identified during construction / commissioning. (Commissioning can commence)

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l Completion Checklist & Signoff

Jacinth-Ambrosia Alliance

ILUKA

JAA Details:

Contract No.:	C1552
PCT No.:	PCT100745
Contractor:	Monadelphous
Brief Scope of Work:	Provision of Fuel Tanks for Storage
Date for Practical Completion:	7/7/09 (DATE MDR'S RECEIVED)
Package Manager:	Ian Cartland
Contracts Specialist:	DALE RYCROFT

Contractor Details:

Contractor's Project Manager:	RAY VENTER
Contractor's Site Manager:	CARLO TURATTI

Practical Completion Requirements

1. Documentation Provided

Reference	Description	Comments	Completed
1	Design Drawings		☒
2	As Built Drawings	N/A	☐
3	QA Documentation	MDR Folder	☒
4	Certificates of Compliance		☐
5	Operation Manuals	N/A	☐
6	Maintenance Manuals		☐
7	Commissioning Spares List		
8	Operations Spares List		
9			
10			

Practical Completion Checklist & Signoff

Jacinth-Ambrosia Alliance ILUKA

2. Site Inspection

Performed by:

Construction Representative: ROBERT GROTT (Name)

Contracts Representative: Michael Coyte (Name)

Engineering Representative: Kevin Mant (Name) [signature] accepted on basis that stencils installed as per spec ITEM 4.

EHS Representative: Environment [signature] Laura Thornton (Name)

Operations Representative: T. [signature] (Name)

QA Representative: [signature] (Name)

Date of Inspection: 27/4. 2009

2.1 EHS Inspection:

Reference	Description	Comments	Completed
1	Housekeeping	JAA Site EHS Representative	☐
2	Hazards	JAA Site EHS Representative	☐
3	Leaks	JAA Site EHS Representative	☐
4			☐
5			☐
6			☐

Date Issued: 26 Apr 09 Revision: A Page 2 of 3

Practical Completion Checklist & Signoff

Jacinth-Ambrosia Alliance

ILUKA

2.2 Technical Inspection:

Reference	Description	Comments	Completed
1	Punch List items	JAA Site	☐
2		Refer to the enclosed Punch List	☐
3			☐
4			☐
5			☐
6			☐
7			
8			
9			
10			

Practical Completion Approval:

Date of Practical Completion: 27/7 2009

EHS Representative:
Environment CHRIS SCATTIE
Name: Laura Morton Signed: Date: 21/7/09.

Construction Area Manager:
Name: ROBERT GROTT Signed: Date: 21-07-09

Site Contracts Administrator:
Name: Michael Coyte Signed: Date: 21/7/09

Contracts Specialist:
Name: DALE RYCROFT Signed: Date: 22/7/09

Package Manager:
Name: Robin Ackhurst Signed: Date: 03/8/'09

Date Issued: 26 Apr 09 Revision: A Page 3 of 3

Flocculant Plant & Store Sign Off

Practical Completion Checklist & Signoff

Jacobs-Ambrosia Alliance

ILUKA

JAA Details:

Contract No.:	C1242
PCT No.:	101308
Contractor:	Lime Systems-Bulk Storage Solutions Pty Ltd
Brief Scope of Work:	Deign and supply of Flocculant Plant
Date for Practical Completion:	30/6/09
Package Manager:	Robin Ackhurst
Contracts Specialist:	Denis Dwyer

Contractor Details:

Contractor's Project Manager:	Stuart Taylor
Contractor's Site Manager:	N/A

Practical Completion Requirements

1. Documentation Provided

Reference	Description	Comments	Completed
1	Design Drawings	Supplied and Accepted	☒
2	As Built Drawings	Supplied and Accepted	☒
3	QA Documentation	Supplied and Accepted	☒
4	Certificates of Compliance	N/A	☐
5	Operation Manuals	Supplied and Accepted	☒
6	Maintenance Manuals	Supplied and Accepted	☒
7	Commissioning Spares List	Supplied and Accepted	☒
8	Operations Spares List	Supplied and Accepted	☒
9	Conformation of Delivery	Confirmation that Goods supplied ready for installation as per Packing Lists Delivery on Site Date: 28/6/09.	☒
10	Commissioning of Plant	NB: Contractor is committed for supervision activities only, so Practical Completion can be finalised prior to commissioning.	☐

Date Issued: 26 Apr 09 Revision A Page 1 of 3

Practical Completion Checklist & Signoff

Jacinth-Ambrosia Alliance

ILUKA

2. Site Inspection

Performed by:

Construction Representative: Chia Leong (Name)

Contracts Representative: Todd Sheedy (Name)

Engineering Representative: Mick Moss (Name)

EHS Representative: Sam Daddle (Name) N/A

Operations Representative: (Name)

QA Representative: 21/8/09 (Name) Bruce Renfrew.

Date of Inspection: 21/8 2009

2.1 EHS Inspection:

Reference	Description	Comments	Completed
1	Housekeeping	N/A Supply and Deliver Contract	☐
2	Hazards		☐
3	Leaks		☐
4			☐
5			☐
6			☐

Date Issued: 26 Apr 09 Revision: A Page 2 of 3

Practical Completion Checklist & Signoff

Jacinth-Ambrosia Alliance

ILUKA

2.2 Technical Inspection:

Reference	Description	Comments	Completed
1			☐
2			☐
3			☐
4			☐
5			☐
6			☐
7			
8			
9			
10			

Practical Completion Approval:

Date of Practical Completion: _____ 2009

EHS Representative:

Name: Andrew Mines Signed: [signature] Date: 5/8/09

Construction Area Manager:

Name: VAS MERTZANIDIS Signed: [signature] Date: 28/8/09

Site Contracts Administrator:

Name: Todd Sheedy Signed: [signature] Date: _____

Contracts Specialist:

Name: DENIS DWYER Signed: [signature] Date: 31/8/09

Package Manager:

Name: _____ Signed: _____ Date: _____

Date Issued: 26 Apr 09 Revision: A Page 3 of 3

Lubricant Store Sign Off

Compliance with Chemical and Lubricant Store Australian Standards AS1940 and AS3780

Inspection and assessment of the compliance requirements as per Australian Standards AS1940 for Iluka Resources and Exact Mining Chemical and Lubricant Stores at Jacinth Ambrosia Mine Site.

Lubricant (Combustible) Store

This store is a 20ft dangerous goods container containing the following fluids -

- Engine oil, C2
- Gearbox oil, C2
- Hydraulic oil, C2
- Grease
- Diesel Fuel Biocide, C1

Separation Distances

AS1940 - pp39, 41
The intended Iluka and Exact storage within the combustible goods store is less than 2500L of C1 and less than 5000L of C2. According to table 4.1 the minimum distance is unrestricted.

Signage

AS1940 - pp32

As a package combustible goods store, the following signage is required.

- DANGER – NO SMOKING, NO NAKED FLAMES
- COMBUSTIBLE LIQUID
- WARNING – RESTRICTED AREA, AUTHORIZED PERSONNEL ONLY
- A sign listing the emergency contact names, titles and phone numbers relevant to the installation
- The name, address and phone number of occupier
- A layout diagram showing the location of fixed fire protection facilities and the drainage system

Fire Requirements

AS1940 - pp122, 124

As a roofed structure with ≥2m³ to ≥10m³ of combustible liquid, the following fire protection measures are required.

- 2 off powder-type extinguisher
- 1 powder-type extinguisher located at each doorway to the storage area
- 2 off foam-type extinguisher

Safety Requirements

AS1940 – pp51

The following safety equipment is required within 10m but not closer than 2m to the storage facility.

- Eye wash facilities
- Hand washing facilities

1/2

Inspection of Lubricant Storage units

Iluka Lubricant Store

AS1940	Compliant		Log	Safety	Env
Separation distance	N/A		CB	✓	✓
Intended use	✓		CB	✓	✓
Signage	✓		CB	✓	✓
Fire Extinguishers	✓	~~Install by April 2011~~	CB	✓	✓
Eye wash facility		~~Install by April~~ 2011			
Hand wash facility		~~Install by April~~ 2011			

Comments

Eye wash + hand wash facilities to be completed 2011

Exact Lubricant Store

AS1940	Compliant		Log	Safety	Env
Separation distance	N/A			✓	✓
Intended use				✓	✓
Signage		~~Install by April~~ 2011			
Fire Extinguishers		~~Install by April~~ 2011			
Eye wash facility		~~Install by April~~ 2011			
Hand wash facility		~~Install by April~~ 2011			

Comments

Signage, fire extinguisher, hand wash + eye wash facilitie to be complete 2011

I have inspected the Iluka and Exact hydrocarbon storage facilities and confirm the inspection assessment as correct

Name	Role	Date	Signature
Chris Bugeja	Logistics Coordinator	13/3/11	
Greg Whitehead	Safety Advisor	13/3/11	
Richard Mills	Senior Environmental Advisor	13/03/11	

2/2

13.9 Iluka Community Events & Program Details 2009 – 2010

Table 40: Iluka Community Events & Program Details 2009 – 2010.

Event	No. of communities / groups	No. of people attending
Road Train Safety Awareness Program 2009 and 2010	2009 Ceduna Area School Koonibba School Penong School Crossways Lutheran School	 400 25 40 80
	2010 Scotdesco Community Town Camp Oak-Valley School Yalata School and Community	 40 30 20 60
JA Site visits 2010, 2011	Yalata Community visit – Nov 2010	36
	Crossways Lutheran and Yalata school visit October 2010	18
	Streaky Bay Primary School – Port Thevenard and Kalari depot tour	20
	Adult activity Centre - Port Thevenard and Kalari depot tour	15
	Public mine tour – June 2010	55
	Government Stakeholder mine tour – June 2010	55
	PIRSA executive mine tour – July 2010	16
	DENR mine tour – October 2010	12
	Vintage Car Club mine tour – July 2010	54
	AW NRM board mine tour – August 2010	16
Ceduna Oysterfest 2008, 2009 and 2010	Staffing of promotional and information tent at Oysterfest. Information posters and demonstration spiral set up.	Several hundred.
Eyre Peninsula Field Days, Cleve	Staffing of promotional and	Several hundred.

Event	No. of communities / groups	No. of people attending
2008, 2010	information tent at field days 2010. Information posters and demonstration spiral set up.	
SACOME Education Program 2011	Delivery of minerals and mining education program to schools: Ceduna Area School Yalata school and TAFE Penong School Koonibba Crossways Lutheran School	 400 63 40 26 89
Scholarship Roadshow 2010	Presentation to students and community of secondary and tertiary scholarship program. Partner schools and the Smith Family in attendance. Scotdesco Community Yalata school Crossways Lutheran School	 60 50 150