

Annual Review & Annual Rehabilitation Report

1 JULY 2020 – 30 JUNE 2021



Toongi Road, Wambangalang Creek causeway. Photo taken 2 July 2021.

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APPENDIX A – Letter Report - Pink-tailed Worm-lizard Monitoring - Area Environmental Consultants & Communication (AREA Aug 2021), Biodiversity Offset Area – analogue vegetation plot Monitoring Spring 2020 (AREA May 2021)

APPENDIX B - Rainfall Data July 2020 - June 2021

APPENDIX C - Correspondence between Regulators and Australian Strategic Materials (Holdings) Ltd

Definitions

Term	Definition
ACCU	Australian Carbon Credit Units (issued by Clean Energy Regulator)
ASM	Australian Strategic Materials Ltd (formerly known as AZL)
ASMH	Australian Strategic Materials (Holdings) Ltd - a wholly owned subsidiary of ASM
AZL	Australian Zirconia Ltd
BCD	Biodiversity & Conservation Division (formerly part of OEH)
BOA	Biodiversity Offset Area
CaCO ₃	Calcium carbonate
CCC	Community Consultative Committee
CPVP	Conservation Property Vegetation Plan
DP	Dubbo Project (formerly known as DZP - Dubbo Zirconia Project)
DPIE	Department of Planning Industry & Environment (NSW Government)
DPI-Water	Water – NSW Department of Primary Industries
DRC	Dubbo Regional Council
DS	Dams Safety (NSW Government)
EC	Electrical Conductivity
EEC	Endangered ecological community
EES	Environment Energy & Science Group (part of DPIE - contains former OEH, EPA)
EP&A	<i>Environment Planning and Assessment Act 1979</i>
EPA	Environment Protection Authority
EPBC	<i>Environment Protection & Biodiversity Conservation Act 1999</i>
EPL	Environment Protection Licence
ERML	Environmental Radiation Monitoring Location
GHG	Greenhouse Gas
HVAS	High volume air sampler
LDP	Licensed discharge point
LFA	Landscape function analysis
LLS	Local Land Services
LOR	Limit of Reporting
LRSF	Liquid Residue Storage Facility
MEG	Mining Exploration & Geoscience (formerly Department of Resources and Geoscience)
Mining Act	<i>Mining Act 1992</i>
ML	Mining Lease
MOD1	Modification 1 of SSD-5251 Consent
MOP	Mining Operations Plan
NGERS	National Greenhouse and Energy Reporting Scheme
NMP	Noise Management Plan
WNSW	Water NSW
OEH	Office of Environment and Heritage
PM10	Particulate matter 10 microns and smaller
PTWL	Pink-tailed Worm-lizard (<i>Aprasia parapulchella</i>)
PVP	Property Vegetation Plan
RAP	Registered Aboriginal Party
REE	Rare Earth Elements
RMS	Roads and Maritime Services
ROM	Run of Mine
SEC	Salt Encapsulation Cell
SEEC	Strategic Environmental and Engineering Consulting

Term	Definition
SRSF	Solid Residue Storage Facility
TARP	Trigger action response plan
TEOM	Tapered Element Oscillating Microbalance
TIM	Total Insoluble Matter
TPC	Toongi Pastoral Company Pty Ltd
TSP	Total suspended particulates
WAL	Water access licence
WHS	Workplace Health & Safety
WRE	Waste Rock Emplacement

Title Block

Table 1: Annual Review Title Block

Name of operation	Dubbo Project
Name of operator	Australian Strategic Materials (Holdings) Ltd
Development consent / project approval #	SSD-5251
Name of holder of development consent / project approval	Australian Strategic Materials (Holdings) Ltd
Mining lease #	ML 1724
Name of holder of mining lease	Australian Strategic Materials (Holdings) Ltd
Water licence #	WALs; 19994, 9191, 3396, 36409, 3412, 30259, 36790, 36791
Name of holder of water licence	Australian Strategic Materials (Holdings) Ltd
MOP/RMP start date	TBA
MOP/RMP end date	TBA
Annual Review start date	1 July 2020
Annual Review end date	30 June 2021
<p>I, Michael Sutherland, certify that this audit report is a true and accurate record of the compliance status of the Dubbo Project for the period 1 July 2020 to 30 June 2021 and that I am authorised to make this statement on behalf of Australian Strategic Materials (Holdings) Ltd.</p>	
<p>Note.</p> <p>The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</p> <p>The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</p>	
Name of authorised reporting officer	Michael Sutherland
Title of authorised reporting officer	General Manager NSW
Signature of authorised reporting officer	
Date	13 September 2021

1. Statement of Compliance

Table 2 provides a statement of compliance status for Australian Strategic Materials (Holdings) Ltd (ASMH) with its project approval (SSD) and mining lease (ML), as at the end of the reporting period.

Table 2: Statement of Compliance

Were all conditions of the following approvals complied with?	
SSD-5251	NO
ML 1724	YES

Table 3 provides a summary of approval conditions not complied with as at the end of the reporting period.

Table 3: Non-compliances

Relevant approval	Condition #	Condition description (summary)	Compliance status	Comment	Relevant Section
SSD-5152	Sch 5, Cond 4	Annual Review was completed but not sent to DPIE by 30 September 2020	Administrative non-compliance	Annual Review was sent to Resources Regulator on time and published on website	Letter from DPIE 25 June 2021 stated Annual Review satisfied requirement.

Compliance status key for Table 3

Risk level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: potential for serious environmental consequences, but is unlikely to occur; or potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: potential for moderate environmental consequences, but is unlikely to occur; or potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

2. Introduction

2.1 Dubbo Project

The Dubbo Project has not yet commenced construction on site, however, this Annual Review reports on environmental management activities undertaken by Australian Strategic Materials (Holdings) Ltd (ASMH) at the Dubbo Project (DP) during the financial year (FY) 2020-2021, and provides details on activities proposed for FY 2021/2022. The report has been produced in accordance with the Post-approval requirements for State significant mining developments - Annual Review Guideline (DP&E, October 2015) to meet the annual reporting requirements conditioned in the ASMH Mining Lease (ML 1724) and Project Approval (SSD-5251). See **Figure 1**.

Australian Strategic Materials Ltd(ASM) was demerged from Alkane Resources Ltd in July 2020 and was listed on the Australian Stock Exchange. David Woodall was appointed as Managing Director with a clear focus on developing ASM into an independent, long-term, net zero-carbon supplier of critical metals. There are now two parts to the business – the Dubbo Project (held by ASMH) and the metallisation business.

ASM intends for the majority of Dubbo Project products to be supplied to its own metals plants. The first of these metal plants will be constructed in South Korea from July 2021.

The DP was approved as SSD-5251 by the NSW Planning Assessment Commission (PAC) on 28 May 2015 and will comprise a small scale open cut mine supplying ore containing rare metals and rare earth elements to a processing plant near the locality of Toongi, approximately 25km south of Dubbo (the DP Site) (see **Figure 2**). The DP has made significant steps towards offtake agreements and funding during the reporting period but is yet to commence construction and thus there has been no rehabilitation activity to report other than natural regeneration of grassy box woodland species in the biodiversity offsets.

Annual extraction of ore from the open cut is planned to be approximately one million tonnes per year which would generate approximately 30 000t of export products. Waste residues produced by the processing operations will be managed in residue storage facilities (on site), designed to contain and encapsulate them.

The DP also includes the construction of a water pipeline between the processing plant and the Macquarie River and Sweet Water bore, a pipeline to carry natural gas between Dubbo and the DP Site, a 132kV electricity transmission line from Geurie substation to site and upgrades of the following linear infrastructure;

- Toongi Road;
- Obley Road; and
- the Toongi-Dubbo section of the currently disused Dubbo-Molong Rail Line.

Collectively, these are referred to as the DP linear infrastructure.

2.2 Mine Contacts

The primary contacts for the DP during the review period are detailed in **Table 4**. This table will be updated when construction gets underway in the next reporting period.

Table 4. Dubbo Project Key Contacts

Key Contact	Position	Contact Details
Rowena Smith	Chief Operating Officer	PO Box 768 West Perth WA 6005 Phone (08) 9200 1681
Michael Sutherland	General Manager NSW	PO Box 910 Dubbo NSW 2830 Phone: (02) 6882 2866
Community Information Line	General Manager NSW	(02) 6882 2866

Figure 1: Dubbo Project – Local Setting

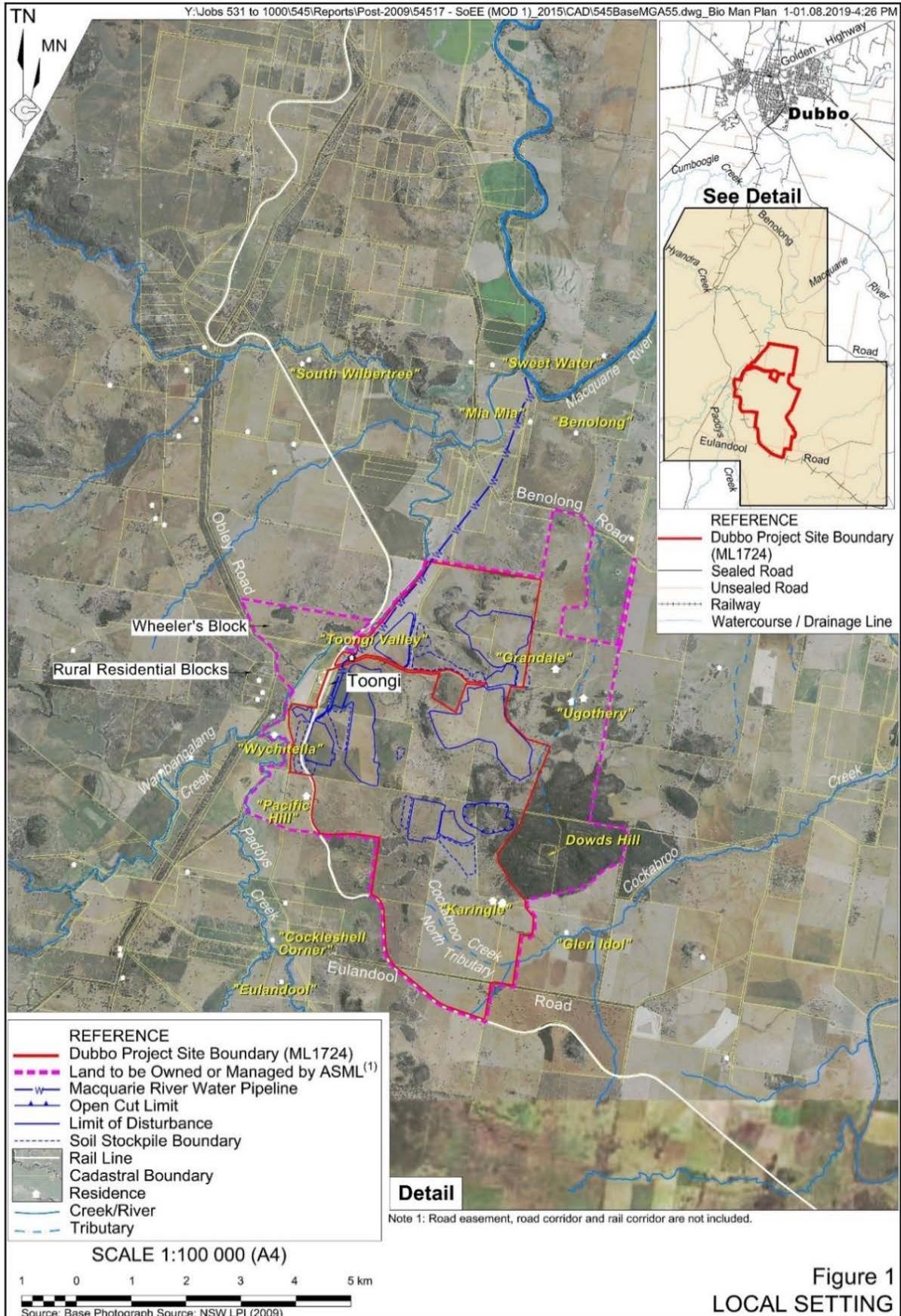


Figure 2: Dubbo Project – Site Layout

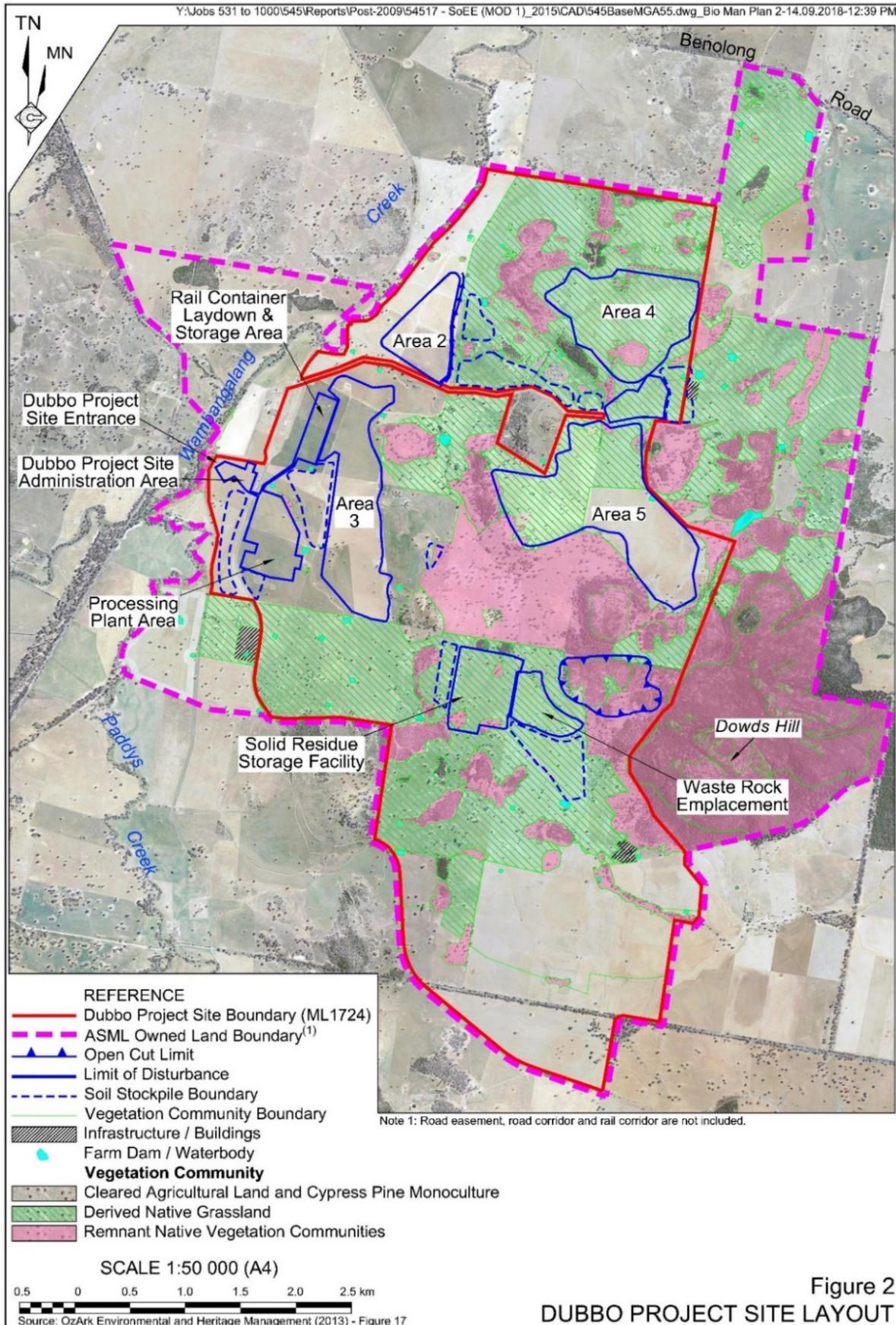


Figure 2
DUBBO PROJECT SITE LAYOUT

Figure 3: Dubbo Project – Environmental Monitoring Locations

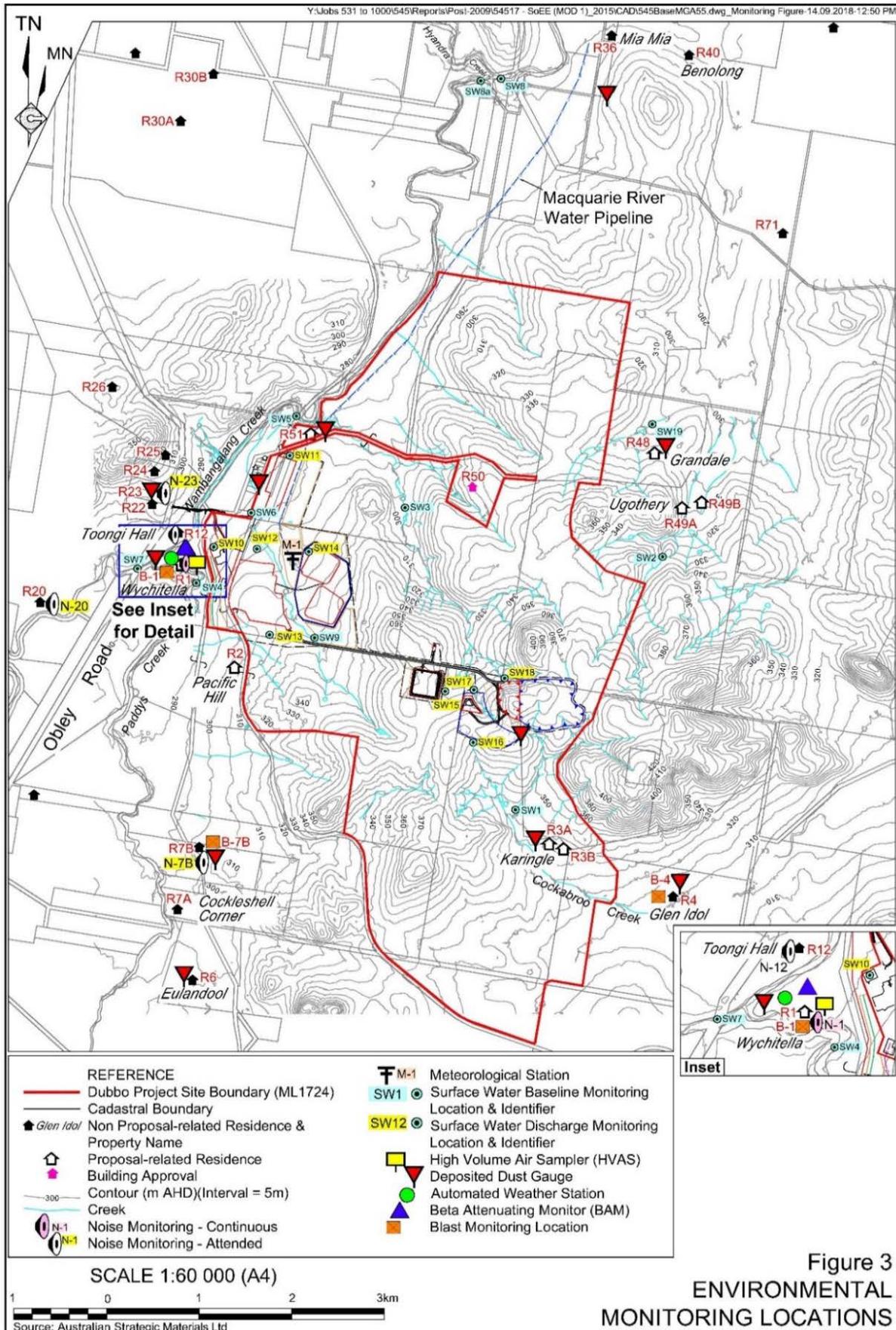
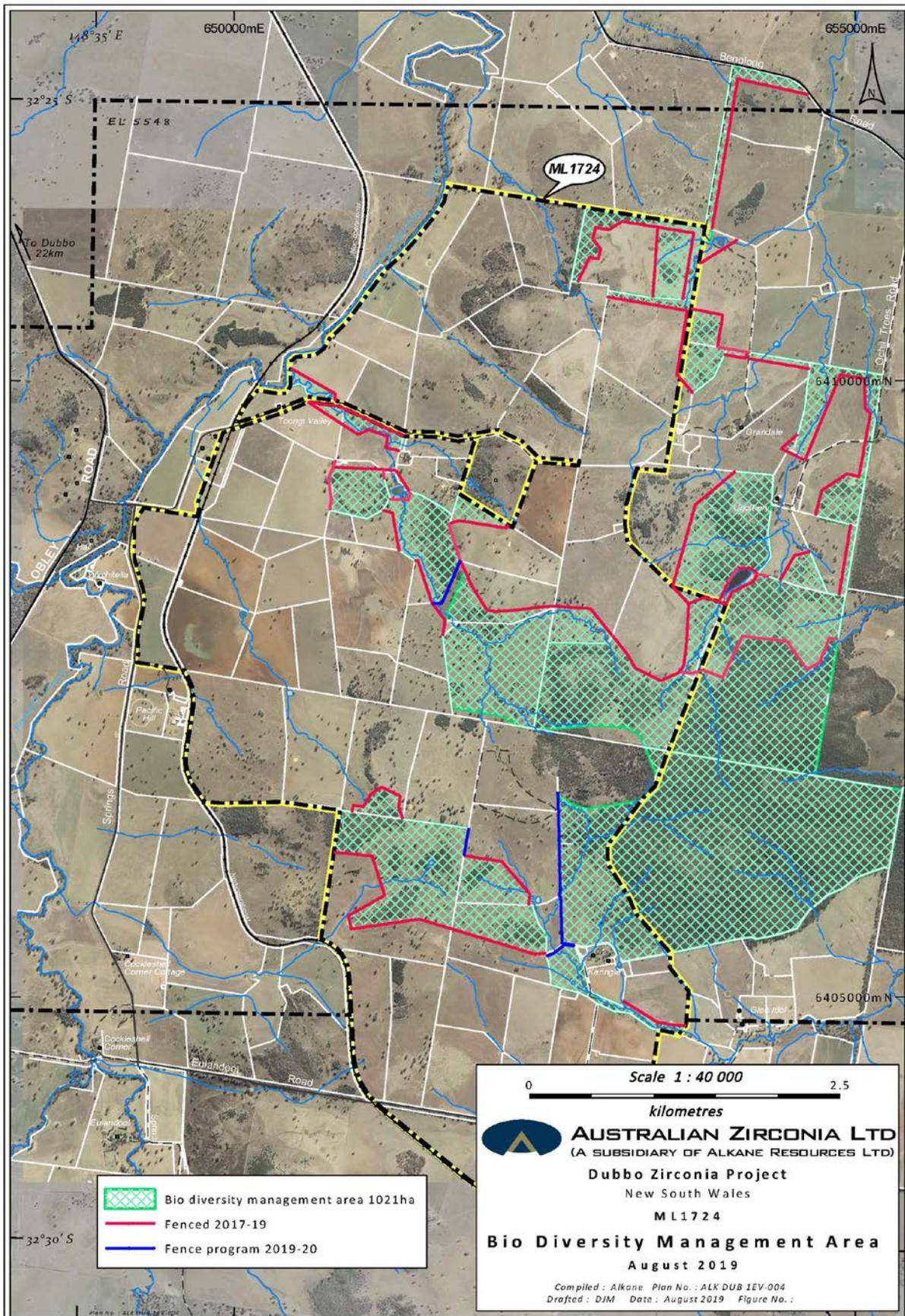


Figure 4: Biodiversity Management Area



Approvals - DP operates under the environmental consents, leases and licenses specified in Table 5.

Table 5. Consents, leases and licenses

Title	Legislation	Regulatory Authority	Approval Duration/ Expiry
State Significant Development approval 5251	Environmental Planning & Assessment (EP&A) Act 1979	NSW Planning and Environment (DPE) – now DPIE	31 December 2037
EPBC 2012/6625	EPBC Act 1999	Australian Government- Dept of Agriculture, Water & Environment	31 December 2045
Mining Lease 1724	Mining Act 1992	NSW Department Resources & Geoscience (DRG) now MEG	18 December 2035
Environment Protection License (EPL) 20702	Protection of the Environment Operations (POEO) Act 1997	NSW Environment Protection Authority (EPA)	Ongoing until surrendered (14 March Anniversary)
Water Access Licences WALs; 19994, 9191, 3396, 36409, 3412, 30259, 36790 and 36791	Water Management Act 2000	Water NSW	N/A
Conservation Property Vegetation Plan	Native Vegetation Act 2003	Local Land Services	In perpetuity
DA D2016-70 Karingle Quarry	Environmental Planning & Assessment (EP&A) Act 1979	Western Joint Regional Planning Panel	7 July 2021 (Modification approval pending)
General Terms of Approval Notice No. 1541379	Section 91A (2) EP&A Act 1979	NSW Environment Protection Authority (EPA)	N/A

3. Operations Summary

3.1 Construction

ASM completed a capital raising in April 2021 to build a metallisation plant in South Korea and complete the Front End Engineering Design (FEED) for the Dubbo Project.

A year since listing on the ASX, Australian Strategic Materials (ASM) has progressed the financing needed for construction of the Dubbo Project.

In June 2021 conditional finance support was gained from Export Finance Australia to secure A\$200 million of debt funding for the project ([ASX Announcement 28 June 2021](#)).

Ground disturbing activities associated with the Dubbo Project had not commenced as of 30 June 2021.

3.2 Operations

All of the land enclosing the DP was acquired by Australian Strategic Materials (Holdings) Ltd by June 2016 and a professional Farm Manager was appointed in May 2016.

The Farm Manager has been charged with the responsibility of operating a commercially viable mixed farming operation (Toongi Pastoral Company Pty Ltd) on 3,715Ha of land containing the Mining Lease and project footprint.

Fencing and managing the 1,021Ha Biodiversity Offset Areas falls under the responsibility of the Farm Manager. The final three km of 29.2km of fencing was installed enclosing the biodiversity offsets by 30 June 2019.

Environmental monitoring points are shown in **Figure 3**.

Baseline water quality, air quality and meteorological data is collected by trained ASMH staff.

Ecological monitoring continues to be undertaken by qualified professionals.

A Community Consultative Committee with an independent Chairperson was established in late 2015 and has met quarterly (except when so little had happened that a meeting was deemed unnecessary).

3.3 Next reporting period

ASM is targetting offtake agreements and project finance to allow the project to progress to construction.

In accordance with the SSD Consent, ASMH will physically commence the project before 28 May 2022.

It is anticipated that Modification 1 for the Dubbo Project will be assessed during this reporting period. MOD 1 will identify proposed changes to site layout (as described in the EIS 2013).

During the next reporting period, assuming project finance has been secured, construction is expected to commence, including:

- Installation of the environmental monitoring station;
- Obley and Toongi Road upgrade;
- Dubbo-Toongi Railway line refurbishment;
- Water supply pipeline and raw water pond;
- Karingle basalt quarry operations (on site supply of construction materials);
- Erosion and sediment control structures; and
- Construction earthworks.

4. Actions required from previous Annual Review

This is the sixth Annual Environmental Management Review for the Dubbo Project despite the project having not yet commenced construction.

Table 6. Actions from review previous Annual Reviews

Actions Required from previous Annual Review	Requested by	Action taken by Operator	Section where discussed
List of actions contained in email dated 4 June 2021 – submit Annual Review via Major Projects Portal	DPIE	Michael Sutherland	Appendix C
Letter dated 25 June 2021 Consent condition 34 of schedule 3 – conservation bond required	DPIE	Michael Sutherland	5.2
Letter dated 25 June 2021 – Annual Review due 30 September. Documents listed in Condition 11 of Schedule 5 to be available on Company website	DPIE	Michael Sutherland	NA

5. Environmental performance

5.1 Air Quality

The DP Air Quality Management Plan (AQMP) was prepared to describe dust control measures at DP and meet the requirements of Schedule 3, Condition 18 of SSD-5251.

Management Plans can be found on the Dubbo Project web page at:

<https://asm-au.com/projects/dubbo-project/environmental-reports-management-plans/>

Air Quality criteria for the project are outlined in **Table 7**.

Table 7. Long term criteria for deposited dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
^c Deposited dust	Annual	b 2 g/m ² /month	a 4 g/m ² /month

Notes to Table 7:

- a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to other sources);
- b Incremental impact (i.e. incremental increase in concentrations due to the development on its own); and
- c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003.

Before construction commences, a High Volume Air Sampler (HVAS) for measuring Total Suspended Particulates (TSP) and PM₁₀ (particulate matter <10µm) will be installed at a location (WY1) between Wychitella homestead and the Toongi Hall.

Deposited dust has been monitored/measured at 12 locations within and neighbouring the project site for several years up until January 2020.

Baseline deposited dust data collection had recommenced on 29 November 2012.

Deposited dust gauges were changed over monthly and three sample sites had monthly samples amalgamated to create enough sample to do additional testwork for radionuclides.

The Cockleshell Corner dust gauge was relocated to Eulandool on 3 August 2015 to enable baseline data to be presented to the property owner.

Six and one half years of deposited dust monitoring has revealed the the project site yields low levels of nuisance dust and is typical of mixed agricultural land with an average 550mm annual rainfall.

To date there is no data on suspended particulates as the permanent environmental monitoring station has not yet been established.

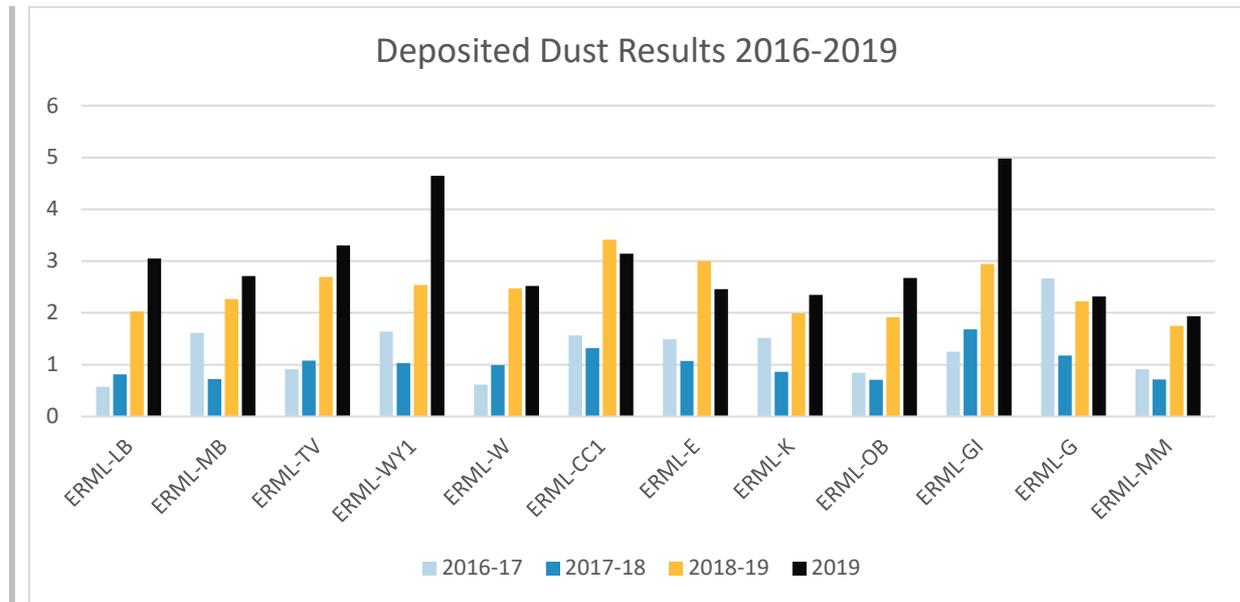
2020-2021 have been above average rainfall years. Pasture growth and ground cover has been well above average and thus locally raised dust has been largely absent for the period. Historic dust results are contained in this report as a reference.

Table 7. Deposited Dust Results

Site ID	Site Name	Annual Dust Deposition Rates (g/m ² .month)			
		2016-2017	2017-2018	2018-2019	2019-2020
		2/6/16 - 2/6/17	4/7/17 - 2/7/18	2/7/18 - 2/7/19	2/7/19 - 3/1/20
ERML-LB	Lifestyle Blocks	0.572	0.815	2.027	3.053
ERML-MB	Malcolm Bye's	1.613	0.719	2.270	2.713
ERML-TV	Toongi Valley	0.912	1.076	2.694	3.305
ERML-WY1	Wychitella Homestead	1.641	1.032	2.538	4.649
ERML-W	Wychitella	0.614	0.993	2.472	2.52
ERML-CC1	Cockleshell Corner Cottage	1.564	1.320	3.411	3.141
ERML-E	Eulandool	1.493	1.075	2.999	2.458
ERML-K	Karingle	1.514	0.862	1.99	2.347
ERML-OB	Ore Body	0.843	0.708	1.919	2.676
ERML-GI	Glen Idol	1.252	1.680	2.943	4.976
ERML-G	Grandale	2.667	1.178	2.223	2.32
ERML-MM	Mia Mia	0.911	0.713	1.753	1.937

Approval Criteria from SSD-5251 Schedule 3, Condition 18, based on 2013 Project EIS Assessment Criteria

Figure 5: Deposited dust results for 2016-2019



5.1.1 Management Measures

No dust management measures were employed during this reporting period as project construction has not commenced. These are baseline monitoring results influenced by seasonal and routine agricultural practices.

Toongi Pastoral Company is relatively conservatively stocked and has maintained good pasture cover in all but cropping paddocks.

5.1.2 Proposed Improvements

An environmental monitoring shelter will be installed in the next period to gather some additional baseline data before construction commences on site.

Deposited dust monitoring will be re-established before construction commences on site.

5.2 Biodiversity

ASMH settled on the last of the Dubbo Project property acquisitions in June 2016 which created the opportunity for a change in focus of land management to biodiversity enhancement in offset areas and building carbon in soils across the estate. This is a significant change in focus after 150 years of management for agricultural production.

ASMH acquired an additional rural property which fronts the Obley Road in late 2020 as part of a prior commercial arrangement.

Biodiversity at DP is managed under the Biodiversity Management Plan (BMP), which was completed in accordance with Schedule 3, Condition 31-35 of SSD-5251.

A component of the BMP is the Biodiversity Offset Strategy, which delineates the 1,021Ha of biodiversity offset areas and management actions selected to protect and enhance remnant vegetation communities. (see **Figure 4.**) The Biodiversity Offset Area (BOA) is protected in perpetuity with the registration on land title of a Conservation Property Vegetation Plan (CPVP) under the *Native Vegetation Act 2003*.

The CPVP was signed by ASM Directors on 22 May 2017 and Central West Local Land Services on 31 May 2017.

A Conservation Bond will be lodged with DPE prior to commencement of any development. The Department will be advised in writing at least three months prior to construction commencing.

It should be noted that there has been significant dieback of trees across the whole project site from 2017 to January 2020. Black and White Cypress pine, Drooping She-oak and even red stringybark have died due to prolonged dry. With that dieback more sunlight is reaching the ground which has enabled growth of grasses and forbs as they have not done in decades. Thick stands of pine trees have groundcover up to 100cm high where in a normal season there would be very low and sparse cover. The photos below illustrate this fact.



*Die back of Black and White Cypress Pine (*Callitris endlicheri* and *C. glaucophylla*) on Dowds Hill during 2018-2019 drought has created an opportunity for succession plant communities. Photo taken on Dowds Hill BOA 27 June 2021.*



Eucalypt seedlings regenerating on Dowds Hill. Currawang (Acacia doratoxylon), Drooping She-Oak (Allocasuarina verticillata), White Cypress Pine (Callitris glaucophylla) and Tumbledown Gum (Eucalyptus dealbata) are all regenerating in space created by dieback and good seasonal conditions. Photo taken 27 June 2021.

5.2.1 Management Measures

Biodiversity management actions for the DP are focussed towards protection and enhancement of habitat for the State and Commonwealth listed Pink-tailed Worm-lizard (PTWL) (*Aprasia parapulchella*).

ASMH has prepared a PTWL Management Plan (Version 2.3) and a PTWL Biodiversity Offset Management Plan both of which are appendices in the Biodiversity Management Plan (V2.0) which was approved by DPE on 8 February 2017. (see ASM website).

DP biodiversity monitoring is reported annually and is based on ecosystem diversity habitat value measurements adapted from the Biometric methodology. ASMH employees record opportunistic sightings of various species of plants and animals.

The Autumn (March 2021) PTWL survey was postponed twice owing to well above average rainfall on site (188.2mm of rain in March 119.2mm of rain in June). (See letter report in Appendix A)

In 2017 annual monitoring was also postponed due to severe drought. The next survey is scheduled to occur in Spring - October/November 2021 as per recommendation in the 2020 annual monitoring report.

Four vegetation community benchmarks and one control site were established around and neighbouring the project site in May 2016.

The community benchmarks were surveyed in Spring 2020 (25 September 2020) by Area Environmental ecologists.



Vegetation plot survey near Toongi Hall in a Fuzzy Box (*Eucalyptus conica*) Woodland on 25 September 2020.

Remnant vegetation monitoring sites are recovering at varying rates, depending on grazing and cultivation history.

The ability to turn off watering points (on farmland) and Project-erected electric fencing will discourage kangaroo numbers continuing to build up in the BOAs during dry periods.

Kangaroos, feral pigs, foxes and cats have been the focus of pest control programs during this period.



Pig diggings close to the orebody. Photo taken 27 June 2021.



Rainfall held in rock pools on the summit of Dowd's Hill enable feral pigs to water and feed close to cover and away from crops and pastures where they are more easily controlled. Photo taken 27 June 2021.

5.2.2 Proposed Improvements

During the next reporting period;

- TPC will maintain fences around the biodiversity offset areas,
- Livestock will be excluded from BOAs to allow for natural regeneration,
- White Cypress Pine will be thinned to improve grass cover and reduce rainfall runoff,
- Introduced vertebrate pest (pig, fox, cat and rabbit) control will continue,
- Eastern Grey Kangaroo (*Macropus giganteus*) will be culled under licence to reduce grazing pressure in the BOAs and across agricultural land,
- Signage in strategic areas will be installed to restrict access to BOAs to authorised personnel only and
- Vegetation plots will be monitored in October or November 2021 which will likely provide baseline data on the effects of two well above average rainfall years in succession on vegetation (ungrazed by livestock) that is being protected for its biodiversity value.

5.3 Heritage

A Heritage Management Plan (HMP), which outlines measures to manage Aboriginal and Non-Aboriginal heritage sites at DP was approved by DPE on 8 February 2017.

The Farm Manager has use of a database to ensure that heritage sites outside of the project footprint and BOAs are not further disturbed by routine agricultural activities.

Additional sites outside the impact footprint have been identified and added to the heritage database.

With all existing or relocated sites adequately maintained, no active cultural heritage management occurred during the reporting period.

5.3.1 Management Measures

Management of the existing sites consisted of the Farm Manager and Stationhand familiarising themselves with the sites across the land controlled by Toongi Pastoral Company.

5.3.2 Proposed Improvements

RAPs will be invited to review heritage sites across the project at an agreed frequency once construction commences.

Cultural heritage inductions will be provided to construction contractors and visitors who will be working in the field around the site. A local cultural awareness trainer has been engaged by ASMH.

5.4 Meteorological Monitoring

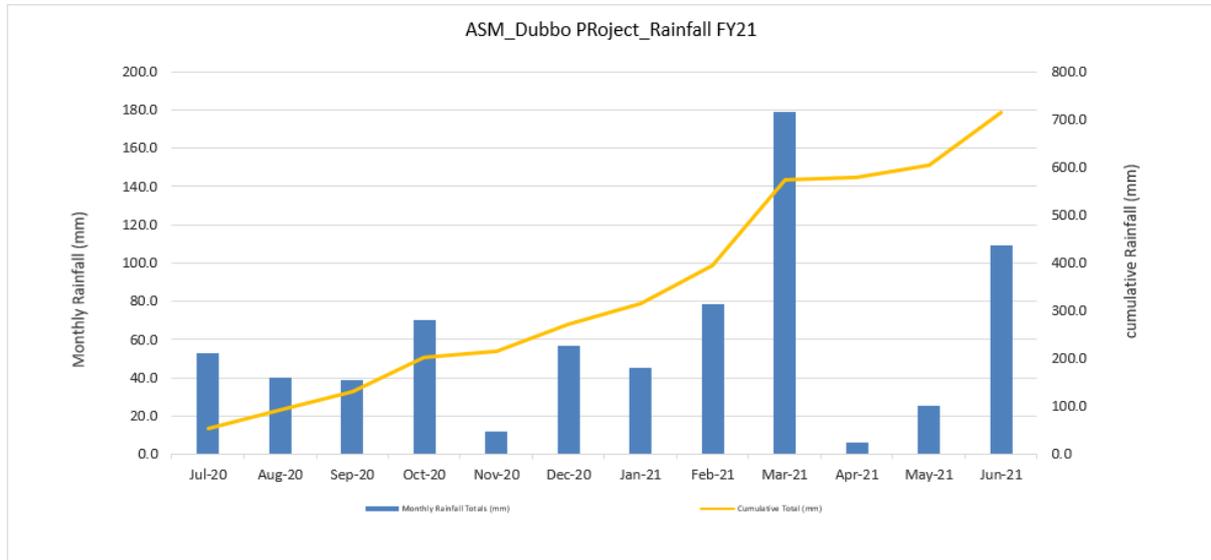
The met station at Wychitella has operated since 2001 though has been rendered inoperable twice – once from a stubble fire that melted the wiring and in 2020 when two cattle forced their way into the monitoring enclosure and subsequently could not get out. The cattle perished as did the monitoring equipment. The met data is incomplete for this period.

Rainfall for the period is contained in **Appendix B**.

A total 714.6mm of rain fell over 84 days in the reporting period which has broken the drought of well below average rainfall years in 2018-2019. A below average total of 458.9 mm rain fell in the preceeding twelve months. The drought started to break in January 2020 and despite a relatively dry April-May 2021 the growing season has been phenomenal.

Seasonal conditions in the 2020 calendar year were anecdotally the best in 100 years (pers comm Warwick Harper). The BOM are predicting an above average Spring rainfall in 2021.

Figure 6: Monthly and cumulative rainfall on project site to 30 June 2021.



5.4.1 Proposed Improvements

In March 2017 ASMH converted the weather station at Wychitella to a cloud based data storage system with real time access to data. There is a break in weather data for this reporting period though rainfall data is continuous from the Met Station or Grandale Homestead rain gauge.

A new environmental monitoring shelter, which will include a met station, will be installed in the next period in the lead up to construction activity on site.

6. Water Management

The DP Water Management Plan (Version 2.1 dated 16 Oct 2016) was approved by DPE on 12 October 2016.

During the reporting period *Water Performance Measures* were included in the DP project approval, Condition 29 of Schedule 3 of SSD- requires ASMH to comply with these measures. **Table 10** presents these *Water Performance Measures* and where each measure is addressed in this Water Management section.

As no construction has commenced on site the measures below have not yet been installed.

The NSW Soil Conservation Service has been consulted during the reporting period regarding the design and construction of erosion and sediment control structures for the site.

Redundant farm dams have been filled in and advice has been provided on restoration/rehydration of watercourse B.

Table 10. Water management performance measures

Feature	Performance Measure
Water Management – General	<p>Minimise the use of clean water on site.</p> <p>Minimise the need for make-up water from external supplies.</p>
Construction and operation of infrastructure	<p>Design, install and maintain all infrastructure within 40 m of watercourses to:</p> <ul style="list-style-type: none"> minimise the impact on watercourse water quality, hydrology and function; minimise the impact on the habitat of aquatic species, populations or communities, consistent with the <i>Guidelines for fish habitat conservation and management – Chapter 4</i> (DPI 2013), or its latest version; ensure pipelines across perennial watercourses are installed by directional drilling (under-boring) or attached to rail or road bridge crossings; and be in accordance with NOW’s <i>Guidelines for Controlled Activities on Waterfront Land</i> (2012), or the latest version(s).
Macquarie River Pumping Station	<p>Design, construct and operate the water intake structure to prevent to the greatest extent practicable the entrapment and/or extraction of aquatic fauna species including juvenile fish and larvae.</p>
Mine Water Management System - General	<p>Design, install and/or maintain mine water storage infrastructure to prevent the discharge of mine water off-site (this does not apply to sediment control structures that can be designed to discharge in accordance with an EPL).</p> <p>On-site storages are suitably designed, installed and/or maintained to minimise permeability.</p> <p>Maintain adequate freeboard at all times to minimise the risk of discharge to surface waters.</p>
Waste Residue Storage Facilities and Salt Encapsulation Cells	<p>Nil discharge from site.</p> <p>Design, construct and maintain:</p>

	<p>in accordance with the recommendations of the NSW Dam Safety Committee;</p> <p>to be stable over the long term and under all expected loading conditions;</p> <p>in accordance with the standards set out in the <i>Environmental Guidelines – Management of Tailings Storage Facilities</i> (VIC DPI, 2006); and</p> <p>to be lined with HDPE liners or equivalent that complies with a minimum permeability standard of $< 1 \times 10^{-9}$ m/s in accordance with the <i>NSW Environmental Guidelines for Solid Waste Landfills</i> (EPA, 1996), unless otherwise agreed with the EPA; and</p> <p>to ensure the Solid Residue Storage Facility and Salt Encapsulation Cells are double-lined and include an adequate leak detection system.</p> <p>Ensure that at all times a freeboard of at least 600 mm (or 1000 mm for liquid residue storage facility) or a freeboard capable of accommodating a 1 in 100-year ARI, 72-hour rainfall event (or 1 in 10,000 year for the liquid residue storage facility) without overtopping, whichever is greater.</p>
Waste Rock Emplacement	<p>Design, install and maintain the emplacement to encapsulate and prevent:</p> <p>migration of potentially acid forming material, and saline and sodic material; and/or</p> <p>manage long term saline groundwater seepage.</p>
Clean water diversion & storage infrastructure	<p>*Design, install and maintain the clean water diversion system to capture and convey the 100-year ARI flood around the perimeter of the site.</p> <p>Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site.</p>
Flood mitigation measures	<p>Design, install and maintain flood mitigation measures ensuring that the Processing Plant, Administration areas, Waste Residue Storage Facilities, Salt Encapsulation Cells and Waste Rock Emplacement are appropriately protected from flooding up to the 1 in 100 ARI.</p> <p>Residual impacts downstream must be managed in an appropriate manner.</p>
Sediment control structures	<p>Design, install and maintain erosion and sediment controls generally in accordance with <i>Managing Urban Stormwater: Soils and Construction – Volume 1</i> and <i>Volume 2E Mines and Quarries</i>.</p>
Chemical and hydrocarbon storage	<p>Chemical and hydrocarbon products to be stored in covered, impervious bunded areas in accordance with the relevant Australian Standards.</p>
Aquatic and riparian ecosystem	<p>Maintain or improve baseline channel stability.</p> <p>Develop site-specific in-stream water quality objectives in accordance with ANZECC 2000 and <i>Using the ANZECC Guidelines and Water Quality Objectives in NSW</i> procedures (DECC 2006), or its latest version</p>

Note *: a diversion system around the project site is not possible nor feasible but clean and dirty water systems will be kept separate through engineering design.

6.1 Water Supply

The principal source of water for DP is the Macquarie River which is seven kilometres north of the processing plant. A pump station within an easement on Mia Mia will supply water via a buried poly pipeline to the plant.

A combination of High and General security Macquarie River water licences will provide the DP with processing water. This river water can be supplemented with temporary water (through seasonal purchase) and also with bore water from a licenced bore established on “Sweet Water” 600m northeast of the pump station.

The production bore was established on Sweet Water in October 2016 and was pump tested for seven days in February 2017. A Works Approval has been obtained from Water NSW for 1,250ML/annum. Water will ultimately be pumped to the river pump water supply line and joined.

Maximum Harvestable Rights Dams Capacity (MHRDC) is the volume of water landholders are entitled to capture and use without need for licencing. The maximum capacity of rainfall/runoff captured on ASMH-owned land is 223ML/yr.

Sediment or pollution control structures are exempt from the MHRDC consideration, unless the water captured is to be re-used on the site/property for non-environmental purposes.

An onsite water treatment plant will be used to produce potable water, eliminating the requirement to import potable water.

Table 11. Water Supply

Water Licences	Water sharing plan, source and management zone (as applicable)	Entitlement (ML)	Active pumping
WALs:19994, 9191, 3396, 36409, 3412	High Security Macquarie/Cudgegong	856	0
WAL30259	General Security Macquarie/Cudgegong	750	0
N/A	NSW Murray Darling Basin Fractured Rock <i>Aquifer</i>	Stock & domestic	Stock & domestic
N/A	Onsite dams, under harvestable rights	223	Stock & domestic
WAL 37691, 37690	Upper Macquarie Alluvial Groundwater Source	470*	Nil

* An additional groundwater entitlement will be acquired in the next period

6.2 Water Balance

The site water balance was being reviewed during the reporting period in line with a proposed modification of the project.

The water balance indicates that DP will be dependent on a combination of river and bore water.

The project is designed for zero discharge of ‘dirty water’ which will be kept separate from existing ‘clean’ water discharges from the ephemeral drainage lines that drain the Toongi Pastoral Company property.

6.3 Clean Water Management (Surface)

For reporting purposes, clean water management is divided into:

- onsite management;
- Wambangalang and Cockabroo Creeks; and
- offsite discharge.

6.3.1 Site Water

Clean water consists of through-flow from drainage of the undisturbed Dowd’s Hill and water from onsite non-mine disturbed catchments. This water is diverted away from contamination sources (mine disturbance and infrastructure) and directed offsite. Management includes the construction of drains and bunds to collect and divert surface water flow past, or away from, mining disturbed catchments.



| A healthy drainage line on Dowd's hill. Photo taken 27 June 2021.

6.3.2 Surface Water Monitoring results

No baseline data was carried out during the period as ten years of data has been collected already.

It is expected that all of the data collected to date will enable water quality trigger values for the project to be established in consultation with the EPA.

February 2020 saw the first flows in Wambangalang and Paddy's Creeks since March 2019. The flows were terracotta in colour as was the Macquarie River through Dubbo owing to the soil erosion exacerbated by drought conditions in the catchments. Large amounts of organic matter were flushed down the creeks and rivers as the drought started to break with thunderstorm events.

Sample results from 2020 indicate increasing salinity levels in Wambanagalang and Paddys Creeks when flows diminish.

The above average rainfall since early 2020 has seen local creeks and streams run intermittently



Watercourse B flowing across Toongi Road on “Toongi Valley” discharges in Wambangalang Creek. Despite very good ground cover surface water does contain suspended solids. Photo taken 7 July 2021.

6.3.3 Discharge

No licenced discharges occurred during the reporting period.

6.4 Mine Water Management

This section does not apply as no construction has commenced.

6.5 Erosion and Sediment Control

This section does not apply as no construction has commenced.

6.6 Groundwater

By way of background information, sampling and pump testing of the stock and domestic bores around and neighbouring the project site occurred in June 2016. These bores have been established for many years to supply stock and domestic water to several properties.

All DP groundwater bores (mostly in the fractured rock aquifers of the Lachlan Fold Belt) provide less than 2L/sec of stock quality drinking water.

Springs in the Springs Offset and Mine South Offset re-commenced flowing in Winter 2020 after two years of zero flow. Springs were flowing on Karingle and Toongi Valley on 30 June 2021.

Table 12. Stock and domestic bore depth and yield

Sample Reference	Bore Name	Location	Total Depth	L/sec	LPM	SWL
GW-001	Ugothery	Shed	67.24	0.37	21.9	11.05
GW-002	Grandale	West Bore	28.31	0.30	18.1	13.24
GW-003	Toongi Valley 2	Shearing Shed	36.96	0.91	54.6	8.95
GW-004	Wychitella	House	47.33	1.53	91.8	5.4
GW-005	Pacific Hill 1	Shed	48.55	1.40	84.1	18.52
GW-006	Karingle 2	Lane West of House	38.98	1.41	84.6	13.3
GW-007	Toongi Valley 3	Spring	12.86	1.64	98.3	2.61
GW-008	Karingle 1	House	39.66	1.32	79	16.29
GW-009	Toongi Village	Well	15.4	1.43	85.6	7.32

Seven geotech bores/piezometres (installed September 2014) were dipped for water levels on 7 September 2017, 11 September 2018, 21 August 2019 and 30 July 2020. The drought conditions over the reporting period has seen the local water table fall in all three wet piezos up to 3.69m over 24 months. Four of seven piezos are currently dry.

Table 13. Geotech bores in the DP footprint

Bore	Piezo Depth	Wet /Dry	Depth to SWL (m) Sep 2017	Depth to SWL (m) Sep 2018	Depth to SWL (m) Aug 2019	Depth to SWL (m) Jul 2020	Depth to SWL 3 Aug 2021	Reference Point (m above ground level)
C	13.06	Dry	Dry	Dry	Dry	Dry	Mud	N/A
S	15.72	Wet	10.73	12.86	14.42	14.8	13.28	0.75
W	15.27	Wet	15.24	15.26	Mud	Dry	Mud	0.7
E	14.95	Wet	Dry	Moist	Dry	Dry	Mud	0.9
Q	15.66	Wet	11.61	12.00	12.34	12.8	12.58	0.85
I	16.3	Dry	Dry	N/A	Dry	Dry	Dry	N/A
Y	11.6	Wet	8.93	9.45	9.8	9.7	8.97	0.9

6.7 Proposed Water Management Improvements

No improvements are proposed to groundwater management at DP in the next reporting period.

7. Rehabilitation

The Dubbo Project has not yet commenced construction.

7.1 Rehabilitation during reporting period

No rehabilitated activities were completed during the reporting period.

7.2 Post Rehabilitation Land use

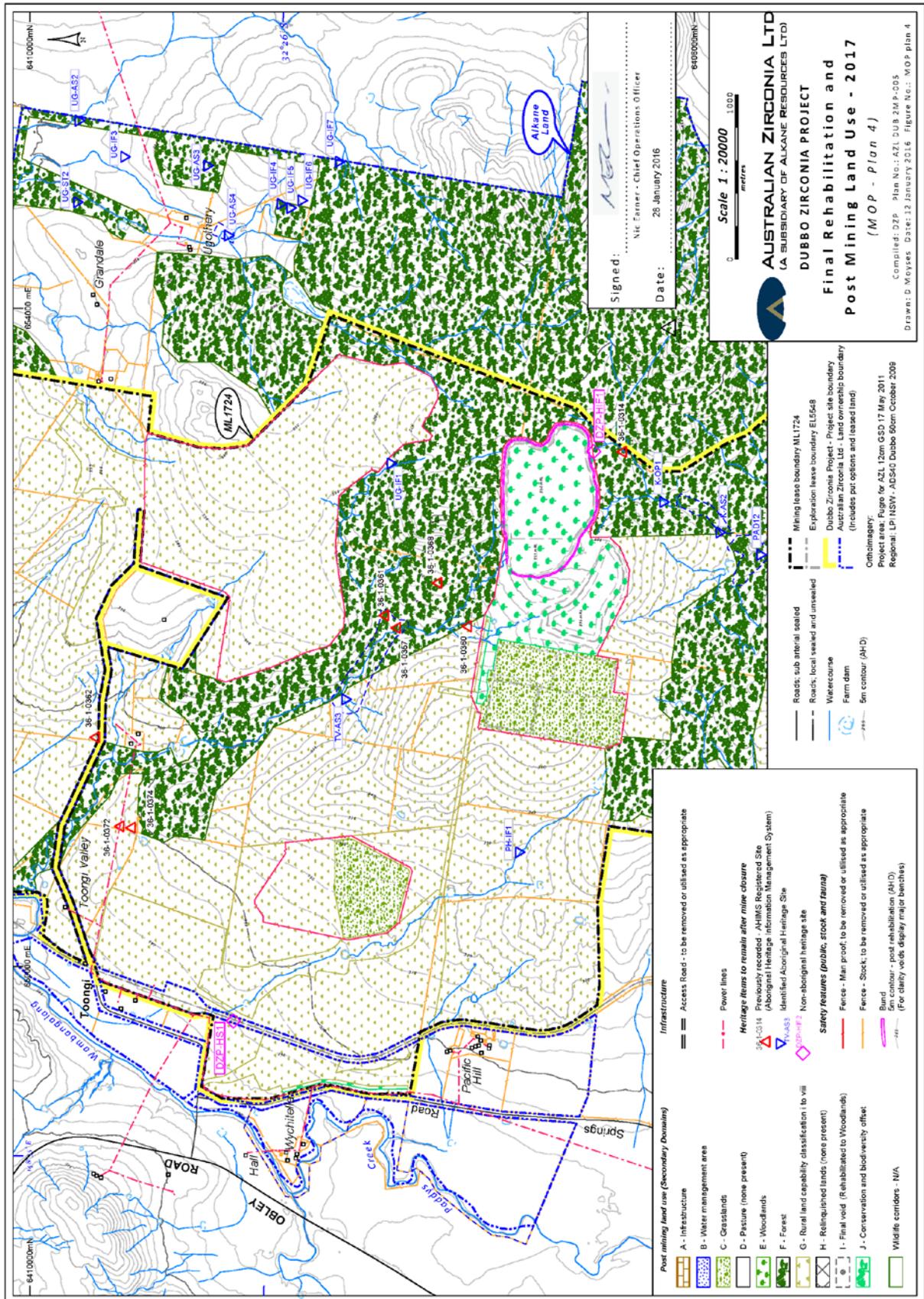
These post-rehabilitation land use objectives and targets are contained in the draft 2015-2017 MOP. The MOP has not yet been approved by MEG.

Table 14: Rehabilitation and BOS Objectives and Targets

Category	Objective		Target(s)
	Rehabilitation	BOA	
Ecosystem Development (Final Land Use)	Protect, enhance and extend areas of remnant native vegetation.		Secure the BOA under PVP or equivalent mechanism.
	Maintain habitats on the final landform which encourage colonisation by native flora and fauna with specific niche requirements.		Species diversity and density of rehabilitated landforms equivalent to analogue sites established within the BOA.
	Extend, improve, protect and link areas of remnant native vegetation.		Secure the BOA under PVP or equivalent mechanism. Prepare and implement a Biodiversity Management Plan (BMP).
	Retain areas on the DP Site amenable to future agricultural or industrial activities.	-	Agricultural productivity of land equivalent to pre-mining landforms.
Post-Mining Land Use	Maximise positive and minimise adverse socio-economic outcomes following mine closure.	-	Consult with the community and government agencies in relation to the post-mining land use. Rehabilitate the Mine in accordance with Plan 4 , unless otherwise agreed.

	Provide rehabilitated woodland communities which adjoin the established Biodiversity Offset Area to maximise the wildlife corridors created within the local setting.	Undertake habitat augmentation to improve and promote corridors for fauna movement linking adjacent remnant woodland vegetation with the rehabilitation of the Mine.	Establish woodland vegetation over the landform equivalent to local analogues of that community. Visual identification of wildlife corridors within the largely agricultural setting. Conserve under a Conservation PVP 1021ha of remnant native vegetation in accordance with a Biodiversity Offset Strategy.
	Integrate areas of biodiversity enhancement and conservation with agriculture.		Undertake agricultural activities on the Mine Site, including within the BOA in accordance with a PVP and BMP.
Other	Allow for the relinquishment of the Mining Lease and the return of the security lodged over the Mining Lease within a reasonable time after the end of the mine life.		50% within 5 years of final rehabilitation. 100% within 10 years of final rehabilitation.

Figure 7: MOP Plan 4 showing proposed final land uses at DZP



7.3 Trials, Monitoring and Research

No trials nor monitoring of rehab was undertaken during this period. During the 2017 reporting period, four benchmark vegetation communities benchmarks were identified and described by OzArk as a goal against which to measure rehabilitation success.

7.4 Key rehabilitation risks

A key rehabilitation risk in the next reporting period will be weather related. Stripping and handling topsoil resources should ideally be performed when soils are not too wet nor too dry.

7.5 Actions for next reporting period

Topsoil stripping and stockpiling will take place during the next reporting period only if construction has commenced. Trials will examine productive pasture establishment techniques on the soil stockpiles. It is intended to establish productive perennial pastures on the soil stockpiles and include those stockpiles as a resource to be opportunistically grazed by livestock.

The soil stockpiles will be managed for their long term soil health to ensure they are a suitable medium for the final landform rehabilitation in 20+ years time.

Toongi Pastoral Company will register the farm (surrounding the mine site) as a Commonwealth carbon project with the aim of sequestering carbon in the farms soils. A preliminary assessment has been undertaken and the baseline soil sampling will be conducted during this reporting period.

8. Community

8.1 Consultation

The key strategy to ensure an effective passage of information between ASMH and the surrounding community is the Community Consultative Committee (CCC). The CCC is an independently chaired member committee representing DP, the local community (including environmental interests) and the Aboriginal community.

At CCC meetings, typically held quarterly, members are updated by ASMH personnel on the progress of current and proposed mining operations and projects. Community representatives are given the opportunity to raise concerns regarding the project and to offer advice regarding consultation with the community. CCC meeting minutes are available via the ASM website (<https://www.asm-au.com/>).

During the reporting period, the CCC met only twice. In the next period it is anticipated that the CCC will meet quarterly as the project is gathering pace towards construction.

CCC meetings were held on 16 November 2020 and 17 May 2021. Minutes are posted on the ASM website.

Dubbo Project Community Updates (newsletter) were published in October 2020 and March 2021.

ASM Managing Director, David Woodall, visited to Dubbo and Toongi in May 2021. The Managing Director met with a wide range of government and community stakeholders, including:

- Government leaders, including local member Dugald Saunders MP, Dubbo Regional Council (councillors and staff), and representatives from Orana Regional Development Australia;
- Community and business leaders at The Exchange;
- The Dubbo Project Community Consultative Committee;
- Representatives from Dubbo Aboriginal Community Working Party, Three Rivers Regional Assembly, Dubbo Local Aboriginal Land Council, and Elders to listen to their priorities and grow relationships; and
- Local potential equipment suppliers.

In addition to the CCC, ASMH utilised a number of methods of communication/consultation with the community during the reporting period, including:

- ASX announcements (publicly) available and sent to subscribers;
- Making relevant information regarding mine approvals, operations and environmental monitoring available to the public on the ASM website;
- Distributing a community newsletter, to provide the Dubbo-Toongi community and any other interested parties with information on the DP development;
- Attending vocational and tertiary information days at schools;
- Presentations to interest groups (Rotary, Dubbo Chamber of Commerce, Orana RDA, Western Regional Science & Engineering Challenge, schools career expos);
- Providing a 24-hour community information line;
- Sending issue-specific letters to members of the public in response to queries regarding the project; and
- Field Days and training days hosted by Toongi Pastoral Company (Dubbo Show, Grey Box Grassy Woodland Workshop and Rural Fire Service Aerial Response training).

These methods of community consultation will continue during the next reporting period as well as targeted consultation for MOD1.

8.2 Support

Over the life of the development, ASMH has committed to a Voluntary Planning Agreement with Dubbo Regional Council to contribute annually:

- \$300 000 to the maintenance of Obley/Toongi Road;
- \$42,000 Roads Contributions (to and from work);
- \$42,000 Roads Contributions (other direct vehicle trips for employees); and
- \$230, 000 for Boundary Road (Keswick Parkway South to Sheraton Road).

CPI adjustment to apply after year one. VPA contributions to commence on 1 January or 1 July following commencement of Obley/Toongi Road upgrade.

8.3 Complaints and enquiries

ASMH manage complaints in accordance with the protocols and procedures contained in the EMS. During the reporting period no complaints were received.

ASMH staff will respond to all complainants and conduct investigations into specific concerns. Investigation outcomes consisting of corrective action, where required, and follow-up communication with the complainant will be actioned.

A register of complaints and enquiries received from the community is maintained by ASMH. A modified version of this register (excluding personal details of complainants) is published on the ASM website.

No complaints have been received during this reporting period.

9. Independent Environmental Audit

As per Schedule 5 conditions 9 and 10 of the consent condions:

1. Within one year of commencing development under this consent, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
 - (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
 - (b) include consultation with the relevant agencies;
 - (c) assess the environmental performance of the development and assess whether it is complying with the requirements in this consent and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals);
 - (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; and
 - (e) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any assessment, plan or program required under the abovementioned approvals.

Note: This audit team must be led by a suitably qualified auditor and include experts in water resource management, ecology, transport and road design and hazardous materials management and any other field specified by the Secretary.

2. Within 6 weeks of the completion of this audit, unless the Secretary agrees otherwise, the Applicant shall submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report, including a timetable for the implementation of any measures proposed to address the recommendations in the audit report. If the Applicant intends to defer the implementation of a recommendation, reasons must be documented.

As construction has not yet commenced, this condition has not yet been triggered.

10. Incidents and non-compliances during reporting period

This section provides further detail on the incidents and non-compliances reported in Section 1 as well as any other official regulatory interaction that occurred during the reporting period.

10.1 Official Regulatory Interaction

No reportable incidents or warning letters, penalty notices or prosecution proceedings by any regulatory agency were received during the reporting period.

Correspondence from DPIE is contained in **Appendix C**.

11. Activities to be completed in next reporting period

Environmental activities and initiatives to be implemented in the next reporting period (assuming construction has commenced) will focus on reduction of offsite impacts such as noise and dust, management and monitoring of biodiversity offset areas, finalising the final landform plans, and commencing rehabilitation of soil stockpiles and erosion and sediment control structures. Details on these activities are shown in **Table 15**.

Table 15: Activities proposed for 2021-2022

Proposed Activities	Location	Proposed Completion Date
Fauna monitoring	ASMH site and offset areas	Ongoing
Control of noxious weeds	ASMH site and offset areas	Ongoing
Eastern Grey Kangaroo culling	TPC and BOA	Ongoing
Feral animal control	TPC & BOA	Ongoing
Fence maintenance in accordance with the Biodiversity Offset Management Plan and PVP	Offset areas	Ongoing
Design restoration works drainage line B in the BOA for stream bed rehabilitation	Biodiversity and rehabilitation areas	Sep 2021
Pink-tailed Worm-lizard Survey	PTWL Offset areas	Spring 2021
Analogue vegetation plot monitoring	Obley Road Reserve, Toongi Hall and Project Site	Spring 2021
Continue weed management and rubbish removal	Biodiversity offset areas	Ongoing
Installation of environmental monitoring shelter	Wychitella – across creek from Toongi Hall	Mar 2022
Environmental monitoring as required by consent conditions and EPL	Site and linear infrastructure activity areas	TBC

**APPENDIX A – Letter Report - Pink-tailed Worm-lizard Monitoring Report - Area
Environmental Consultants & Communication (AREA Aug 2021)**

**Biodiversity Offset Area – Analogue Vegetation Plot Monitoring Spring 2020 (AREA May
2021)**

AREA Landscape Design Consultants Pty Ltd ABN: 56 646 194 176

- ✓ Commercial external landscape designs for built or natural environments
- ✓ Vegetation Management Plans
- ✓ Stakeholder and community engagement
- ✓ Peer review / project briefs / budgeting assistance

AREA Environmental & Heritage Consultants ABN: 29 616 529 867

- ✓ Environmental impact assessments and approvals : REFs, MW REFs, PEAs
- ✓ Ecology, Aboriginal and historic heritage assessments
- ✓ Biodiversity assessment method (BAM) assessments (BDAR) and offsetting (BSAR)
- ✓ Plans of Management
- ✓ Aboriginal community engagement
- ✓ Stakeholder and community engagement
- ✓ Peer review / project briefs / budgeting assistance / expert witness



Job: Pink-tailed Worm-lizard interim 2021 Monitoring Report
Business: AREA Environmental & Heritage Consultants ABN: 29 616 529 867
Department: Life Sciences (Ecology)
Detail: Short report providing an update between monitoring events
To: Michael Sutherland (General Manager NSW, Australian Strategic Materials Ltd)
Date: 30 August 2021

Dear Michael,

This letter provides an update of the Dubbo Project Pink-tailed Worm-lizard (*Aprasia parapulchella*) monitoring for 2021.

The autumn survey was postponed twice owing to well above average rainfall on site (188.2 millimetres of rain in March 119.2 millimetres of rain in June). In 2017 annual monitoring was postponed due to severe drought. The next survey is scheduled to occur in spring - October/November 2021 as per recommendation in the 2020 annual monitoring report.

The nature of the proposed October/November 2021 monitoring is to do targeted searches in the species natural habitat as well as targeted tile flipping (not all tiles will be flipped as the majority of the survey effort will be put toward detecting the species in natural habitat in the offset area).

The reason for the rescheduling is well above rainfall over the past eighteen months and as a result native grassland managed by the Toongi Pastoral Company in the 1,020-hectare biodiversity offset area has flourished reconnecting all areas of suitable Pink-tailed Worm-Lizard within the offset area. Native grasses provide food for ant species that the Pink-tailed Worm-lizard cohabits with and preys upon.

Like many native species the cryptic Pink-tailed Worm-lizard follows seasonal 'booms and busts' and we expect the likelihood of detecting the species in November 2021 to be moderate to high. September is the time of year BioNet and Commonwealth guidance material recommended for the detection of the species. In my opinion, while this season is recommended, survey effort to date has shown it can be detected in other seasons / month of the year with March being the most successful to date (preceded by favourable weather).

The reason why October/November 2021 is favoured is because of the native grassland. It is anticipated natural recovery of the species would have occurred post severe drought in 2020 and by September 2021 the species will be more likely to be detected in a native grassland which has had time to recover and provide a functioning ecosystem / habitat for the species to be occupied by them.





Over 2020 and 2021 opportunistic searches have occurred within the 1020-hectare biodiversity offsetting area:

- During vegetation monitoring in September 2020 opportunistic rock flipping failed to detect the species and at the time the assessor thought the environment was in recovery mode from the severe drought and was likely to have affected Pink-tailed Worm-lizard ability to be detected (though very low population numbers).
- In October 2020 targeted searches occurred for *Swainsona recta* occurred within the biodiversity offset area (Northern Trachyte) and opportunistic rock flipping for Pink-tailed Worm-lizard failed to detect it.
- Over two or three days in autumn and winter 2021 on sunny days, opportunistic rock flipping again failed to detect the species This was not an unexpected result; however, this highlights the species has in the past been detected mostly in other times not considered ideal in the guidance material.

Overall, since the Toongi Pastoral Company has taken over management of the 1,020-hectare biodiversity area significant improvement in habitat for the species has occurred. A combination of a completed fence for the offset area and the farm being sustainability grazed has seen an impressive natural recovery of native grassland across the whole property which provides habitat for the species.

If you have any questions, please feel free to contact me.

Regards

A handwritten signature in black ink, appearing to read "Phil Cameron", with a horizontal line underneath.

Phil Cameron
Managing Director
CEnvP, NSW Biodiversity Assessment Method (BAAS17082) & Biobanking (0117) accredited

AREA Environmental & Heritage Consultants
AREA Landscape Design Consultants

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We acknowledge Traditional Owners and Custodians and their ancestors

Australian Strategic Materials Ltd Dubbo Project

Biodiversity Offset Area - analogue vegetation plot monitoring
Dubbo Regional LGA NSW
Spring 2020



ABN:29 616 529 867

Advanced Regional Environmental Assessments (AREA)

- ✓ Environmental impact assessments and approvals
- ✓ High level preliminary environmental assessment (PEA)
- ✓ Review of environmental factors (REF)
- ✓ Peer review
- ✓ Community engagement
- ✓ Biobanking and biodiversity offsetting assessments
- ✓ Aboriginal heritage assessments and community walkovers
- ✓ Landscape design

AREA acknowledges Traditional Owners
of the country on which we work

EXECUTIVE SUMMARY

AREA Environmental Consultants & Communication (AREA) was commissioned by Australian Strategic Materials Ltd (the proponent) to complete annual monitoring of five established analogue vegetation monitoring points in and nearby the Dubbo Project (previously known as the Dubbo Zirconia Project) Biodiversity Offset Area, Toongi NSW.

The Dubbo Project was approved as SSD-5251 by the NSW Planning Assessment Commission (PAC) on 28 May 2015 assessed under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Annual monitoring of five analogue plots is required by the Biodiversity Management Plan. Prior to 2020 vegetation monitoring was conducted using the now defunct BioBanking Assessment Method. The 2020 monitoring used the current assessment framework of the NSW government, the Biodiversity Assessment Method (BAM 2020).

All plots recorded parameters which were below benchmark for the Plant Community Type.

- Plot 1 and 5 showed the fewest parameters which were consistent or better than the benchmark (both with five of 15 parameters)
- Plot 2 showed the highest numbers of parameters above the 25 percent benchmark (six of 10 parameters)
- Plot 3 showed the most parameters which were consistent or better than the benchmark (10 of 15 parameters).
- Plot 3 showed the fewest parameters which did not meet the 25 percent benchmark (two of 15 parameters).

The difference in assessment techniques notwithstanding, comparison between the 2016 and 2020 data showed:

- improvement in condition for one or two parameters for all plots
- decline in condition for one or two parameters for all plots
- consistent condition for one or two parameters for all plots.

Overall improvement in native vegetation recorded is improving with time. The decline in parameters is consistent with expected impact from the preceding severe 2017 to 2020 drought.

Document Controls

Proponent	Australian Strategic Materials Ltd (ASM)	
Client	ASM	
Quote number	N/A	
Project No / Purchase Order No	N/A	
Document Description	Biodiversity Offset Area Monitoring Points Spring 2020	
Clients Representative Managing this Document	Mike Sutherland	
AREA Person(s) Managing this Document	Phil Cameron	
Cover image	Section of the proposed alignment	
DOCUMENT STATUS: DRAFT		
DRAFT: Series V1.X AREA internal edits	Date	Action
V1.0	26.11.20	For internal edit
V1.1	12.01.21	Reviewed
DRAFT Series V2.X Client / AREA internal edits	Date	Action
V2.0	26/05/2021	Draft to client
V2.1		
FINAL (Draft approved by client)	Date	Action
V3.0		
Prepared for	Mike Sutherland NSW General Manager Alkane Resources Office: 6882 2866 Fax: 6882 9282 Mobile: 0427 691 733	
Prepared by 	Gabrielle Green – Cadet Environmental Consultant and Phillip Cameron – Managing Director AREA Environmental Consultants & Communication Pty Ltd 'Old Macquarie Brewery' c1876, 72 Brisbane Street Dubbo, NSW 2830 M 0409 852 098 E phil@areaenv.com.au ABN:29 616 529 867	
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Terms and acronyms used in this document

Acronym	Definition
BOM	Bureau of Meteorology
BOS	Biodiversity Offset Strategy
EEC	Endangered Ecological Community
LGA	Local Government Area
NSW	New South Wales
DPIE	Department of Planning, Industry and Environment
PCT	Plant Community Types
VIS	Vegetation Information System

1 Introduction

1.1 Background

AREA Environmental & Heritage Consultants (AREA) was commissioned by Australian Strategic Materials (the proponent) to undertake annual monitoring of five established analogue vegetation monitoring points in the Dubbo Project Biodiversity Offset Area (3) and local plots (2) (Figure 1-1 to 1-3) near Toongi, NSW.

The Dubbo Zirconia Project (now the Dubbo Project) was approved as SSD-5251 by the NSW Planning Assessment Commission (PAC) on 28 May 2015 assessed under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

In 2017, the NSW legislation governing how vegetation is measured changed. The BioBanking Assessment Method (BBAM) has been superseded by the Biodiversity Assessment Method (BAM). The BAM provides a system for measuring vegetation which is more transparent, repeatable and objective. The BAM as it pertains to vegetation assessment plots is described in section 2.2.

Data collected using BAM generates four numbers as a score out of 100, which provide a measure of the vegetation quality. These are:

- Composition – a measure of the species count/ richness
- Structure – a measure of the cover provided by each growth form
- Function – a measure of the habitat values such as leaf litter, large logs and tree hollows
- Vegetation Integrity – an overall measure of quality.

Comparison of these four figures over time can be used to map changes in vegetation quality.

BAM was used for the 2020 Dubbo Project Biodiversity Offset Area vegetation monitoring. This report will present the results from the 2020 monitoring but will avoid comparisons where there is not a consistent technique used.

As discussed in the 2019 monitoring report, the recognised vegetation descriptions have changed since the original monitoring events. Benson vegetation classifications based on Catchment Management Areas have been replaced with Plant Community Types (PCT) within Bioregions and subregions. These new vegetation classifications include a new set of benchmarks which define each PCT. Data collected during the 2020 monitoring event will be measured against the benchmarks for the Plant Community Types.

Table 1-1: Change to vegetation classification

Plot ID	Superseded classification (Biobanking)	Current classification (BAM 2020)
1	White Cypress Pine monoculture – no classification determined	PCT267 - White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion
2	CW213 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)	PCT267 - White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion
3	CW138 - Fuzzy Box - Inland Grey Box on alluvial brown loam soils of the NSW South Western Slopes Bioregion and southern BBS Bioregion (Benson 201)	PCT201 -Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
4	CW145 - Inland Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (Benson 76)	PCT76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions
5	CW212 - White Box - Tumbledown Gum woodland on fine-grained sediments on the NSW central western slopes (Benson 270)	PCT270 - White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes

1.2 Locality

The Biodiversity Offset Area is located approximately 20 kilometers south of Dubbo near Toongi, NSW in the Dubbo Regional Local Government Area (LGA). Figure 1-1 to Figure 1-5 show the location and local context of the Biodiversity Offset Area.

Regional context of the study area is provided in Table 1-2.

Table 1-2: Regional context of the Biodiversity Offset Area

Criteria	Site context
Interim Biogeographic Regionalisation for Australia (IBRA Region)	NSW South Western Slopes (Inland Slopes) Bioregion
State	New South Wales
Topographical map sheet	Dubbo 8633
Local Government Area	Dubbo Regional
Nearest town / locality	Toongi (locality) Dubbo (Town)
Accessed from nearest town by	Dubbo accessed by Eulandool Road then The Springs Road, then Obley Road.
Land use / disturbance	Agriculture (ploughed landscapes) and continuous grazing.
Nearest waterway (Name, Strahler Order)	No named waterways occur within the Biodiversity Offset Area (BOA). However, within 1500m Wambangalang Creek occurs to the north west, Paddys Creek occurs to the south west. Cockabroo Creek occurs to the south east, and a small section lies within the project boundary. These are all third or higher Strahler Order waterways Numerous unnamed first, second and third Strahler Order waterways are mapped within the BOA.
Spot point Australian Height Datum (AHD)	Approximately 280m to 420m
Surrounding land use	Grazing, ploughed agriculture, Biodiversity Offset Area and road reserve

Figure 1-1: Location

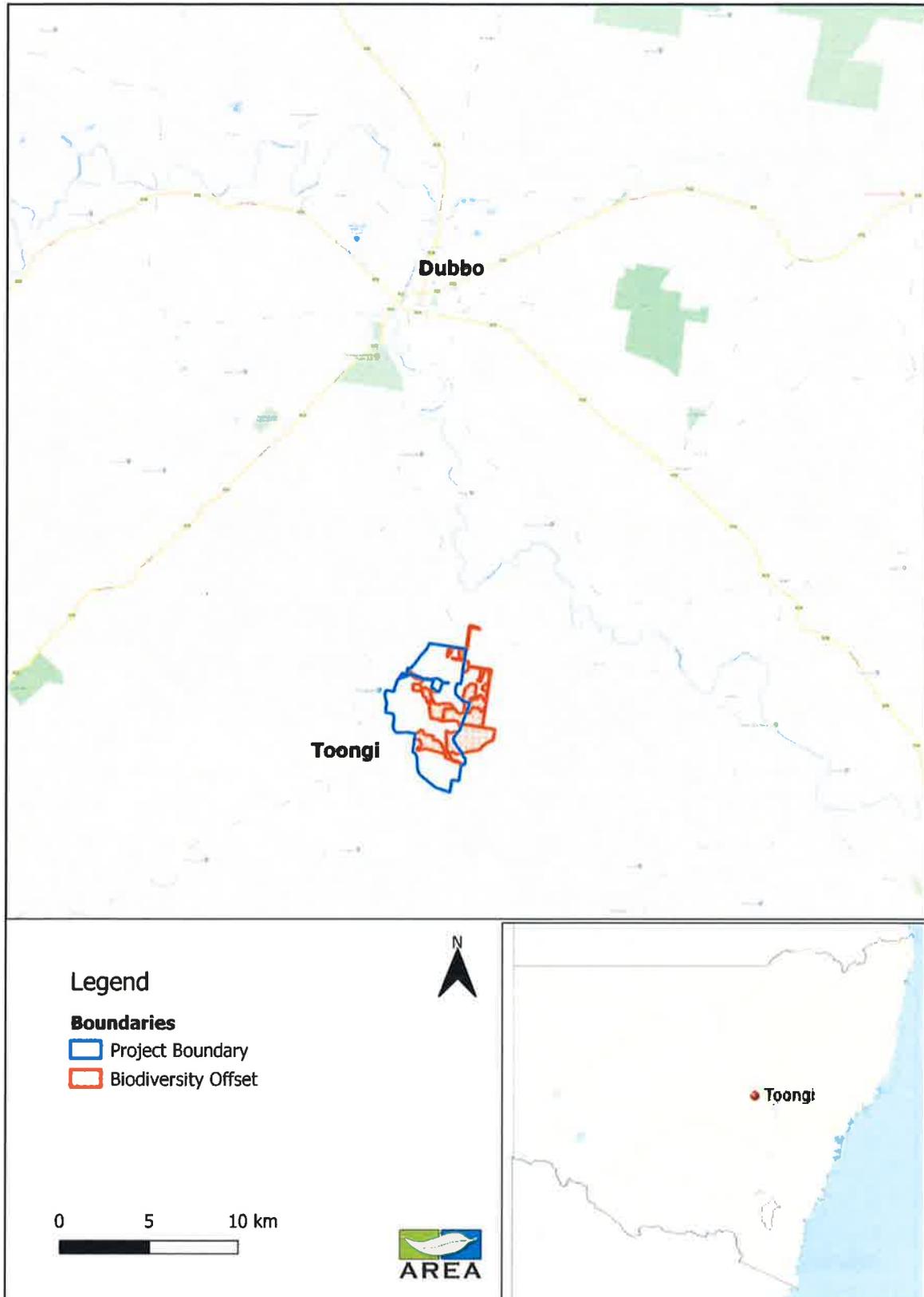


Figure 1-2: Biodiversity Offset Area (aerial)

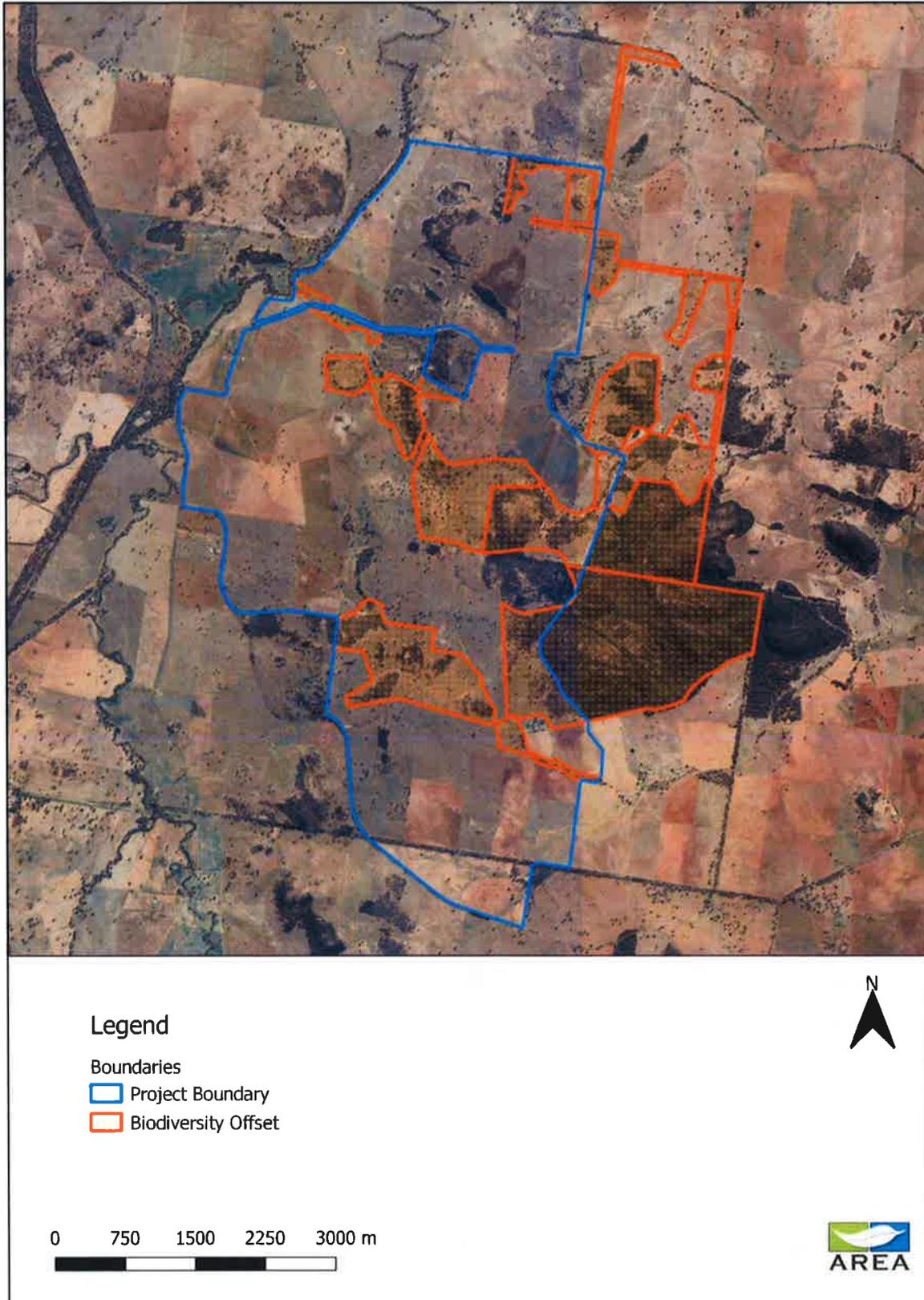


Figure 1-3: Biodiversity Offset Area (topo)

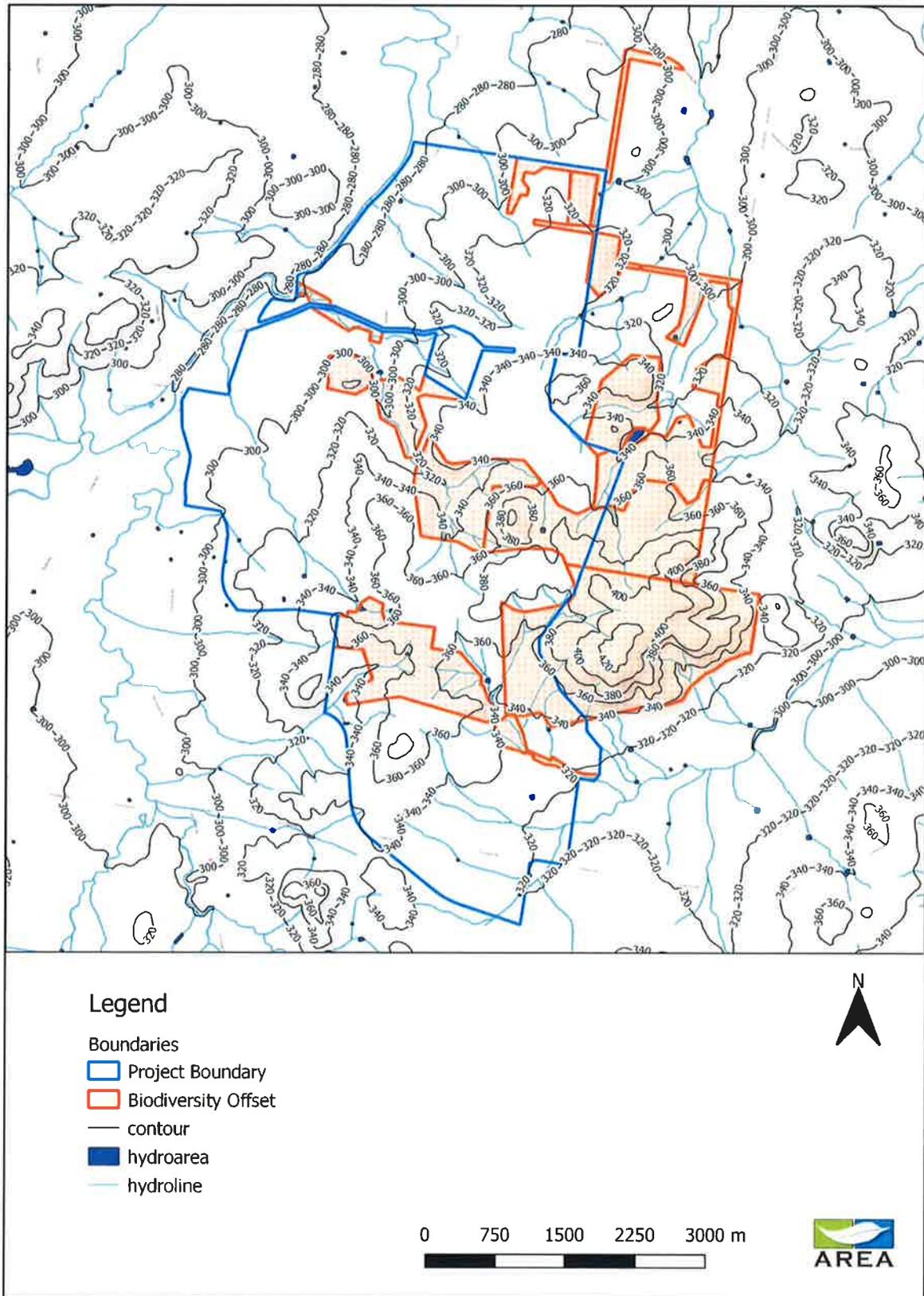
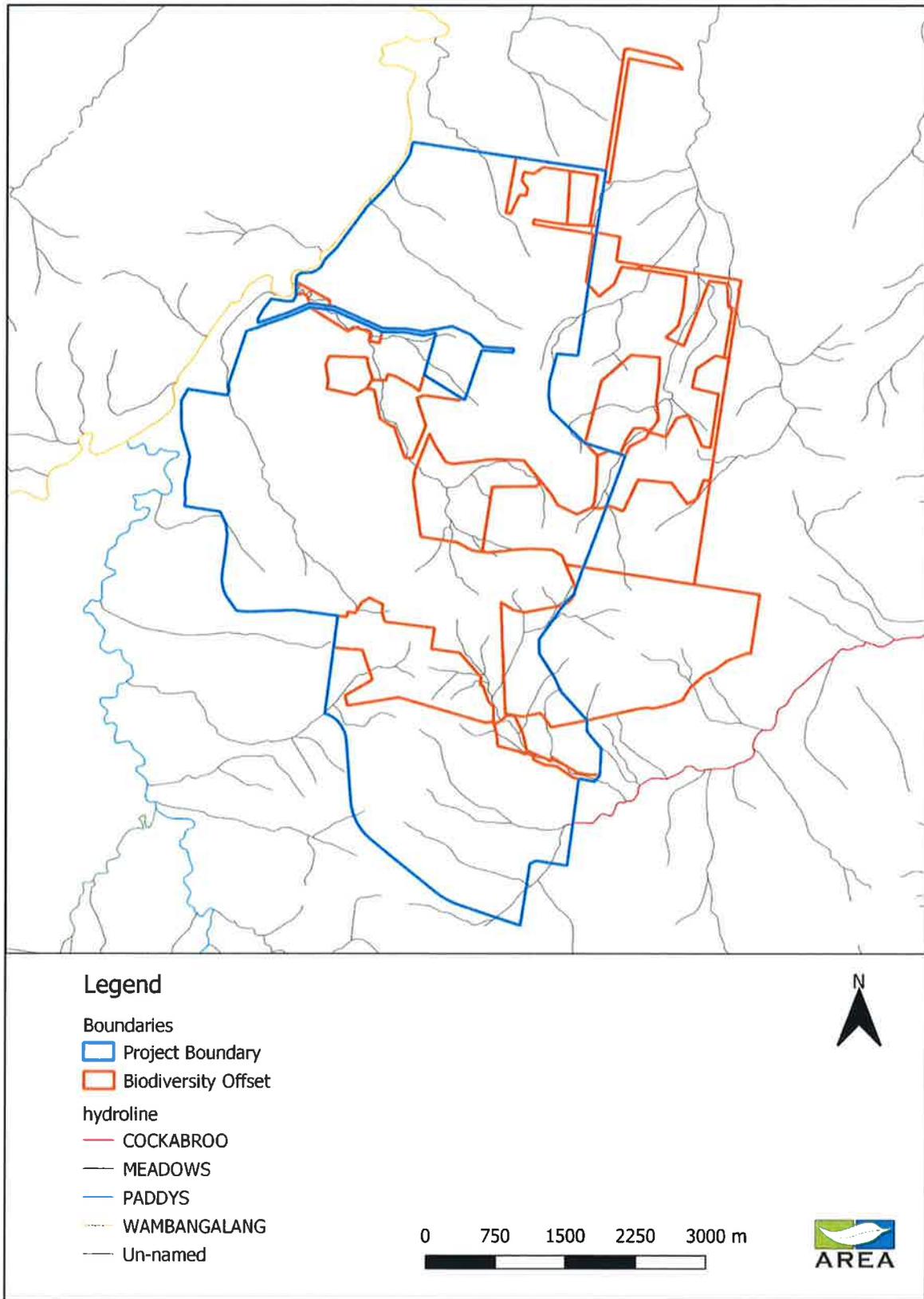


Figure 1-5: Waterways



2 Methods

Field survey was undertaken on 25 September 2019 by two AREA ecologists. The survey included assessment of five established analogue vegetation plots using the BAM (2020). Most nested plots are marked with rock cairns or star pickets at the start of the midline. The 50-metre midline and the 20 by 20-meter plot boundary were defined using 100-meter tape measures.

2.1 Project personnel

This monitoring and preparation of this monitoring report was carried out by appropriately qualified and experienced staff (Table 2-1).

Table 2-1: Summary of AREA project teams' qualifications

Name	Position	CV Details	Role in this project
Phillip Cameron	Principal consultant	<ul style="list-style-type: none"> BSc. Major in Biology. Macquarie University Ass Dip App Sci. University of Queensland Certified Environmental Practitioner (EIANZ) NSW Biodiversity Assessment Method Accredited Assessor (Number BAAS17082) NSW DPIE BioBanking and Bio-certification Assessor: accreditation number 0117 NSW DPIE Scientific License: 101087 NSW DPI Ethics Approval 11/5475 Practicing member of the NSW Ecological Consulting Association Practicing member of the Environment Institute of Australia and New Zealand (EIANZ) WHS White Card and Blue Card Apply First Aid (Parasol) ID: 6007221. 	Project Management Fieldwork QMS
Gabrielle Green	Cadet Consultant	<ul style="list-style-type: none"> B. Env. Sc. New England University (in prep) AHCPCM201- Recognising grasses WHS White Card WIRES training 	Fieldwork Report Writing

2.2 Vegetation integrity survey plots

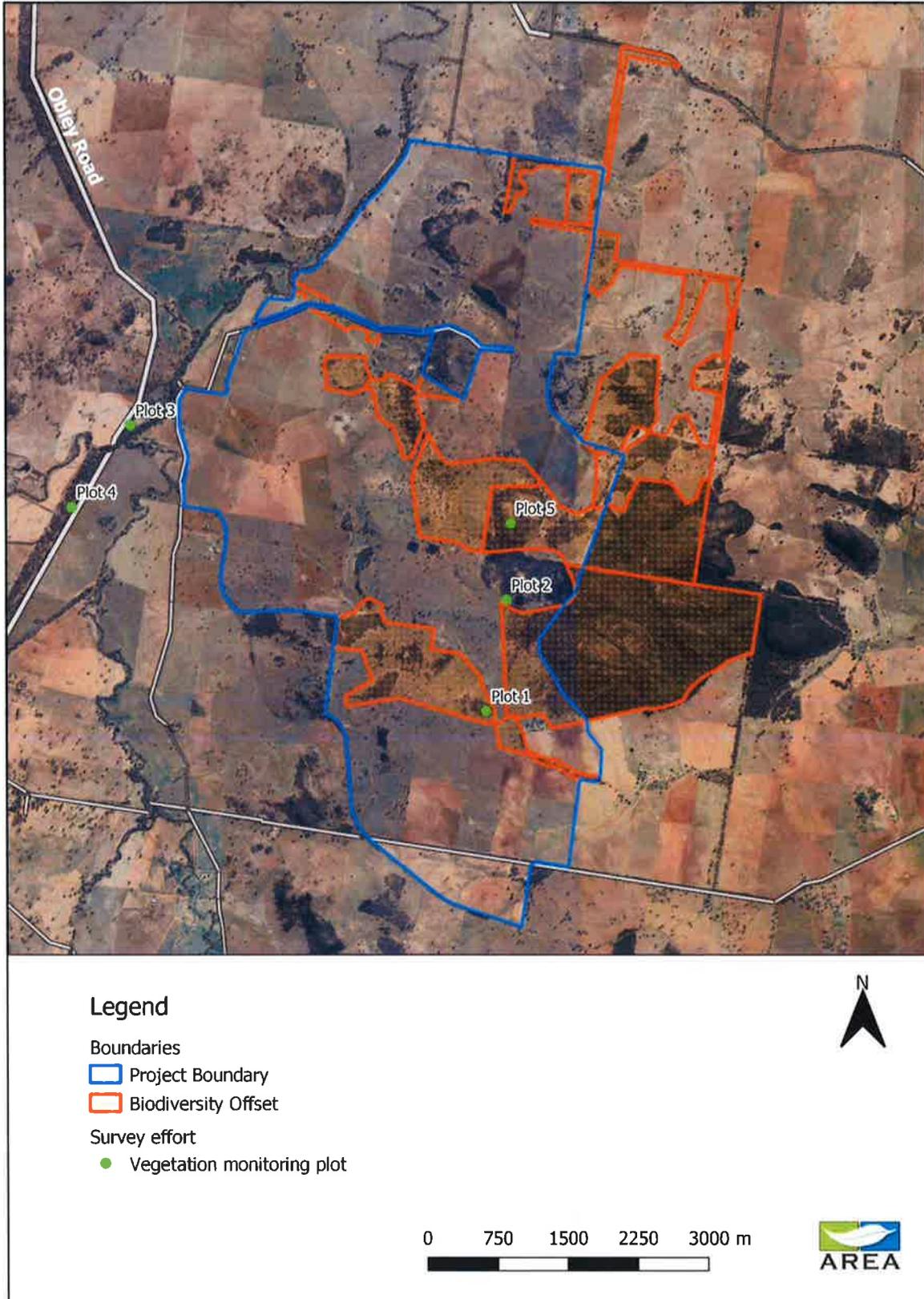
Five BAM 2020 plots were monitored within the study area (Table 2-2 and

Figure 2-1). Plot sheets are provided in Appendix A. Plots are not permanently marked however rock cairns are in place to mark most plots.

Table 2-2: Coordinates in GDA z55 of the monitoring plots

Plot ID	Easting (GDA94 Zone 55)	Northing (GDA94 Zone 55)
1	652426	6405475
2	652663	6406659
3	648677	6408583
4	648032	6407720
5	652722	6407476

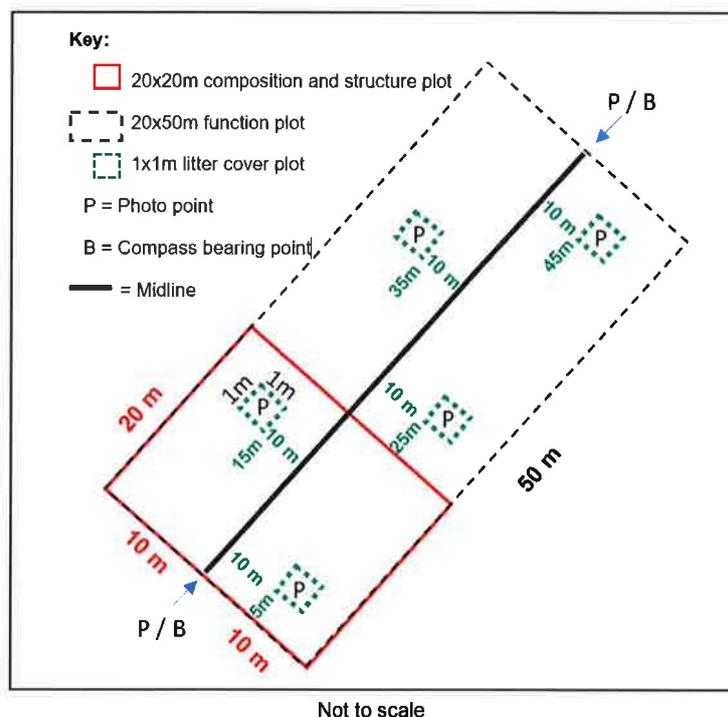
Figure 2-1: Vegetation plot location



The annual monitoring followed the points listed below:

- All five plots were assessed.
- Access to these plots is easy and can be achieved by vehicle and a short walk.
- Conditions during this monitoring event did not reduce accessibility of the plots.
- Not all plots are not permanently marked, however plot coordinates, and photos from previous years of monitoring were used to confirm correct location of the assessment in 2020.
- The assessors implemented the monitoring using a nested plot around a central 50m transect as follows:
 - One 400m² plot (standard 20m x 20m) was used to assess all the composition (species richness) and structure (percent cover) attributes set out in the BAM Plot – Field Survey Form.
 - One 1000m² (standard 20m x 50m) plot was used to assess the function attributes: number of large trees, stem size class, tree regeneration and length of logs.
 - Five 1m² sub-plots are used to assess average litter cover (and other optional groundcover components) for the plot.

Figure 2-2: Nested plot layout (20x20m = composition and structure plot, 20x50m = function attribute assessment plot, 1x1m = litter cover plot)



2.2.1 Composition

- Assessment of composition was based on the number of native plant species (richness) observed and recorded by the assessor within each 20m x 20m plot for each growth form group shown in Table 3 of the NSW Office of Environment & Heritage document Biodiversity Assessment Methodology 2020 (hereafter BAM 2017).
- The assessor allocated each species to one growth form group based on the adult/mature growth form of the species and according to the definitions set out in Appendix 4 of BAM (2020).
- The minimum vegetation survey data recorded by the assessor for composition within each of the five 20m x 20m condition plots was:
 - Scientific name for the three dominant native species within each growth form group. Dominant native species means those native species that contribute most to the total cover of the growth form group.
 - Whether each species is native, exotic or high threat exotic.
 - The growth form group to which each native species has been allocated.
 - The composition of each growth form group was assessed by counting the number of different native plant species recorded within each growth form group within each of the five 20m x 20m condition plots.

2.2.2 Structure

- Structure is the assessment of foliage cover for each growth form group within each of the five 20m x 20m plot boundaries. Foliage cover for a growth form group is the percentage of cover of all living plant material of all individuals of the species present for that group. This includes leaves, twigs, branchlets and branches as well as canopy overhanging the plot even if the stem is outside the plot.
- The assessor recorded an estimate of the foliage cover for each native and exotic species present within the 20m x 20m plot. Foliage cover estimates for each species was drawn from the following number series: 0.1, 0.2, 0.3, 1, 2, 3, 10, 15, 20, 25, 100 per cent.
- The structure of each growth form group for the 20m x 20m plot was recorded by the assessor as the sum of all the individual foliage cover estimates of all native plant species recorded within each growth form group within each Plot.
- The assessor assigned each non-native (exotic) plant species a foliage cover estimate and either E (exotic) or HTE (high threat exotic).

2.2.3 Function

- The number of large trees, tree stem size class, tree regeneration and length of fallen logs was recorded within each 1000m² plot as specified in Paragraph 5.3.4.8 of BAM (2020).
- Tree stem size classes was measured at 1.3m above ground height, referred to as 'diameter at breast height over bark' or DBH.
- Tree stem size classes are: <5, 5–9, 10–19, 20–29, 30–49, 50–79, and 80+ cm DBH and include all species in the tree growth form group.
- Only living trees contributed to counts for determination of presence and for a multi-stemmed tree, only the largest living stem is included in the count for determining the presence or absence of stems within each size class.

- The number of large trees is a count of all living stems with a DBH equal to or greater than the large tree benchmark DBH size for that PCT or vegetation class.
- For a multi-stemmed tree, at least one living stem equal to or greater than the large tree benchmark DBH size to count as a large tree was used.
- Stem size classes were based on the presence or absence of living tree stems within size classes that fall between regenerating stems (<5cm DBH) and the large tree benchmark DBH size(s).
- Regeneration was based on the presence or absence of living trees with stems <5cm DBH.
- The length of fallen logs is the total length in metres of all woody material greater than 10cm in diameter that is dead and entirely or in part on the ground within the 20m x 50m plot. Where logs extend outside of the plot, the assessor only recorded the length of fallen log that is contained within the plot.
- Litter cover is assessed as the average percentage ground cover of litter recorded from five 1m x 1m plots evenly located along the central transect of each plot, specified in Paragraph 5.3.4.8 of BAM (2020).
- Litter cover includes leaves, seeds, twigs, branchlets and branches (<10cm in diameter). The assessment of litter cover included all plant material that was detached from a living plant. Dead material still attached to a living plant (such as a grass) is assessed as litter cover where it is in contact with the ground. Dead material still attached to a living plant that is not in contact with the ground, or litter suspended in the canopies of other plants is not assessed as litter cover. Litter cover was considered as the two-dimensional litter layer and includes litter under the canopies of erect plants.
- The number of trees with hollows was determined by counting the number of trees with hollows that are visible from the ground in the 20m x 50m plot. The number of trees with hollows included native species allocated to the shrub growth form group. It included both living and dead trees.
- The number of trees with hollows did not contribute to the vegetation integrity score. The presence of hollow bearing trees is used as part of the habitat suitability assessment for some threatened species in Chapter 6 of BAM (2020) and for identifying the credit class for biodiversity credits in Chapter 11 of BAM (2020).

3 Results

A list of fauna observed opportunistically during the assessment is provided in Appendix B.

3.1 Preceding rainfall

Average annual rainfall for Dubbo is 552.8 millimeters (Bureau of Meteorology, Table 3-2). Twelve-month rainfall for Dubbo prior to field surveys (September 2019 to August 2020 inclusive) was below the annual average at 480 millimeters (Table 3-1). The monitoring event was undertaken during a time of increased rainfall for NSW.

Table 3-1: Rainfall Dubbo Airport Weather Station

Lat: 32.22° S; Lon: 148.58° E; Elevation: 284m

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2009	3.8	59.0	16.2	57.2	10.0	67.4	25.0	10.0	35.2	54.0	12.8	188.8	539.4
2010	25.6		69.6	62.2	54.6	34.2	64.4	58.4	51.8	54.0	144.0	167.6	786.4
2011	8.6	37.8	49.4	28.4	60.0	11.2	8.4	59.8	81.8	55.4	101.6	74.8	577.2
2012	98.0	118.0	125.0	1.6	85.4	41.6	44.6	9.8	31.6	9.4	38.2	5.4	608.6
2013	63.4	27.8	80.8	0.4	27.0	126.0	23.2	5.4	83.2	5.2	3.0	47.6	493.0
2014	49.8	50.8	142.4	57.8	26.8	57.6	55.6	15.4	15.6	11.6	11.2	77.0	571.6
2015	130.6	31.8	8.4	81.8	47.8	72.2	60.2	39.4	6.8	46.4	66.6	59.6	651.6
2016	122.8	3.2	16.2	25.0	55.4	151.6	105.2	50.4	157.8	56.2	34.0	138.6	916.4
2017	14.8	1.6	223.0	9.4	5.2	9.2	3.0	20.6	5.0	84.6	34.8	54.2	465.4
2018	28.6	2.4	4.0	6.8	13.0	18.6	1.6	36.4	6.8	90.4	68.6	34.4	311.6
2019	64.4	18.4	46.8	0.0	23.4	10.4	6.4	6.8	11.0	1.6	19.4	2.6	211.2
2020	36.0	81.8	145.0		28.8	32.6	82.2	39.0	47.6	60.6			553.6

(Orange fill = below average)

Table 3-2: Rainfall summary statistics for all years (Source: BoM)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	56.1	42.2	63.5	31.4	38.8	48.3	41.5	34.3	41.7	46.2	59.0	58.9	552.8
Lowest	3.8	1.6	4.0	0.0	0.6	4.0	1.6	0.4	0.6	1.2	0.0	2.6	211.2
5th %ile	7.6	2.5	8.6	0.2	4.4	9.5	3.2	3.5	5.4	1.9	4.5	5.4	228.6
10th %ile	9.8	4.3	11.0	0.5	5.1	10.8	5.2	6.1	6.8	2.8	10.8	9.4	311.6
Median	37.4	29.6	37.1	23.5	28.8	35.8	34.1	20.4	33.4	52.3	66.6	47.6	566.0
90th %ile	127.5	80.5	144.2	75.9	81.4	106.5	87.1	67.7	82.5	87.5	106.6	156.0	809.0
95th %ile	148.7	112.6	169.5	84.0	86.5	125.0	101.9	105.4	104.5	104.5	137.2	169.0	851.0
Highest	191.0	218.2	223.0	105.8	102.2	151.6	138.0	151.6	157.8	112.0	181.8	188.8	916.4

3.2 Plot data

3.2.1 Plot results compared to benchmarks for the PCT

The results of processed plot data were compared to PCT benchmark information in the NSW VIS database (BioNet Vegetation Classification). Vegetation and habitat parameters recorded in each plot were compared against benchmarks described by the NSW government for the relevant PCT. In the following tables, green and red shading indicate where the plot does (green) or does not (red) meet 25% of the benchmark value for each attribute in the row for the PCT, and yellow where the plot data meets or exceeds the stated value of the benchmark (above benchmark).

Table 3-3: 2019 Individual plot data and benchmarks for Plot 1 and 2 (PCT267).

PCT267 - White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion				
Class/IBRA: Western Slopes Grassy Woodlands / NSW South Western Slopes				
Attribute	Benchmark value	25% benchmark	Plot 1	Plot 2
Tree Richness	3	0.75	2	2
Shrub Richness	3	0.75	0	1
Grass and Grass Like Richness	8	2	4	6
Forb Richness	9	2.25	9	18
Fern Richness	1	0.25	0	1
Other Richness	1	0.25	1	0
Tree Cover	18	4.5	53	2.1
Shrub Cover	1	0.25	0	0.01
Grass and Grass Like Cover	30	7.5	1.12	50.22
Forb Cover	6	1.5	7.43	7.88
Fern Cover	0	0	0.5	0.01
Other Cover	0	0	0	0
Total length of fallen logs	41	10.25	36	45
Litter Cover	55	13.75	2.2	17.6
Number of Large Trees (>50dbh)	4	1	0	1

Table 3-4: 2019 Individual plot data and benchmarks for Plot 3 (PCT201)

PCT201 - Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion			
Class/IBRA: Western Slopes Grassy Woodlands / NSW South Western Slopes			
Attribute	Benchmark value	25% benchmark	Plot 3
Tree Richness	3	0.75	1
Shrub Richness	3	0.75	2
Grass and Grass Like Richness	8	2	7
Forb Richness	9	2.25	14
Fern Richness	1	0.25	0
Other Richness	1	0.25	0
Tree Cover	18	4.5	10
Shrub Cover	1	0.25	1.10
Grass and Grass Like Cover	30	7.5	78.01
Forb Cover	6	1.5	5.18
Fern Cover	0	0	0
Other Cover	0	0	0
Total length of fallen logs	41	10.25	25
Litter Cover	55	13.75	34
Number of Large Trees (>50dbh)	4	1	4

Table 3-5: 2019 Individual plot data and benchmarks for Plot 4 (PCT76)

PCT76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions			
Class/IBRA: Floodplain Transition Woodlands / NSW South Western Slopes			
Attribute	Benchmark value	25% benchmark	Plot 4
Tree Richness	3	0.75	2
Shrub Richness	5	1.25	0
Grass and Grass Like Richness	7	1.75	4
Forb Richness	11	2.75	8
Fern Richness	1	0.25	1
Other Richness	1	0.25	0
Tree Cover	31	7.75	15.1
Shrub Cover	2	0.5	0
Grass and Grass Like Cover	23	5.75	65.20
Forb Cover	5	1.25	15.6
Fern Cover	0	0	0.1
Other Cover	0	0	0
Total length of fallen logs	49	12.25	34
Litter Cover	65	16.25	40
Number of Large Trees (>50dbh)	3	0.75	4

Table 3-6: 2019 Individual plot data and benchmarks for Plot 5 (PCT270)

PCT270 - White Box - Tumbledown Red Gum - Long-leaved Box shrub/grass woodland on fine-grained sediments of the upper Macquarie River gorge, NSW central western slopes			
Class/IBRA: Western Slopes Dry Sclerophyll Forests / NSW South Western Slopes			
Attribute	Benchmark value	25% benchmark	Plot 5
Tree Richness	5	1.25	3
Shrub Richness	9	2.25	0
Grass and Grass Like Richness	6	1.5	5
Forb Richness	8	2	15
Fern Richness	1	0.25	0
Other Richness	1	0.25	1
Tree Cover	61	15.25	10
Shrub Cover	10	2.5	0
Grass and Grass Like Cover	15	3.75	8.1
Forb Cover	4	1	70.2
Fern Cover	0	0	3
Other Cover	0	0	0
Total length of fallen logs	67	16.75	11
Litter Cover	66	16.5	10
Number of Large Trees (>50dbh)	1	0.25	0

3.2.2 Plot results compared to 2016 plot data

Plot data from this 2020 monitoring event has been compared to the data from 2016 and 2019. Green shaded cells indicate an improvement since 2016 or 2019 (where relevant), red shading indicates a decline, and no shading indicates no change. Note: This comparison may not accurately reflect changes as different methods to collect data were used to assess the 2016 and the 2019 / 2020 plots however data collected under similar collection methodology has been considered. N/A means 2016 data cannot be compared to 2019 and 2020 data.

Table 3-7: Plot results - comparisons

PLOT 1	2016	2019	2020
Native plant species richness	9	15	16
Native over-storey cover (%)	40.5	25	10
Native mid-storey cover (%)	0	N/A	N/A
Native ground cover (grasses) (%)	21.5	10.23	8.1
Native ground cover (shrubs) (%)	N/A	0	0
Native ground cover (other) (%)	N/A	0	0
Number of trees with hollows	0	0	0
Total length of fallen logs (m)	33	36	36

PLOT 2	2016	2019	2020
Native plant species richness	16	18	28
Native over-storey cover (%)	21	2.05	2
Native mid-storey cover (%)	0	N/A	N/A
Native ground cover (grasses) (%)	27.5	52.11	50.22
Native ground cover (shrubs) (%)	N/A	0	0.01
Native ground cover (other) (%)	N/A	0	0
Number of trees with hollows	1	1	1
Total length of fallen logs (m)	16	45	45

PLOT 3	2016	2019	2020
Native plant species richness	24	20	24
Native over-storey cover (%)	41	25	10
Native mid-storey cover (%)	0	N/A	N/A
Native ground cover (grasses) (%)	18.5	41.62	78.01
Native ground cover (shrubs) (%)	N/A	0	1.10
Native ground cover (other) (%)	N/A	0	0
Number of trees with hollows	6	7	1
Total length of fallen logs (m)	11	57	25

PLOT 4	2016	2019	2020
Native plant species richness	15	18	15
Native over-storey cover (%)	34	25	15.1
Native mid-storey cover (%)	0	N/A	N/A
Native ground cover (grasses) (%)	39	37.11	65.2
Native ground cover (shrubs) (%)	N/A	2.06	0
Native ground cover (other) (%)	N/A	0	0
Number of trees with hollows	2	3	3
Total length of fallen logs (m)	12	34	34

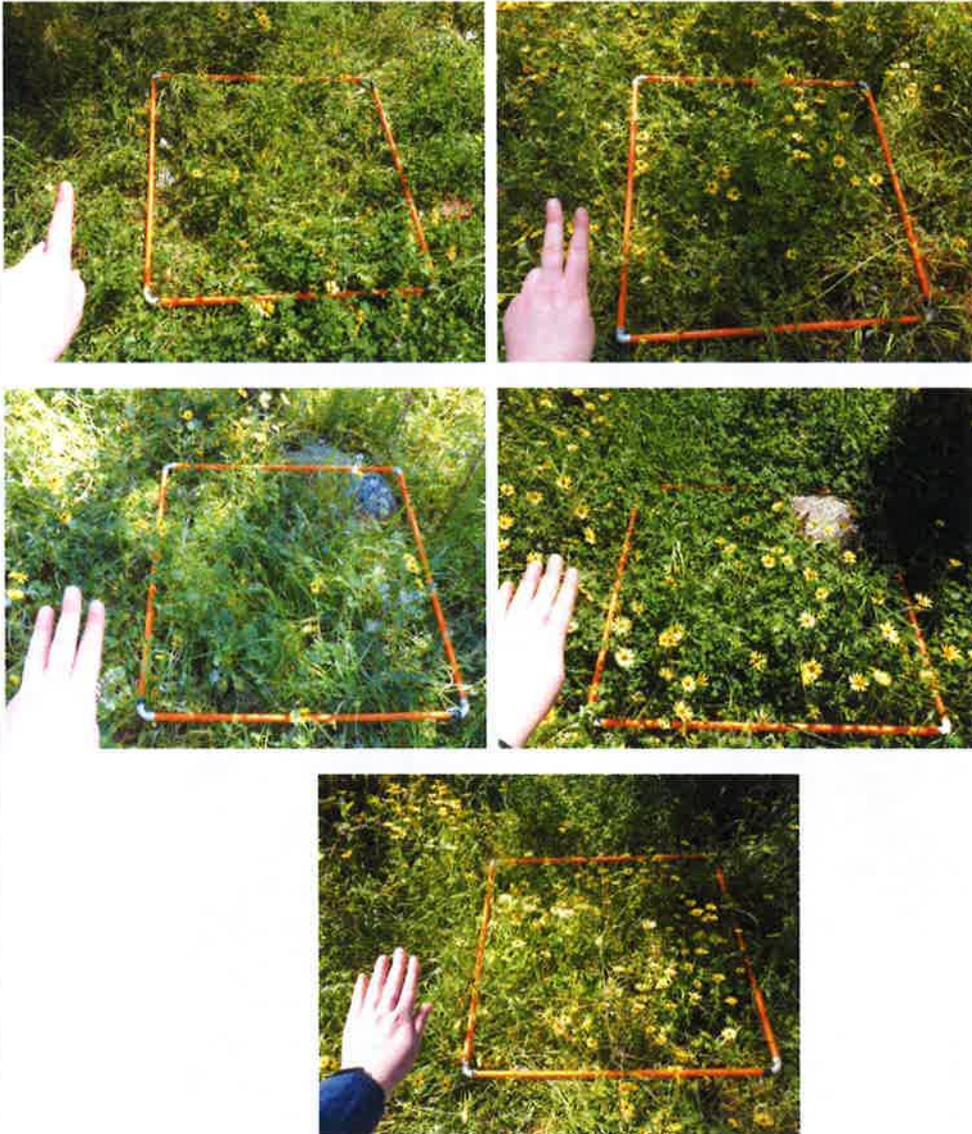
PLOT 5	2016	2019	2020
Native plant species richness	9	11	25
Native over-storey cover (%)	19	18	10
Native mid-storey cover (%)	0	N/A	N/A
Native ground cover (grasses) (%)	38.5	4	8.1
Native ground cover (shrubs) (%)	N/A	0	0
Native ground cover (other) (%)	N/A	0	0
Number of trees with hollows	0	1	2
Total length of fallen logs (m)	0	36	11

3.2.3 Photographic record

Table 3-8: Plot photographs 2020

2020 monitoring	
PLOT 1	
Midline start	
Midline end	No midline end image recorded for 2020

Groundcover quadrats



PLOT 2

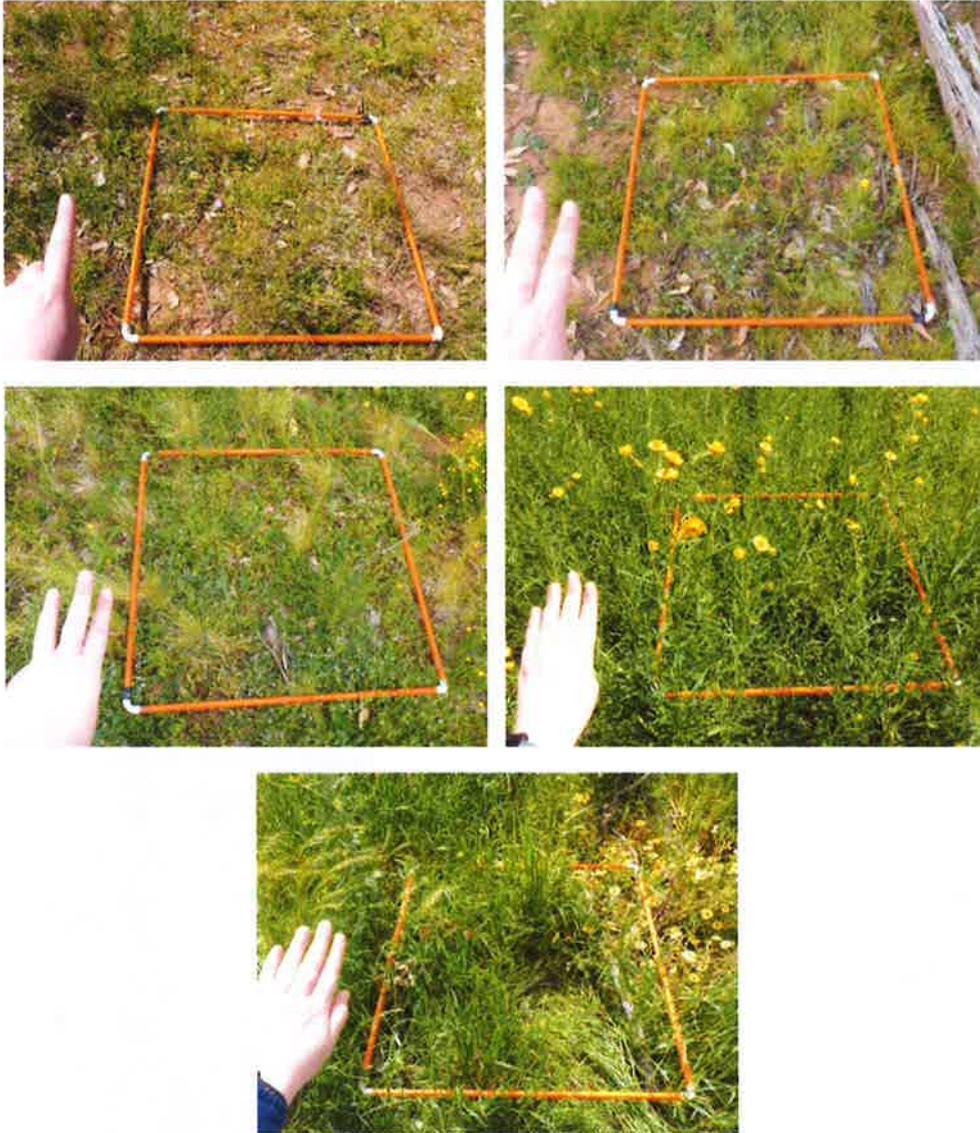
Midline start



Midline end



Groundcover quadrats



PLOT 3

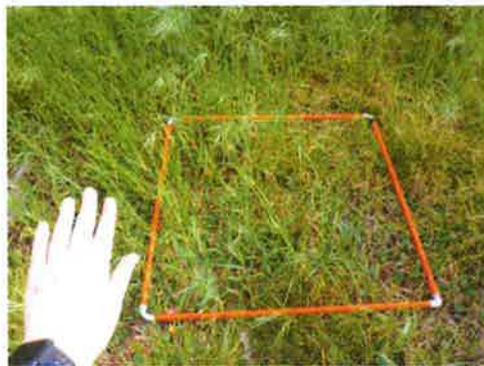
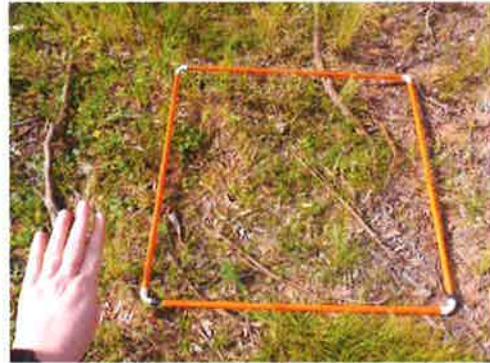
Midline start



Midline end



Groundcover quadrats



PLOT 4

Midline start



Midline end



2020 monitoring

Groundcover quadrats

No ground cover quadrants available due to weather conditions.

PLOT 5

Midline start



Midline end



Groundcover quadrats

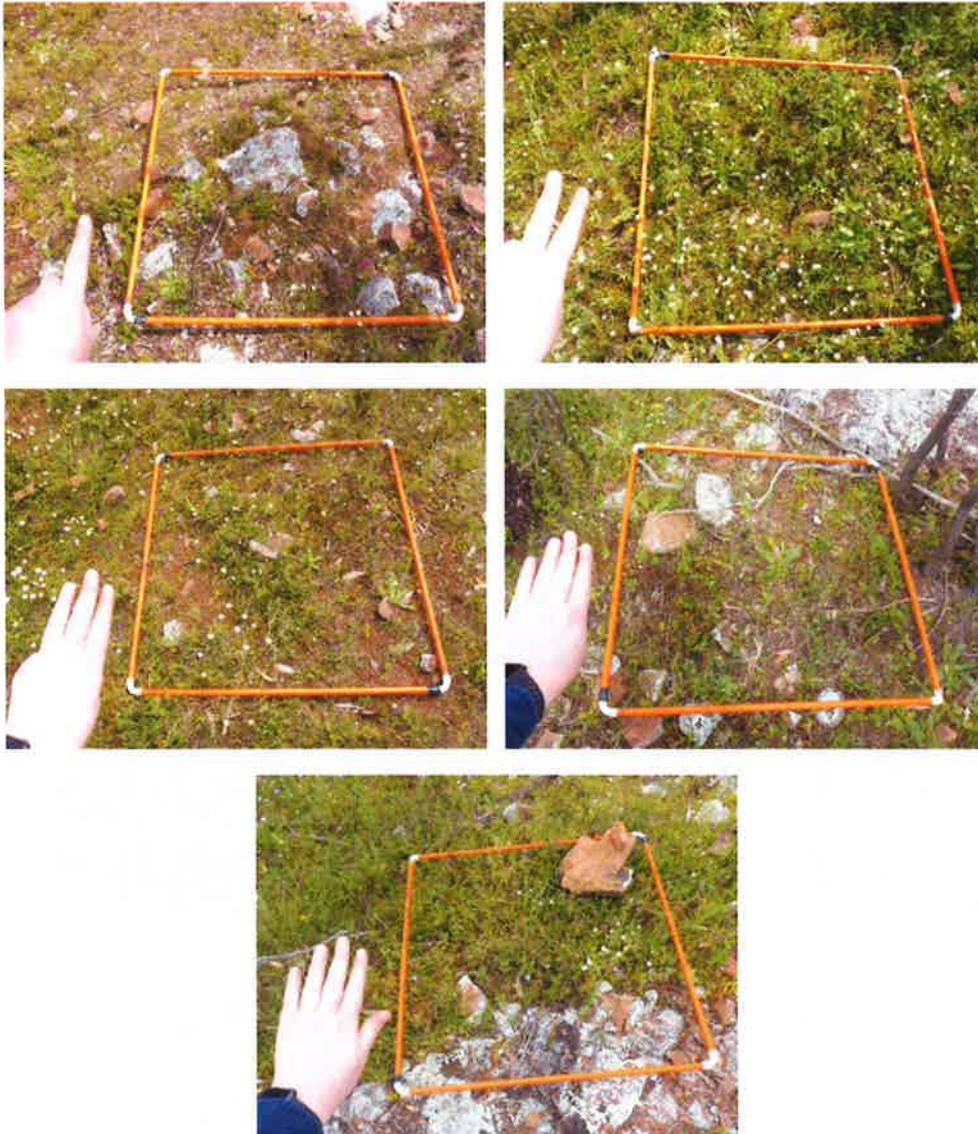


Table 3-9: Photo point comparison

From Biodiversity Management Plan (2016)	Monitoring September 2019	Monitoring September 2020
<p>PLOT 1</p> 		
<p>PLOT 2</p> 		

From Biodiversity Management Plan (2016)	Monitoring September 2019	Monitoring September 2020
<p data-bbox="177 734 252 757">PLOT 3</p> 		
<p data-bbox="359 1115 438 1137">PLOT 4</p> 		

From Biodiversity Management Plan (2016)	Monitoring September 2019	Monitoring September 2020
<p data-bbox="363 712 427 734" style="text-align: center;">PLOT 5</p> 		

3.2.4 BAM calculations

Results from the BAM Calculator are provided in Table 3-10.

Table 3-10: BAM results 2020 data

Plot number	Composition score	Structure score	Function score	Vegetation integrity score
1	65.7	43.7	46.9	51.3
2	79	66.2	61.3	68.4
3	76.7	89.5	58.7	73.9
4	62.7	73.5	67.3	67.7
5	64	21.5	32.1	35.3

These data show:

- The Composition score measures biodiversity.
 - This score represents the number of expected native species within the plot as a per cent of the expected benchmark for the PCT (Note: 100% is a very good example of the PCT).
 - Any score above 25 per cent of the benchmark is considered to be 'within benchmark'.
 - The 2020 composition scores are all above 60 per cent, this means the biodiversity recorded in 2010, despite monitoring occurring not long after a severe prolonged drought is within benchmark.
- A structure score indicates how dense a vegetation type is (canopy species, shrubs, grasses, forbs, ferns other) as a per cent of the expected benchmark for the PCT.
 - The structure scores in Plots 1 to 4 are all within benchmark however Plot 5 is below benchmark.
 - This plot occurs on a rocky hill which has mass tree death (due to thin soils over hard rock) affecting most aspects of the structural score.
- A function score is a proxy for suitable habitat for a suite of native species.
 - The structure score measures diameter of breast height size classes of trees (indicating the age cohorts), presence or absence of regeneration, number of trees with hollows, logs, per cent of leaf litter.
- Vegetation integrity: the condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT. Vegetation integrity score: the quantitative measure of vegetation condition calculated in accordance with Equation 23 or Equation 24.

3.2.5 Weeds

One High Threat Exotic weeds and no Weeds of National Significance were recorded.

High Threat Exotic weeds recoded in the plots were:

- Cobblers Pegg – *Bidens Pilosa*

Exotic species recoded in the plots were:

- Capeweed – *Arctotheca calendula*
- Perrenial Ryegrass – *Lolium perenne*
- Milk Thistle – *Silybum marianum*
- Safron Thistle – *Carthamus lanatus*
- Barrel clover – *Medicago*
- Shivery Grass - *Briza minor*

- Hooves foot clover - *Trifolium arvense*
- Proliferous pink - *Petrorhagia nanteuillii*
- Scarlet pimpernel – *Anagallis arvensis*
- Peppercross - *Lepidium africanum*
- Hedge mustard - *Sisymbrium officinale*
- *Lepidium sp.*
- Mexican poppy - *Argemone ochroleuca*
- Great Brome - *Bromus diandrus*
- Perrenial Ryegrass - *Lolium perenne*
- Burr Medic - *Medicago polymorpha*
- Pattersons Curse – *Echium plantagineum*
- Bindweed – *Convolvulus arvensis*
- Wild Sage - *Salvia verbenaca L.*
- *Medicago sp.*
- Cleavers – *Galium aparin L.*
- Twiggy Mullein – *Verbascum virgatum*
- Barley Grass – *Hordeum glaucum*
- Cough bush - *Cassinia laevis*
- *Weed sp1*

Weed burden is currently high as result of the current increased rainfall in the region.

4 Conclusions

This document addressed monitoring actions in the approved Biodiversity Management Plan shown on Table 4-1.

Table 4-1: Project comments against Development Conditions of Consent

Location	Monitoring action	Frequency	Comment
Control Site and Analogue Sites 1 to 5	BioMetric Vegetation Condition Benchmark	Annual	Monitoring completed – September 2020

All plots recorded parameters which were below benchmark for the Plant Community Type.

- Plot 1 and 5 showed the fewest parameters which were consistent or better than the benchmark (both with five of 15 parameters).
- Plot 2 showed the highest numbers of parameters above the 25 percent benchmark (six of 10 parameters)
- Plot 3 showed the most parameters which were consistent or better than the benchmark (10 of 15 parameters).
- Plot 3 showed the fewest parameters which did not meet the 25 percent benchmark (two of 15 parameters)

The difference in assessment techniques notwithstanding, comparison between the 2016 and 2020 data showed:

- improvement in condition for one or two parameters for all plots
- decline in condition for one or two parameters for all plots
- consistent condition for one or two parameters for all plots.

5 References

- Benson, J. (2009). *New South Wales Vegetation Classification and Assessment, NSWVCA database*. Sydney: NSW DEC.
- BoM. (2016, May 26). *Climate Statistics for Australian Locations: Walgett Council Depot*. Retrieved from http://www.bom.gov.au/climate/averages/tables/cw_052026.shtml
- NSW Department of Primary Industries. (2017a). *NSW WeedWise (online)*. Retrieved from NSW WeedWise (online): <http://weeds.dpi.nsw.gov.au/>
- Department of Planning, Industry and Environment. (2017). *Biodiversity Assessment Methodology*. Sydney: NSW Government.
- Department of Planning, Industry and Environment. (2017). *Vegetation Information System (online)*. Retrieved from Vegetation Information System (online): <http://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx>
- Royal Botanic Gardens and Domain Trust, Sydney (online). (2017). *PlantNET (The NSW Plant Information Network System)*. Retrieved from PlantNET (The NSW Plant Information Network System): <http://plantnet.rbgsyd.nsw.gov.au>
- Thackway, R. a. (1995). *An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program, Version 4.0*. ACT: Australian Nature Conservation Agency.

Appendix A - 2020 BAM Plot sheets

BAM Plot – Field Survey Form

Site Sheet no:

Date 25/02/20		Survey Name ASM Towns; Pine Hill 1		Recorders Phil Cameron, Cath Green	
Zone 55	Datum	IBRA region	Photo #	Zone ID	
Easting 652226	Northing 6405475	Plot Dimensions 20 x 20 in 20 x 50		Orientation of midline from the 0 m point.	
Likely Vegetation Class Western Slopes Grassy Woodlands				Magnetic °	
Plant Community Type PCT 267				EEC:	
				Confidence: H M L	
				Confidence: H M L	

Revised 15/02/2017 and 15/02/2018. The BAM Plot is a standardised format for recording vegetation data. It is designed to be used in a range of environments and is suitable for both field and office use. The BAM Plot is a standardised format for recording vegetation data. It is designed to be used in a range of environments and is suitable for both field and office use.

BAM Attribute (400 m ² plot)	Sum values
Trees	2
Shrubs	0
Grasses etc.	4
Forbs	9
Ferns	1
Other	0
Count of Native Richness	
Trees	53
Shrubs	0
Grasses etc.	1.12
Forbs	7.43
Ferns	0.5
Other	0
Sum of Cover of native vascular plants by growth form group	
Trees	53
Shrubs	0
Grasses etc.	1.12
Forbs	7.43
Ferns	0.5
Other	0
High Threat Weed cover %	0.1

BAM Attribute (20 x 50 m plot)		Stem Classes and Hollows		Record living (Euc*) and living native non-Euc* (Non Euc*) stems separately
dbh	Euc*	Non Euc	Hollows†	
80 + cm	—	—	—	Data needed to populate only (ticks) unless a large tree for that size class.
50 – 79 cm	—	—	—	
30 – 49 cm	—	16	Hollows 20cm+	* includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncaesia</i>
20 – 29 cm	—	15	—	† For hollows record only the presence of a stem (tick) and not the number of stems. Record hollows in the plot (tick) and not the number of hollows. This size class records tree regeneration.
10 – 19 cm	—	✓	—	
6 – 9 cm	—	—	—	
< 5 cm	—	—	—	
Length of logs (m) (≥10 cm diameter, >50 cm in length)			—	total 36

* Record living tree stems in the plot (tick) and not the number of stems. Record hollows in the plot (tick) and not the number of hollows. This size class records tree regeneration. † For hollows record only the presence of a stem (tick) and not the number of stems. Record hollows in the plot (tick) and not the number of hollows. This size class records tree regeneration.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 5 1 0 0	5 2 0 5	—	0 0 20 20 0
Average of the 5 subplots	2.2	1.4	0	8

Litter cover is measured as the percentage of litter on a 1m² area. Bare ground cover is measured as the percentage of bare ground on a 1m² area. Cryptogam cover is measured as the percentage of cryptogams on a 1m² area. Rock cover is measured as the percentage of rock on a 1m² area.

North-south	East-west	Soil texture	Soil depth
Light	Dark	Light	Dark
Shallow	Deep	Light	Dark
Shallow	Deep	Light	Dark

Plot Disturbance	Severity code	Age code	Free Text Section for brief site description	Leaf Litter and end point GPS		
				ID	Easting	Northing
Clearing (inc logging)	2	0				
Cultivation (inc pasture)	—	—				
Soil erosion	—	—				
Firewood / CWD removal	1	0				
Grazing (identify native/stock)	2	0				
Fire damage	—	—				
Storm damage	—	—				

Severity 0=no evidence, 1=light, 2=moderate, 3=severe Age R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet <u> </u> of <u> </u>	Survey Name	Plot Identifier	Recorders
Date <u>25/9/20</u>	<u>ASU Tringa</u>	<u>Plot 1</u>	<u>Phil Cameron & Gail Green</u>

40	BAM Code	GF Code	Scientific name (mandatory) or a suitable substitute if identifying separately from within a survey. Data from here will be used to assign growth form, height and cover.	H	E or HTE	Cover	Abund	WETA	WTA	WTA	WTA
1	TG	+	<i>Callitriche flammula</i>	N		50	32	U			25
2	TG	+	<i>Brachycladon populaceus</i> <i>Kuwaitia</i>	N		3	1	U			40
3			<i>Arctostaphylos calendula</i> <i>Capeweed</i>	E		50	75K	L			0.2
4			<i>Lolium perenne</i> <i>Perennial Ryegrass</i>	E		20	75K	L			0.2
5	FG	f	<i>Apium prostratum</i> <i>Native Cellary</i>	N		5	1K	L			0.2
6			<i>Silybum marianum</i> <i>Milk Thistle</i>	E		1	500	L			0.2
7			<i>Canthamus lanatus</i> <i>Sardinian Thistle</i>	E		0.1	10	L			0.2
8	FA	f	<i>Trodium cicutarium</i> <i>Storks Bill</i>	N		2	200	L			0.3
9	AG	s	<i>Austrostipa nodosa</i> <i>Bush Spear Grass</i>	N		1	200	L			0.2
10	EG	s	<i>Chilanthodes sicleri</i> <i>Poison Bush</i>	N		0.5	100	L			0.2
11			<i>Medicago</i> <i>Barrel Clover</i>	E		5	1000	L			0.2
12	FG	f	<i>Dryas octopetala</i> <i>Kidney Wasp</i>	N		0.1	50	L			0.1
13			<i>Dichapogon strictus</i> <i>Chocolate Lily</i>	N		0.01	2	L			0.2
14			<i>Biza minor</i> <i>Slimy Grass</i>	E		0.01	2	L			0.2
15			<i>T. folium arvense</i> <i>Heave-foot Clover</i>	E		2	1000	L			0.2
16	FG	f	<i>Cassia repens</i> <i>Australian Stereocarp</i>	N		0.1	100	L			0.1
17	FG	f	<i>Glycine clandestina</i>	N		0.01	100	L			0.1
18	GG	s	<i>Styphelopsis mitchelliana</i> <i>Mulga Mitchell</i>	N		0.01	10	L			0.2
19	GG	s	<i>Panicum effusum</i> <i>Hairy Panic</i>	N		0.01	10	L			0.2
20	FG	sf	<i>Dichapogon strictus</i> <i>modelling Chocolate Lily</i>	N		0.01	10	L			0.2
21			<i>Bidens pilosa</i> <i>Golden Top</i>	HTE		0.1	100	L			0.3
22	FH	f	<i>Oxalis stricta</i>	N		0.1	100	L			0.2
23			<i>Pterorhagia unguiculata</i> <i>Purple Pink</i>	E		0.1	50	L			0.2
24			<i>Halimolobos unguiculata</i> <i>Scarlet Pimpernel</i>	E		0.1	50	L			0.2
25	FC	f	<i>Erodium cicutarium</i>	N		0.1	10	L			0.2
26	GG	s	<i>Aristida lanosa</i>	N		0.1	10	L			0.3
27			<i>Lepidium africanum</i> <i>Peppercorn</i>	E		0.1	10	L			0.2
28	FC	f	<i>Crotalaria hirsutula</i> <i>Bunga Flea</i>	N		0.01	10	L			0.2
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.
 Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
 Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.
 Form version designed 15 September 2017

0.07 - covered
 Callitriche x 5

Printed 30 July 2020

BAM Plot – Field Survey Form

Site Sheet no:

Date <u>23/09/20</u>		Survey Name <u>Acacia Youngs</u>	Plot Identifier <u>2</u>	Recorders <u>Phil Canavan & A Green</u>	
Zone <u>55</u>	Datum	IBRA region	Photo #	Zone ID	
Easting <u>652663</u>	Northing <u>6406659</u>	Plot Dimensions	20 x 20 in 20 x 50	Orientation of midline from the 0 m point.	Magnetic °
Likely Vegetation Class <u>Western Slopes Grassy Woodlands</u>					Confidence: H M L
Plant Community Type <u>White box PC1-267</u>					EEC: H M L

BAM Attribute (400 m ² plot)	Sum values
Trees	2
Shrubs	1
Grasses etc.	6
Forbs	18
Ferns	1
Other	0
Count of Native Richness	
Trees	2.1
Shrubs	0.01
Grasses etc.	50.22
Forbs	7.88
Ferns	0.01
Other	0
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover % <u>0</u>	

BAM Attribute (20 x 50 m plot)		Stem Classes and Hollows		Record living woody† (Euc) and living native non-woody†. This Eucy alone separately.
dbh	Euc*	Non Euc	Hollows†	
80 + cm				1
50 – 79 cm	1	1		
30 – 49 cm			Hollows 20cm+	
20 – 29 cm	1	1		
10 – 19 cm				
5 – 9 cm				
< 5 cm	✓	1		This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)			45	total 45

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	4 0 3 0 1 5 1 2	2 0 2 0 5 0 0	0 1 1 0 0	
Average of the 5 subplots	17.6	9	0.4	0

Mortality			
Life			
Abundance			
Other			

Plot Disturbance Cleaning (inc. logging) Cultivation (inc. pasture) Soil erosion Firewood / CWD removal Grazing (identify native/stock) Fire damage Storm damage	Severity code 0=no evidence, 1=light, 2=moderate, 3=severe	Age code R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)	Free Text Section for brief site description		Leaf Litter and end point GPS		
			ID	Easting	Northing	End point	

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe. Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet of

Survey Name	Plot Identifier	Recorders
ASH TOONGI	2	K. Green G. Green

Date 25/09/20

GF Code	Site	Species Name	Common Name	Life Form	Cover (%)	Abund.	Dist. (m)	Notes	Plot
1	TG	+	<i>Eucalyptus albens</i>	white box	~	2	7	U	2.5
2	GL	g	<i>Austrostipa scabra</i>	Rough Spargrass	~	40	50k	L	0.2
3	GL	g	<i>Aust. da. ramosa</i>	Purple wiregrass	~	10	50k	L	0.2
4	TG	z	<i>Calathea glaucophylla</i>	white cyprus, etc	~	0.1	20	U	1.5
5	FL	f	<i>Sida acuta</i>		~	0.01	10	L	0.1
6	FG	f	<i>Emilia nutans</i>	limp f	~	0.1	20	L	0.1
7	GL	s	<i>Panicum effusum</i>		+	0.1	5	L	0.3
8	FL	f	<i>V. Haden. cincta</i>		~	0.01	100	L	0.2
9	FL	f	<i>Calat. hispida</i>		~	0.1	100	L	0.2
10	FL	f	<i>Emilia nutans</i>		~	0.1	50	L	0.2
11	FL	f	<i>Goodenia hederacea</i>		+	0.01	10	L	0.2
12	FL	f	<i>Chaetochloa australensis</i>		~	0.01	10	L	0.3
13	FL	f	<i>Calat. lappacea</i>		~	0.1	100	L	0.1
14	GL	g	<i>Cyperaceae</i>		~	0.1	100	L	0.2
15	FL	f	<i>Xerochrysum bracteatum</i>	Golden Everlasting Daisy	~	5	200	L	0.2
16	FL	f	<i>Leucocorympha albicans</i>	White Scab Daisy	~	2	50	L	0.3
17	FL	f	<i>Dianella caerulea</i>	Blue flax lily	~	0.01	5	L	0.3
18	FL	f	<i>Apium Prostratum</i>	Native cellery	~	0.1	50	L	0.3
19	FL	f	<i>Crassula sieberiana</i>	Australian sp. crop	+	0.1	100	L	0.1
20	SL	s	<i>Dodonaea</i>	wedge leaf prop bush	~	0.01	1	M	0.2
21	FL	f	<i>Brachycome sp.</i>	Daisy sp. B. (imp. sp.)	~	0.1	100	L	0.1
22	FL	f	<i>Erodium cicutarium</i>	Stork's bill	~	0.1	20	L	0.3
23	—	—	<i>Arctotheca calendula</i>	Cape weed	E	0.01	20	L	0.2
24	GL	s	<i>Rhynchospora</i>		N	0.1	10	L	0.2
25	FL	f	<i>Chelidonium majus</i>	Blue bell	N	0.01	50	L	0.2
26	GL	s	<i>Aristida behriana</i>	Bush wire grass	N	0.01	10	L	0.1
27	—	—	<i>Lactuca maritima</i>	Milk thistle	G	0.01	50	L	0.2
28	FL	f	<i>Bulbine bulbosa</i>	Bulbine lily	N	0.01	10	L	0.2
29	FL	f	<i>Oxalis chloroides</i>		N	0.01	20	L	0.1
30	—	—	<i>Sisymbrium</i>	Hedge mustard	E	0.01	5	L	0.2
31	—	—	<i>Lepidium sp.</i>		E	0.01	5	L	0.2
32	—	—	<i>Carthamus lanatus</i>	Saffron Thistle	G	0.01	10	L	0.2
33	FL	f	<i>Rumex crispus</i>		N	0.01	5	L	0.2
34	—	—	<i>Argemone ochroleuca</i>	Americ. Poppy	E	0.01	5	L	0.2
35	—	—	<i>Trifolium arvense</i>	Horseshoe clover	E	0.1	20	L	0.2
36									
37									
38									
39									
40									

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.
 Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
 Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

BAM Plot – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
25/9/20		Asm: 200Vag		700m; Hill		And Cameron, Call Green	
Zone	Datum	IBRA region	Photo #	Zone ID			
SS		3					
Easting	Northing	Plot Dimensions		Orientation of midline from the 0 m point.		Magnetic °	
648677	6408583	20 x 20 in 20 x 50					
Likely Vegetation Class		Western slopes Grassy woodlands				Confidence:	
Plant Community Type		Pct 201				H M L	
		EEC:				Confidence	
						H M L	

Recorders should complete this form together with the plot sheet. The data on this sheet will be used to generate a BAM plot sheet. The BAM plot sheet will be used to generate a BAM plot sheet. The BAM plot sheet will be used to generate a BAM plot sheet.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	
Trees	1
Shrubs	2
Grasses etc.	7
Forbs	14
Ferns	0
Other	0
Sum of Cover of native vascular plants by growth form group	
Trees	10
Shrubs	1.10
Grasses etc.	78.01
Forbs	5.18
Ferns	0
Other	0
High Threat Weed cover %	5

BAM Attribute (20 x 50 m plot)		Stem Classes and Hollows		Record being analysed? (Euc?) and being native non-Eucalypt? (Non Euc?) items separately.
dbh	Euc*	Non Euc	Hollows†	
80 + cm	-	-	1	Data entered is prescriptive only (do not include a large tree for that size class).
50 - 79 cm	4	-		
30 - 49 cm	-	-	Hollows 20cm+	* includes all species of Eucalyptus, Casuarina, Acacia, and other species and Syncaesia
20 - 29 cm	-	-	2	† If hollows count is 0, the presence of a stem is not recorded.
10 - 19 cm	-	-		‡ This hollow count is only for trees with a diameter of 10 cm or more. This hollow count may be a good indicator of tree regeneration.
5 - 9 cm	-	-		
< 5 cm	-	-		This size class records tree regeneration.
Length of logs (m) (≥10 cm diameter, >50 cm in length)				total
				25

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	50 30 10 10 20	10 10 0 20 0		
Average of the 5 subplots	34	5	0	0

Litter cover is assessed as the average of five 1m x 1m subplots. The subplots are randomly placed within the plot. The subplots are randomly placed within the plot. The subplots are randomly placed within the plot.

Disturbance	Severity	Age	Free Text Section for brief site description	Leaf Litter and end point GPS
Clearing (inc. logging)	1	O		ID Easting Northing
Cultivation (inc. pasture)	-	-		End point
Soil erosion	-	-		
Firewood / CWD removal	2	R		
Grazing (identify native/stock)	-	-		
Fire damage	-	-		
Storm damage	-	-		

Plot Disturbance	Severity code	Age code	Free Text Section for brief site description	Leaf Litter and end point GPS
Clearing (inc. logging)	1	O		ID Easting Northing
Cultivation (inc. pasture)	-	-		End point
Soil erosion	-	-		
Firewood / CWD removal	2	R		
Grazing (identify native/stock)	-	-		
Fire damage	-	-		
Storm damage	-	-		

Severity 0=no evidence, 1=light, 2=moderate, 3=severe Age R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet of

Date	Survey Name	Plot Identifier	Recorders
__/__/__		7600011113	Phil C & Graham G

GF Code	Form	Species Name	Common Name	N/E/HTE	Cover	Abund	Fruct	Fls	Stems
TG	f	Eucalyptus camera	Fussy tree	N	10	1	U	-	2.0
GH	G	Bromus hordeus	Great brome	E	60	100	L	-	1m
GH	G	Austrostipa verticillata		N	5	100	L	-	1m
GH	G	Austrostipa decumbens	Rippled-stem	N	5	200	L	-	1m
		Lolium perenne	Perennial Ryegrass	E	10	200	L	-	0.8
		Mitella sp	Rice-flower	E	10	400	L	-	0.2
		Bidens pilosa	Climbing Pig	HTE	5	100	L	-	0.2
FG	f	Calceolaria	Yellow Pig Daisy	N	2	100	L	-	0.2
GH	G	Austrostipa	Rippled-stem	N	5	100	L	-	0.2
GH	G	Eragrostis	Woolly-headed	N	1	100	L	-	0.2
FG	f	Calceolaria	Rippled-stem	N	0.5	50	L	-	0.2
FG	f	Eragrostis		N	0.5	50	L	-	0.2
		Trifolium arvense	Woodsford Clover	E	0.1	50	L	-	0.2
FG	f	Vitadonia	Fuchsia	N	0.1	50	L	-	0.2
		Cheilanthes	Pale-flowered	E	0.1	50	L	-	0.2
		Silybum marianum	Milk Thistle	E	0.1	50	L	-	0.2
		Convolvulus arvensis	Bindweed	E	0.01	10	L	-	0.2
FG	f	Belline bulbosa		N	0.01	10	L	-	0.1
FG	f	Dichondra repens	Kidney Weed	N	0.01	10	L	-	0.1
FG	f	Hydrocotyle laxiflora	Stinking Pennywort	N	0.01	10	L	-	0.1
FG	f	Microseris debilis	Winter Apple	N	0.01	2	L	-	0.1
GH	G	Dianella revoluta		N	0.01	2	L	-	0.1
GH	G	Atriplex nummularia	Delicious Saltbush	N	0.01	2	L	-	0.1
		Urtica		E	0.01	2	L	-	0.1
		Urtica		E	1	2	L	-	0.1
		Galium aparine	Claytonia	E	1	2	L	-	0.1
FG	f	Eragrostis	Shadebill	N	1	50	M	-	0.1
GH	G	Austrostipa		N	1	10	L	-	0.1
		Verbascum virgatum	Tricky Mullein	E	1	10	L	-	0.1
FG	f	Acrocalymma	Forest Creeper	N	1	10	L	-	0.1
FG	f	Helianthus	Golden Tassel	N	0.01	50	L	-	0.2
FG	f	Sida		N	0.01	2	L	-	0.1
GH	G	Cyperus	Card	N	2	100	L	-	0.1
FG	f	Chytone		N	0.01	1	L	-	0.1
FG	f	Commelina cyanea	Scurvyweed	N	0.01	1	L	-	0.1

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.
 Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
 Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Plot – Field Survey Form

Site Sheet no:

Date 25.1.2020		Survey Name Pymadingi	Plot Identifier 4 sub	Recorders Phil Gordon, Galina Greer	
Zone 55	Datum	IBRA region	Photo #	Zone ID	
Easting 648032	Northing 6407720	Plot Dimensions 20 x 20 in 20 x 50	Orientation of midline from the 0 m point.	Magnetic °	
Likely Vegetation Class Floodplain Transition woodlands				Confidence H M L	
Plant Community Type PCT-76				Confidence H M L	
				EEC:	

Recorded using an automatic data logger. The data logger is a small device that records data from sensors and stores it on a memory card. It is connected to a computer and the data is transferred to a spreadsheet. The data logger is used to record the following data: Time, Temperature, Humidity, Light, and Soil Moisture.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	
Trees	2
Shrubs	0
Grasses etc.	4
Forbs	8
Ferns	1
Other	0
Sum of Cover of native vascular plants by growth form group	
Trees	15.1
Shrubs	0
Grasses etc.	65.2
Forbs	15.6
Ferns	0.1
Other	0
High Threat Weed cover %	0

BAM Attribute (20 x 50 m plot)		Stem Classes and Hollows		Recent living canopy (Euc) and living native non-canopy (Non Euc) stems separately
dbh	Euc*	Non Euc	Hollows†	
80 + cm	2	—	3	Data recorded presence only (tick) unless a large tree for that class.
50 – 79 cm	2	—		
30 – 49 cm	3	—	Hollows 20cm+	* Includes all species of Eucalyptus, Corymbia, Angophora, Lophocorymbus and Symphyca.
20 – 29 cm	—	—	0	† Non-hollows record stems presence of a stem (tick) unless a large tree for that class.
10 – 19 cm	—	—		
5 – 9 cm	—	—		
< 5 cm	—	—	This size class records tree regeneration	
Length of logs (m) (>10 cm diameter, >50 cm in length)		—		total 34

* Includes all species of Eucalyptus, Corymbia, Angophora, Lophocorymbus and Symphyca. † Non-hollows record stems presence of a stem (tick) unless a large tree for that class. This size class records tree regeneration.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	40, 40, 45, 25, 50	10, 0, 0, 50, 0	—	—
Average of the 5 subplots	40	12	0	0

Plot cover assessment is the measurement of the ground cover of the vegetation. It is measured in terms of the percentage of the ground cover that is covered by the vegetation. The measurement is taken by measuring the area of the ground cover that is covered by the vegetation. The measurement is taken by measuring the area of the ground cover that is covered by the vegetation.

Disturbance	Severity	Age
Clearing (inc logging)		
Cultivation (inc pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Stem damage		

Plot Disturbance Cleaning (inc logging) Cultivation (inc pasture) Soil erosion Firewood / CWD removal Grazing (identify native/stock) Fire damage Stem damage	Severity code 0=no evidence, 1=light, 2=moderate, 3=severe	Age code R=recent (<3yrs), NR=no recent (3-10yrs), O=old (>10yrs)	Free Text Section for brief site description		Leaf Litter and end point GPS		
			ID	Easting	Northing	End point	

Severity 0=no evidence, 1=light, 2=moderate, 3=severe Age R=recent (<3yrs), NR=no recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet <u> </u> of <u> </u>		Survey Name	Plot Identifier	Recorders
Date	25/09/20	Asm Rongosida	4	Phil Cameron, Gabe Cox

	GF Code	GF Date	Plant species name (mandatory) or 3 or 4 quadrants (if 100% cover) (mandatory) (Note: Data from here will be used to assign quadrants from counts and others)	N, E or HTE	Cover	Abund	Stature	Flower	Frug
1	TG	T	<i>Cucurbiturpe diversicaarpa</i>	N	15	5	U	-	30
2	LH	S	<i>Aristostipa verticillata</i>	G	50	250	L	-	0.4
3	FG	L	<i>Calathea lappaceae</i> Yellow lily daisy	N	10	250	L	-	0.2
4	GG	G	<i>Andropogon immanis</i>	N	15	200	L	-	0.3
5	TH	T	<i>Calathea discolorifolia</i>	N	0.1	4	U	-	0.5
6	FL	L	<i>Syntherisma sanguinalis</i>	N	0.1	50	L	-	0.1
7	LH	S	<i>Panicum effusum</i>	N	0.1	25	L	-	0.3
8	FG	L	<i>V. Hedyotis cuneata</i>	N	0.1	100	L	-	0.2
9	FL	L	<i>Calathea hispida</i> - Bagan Flea	N	0.1	100	L	-	0.1
10	FL	L	<i>Enicospiza rufus</i>	N	0.1	20	L	-	0.1
11	FL	L	<i>Gynandropsis baccata</i>	N	0.1	20	L	-	0.1
12	FG	L	<i>Chrysanthemum serotinum</i>	N	0.1	15	L	-	0.2
13	FL	L	<i>Calathea lappacea</i> Yellow lily daisy	N	0.1	20	L	-	0.2
14			<i>Lolium perenne</i> Perennial Rye Grass	E	0.2	120	L	-	0.2
15			<i>Arctostaphylos latifolia</i> Cape heath	E	0.2	200	L	-	0.2
16			<i>Hordeum glaucum</i> Balm Grass	E	0.1	200	L	-	0.2
17	GG	S	<i>Rhynchospora</i> sp	N	0.1	20	L	-	0.2
18	FL	L	<i>Leucochrysum albicans</i> White sunray daisy	N	5	200	L	-	0.1
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
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38									
39									
40									

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.
 Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
 Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

BAM Plot – Field Survey Form

Site Sheet no:

Date 25/1/20		Survey Name Asm Toongi	Plot Identifier 5 Hill	Recorders Phil Cameron, Gail Green	
Zone 55	Datum	IBRA region	Photo #	Zone ID	
Easting 652722	Northing 6407476	Plot Dimensions	20 x 20 in 20 x 50	Orientation of midline from the 0 m point.	Magnetic °
Likely Vegetation Class Western Slopes Dry Sclerophyll Forests					Confidence H M L
Plant Community Type PCT-270					Confidence H M L

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	
Trees	3
Shrubs	0
Grasses etc.	5
Forbs	15
Ferns	1
Other	0
Sum of Cover of native vascular plants by growth form group	
Trees	10
Shrubs	0
Grasses etc.	8.1
Forbs	70.2
Ferns	3
Other	0
High Threat Weed cover %	0

BAM Attribute (20 x 50 m plot)		Stem Classes and Hollows		Record living (Euc*) and living native non-Euc* (Non Euc) stems separately
dbh	Euc*	Non Euc	Hollowst	
80 + cm	—	—	2	Data recorded is precise only (tick) unless a large tree for that size class.
50 – 79 cm	—	—		
30 – 49 cm	2	—	Hollows 20cm+	* include all species of Eucalyptus, Corymba, Acacia, Leptospermum and Symphoricarpos
20 – 29 cm	1	—	—	† This hollows count includes hollows up to 100 cm diameter and 100 cm high. Hollows 100 cm diameter and 100 cm high are recorded as 100 cm diameter and 100 cm high hollows. The hollow count is the sum of all hollows in the plot.
10 – 19 cm	—	✓	—	
6 – 9 cm	—	✓	—	
< 5 cm	✓	✓	—	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)			11	total 11

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	20, 10, 5, 10	10, 0, 20, 2, 2	20, 30, 20, 5, 12	40, 2, 5, 10, 50
Average of the 5 subplots	10	6.8	15.4	21.4

Microbiological	—	—	—
Litter	—	—	—
Soil	—	—	—
Other	—	—	—

Plot Disturbance Clearing (inc. logging) Cultivation (inc. pasture) Soil erosion Firewood / CWD removal Grazing (identify native/stock) Fire damage Storm damage	Severity code 0=none, 1=light, 2=moderate, 3=severe	Age code R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)	Free Text Section for brief site description		Leaf Litter and end point GPS		
			ID	Easting	Northing	End point	

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet <u> </u> of <u> </u>	Survey Name	Plot Identifier	Recorders
Date <u>25/9/20</u>	<u>Asu. Too-yi</u>	<u>Plot B</u>	<u>Phil Cameron, Celia Green</u>

#	BAM Code	GF Code	Species name, vernacular, or Latin name (if identifying name is for identification, survey data may have to be used to confirm - check with records and experts)	Native/Exotic/HTE	Cover	Abundance	Notes	Value	Weight
1	T4	f	Eucalyptus debilata	Tumbledown Gum	N	5	7	U	6
2	T4	f	Casuarina	She oak	N	2	6	U	3
3	T4	f	Cypress glaucophylla	most dead in plot	N	3	5	U	5
4	F4	f	Swainsona	Swainsona	N	5	21k	L	0.1
5	F4	f	Leucochrysum albicans	White Sunray Bisc	N	5	21k	L	0.1
6	F4	f	Xerochrysum bracteatum	Golden Everlasting	N	5	21k	L	0.2
7	F4	f	Apium prostratum	Native celtory	N	15	21k	L	0.2
8	F4	f	Helipterum australe	Common Sunray	N	5	21k	L	0.1
9	F4	f	Chilomenium laevis	Blue bell	N	5	22k	L	0.1
10	F4	f	Bulbine bulbosa	Bulbine	N	1	50	L	0.2
11	F4	f	Calandrinia eremaea	Small purslane	N	20	21k	L	0.1
12	F4	f	Erodium cicutarium	Storksbill	N	1	200	L	0.2
13			Silybum marianum	Milk thistle	E	1	50	L	0.2
14	F4	f	Oxalis chaeodes	Oxalis	N	1	50	L	0.1
15	F4	f	Tricoryne elatior	Yellow Rush-Lily	N	0.1	50	L	0.2
16	G4	g	Tamox	Shrub leaf gum	N	0.1	50	L	0.1
17	F4	f	Crassula sieberiana	Australian stone crop	N	5	21k	L	0.1
18	F4	f	Nyctanthes	Nyctanthes	N	1	20	L	0.2
19			Pisonia	Clay gum	E	0.01	20	L	0.2
20	G4	g	A. glauca	A. glauca	N	5	100	L	0.2
21	G4	g	Thyridolepis mitchelliana	Mitchell Bulb Gum	N	1	100	L	0.2
22	G4	g	Rhynchospora sp.	Rhynchospora	N	1	100	L	0.2
23	F4	f	V. Hadriana	V. Hadriana	N	1	200	L	0.2
24			Trifolium arvense	Red clover	E	3	200	L	0.2
25	EG		Chenopodium	Peppercorn	N	3	300	L	0.2
26			Cassinia laevis	Cough-bush	E	1	50	L	0.2
27	G4	g	Arctostaphylos	Arctostaphylos	N	1	100	L	0.2
28			Arctotheca calendula	Cape weed	E	1	100	L	0.1
29			weed sp	weed sp	E	0.01	100	L	0.2
30			Medicago sp	Medicago	E	0.1	50	L	0.1
31	F4	f	Pterostylis	Budget Greenhood	N	0.1	50	L	0.1
32									
33									
34									
35									
36									
37									
38									
39									
40									

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.
 Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
 Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Appendix B - Observed fauna

Common name	Scientific name
Eastern Rosella	<i>Platycercus eximius</i>
Magpie	<i>Cracticus tibicen</i>
Magpie Lark	<i>Grallina cyanoleuca</i>
Noisy Miner	<i>Manorina melanocephala</i>
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>
Red-rumped Parrot	<i>Psephotus haematonotus</i>
Crested Pigeon	<i>Ocyphaps lophotes</i>
Galah	<i>Eolophus roseicapilla</i>
Australian Hobby	<i>Falco longipennis</i>
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>
Richards Pipit	<i>Anthus richardi</i>

APPENDIX B - Rainfall Data July 2020 - June 2021

**APPENDIX A – Letter Report - Pink-tailed Worm-lizard Monitoring Report - Area
Environmental Consultants & Communication (AREA Aug 2021)**

**Biodiversity Offset Area – Analogue Vegetation Plot Monitoring Spring 2020 (AREA May
2021)**

Dubbo Project		Rainfall 2021											
Date	Jul mm	Aug mm	Sep mm	Oct mm	Nov mm	Dec mm	Jan mm	Feb mm	Mar mm	Apr mm	May mm	Jun mm	Date
1			0.2				10.5						1
2		0.2	0.2	0.2				22.0					2
3		0.2	3.8	0.2			34.5				0.8	41.0	3
4			0.2		7.8						23.6	0.2	4
5						12.0							5
6		0.8											6
7		13.8	0.2					17.5					7
8		1.2		5.6						6.0			8
9		0.4	7.2								0.2		9
10	9.0												10
11	2.4								31.5				11
12	2.2	0.2											12
13	5.6	0.4	0.4					28.5					13
14	0.2	9.2	0.2							3.0			14
15	0.2	5.4											15
16	0.4												16
17	0.2			4.2								12.2	17
18		1.6		0.8								0.2	18
19			0.4							29.0		4.0	19
20		0.8	18.2				7.5			6.0			20
21		0.6	3.8										21
22		4.4	1.4										22
23		0.4		0.4									23
24				17.6						66.0		0.4	24
25			2.2	14.4	3.0					43.5		8.4	25
26				11.4								0.2	26
27													27
28		0.2		15.6							1.0		28
29	33.2		0.2		1.5								29
30	0.2		0.2			37.5							30
31													31
Totals	53.2	40.4	38.6	70.0	12.3	57.0	45.0	78.5	179.0	6.0	25.6	109.0	TOTAL
No.days	9	18	14	8	3	3	2	5	6	1	4	11	84
Cum. total	53.2	93.6	132.2	202.2	214.5	271.5	316.5	395.0	574.0	580.0	605.6	714.6	714.6

0.2 readings may be dew

Raingauge situated at met station on Wychitella

**APPENDIX C – Correspondence between Regulators and Australian Strategic Materials
(Holdings) Ltd**

Mike Sutherland - ASM

From: Resources Regulator <nswresourcesregulator@service-now.com>
Sent: Thursday, 3 September 2020 3:23 PM
To: Mike Sutherland - ASM
Subject: MAAG0008395 | Annual Review Dubbo Project ML1724 SSD 52-51

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Dear Mike Sutherland,

ML 1724 (1992), Annual Environmental Management Report

The Resources Regulator has received the above report lodged in accordance with the annual reporting condition of your mining authorisation(s).

Please note that the annual report may be the subject of a detailed review to ensure compliance with the conditions of your mining authorisation and the provisions of the *Mining Act 1992*.

This may include an inspection of the mining operation by Inspectors from the Resources Regulator.

If you have any questions in relation to this matter, please contact the Resources Regulator on 1300 814 609 option 2 then 5, or simply reply to this email.

Regards

Compliance Coordination

Resources Regulator

516 High Street | Maitland NSW 2320

PO Box 344 HRMC NSW 2310

Telephone: 1300 814 609 (opt 2 then 5)



**Regional
NSW**

The Department of Regional New South Wales acknowledges that it stands on Country which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for Elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.



REVISED: Maintenance of competence requirements for practising certificates

Webinar: 15 September 2020 | [Register here](#)



Ref:MSG0296227_68ci9f3l02U1QloThnC

Mike Sutherland

From: no-reply@majorprojects.planning.nsw.gov.au
Sent: Thursday, 10 June 2021 1:00 PM
To: Mike Sutherland
Cc: Michael.Wood@environment.nsw.gov.au
Subject: Dubbo Project (formerly known as the Dubbo Zirconia Mine) - Annual review 2019/20 - Service Level Agreement

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

The Department has now commenced its detailed assessment of the Annual review 2019/20 for the Dubbo Project (formerly known as the Dubbo Zirconia Mine).

The Department has classified this document as 'Regular'.

The Department may ask for additional information to complete its assessment.

If you have any enquiries, please contact Michael Wood at Michael.Wood@environment.nsw.gov.au.

To sign in to your account click [here](#) or visit the Major Projects Website.

Please do not reply to this email.

Kind regards

The Department of Planning, Industry and Environment



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Industry &
Environment

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This email is intended for the addressee(s) named and may contain confidential and/or privileged information.

If you are not the intended recipient, please notify the sender and then delete it immediately.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL



Mike Sutherland

From: Jennifer Rowe <Jennifer.Rowe@planning.nsw.gov.au>
Sent: Friday, 4 June 2021 2:19 PM
To: Mike Sutherland
Subject: Dubbo Zirconia Project SSD5251 - Overdue Annual Review

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

To Michael

The Department Planning Industry and Environment (Department) has recently reviewed our records and it appears that the Annual Review required under Schedule 5 Condition 4 for the Dubbo Zirconia Project SSD5251 (Consent), covering the period of 1 July 2019 to 30 June 2020, was not submitted to the Department for approval.

This email is to inform you that the Department may investigate this further and you may receive further correspondence in relation to this matter. The Department has concerns that by failing to submit the Annual Review as per the requirements it is potentially in non-compliance with the Consent.

Notwithstanding the information above, it is advised that you submit to the Department by no later than **COB Wednesday 30 June 2021**, all outstanding Annual Reviews, seeking the Secretary's approval as required under Schedule 5 Condition 4 of the Consent. If you are unable to meet this timeframe, please contact me on the details below to discuss an alternate timeframe.

If you have submitted the Annual Review covering the period identified above and/or been granted an extension of time, please provide the correspondence by the same timeframe requested above.

In order for the Department to accept the Annual Reviews they are required to be registered via the major projects website. Details are outlined below on how to do this.

You may not be aware, but the Department upgraded the Major Projects Website as part of its [commitment](#) to improve the timeliness and transparency of its post approval functions.

You are now required to submit all documents and/or requests as required under the conditions of consent or approval, such as compliance reports, incident/non-compliance notifications, annual reviews, independent environmental audits etc, by lodging it on the Major Projects Website.

As part of this upgrade, proponents are requested to submit all [post approval and compliance documents](#) online, via the Major Projects Website.

This will allow you to track the progress of the Department's review against clear benchmarks, consult directly with government agencies using the website, and receive and respond to any requests for additional information online. This will also improve the way the Department can track and report on its post approval functions.

To submit documents on the Major projects Website, you must have an account. If you have not created an account, click 'Sign in' in the top right-hand corner of the [website](#), then click 'Create account'. For detailed instructions on how to create an account, click [here](#).

Once you have an account, simply sign in and select 'Lodge Documents'. For detailed instructions on how to lodge documents, including how to consult with public authorities online, click [here](#).

If you need help creating an account or lodging your document online, please contact our support team at majorprojectssupport@planning.nsw.gov.au.

If you have any further questions, please feel free to contact me on the details below.

Kind regards
Jennifer Rowe
Senior Compliance Officer

Compliance | Department of Planning, Industry and Environment
T 02 4247 1851 | M 0488 988 641 | E jennifer.rowe@planning.nsw.gov.au
PO Box 5475 | Level 2/84 Crown Street Wollongong, NSW 2500
www.dpie.nsw.gov.au



**Planning,
Industry &
Environment**

The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

If you are submitting a compliance document or request as required under the conditions of consent or approval, please note that the Department is no longer accepting lodgement via compliance@planning.nsw.gov.au.

The Department has recently upgraded the Major Projects Website to improve the timeliness and transparency of its post approval and compliance functions. As part of this upgrade, proponents are now requested to submit all post approval and compliance documents online, via the Major Projects Website. To do this, please refer to the instructions available [here](#).



Mr Michael Sutherland
Second Floor, 21 Church Street
Dubbo New South Wales 2830

25/06/2021

**Dubbo Project (formerly known as the Dubbo Zirconia Mine) - Annual review 2019/20
(SSD-5251)**

Dear Mr Sutherland

Reference is made to the Annual Review for the Dubbo Project for the period 1 July 2019 to 30 June 2020, submitted to the Department on 4 June 2021, rather than 30 September 2020 as required under Condition 4 of Schedule 5 of SSD-5251 (the consent) for the Dubbo Zirconia Mine Project.

The Department has reviewed the 2019/20 Annual Review and considers, although the Annual Review was significantly late, it generally satisfies the requirement of the consent. The Department looks forward to reviewing the 2020/21 Annual Review by 30 September 2021. Please note that approval of this Annual Review is not an endorsement of the compliance status of the project.

Also, as per letter dated 27 July 2017, addressed to yourself, you are reminded about Condition 34 of schedule 3 of Development Consent SSD 5251, where the Department requires the lodgement of a Conservation Bond prior to the commencement of any development.

In accordance with Condition 11 of Schedule 5 of the consent, the Applicant is required to make a copy of the documents listed by this condition publicly available on the company website and ensure that these documents are up-to-date. It is requested that the Annual Review is uploaded within one month of the date of this letter.

In respect to the late submission of the 2019/2020 Annual Review the Department has noted this non-compliance in the system and will be taking no further action in respect to this.

Should you need to discuss the above, please contact Michael.Wood@environment.nsw.gov.au as per the details provided above.

Yours sincerely

A handwritten signature in black ink, appearing to read 'K O'Reilly'.

Katrina O'Reilly
Team Leader - Compliance
Compliance
As nominee of the Planning Secretary

