



# **APPIN MINE ANNUAL REVIEW FY22**



## Table of Contents

<b>1. STATEMENT OF COMPLIANCE.....</b>	<b>8</b>
<b>2. INTRODUCTION.....</b>	<b>10</b>
2.1 Background .....	10
2.2 Overview of Operations .....	10
2.3 Mine Contacts .....	11
<b>3. APPROVALS.....</b>	<b>11</b>
<b>4. OPERATIONS SUMMARY .....</b>	<b>13</b>
4.1 Mining.....	13
4.2 Mineral Processing .....	15
4.3 Ore and Product Stockpiles .....	16
4.4 Construction .....	17
4.5 Land Preparation .....	21
4.6 Exploration .....	21
<b>5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW .....</b>	<b>22</b>
<b>6. ENVIRONMENTAL PERFORMANCE .....</b>	<b>25</b>
6.1 Air Pollution .....	25
6.2 Erosion and Sediment .....	29
6.3 Surface Water .....	30
6.4 Contaminated Land .....	48
6.5 Threatened Fauna and Flora .....	49
6.6 Weeds .....	55
6.7 Blasting .....	55
6.8 Operational Noise.....	55
6.9 Visual, Stray Light.....	63
6.10 Aboriginal Heritage.....	63
6.11 Natural Heritage .....	63
6.12 Spontaneous Combustion .....	63
6.13 Bushfire .....	63
6.14 Mine Subsidence .....	64
6.15 Hydrocarbon Contamination .....	79
6.16 Hazardous Material Management.....	79
6.17 Methane Management.....	81
6.18 Public Safety .....	84
6.19 Waste Management .....	85



6.20 North Cliff .....	89
<b>7. WATER MANAGEMENT .....</b>	<b>92</b>
7.1 Water Licences .....	92
7.2 Compensatory Water .....	92
7.3 Groundwater .....	93
7.4 Water Supply and Use .....	94
7.5 Rainfall .....	95
<b>8. REHABILITATION .....</b>	<b>98</b>
8.1 Rehabilitation for the Reporting Period .....	98
8.2 Rehabilitation and Research .....	99
8.3 Further Development of the Final Rehabilitation Plan .....	100
<b>9. COMMUNITY .....</b>	<b>101</b>
9.1 Complaints .....	101
9.2 Community Engagement .....	103
9.3 IMC Community Partnerships Program (CPP) .....	106
<b>10. INDEPENDENT AUDIT .....</b>	<b>107</b>
10.1 Environmental Audits .....	107
10.2 Environmental Risk Register .....	108
<b>11. INCIDENTS, NON-COMPLIANCES AND EXCEEDANCES DURING THE REPORTING PERIOD .....</b>	<b>109</b>
<b>12. ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD .....</b>	<b>111</b>
12.1 Mine Operations .....	111
12.2 Exploration .....	111
12.3 Projects .....	111
12.4 Environmental Management .....	112
<b>13. REFERENCES AND ASSOCIATED DOCUMENTS .....</b>	<b>113</b>
13.1 Acronyms used in Annual Review .....	113
13.2 Management Plans .....	115
<b>14. PLANS .....</b>	<b>117</b>
Plan 1: Regional Location Plan showing Mining Domains .....	118
Plan 2: Appin Shaft and Pit Top Locality Plan .....	119
Plan 3: Site Layout and Monitoring Locations - Appin East Pit Top .....	120
Plan 4: Site Layout and Monitoring Locations - Appin West Pit Top .....	121
Plan 5: Site Layout - Ventilation Shafts No. 1 and 2 .....	122
Plan 6: Site Layout - Ventilation Shaft No. 3 .....	123



Plan 7: Site Layout and Monitoring Locations - Ventilation Shaft No. 6 .....	124
Plan 8: Proposed Site Layout and Monitoring Locations- Ventilation Shaft No. 7 and 8 (AMVA Project).....	125
Plan 9: Site Layout and Monitoring Locations - Appin North Pit Top and WCCPP.....	126
Plan 10: Site Layout and Monitoring Locations- Appin North Pit Top.....	127
Plan 11: Site Layout and Monitoring Locations- WCCPP .....	128
Plan 12: Site Layout - North Cliff Pit Top .....	129
Plan 13: Land Preparation Plan – CWEA.....	130
Plan 14: CWEA Cultural Heritage Sites.....	131
Plan 15: Georges River Stream Features.....	132
Plan 16: Appin Area 7 and 9 Surface Water Monitoring Locations - FY22.....	133
Plan 17: Appin Area 7 and 9 Gas Zones - FY22.....	134
Plan 18: Appin Area 7 and 9 Groundwater Monitoring – FY22 .....	135
Plan 19: Appin Area 7 and 9 Longwall Extraction - FY22 Actual and FY23 Forecast.....	136
Plan 20: Biodiversity Offset Areas .....	137
Plan 21: Appin Exploration Activity - FY22 .....	138
Plan 22: Planned Appin Exploration Activity - FY23 .....	139
<b>15. APPENDICES.....</b>	<b>140</b>
Appendix 1: EPL 2504 Annual Return - 2021/2022 .....	140
Appendix 2: Rehabilitation Cost Estimate.....	141
Appendix 3: Appin Mine Project Approval Condition Compliance Report .....	142
Appendix 4: Independent Environmental Audit Progress - FY22 .....	179
Appendix 5: Community Complaints Report - FY22 .....	188
Appendix 6: Appin Mine Long-Term Environmental Monitoring Data.....	190
Appendix 7: Annual CWEA Rehabilitation Report.....	191
Appendix 8: Annual <i>Persoonia hirsuta</i> Condition Monitoring Report.....	192
Appendix 9: Appin West BioBank Site Annual Report - 2021/2022 .....	193
Appendix 10: Nepean River BioBank Site Annual Report - 2021/2022.....	194
Appendix 11: Cataract River BioBank Site Passive Management Annual Report - 2022 ...	195
Appendix 12: Ventilation Shaft No. 6 Offset Annual Monitoring Report - 2021/2022.....	196
Appendix 13: Ventilation Shaft No. 6 Bush Regeneration Report - 2021/2022 .....	197
Appendix 14: EPBC Approval 2010/5350 Compliance Report - FY22 .....	198
Appendix 15: WaterNSW Special and Controlled Areas Consent (F2020/1545) - Annual Statement of Compliance .....	199



## Figures

Figure 1: RoM production – Appin Mine (in million tonnes per annum [Mtpa]).....	15
Figure 2: PM <sub>10</sub> Maximum 24-hour Moving Average at Appin East PF3.....	27
Figure 3: PM <sub>10</sub> Maximum 24-hour Moving Average at Appin East PF1 .....	27
Figure 4: PM <sub>10</sub> Maximum 24-hour Moving Average at Appin North PF1 .....	28
Figure 5: PM <sub>10</sub> Maximum 24-hour Moving Average at Vent Shaft 6 PF1 .....	28
Figure 6: <i>P. hirsuta</i> condition and population within the Offset during the 2021 Spring monitoring	52
Figure 7: FY22 GHG Emissions - Appin Mine .....	82
Figure 8: FY15 to FY22 GHG Emissions - Appin Mine .....	82
Figure 9: FY19 – FY22 Diversion and Landfill Comparison .....	87
Figure 10: FY22 rainfall data - Menangle (BOM site #68216).....	96
Figure 11: FY15 - FY22 Annual Rainfall - Appin East (AE Mains P28 DustTrak II).....	96
Figure 12: FY12 - FY22 Annual Rainfall - Menangle (BOM site #68216).....	97
Figure 13: FY22 Community Complaints for Appin Mine .....	102
Figure 14: Community complaints from FY13 – FY22 for Appin Mine .....	102



## Tables

Table 1: Annual Review Title Block.....	7
Table 2: Statement of Compliance .....	8
Table 3: Non-compliances .....	9
Table 4: Mine Contacts .....	11
Table 5: Project Approvals associated with Appin Mine .....	11
Table 6: Mining Leases and Licences associated with Appin Mine .....	12
Table 7: Exploration Licences/Authorisations associated with Appin Mine .....	13
Table 8: Area 7 Longwall Start and Finish Dates.....	14
Table 9: Area 9 Longwall Start and Finish Dates.....	14
Table 10: Production Summary.....	15
Table 11: Appin North Stockpiles Capacities.....	16
Table 12: Actions from Previous Annual Review .....	22
Table 13: Appin Mine Air Quality Monitoring Sites and their Function .....	25
Table 14: Fixed optical photometer long-term criteria.....	26
Table 15: Fixed optical photometer short-term criteria .....	26
Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine .....	32
Table 17: Summary of Compliance with EPL Discharge Volume Limits Across Appin Mine.....	44
Table 18: Noise Survey Points and Results .....	57
Table 19: Predicted vs Observed Impacts for Landscape Features for Area 7 and Area 9.....	67
Table 20: Predicted vs Observed Impacts for Aquatic Ecology for AA7.....	70
Table 21: Predicted vs Observed Impacts for Aquatic Ecology for AA9.....	70
Table 22: Predicted vs Observed Impacts for Terrestrial Ecology for AA7 and AA9.....	71
Table 23: Predicted vs Observed Impacts for Surface Infrastructure for Area 7 .....	74
Table 24: Predicted vs Observed Impacts for Surface Infrastructure for Area 9 .....	75
Table 25: Predicted vs Observed Impacts for Landscape Features for Area 5 .....	76
Table 26: Predicted vs Observed Impacts for Surface Water for Area 5.....	76
Table 27: Predicted vs Observed Impacts for Aquatic Ecology for Area 5.....	78
Table 28: Predicted vs Observed Impacts for Terrestrial Ecology for Area 5.....	78
Table 29: Summary of Dangerous Goods Storage at manifest quantities - Appin West .....	79
Table 30: Summary of Dangerous Goods Storage at manifest quantities - Appin North.....	80
Table 31: Explosives and Detonator Storage – Appin East .....	81
Table 32: Explosives and Detonator Storage – Appin West .....	81
Table 33: Summary of Greenhouse Emissions - Appin Mine .....	82
Table 34: Safety Risks and Control Mechanisms .....	84
Table 35: Main waste streams for Appin Mine.....	85
Table 36: Main waste quantities for Appin Mine .....	86
Table 37: CWEA – Capacity and Status.....	88
Table 38: Water Take – Appin Mine .....	92
Table 39: Compensatory Water – Groundwater Bores .....	93
Table 40: Potable Water Usage for Appin West.....	94
Table 41: Potable Water Usage for Appin East .....	95
Table 42: Water Usage Comparison – Appin North.....	95
Table 43: Rehabilitation Status (Cumulative) .....	99
Table 44: Environmental Audits undertaken during reporting period .....	107
Table 45: Non-compliances during the reporting period .....	109
Table 46: Exceedances of criteria during reporting period.....	109
Table 47: Regulatory action during reporting period.....	110
Table 48: Acronyms used in Annual Review .....	113
Table 49: Management Plans .....	116




**Table 1: Annual Review Title Block**

<b>Name of operation</b>	Appin Mine
<b>Name of operator</b>	South32 Illawarra Metallurgical Coal (IMC)
<b>Project approval #</b>	08_0150
<b>Name of holder of development consent / project approval</b>	Illawarra Coal Holdings Pty Ltd
<b>Mining lease #</b>	CCL 767, CCL 724, CL 388, CL 381, ML 1382, ML 1433, ML 1574, ML 1678, ML 1698, ML 1473, MPL 200, MPL 201
<b>Name of holder of mining lease</b>	Illawarra Coal Holdings Pty Ltd, Endeavour Coal Pty Ltd
<b>Water approvals #</b>	10WA117285, 10WA117999, 10WA103794, 10WA118778, 10WA118766
<b>Name of holder of water approvals</b>	Endeavour Coal Pty Ltd
<b>MOP/RMP start date</b>	1 October 2020
<b>MOP/RMP end date</b>	30 September 2024
<b>Annual Review start date</b>	1 July 2021
<b>Annual Review end date</b>	30 June 2022

**I, Chris Schultz certify that this audit report is a true and accurate record of the compliance status of South32 – Illawarra Metallurgical Coal – Appin Mine for the period 1 July 2021 – 30 June 2022 and that I am authorised to make this statement on behalf of Illawarra Coal Holdings Pty Ltd and Endeavour Coal Pty Ltd.**

*Note.*

- The Annual Review is an 'environmental audit' for the purposes of section 9.39 (2) of the Environmental Planning and Assessment Act 1979. Section 9.42 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.*
- 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).*

<b>Name of authorised reporting officer</b>	Chris Schultz
<b>Title of authorised reporting officer</b>	Superintendent Environment (under Power of Attorney dated 10 February 2021)
<b>Signature of authorised reporting officer</b>	
<b>Date</b>	26 September 2022



## 1. STATEMENT OF COMPLIANCE

**Table 2: Statement of Compliance**

<b>Approval</b>	<b>Purpose</b>	<b>Compliant?</b>
08_0150	Project Approval under Section 75J of the <i>EP&amp;A Act 1979</i> . <sup>1</sup>	No
EPBC 2010/5350	BSO Project Approval under Sections 130(1) and 133 of the <i>EPBC Act 1999</i> .	Yes
EPBC 2010/5722	Appin Mine Ventilation Shaft No. 6 Approval under Sections 130(1) and 133 of the <i>EPBC Act 1999</i> .	Yes
EPL 2504	Environment Protection Licence for Appin Mine	No
<b>WaterNSW Access Consent</b>		
F2020/1545 <sup>2</sup>	Special and Controlled Areas access	Yes
<b>Mining Lease / Sub-Lease</b>		
	<b>Number</b>	
Coal Lease	388	Yes
Mining Lease	1382	Yes
Mining Lease	1433	Yes
Mining Lease	1574	Yes
Mining Lease	1678	Yes
Mining Lease	1698	Yes
Mining Lease	1832 <sup>3</sup>	Yes
Consolidated Coal Lease	724	Yes
Consolidated Coal Lease	767	Yes
Coal Lease	381	Yes
Mining Purposes Lease	200	Yes
Mining Purposes Lease	201	Yes
Mining Lease	1473	Yes
<b>Water Approval / Access Licence</b>		
	<b>Number</b>	
Water Approval	10WA117285 - Mountbatten	Yes
Water Approval	10WA117999 – Brennans Creek Dam	Yes
Water Approval	10WA103794 - Brennans Creek Dam Diversion	Yes
Water Approval	10WA118778 – Appin	Yes
Water Approval	10WA118766 – West Cliff	Yes
Groundwater Access Licence	36481 – West Cliff	Yes
Groundwater Access Licence	36477 – Appin	Yes
Groundwater Access Licence	37464 – Appin	Yes

<sup>1</sup> A notice of Modification under Section 75W of the Environmental Planning and Assessment Act 1979 28 October 2016 incorporated the VS#6 Approval requirements into the Project Approval.

<sup>2</sup> Annual Statement of Compliance provided in Appendix 15.

<sup>3</sup> Mining Lease Application No. 611. Granted 9 August 2022.





Groundwater Access Licence <sup>4</sup>	44376 - Appin	Yes
Surface Water Access Licence	35519 – Brennans Creek Dam	Yes
Surface Water Access Licence	30145 – Mountbatten	Yes

**Table 3: Non-compliances**

Relevant approval	Condition #	Condition description (summary)	Compliance status	Comment	Where addressed in Annual Review
EPL 2504	Condition O1	Plant and equipment to be operated/ maintained in a proper and efficient manner	Non-compliant	Modification to bund identified.	Section 11
PA 08_0150	Condition 12 of Schedule 2				

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: <ul style="list-style-type: none"> <li>potential for serious environmental consequences, but is unlikely to occur; or</li> <li>potential for moderate environmental consequences, but is likely to occur</li> </ul>
Low	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> <li>potential for moderate environmental consequences, but is unlikely to occur; or</li> <li>potential for low environmental consequences, but is likely to occur</li> </ul>
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)

Refer to Section 11 for more detail regarding the non-compliances listed in Table 3.

The predictions and Statement of Commitments from the Bulli Seam Operations (BSO) Project Environmental Assessment (EA) are incorporated into the Appin Mine federal *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* and state *Environmental Planning and Assessment Act 1979 (EP&A Act)* Project Approval conditions. An assessment of compliance with the conditions of these approvals is considered to be an assessment of compliance against the predictions in the EA. An assessment of compliance with the state and federal conditions is provided in:

<sup>4</sup> Issued 8 August 2022.



- Appendix 1: EPL 2504 Annual Return - 2021/2022
- Appendix 3: Appin Mine Project Approval Condition Compliance Report
- Appendix 4: Independent Environmental Audit Progress - FY22
- Appendix 14: EPBC Approval 2010/5350 Compliance Report - FY22

## 2. INTRODUCTION

### 2.1 Background

This Annual Review for Appin Mine details the environment and community performance for the period 1 July 2021 to 30 June 2022, and meets the requirements set out in the *Post approval requirements for State significant mining developments - Annual Review Guideline* (NSW DPE, October 2015).

The Annual Review has been prepared to meet the requirements of Condition 4 of Schedule 6 of the BSO Project Approval 08\_0150 (the Project Approval) and the NSW Resources Regulator requirement to submit an Annual Environmental Management Report (AEMR) under the Mining Leases for Appin Mine.<sup>5</sup>

A copy of the report is publicly available via the IMC website under Bulli Seam Operations Annual Review: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

### 2.2 Overview of Operations

The NSW Government granted approval for the BSO Project in December 2011. The BSO Project combined the Appin Mine and West Cliff Colliery mining operations and provided for the continuation of coal mining operations to 31 December 2041. Appin Mine underground longwall mining operations have transitioned wholly to the Appin Area 9 (AA9) and Appin Area 7 (AA7) mining domains following completion of longwall mining activities at West Cliff in early 2016. The locations of underground mining domains and surface facilities associated with Appin Mine are illustrated in Plan 1 and Plan 2 respectively.

Appin Mine, Cordeaux Colliery and Dendrobium Mine (and associated facilities) collectively operate as South32 Illawarra Metallurgical Coal (IMC).

Appin Mine consists of the merged Appin and Tower Collieries. Appin Mine is owned and operated by Endeavour Coal Pty Ltd, a subsidiary company of Illawarra Coal Holdings Pty Ltd (ICHPL) which is 100% owned by South32 Limited. Appin Colliery (located at Appin) commenced operations in 1962 and Tower Colliery (located at Douglas Park) commenced operation in 1978. The underground infrastructure, roadways, conveyor and ventilation systems were joined in 2003 to become Appin Mine. The original Appin Colliery (now Appin Colliery – East) is located adjacent to Appin Village, approximately 37 kilometres northwest of Wollongong.

Tower Colliery (now Appin Colliery - West) was officially opened in November 1978. Following the sinking of the access and ventilation shafts, underground development of the mine was undertaken from 1978 through to 1988 when longwall operations were introduced. Tower Colliery completed extraction of 20 longwall blocks between 1988 and September 2002. The mine was redeveloped underground to establish mining operations in the current AA7 and AA9 mining domains.

---

<sup>5</sup> The Mining Leases for Appin Mine were renewed in FY23 and there is no longer a requirement for the submission of an AEMR.



Key areas associated with the current Appin operations include the Appin Colliery - East (Appin East) Pit Top site (Plan 3), the Appin Colliery - West (Appin West) Pit Top site (Plan 4), the Appin East No. 1 and No. 2 fan site (Plan 5), the Appin East No. 3 fan site (Plan 6), the Appin West No. 6 fan site and Douglas North Sub-station site (Plan 7) and the Appin Mine Ventilation and Access (AMVA) Project (Ventilation Shafts 7 and 8) site (Plan 8)<sup>6</sup>.

Appin Colliery – North (formerly West Cliff Colliery) and the West Cliff Coal Preparation Plant (WCCPP) is located approximately 26 km northwest of Wollongong, NSW. Appin Colliery - North (Appin North) is operated by Endeavour Coal Pty Ltd.

IMC has conducted underground coal mining operations at Appin North since 1997. Prior to this, Appin North was operated by Kembla Coal and Coke Pty Limited (KCC). Longwall mining at Appin North concluded in early 2016. The last mining area, Area 5, was completed in February 2016 and consists of part of Consolidated Coal Lease (CCL) 767 and Coal Lease 381, which were both transferred from Appin Colliery to Appin North in 1997. Appin North merged with Appin Mine in February 2016.

Key areas of the Appin North site include the Pit Top (Plan 9 and Plan 10), the Coal Wash Emplacement Area (CWEA) (Plan 9) and WCCPP (Plan 11) and the redundant North Cliff Mine site which is surrounded by the Dharawal National Park (Plan 12).

## 2.3 Mine Contacts

The site contacts for Appin Mine are provided in Table 4.

<b>Table 4: Mine Contacts</b>		
<b>Position</b>	<b>Name</b>	<b>Number</b>
General Manager Appin Mine	Andy Hyslop	(02) 4629 4752
Specialist Environment – Appin West and East	Hubert Mhangami	0466 981 434
Specialist Environment – Appin North and WCCPP	Polly Barlow	(02) 4640 4126
Superintendent Environment	Chris Schultz	(02) 4286 3384

## 3. APPROVALS

Table 5, Table 6 and Table 7 describe the Project Approvals, Mining Leases, Licences and Exploration Leases associated with Appin Mine.

<b>Table 5: Project Approvals associated with Appin Mine</b>		
<b>Document</b>	<b>Issue Date</b>	<b>Expiry date</b>
Appin Gas Drainage Project – Initial	Oct 2009	
Appin Gas Drainage Project – 2010	Dec 2010	
Appin Gas Drainage Project – 2012	Feb 2012	
Project Approval (NSW Government)	22 Dec 2011	31 Dec 2041
Project Approval – MOD 1	2 Apr 2015	31 Dec 2041
Project Approval – MOD 2	28 Oct 2016	31 Dec 2041

<sup>6</sup> Approved through MOD 3 in April 2022. No construction commenced in FY23.



Project Approval – MOD 3	12 Apr 2022	31 Dec 2041
Project Approval ( <i>EPBC Act</i> )	15 May 2012	15 May 2042
No. 6 Ventilation Shaft (NSW Government)	4 May 2011	Now Consolidated into Project Approval
No. 6 Ventilation Shaft ( <i>EPBC Act</i> )	1 Apr 2011	1 Apr 2041

**Table 6: Mining Leases and Licences associated with Appin Mine**

Mining Lease / Sub-Lease	Number	Issue Date	Expiry Date
Coal Lease	388	22 Jan 1992	22 Jan 2034
Mining Lease	1382	20 Dec 1995	20 Dec 2037
Mining Lease	1433	24 Jul 1998	23 Jul 2019 <sup>7</sup>
Mining Lease	1574	9 Jul 2008	30 Dec 2023
Mining Lease	1678	27 Sep 2012	26 Sep 2033
Mining Lease	1698	26 Jun 2014	25 Jun 2035
Mining Lease	1832	9 Aug 2022	9 Aug 2043
Consolidated Coal Lease	724	4 Jul 1991	18 Dec 2031
Consolidated Coal Lease	767	29 Oct 1991	8 Jul 2029
Coal Lease	381	24 Oct 1991	24 Oct 2033
Mining Purposes Lease	200	13 Jan 1982	13 Jan 2024
Mining Purposes Lease	201	13 Jan 1982	13 Jan 2024
Mining Lease	1473	20 Nov 2000	19 Nov 2021 <sup>8</sup>
Environment Protection Licence	2504	14 Feb 2001	No expiry
Water Approvals	10WA117999	15 Nov 2012	14 Nov 2027
	10WA103794	1 Jul 2011	30 Jun 2024
	10WA118778	1 Jul 2013	18 Feb 2028
	10WA118766	1 Jul 2013	24 Jun 2028
	10WA117285	15 Nov 2011	14 Nov 2026
Groundwater Access Licence	36481 – West Cliff	N/A	
Groundwater Access Licence	36477 - Appin	N/A	
Groundwater Access Licence	37464 – Appin	N/A	
Groundwater Access Licence	44376 – Appin	N/A	
Surface Water Access Licence	35519 – Brennans Creek Dam	N/A	
Surface Water Access Licence	30145 – Mountbatten	N/A	
Radiation Licence	5061052 – WCCPP/Appin East	26 Jul 2022	26 July 2023
WaterNSW Access Consent	F2020/1545	14 Mar 2020	13 Mar 2025

<sup>7</sup> ML 1433 renewal was applied for on 18 July 2018 and is pending.

<sup>8</sup> ML 1473 renewal was applied for on 16 December 2020 and is pending.



**Table 7: Exploration Licences/Authorisations associated with Appin Mine**

Exploration Licence/Authorisation	Site	Issue Date	Expiry Date
A199	West Cliff	27 Jun 1980	27 Jun 2024
A201	Appin	27 Jun 1980	27 Jun 2024
A248	Appin	13 May 1981	13 May 2026
A306	West Cliff	19 Jul 1983	27 Jun 2024
A312	Appin	10 Aug 1983	10 Aug 2023
A338	Appin	8 Oct 1984	8 Jan 2024
A370	Appin	8 May 1986	27 Jun 2024
A395	Appin	23 Nov 1987	10 Aug 2023
A396	Appin/West Cliff	28 Jun 1988	27 Jun 2024
A397	West Cliff	4 Aug 1987	27 Jun 2024
A432	West Cliff	12 Feb 1991	31 Aug 2023
EL 4470	Appin	5 Jan 1993	5 Jan 2026
EL 8972	Appin	29 Apr 2020	29 Apr 2026

## 4. OPERATIONS SUMMARY

### 4.1 Mining

#### 4.1.1 Longwall Status

Appin Mine underground longwall mining operations have transitioned wholly to AA7 and AA9 following completion of longwall mining activities at Appin North (West Cliff Area 5) in early 2016. Appin Mine extracts coal from the Bulli Seam within the Southern Coalfield. Appin Mine underground longwall mining operations are accessed from three surface locations: Appin North, Appin West and Appin East.

Longwall (LW) 708B commenced mining on 24 April 2020 and had retreated 2260 m, to finish on 3 January 2022. LW709 commenced on 22 February 2022 and as of the end of the reporting period had retreated 601 m with an estimated completion in July 2023.

Extraction of LW904 commenced on 20 May 2021 and had retreated approximately 2026 m as of the end of June. LW904 was completed 9 August 2022.

The start and finish dates for longwalls in the current Appin mining domain are provided in Table 8 and Table 9.



**Table 8: Area 7 Longwall Start and Finish Dates**

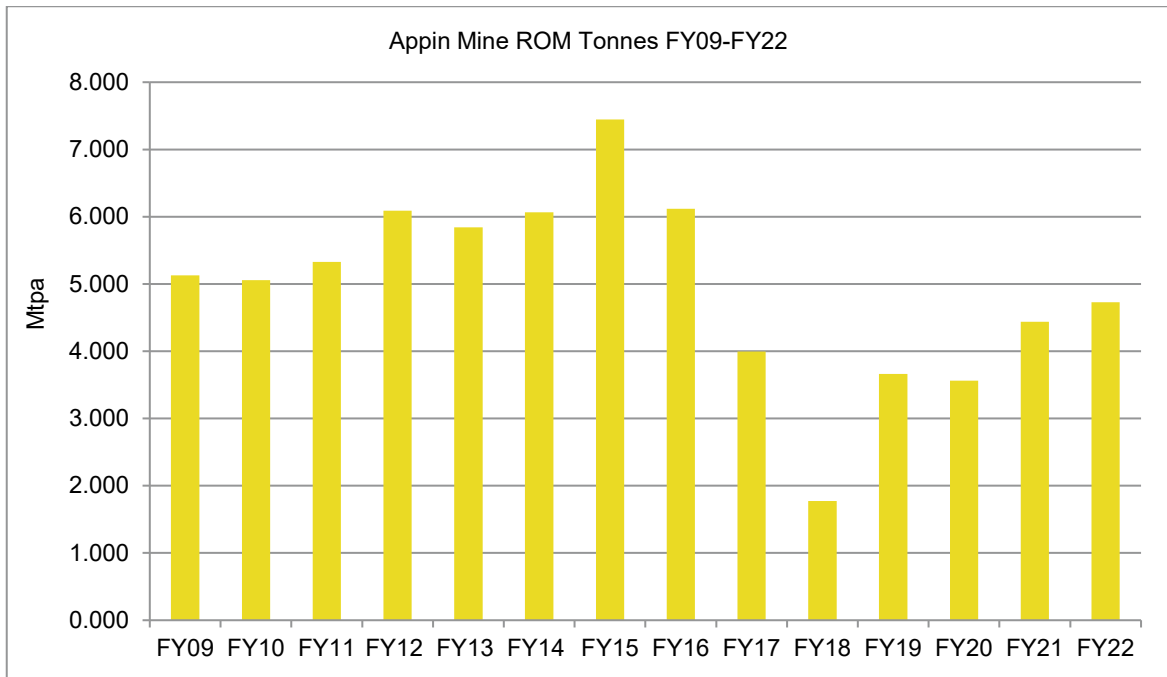
<b>Longwall Number</b>	<b>Start Date</b>	<b>Finish Date</b>
701	27 Oct 2007	9 May 2008
702	18 Sep 2008	20 Apr 2009
703	22 Oct 2009	3 Mar 2011
704	7 May 2011	29 Jul 2012
705	7 Sep 2012	27 Mar 2014
706	23 Apr 2014	28 Nov 2015
707A	7 Jan 2016	16 Aug 2016
707B	26 Sep 2016	19 Jun 2018
708A	2 Apr 2019	20 Oct 2019
708B	24 Apr 2020	3 January 2022
709	22 Feb 2022	Estimated Jul 2023

**Table 9: Area 9 Longwall Start and Finish Dates**

<b>Longwall Number</b>	<b>Start Date</b>	<b>Finish Date</b>
901	19 Jan 2016	8 Aug 2017
902	12 May 2018	3 Apr 2019
903	1 Nov 2019	7 Apr 2021
904	20 May 2021	9 Aug 2022

#### **4.1.2 Longwall Production**

Appin Mine extracted 4.729 million tonnes of Run of Mine (RoM) coal via roadway development and longwall extraction methods for the reporting period, which is a 6.5% increase from the FY21 reporting period. The ROM production levels from FY09 through to the current reporting period are provided in Figure 1.



**Figure 1: RoM production – Appin Mine (in million tonnes per annum [Mtpa])**

The average yield for the reporting period was 82%. The production and waste summary for the reporting period is provided in Table 10.

**Table 10: Production Summary**

	Approval Limit	Previous Reporting Period	This Reporting Period	Next Reporting Period <sup>9</sup>
Waste rock/ Overburden	N/A	N/A	N/A	N/A
RoM Coal/Ore (Mt)	10.5	4.437	4.729	4.541
Coarse Reject (Coal Wash Mt) <sup>10</sup>	N/A	0.736	0.839	0.703
Saleable Product (Mt)	9.3 <sup>11</sup>	3.690	3.900	3.896

## 4.2 Mineral Processing

Mineral processing facilities include the WCCPP, the CWEA and the Dendrobium Coal Preparation Plant (DCPP) (located at the Port Kembla Steelworks). The majority of RoM coal from Appin Mine is

<sup>9</sup> Estimate.

<sup>10</sup> Total processing waste produced at WCCPP for Annual Review period only – does not include coal wash produced at Dendrobium CPP.

<sup>11</sup> Transport Limit.



directed to the WCCPP for processing. The CWEA is used to emplace coal wash from the WCCPP and DCPP (if beneficial reuse options are not available). RoM coal is transported to the WCCPP by:

- coal trucks from the Appin East site, along Appin and Wedderburn Roads; and
- bulk coal winder at Appin North, transported underground from AA7 and AA9.

RoM coal from Appin Mine may also be transported to the DCPP via Mt Ousley on an ‘as required’ basis to maintain work continuity and maintain reduced stockpile sizes at the Appin sites. No coal was transported directly to the DCPP during the reporting period.

Clean coal from the WCCPP is trucked to BlueScope Steel (Port Kembla Steel Works) coal handling facilities or to the Port Kembla Coal Terminal (PKCT) for distribution.

Daily road haulage volumes associated with both the Appin and WCCPP sites is available on the IMC website: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

### 4.3 Ore and Product Stockpiles

No coal is stockpiled at Appin West, as RoM coal is transported underground to Appin East or the WCCPP. The Appin West coal storage bins are currently under care and maintenance.

Appin East has a total raw coal stockpiling capacity of up to 50,000 tonnes. The stockpile is recovered with front-end loaders and transferred directly into the coal haulage trucks for transport by road to either the WCCPP or DCPP.

Appin North operates six primary coal stockpiles for both clean coal and raw coal. The stockpile capacities at Appin North are outlined in Table 11.

**Table 11: Appin North Stockpiles Capacities**

Area	Capacities
No.1 Stockpile	350,000 t nominal capacity – 300,000 t coking coal, 50,000 t Middlings coal
No.2 Stockpile	150,000 t nominal capacity – generally coking coal
No.3 Stockpile	400,000 t nominal capacity – generally coking coal
No.4 Stockpile	450,000 t nominal capacity – generally Appin RoM coal
No.5 Stockpile	70,000 t nominal capacity – generally Appin RoM coal
No.6 Stockpile	30,000 t nominal capacity – generally Appin RoM coal

A Stockpile and Slope Stability Management Plan is in place to manage the stockpile operations. The plan is a framework where the operational risks and controls are documented. Risks associated with the stockpile operations are also detailed in the WCCPP Risk Register, which is reviewed regularly by the site management team to test the effectiveness of controls.

Monitoring and management reviews indicate that the current plan effectively controls all potential stockpile management issues effectively.





## 4.4 Construction

The following construction activities were undertaken during the FY22 reporting period.

### 4.4.1 Appin East Settling Dam Recirculation System

During the reporting period, IMC had identified that a recirculation system was required to reduce the risk of a potential non-compliance with water quality parameters from LDP 19. After treatment via flocculation, settling and filtering methods, if the treated water is determined to be non-compliant with licence conditions, the recirculation system can be initiated until compliance is achieved.

The units were installed and commissioned in July 2021. The set up is shown in Plate 1.



Plate 1: Recirculating valve after Dynasand filter

### 4.4.2 Road Base and Gravel Storage Area

IMC use road base and gravel on unsealed roads and areas to ensure the standard of those roads and areas is acceptable for equipment to operate on. Prior to the FY22 reporting period, gravel and road base was stored in a temporary soil bund near the southwest approved disturbance boundary of the site. IMC constructed a fit for purpose road base and gravel storage area near the main chemicals storage shed to reduce the risk of unauthorised disturbance outside of the approved disturbance boundary.

### 4.4.3 Appin West Warehouse Upgrades

As part of an ongoing initiative to improve environmental standards with respect to chemical and hazardous goods storage, IMC installed an additional 20" self-bunded storage container in May 2022, dedicated to hydrocarbon storage (Plate 2).



**Plate 2: Self Bunded Storage Container**

#### **4.4.4 Water Treatment Plants**

##### **4.4.4.1 Appin North Long-Term Water Treatment Plant (WTP)**

In FY20 IMC committed to the construction of a WTP at Appin North to allow for the treatment of groundwater pumped to the surface from Area 5, in addition to water from the CWEA underdrainage, with the treated water to be directly discharged to Brennans Creek as permeate via LDP 40.

Construction of the WTP began in December 2020 with civil works and the pipeline installation from the WTP to the discharge location. This included the construction of a below ground ~2km pipeline along the Dam Road to the discharge location. Earthworks commenced in March 2021 and the concrete foundations was laid and completed by June 2021. In July 2021 major construction commenced, including the construction of structural plinths and installation of pipe racks, piping and steel tanks. The electrical installation contractor was mobilised in August 2021. All pump sets and poly tanks were installed, and the switch room structure was complete by October 2021. In November 2021 the switch room fit out commenced, with the delivery of Motor Control Centre 2 and the installation of structures completed. The mechanical installation, piping installation and fit out of the switch room was completed in February 2022. The No. 2 shaft and WTP transformers were delivered in July 2022 with electrical installation 75% complete. The installation of a pump system to connect the underdrainage to the WTP was also completed in FY22.

There were significant delays to construction and commissioning due to COVID restrictions, labour shortages, equipment availability, supply chain issues and significant wet weather. An application to vary the date for completion of the WTP in EPL 2504 was submitted in November 2021, and a further application was submitted in July 2022. Energisation and commissioning of the WTP will take place in FY23.

The long-term WTP layout is shown in Plate 3.



**Plate 3: Appin North WTP layout**

#### **4.4.4.2 Appin North Temporary WTP**

A Temporary WTP was commissioned in FY21. Details on this construction can be found in the FY21 Annual Review. The temporary plant has continued to operate over the reporting period, with 175 ML of permeate being produced and discharged to Brennans Creek through LDP 40.

#### **4.4.5 Minor Improvement Projects**

##### **4.4.5.1 General**

The new iAuditor environmental action tracker tool was implemented during the reporting period. The system allows for planned actions to be collated and scheduled to relevant environmental representatives for completion. These actions were previously recorded in a spreadsheet.

##### **4.4.5.2 Appin North**

The following improvement projects were implemented or progressed at Appin North during the reporting period.

- Planning for the upgrade of the Appin North bulk coal winder was ongoing from FY21. It is expected that the project will be completed in FY23.
- The Appin North Waste Sorting Pad was resealed, concreted and extended for greater waste storage and further prevention of runoff.
- A proposed engineering design was submitted over FY22 for an upgrade of the haul road system between the CWEA and the WCCPP at the Appin North site. Construction was planned to commence in FY23, however has since been put on hold and not included as a capital project for FY23.



- A secondary haul road through the current Stage 3 CWEA was constructed during FY22.<sup>12</sup>
- The drill mud pond truck discharging platform was constructed in FY22 on the currently constructed drill mud ponds to achieve adequate stability and increased safety for discharging trucks. The relocation of the drill mud slurry ponds at Appin North was not undertaken during the reporting period. It was identified that additional design work was required and it is planned for them to be relocated in FY23.
- The Brennans Creek Dam (BCD) discharge valves (LDP 10 and LDP 13) were replaced.
- Planning for the Reclaim Sump pump at Brennans Creek Dam was undertaken during the reporting period. The implementation of the pump is planned for FY23.
- A major project is underway for structural review of the 8000 tonne WCCCP product bins to reinstate designed capacity. The design plan continued during the reporting period, with works planned for late FY23 to early FY24.
- Upgrade of the Washery Switchboard "A". This included a new Switch room construction and upgrade that commenced in FY22. The switchboard and transformer upgrades have been completed with commissioning planned for early FY23.
- A Weather Station was installed in Stage 1 of the CWEA. This weather station was funded by the IMC Community Partnerships Program and will provide weather data for the Rural Fire Service (RFS) for fire fighting purposes and provide local data for IMC.
- The installation of a new flow meter at the Appin North Point 16 underdrainage was completed in FY22. The planned installation of an additional meter on the overflow pipe was not completed as the ordered flow meter was used to replace the existing meter at Point 16 following its failure. The overflow pipe has since been inaccessible due to high flows and ground instability following severe wet weather events since March 2022.

#### **4.4.5.3 Appin West**

The following improvement projects were implemented or progressed at Appin West during the reporting period.

- Repairs to the sprinkler system on the unsealed access road were completed. This has resulted in improved dust control.
- The surface water dam perlite filter system was serviced when the filtration process was observed to be underperforming. This system reduces the concentration of suspended solids and nutrients prior to discharge. Performance has since improved.
- Upgrades to underground piping infrastructure at the Appin West WTP and related surface water tanks to resupply treated water to the operations were completed. New pipes were installed that run from the WTP to new surface tanks and from surface tanks to the shaft which feeds the operations treated water.
- The Ventilation Shaft 6 chiller was upgraded to provide better cooling and performance to the ventilation fans at the site.
- The Ventilation Shaft 6 leaking transformer was repaired.

---

<sup>12</sup> Construction was completed in August 2022.



#### **4.4.5.4 Appin East**

The following improvement projects were implemented or progressed at Appin East during the reporting period.

- The first flush system and settling pond clean out was undertaken as silt build up was observed within these areas due to increased turbidity post-rainfall events caused by above average rainfall received in FY22. Runoff from the main Appin East coal trucks haul road reports to the first flush system, where fines settle to the bottom and treated water is discharged. Treated (coagulant and flocculant dosed) water from the Main Appin East Dam reports into the settling pond for further settling prior to the final filter before discharge.
- Potable water leaks under the bathhouse and next to the muster area were repaired.
- Progressed the commissioning of STORM™ settling rate monitor unit at Appin East.
- Cracks around Ventilation Shaft 2 bund were repaired.
- Maintenance plans were developed for solcenic and waste oil pump out.
- The wooden coal stockpile wall was repaired.
- New concrete retaining wall was installed along the stockpile road.

## **4.5 Land Preparation**

### **4.5.1 Mine Safety Gas Drainage**

There were no land preparation works relating to Mine Safety Gas Drainage during the reporting period.

### **4.5.2 Emplacement Operations**

The following works were undertaken during the reporting period at the CWEA:

- establishing growth medium for ~2 ha;
- vegetation clearing of ~2 ha; and
- continued deposition of coal wash.

The rehabilitated emplacement areas were inspected regularly to assess the progress and effectiveness of the rehabilitation. The monitoring program consists of quarterly inspections undertaken by an IMC Environmental representative, which are supplemented by an extensive annual monitoring program. The annual monitoring program was undertaken in Spring FY22. The report is provided in Appendix 7.

## **4.6 Exploration**

During the reporting period, twenty-six (26) boreholes were drilled in the Appin area, including:

- three surface to in-seam (STIS) holes for fault and dyke pick-up close to planned workings;
- two hydrological holes to monitor groundwater parameters proximal to mine workings; and
- twenty-one standard coal exploration boreholes.

In relation to the exploration boreholes:

- ten were drilled in EL8972;
- three were drilled in E 4470;



- five were drilled in A248; and
- three commenced drilling in A370; however wet weather and catchment closures prevented the completion of these holes.

The two hydrological holes and three STIS holes were drilled in A396. These holes were drilled for mining purposes under the mining lease.

The holes drilled under A396 correspond with the location of CCL 767.

Plan 21 shows the location of FY22 boreholes drilled in the Appin area.

All of the exploration borehole sites were subject to a Review of Environmental Factors (REF), with the exception of some of the mining related holes conducted under the mining lease. Landholder negotiations and access agreements were established prior to any exploration activity occurring.

In addition, an aeromagnetic survey was conducted over the Western Exploration Area (WEA) in June 2022.

Exploration site rehabilitation takes place progressively. Some sites have groundwater monitoring instrumentation installed and these sites will be fully remediated at the completion of the monitoring program.

Objectives are agreed with the landowner prior to works commencing. They are guided by the stipulations in the REF document and associated activity approvals prepared for each exploration campaign. Landholder approval of IMC rehabilitation activities (via the ESF2 form) is sought for all exploration occurring across the wider Appin exploration domain.

## 5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Activities identified by IMC in the FY21 Annual Review to be completed in the FY22 reporting period are shown in Table 12.

No actions were identified by regulatory agencies relating to the FY21 Annual Review.

**Table 12: Actions from Previous Annual Review**

Action Required	Requested by	Where covered in this Annual Review
1. Completion of construction of the Appin North Water Treatment Plant	IMC	Section 4.4.3.1
2. Upgrades to underground piping infrastructure at the Appin West WTP and related surface water tanks to resupply treated water to the operations	IMC	Section 4.4.5.3
3. Ventilation Shaft 6 Chiller upgrade project – to provide better cooling and performance to the ventilation fans at the site	IMC	Section 4.4.5.3
4. Upgrade of Appin North bulk coal winder	IMC	Section 4.4.4.2
5. Installation of Appin North Gas Drainage Plant	IMC	Section 4.4.4.2



6. Water leak in Appin East pit top fire-line repaired	IMC	Section 4.4.5.4
7. Completion of commissioning of STORM™ settling rate monitor unit at Appin East	IMC	Section 4.4.5.4
8. Completion of Appin East surface water dosing automation	IMC	Section 4.4.5.4
9. Brennans Creek Dam Surveillance report submitted to Dams Safety Committee	IMC	Section 6.3.2.3
10. Georges River Aquatic Health Monitoring Report prepared and available on South32 Illawarra Coal Documents website	IMC	Section 6.3.3.3
11. Appin East Drainage Line Sediment Review monitoring	IMC	Section 6.4.1.1
12. Installation of pump on reclaim sump at BCD	IMC	Section 4.4.4.2
13. Ventilation Shaft 6 weed management activities will be ongoing	IMC	Section 6.5.2.4
14. Additional Appin North <i>Persoonia hirsuta</i> translocation	IMC	Section 6.5.2.2
15. Vent Shaft No. 6 Offset <i>Pimelea spicata</i> population census	IMC	Section 6.5.2.4
16. Appin East Gas Extraction Plant noise mitigation options investigations	IMC	Section 6.8.2
17. Development of Appin Mine Bushfire Management Plan	IMC	Section 6.13
18. North Cliff rehabilitation investigations, consultation and preliminary approvals to be progressed	IMC	Section 6.20
19. Coal Wash Emplacement Area coal wash sampling to be conducted	IMC	Section 8.2
20. Revised Rehabilitation Management Plan submitted to Resources Regulator	IMC	Section 8.3
21. Installation of a new flow meter at the Appin North Point 16 underdrainage overflow pipe	IMC	Section 4.4.5.2
22. Relocation of drill mud slurry ponds at Appin North	IMC	Section 4.4.4.2
23. Design of a bushfire trial in established rehabilitation in the CWEA to progress relinquishment	IMC	Section 6.17.4
24. Water balance study Stage 2 completion	IMC	Section 8.2



25. BCD LDP 10 and LDP 13 discharge valves will be replaced	IMC	Section 4.4.4.2
26. Continuation of underground operations in Areas 7 and 9	IMC	Section 4.1
27. Continuation of exploration in EL 8972, CCL 767 (A396), A248, and EL 4470	IMC	Section 4.6
28. Decommission WCCPP 8000 tonne product bins	IMC	Section 4.4.5.2
29. Construction of the proposed AVMA project to commence. The construction phases include the installation of infrastructure and equipment required for the operation of ventilation shafts and mine access facilities. Preliminary works, including updates to management plans, will occur in FY22	IMC	Section 2.2
30. Upgrades to the Appin North Waste Sorting Pad	IMC	Section 4.4.4.2
31. Switchyard upgrades at multiple sites and locations across Appin Mine	IMC	Section 4.4.5
32. Construction of a new coal wash haul road at Appin North	IMC	Section 6.19.3
33. Publishing of the 14-day Report from EQUIS	IMC	Section 6.4.1
34. Continue monitoring under the Georges River Aquatic Health Program	IMC	Section 6.3.3.3
35. Undertake phase 3 of the <i>Persoonia hirsuta</i> translocation trials	IMC	Section 6.5.2.2
36. Progress approvals, planning and environmental assessments required to undertake the work described in the GRRP	IMC	Section 6.14.3
37. Continue to progress the current phase of the decarbonisation program	IMC	Section 6.17.4
38. Installation of habitat in the CWEA for the Broad-headed Snake	IMC	Section 6.5.2.1





## 6. ENVIRONMENTAL PERFORMANCE

### 6.1 Air Pollution

#### 6.1.1 Environmental Management

Air quality is managed in accordance with the Appin Mine Air Quality, Greenhouse Gas and Energy Management Plan (AQMP), which details the air quality and emissions control measures for the project, compliance procedures, monitoring programs, evaluation protocols, notification and communication processes.

The AQMP has been prepared to comply with the intent and requirements of Condition 12 of Schedule 4 of the Project Approval.

The AQMP incorporates:

- Use of real-time air quality monitors: fixed and portable Optical Photometers.
- Visual inspections and audits.

Details of air quality monitoring locations for Appin Mine are provided in Table 13.

**Table 13: Appin Mine Air Quality Monitoring Sites and their Function**

Site ID	Location	Parameter	Measurement Method	Frequency	Function
AE-PF1	NE corner of pit top property boundary –  coal stockpile vehicle entry/exit point	Particulate Matter: PM <sub>10</sub>	Real-time Photometer (fixed)	Continuous	Real-time monitoring of dust emissions at the coal stockpile area truck entry/exit point onto public roads  Real-time Operational Control – Stockpile, internal roads and public road dust control measures performance reference monitor
AE-PF3	W corner of Appin East pit top next to the helipad	Particulate Matter: PM <sub>1</sub> , PM <sub>2.5</sub> , PM <sub>4</sub> , PM <sub>10</sub>	Real-time Photometer (fixed)	Continuous	Amenity goal reference  Real Time Operational Control  Site dust control performance reference
W-PF1	Appin North southern property boundary  at the Wedderburn and Appin Road intersection	Particulate Matter: PM <sub>10</sub>	Real-time Photometer (Fixed)	Continuous	Fixed monitor for real-time monitoring of dust emissions at the Wedderburn Road and Appin Road intersection.  Real-time Operational Control – Roadway dust emissions.
VS6-PF1	Ventilation Shaft 6	Particulate Matter: PM <sub>1</sub> , PM <sub>2.5</sub> , PM <sub>4</sub> , PM <sub>10</sub>	Real-time Photometer (fixed)	Continuous	Fixed monitor for real-time monitoring of particulate matter at the Ventilation Shaft 6 site (from the ventilation shaft, Hume Highway and other ambient sources).  Long term trends and general amenity. Not used for assessment of compliance.



## 6.1.2 Environmental Performance

Results of air quality monitoring are reported online every 14 days, in accordance with Section 66 (6) of the *Protection of the Environment Operations (POEO) Act*, and Condition 11 of Schedule 6 of the Project Approval; and on an annual basis to the EPA via the EPA Annual Return (Appendix 1) and in the Annual Review. The 14-day Report is available on the IMC website: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

A comprehensive summary of all air monitoring results for Appin Mine is provided in this section. Graphs of long-term trends are provided in Appendix 6.

IMC use the monitoring results from the optical photometers for comparison with health and amenity criteria. The photometers provide real-time monitoring results which can be easily correlated with site operations and wind direction.

### 6.1.2.1 Real-time Monitoring

The fixed optical photometer (AE-PF3) located at the Appin East Pit Top is used to provide an indication of compliance against both the long-term criteria and short-term criteria for particulate matter (as listed in Table 14 and Table 15).

The optical photometers AE-PF1 (located at the coal haulage exit at Appin East), W-PF1 (located adjacent to Wedderburn Road) and VS6-PF1 (located next to Ventilation Shaft 6) are used to inform operational activities and are not used for assessment of compliance.

As described in the AQMP, alerts from these monitors are sent by text-message to the Specialist Environment and Operational Personnel when levels  $\geq 40 \mu\text{g}/\text{m}^3$  (greater than 80% of the  $\text{PM}_{10}$  criteria) are recorded, to enable the mobilisation of water trucks or road sweepers as required.

The locations of the optical photometers are shown on Plan 3 and Plan 9.

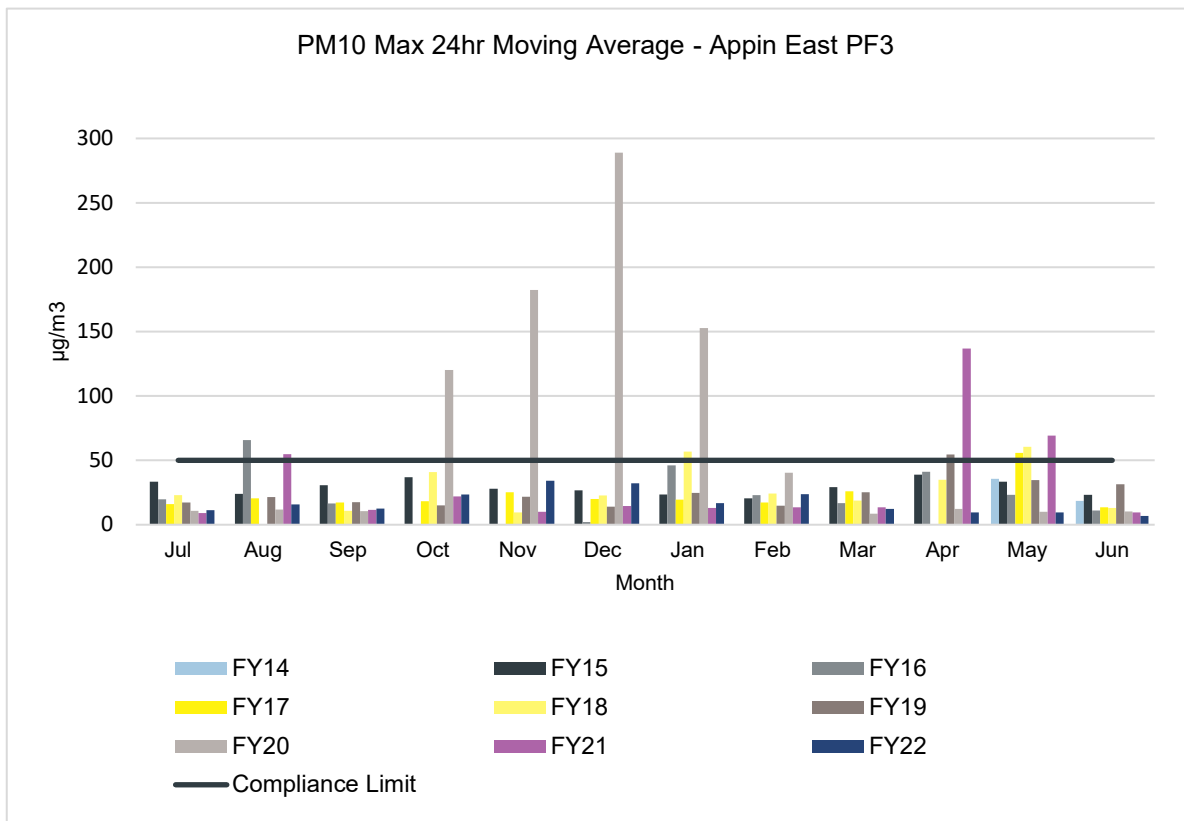
**Table 14: Fixed optical photometer long-term criteria**

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual	90 $\mu\text{g}/\text{m}^3$
Particulate matter <10 $\mu\text{g}$ ( $\text{PM}_{10}$ )	Annual	30 $\mu\text{g}/\text{m}^3$

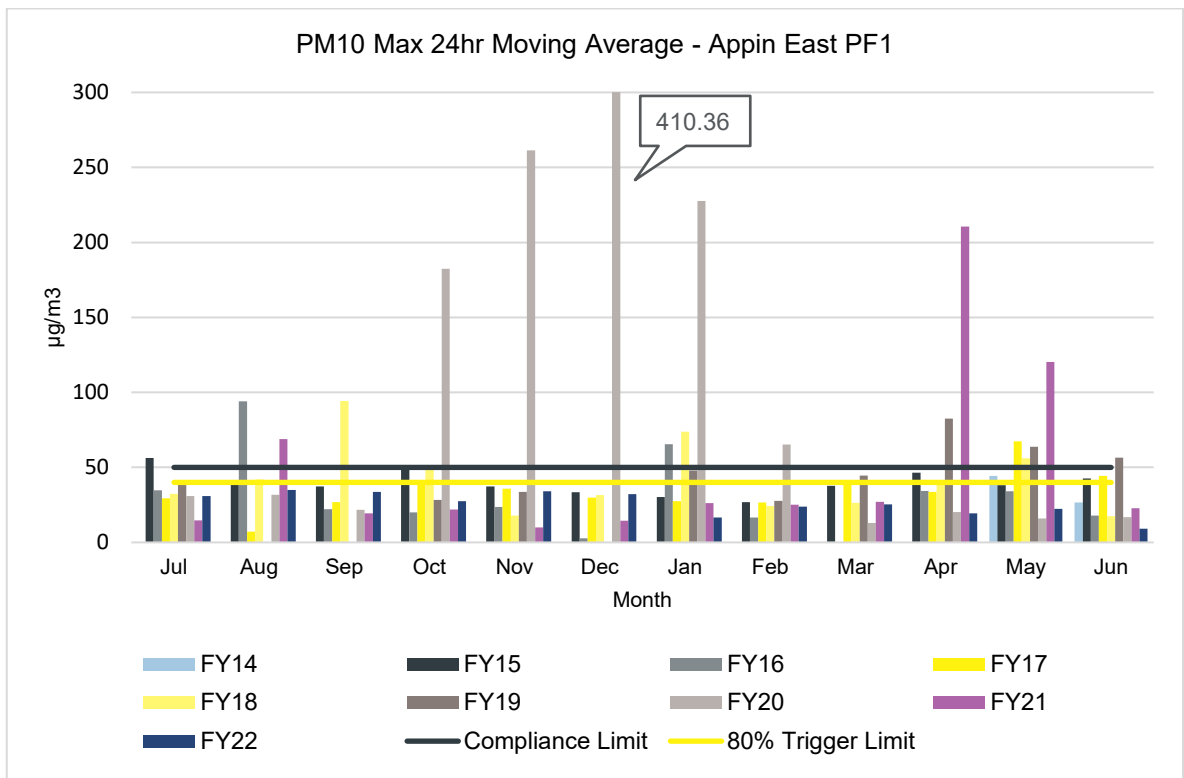
**Table 15: Fixed optical photometer short-term criteria**

Pollutant	Averaging Period	Criterion
Particulate matter <10 $\mu\text{g}$ ( $\text{PM}_{10}$ )	24 hour	50 $\mu\text{g}/\text{m}^3$

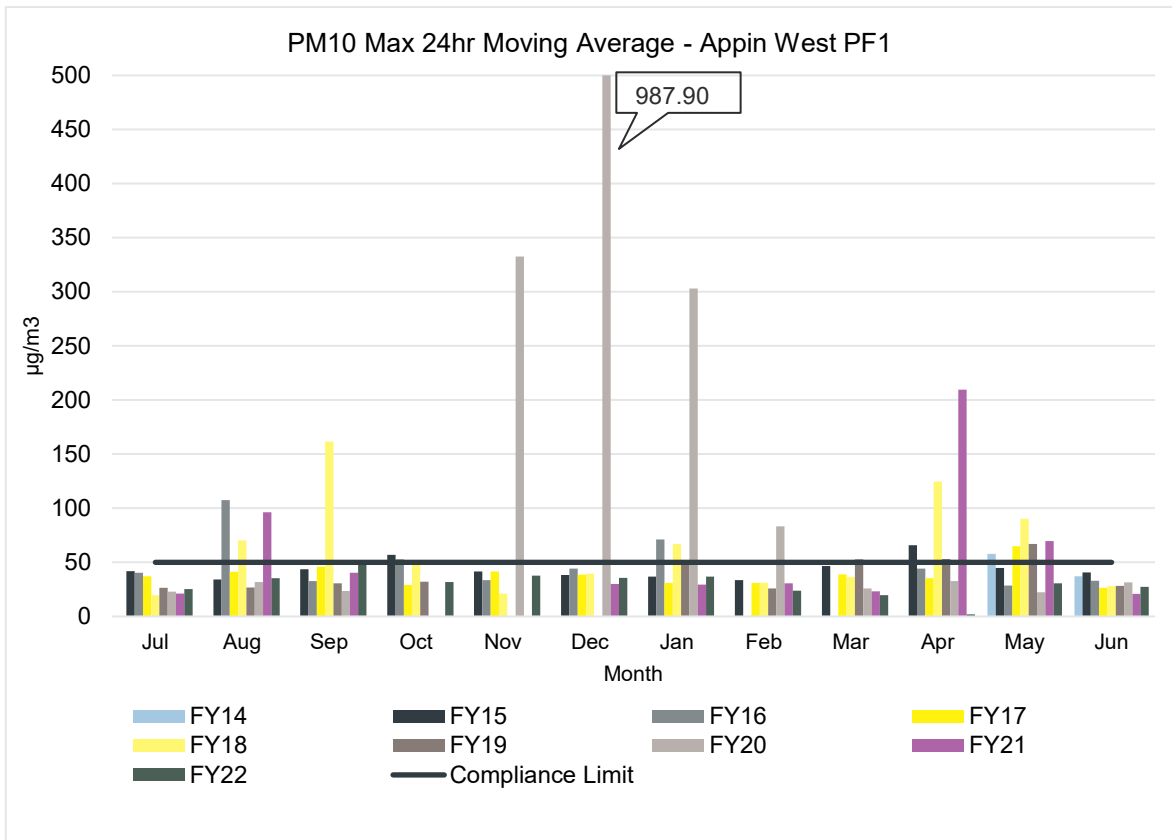
No exceedances against the short-term criteria were observed at AE-PF3 at Appin East during this reporting period. AE-PF1 at Appin East, W-PF1 at Appin North and VS6-PF1 at Ventilation Shaft 6, also recorded no exceedances over this reporting period. Results from the optical photometers are presented in Figure 2, Figure 3, Figure 4 and Figure 5 respectively.



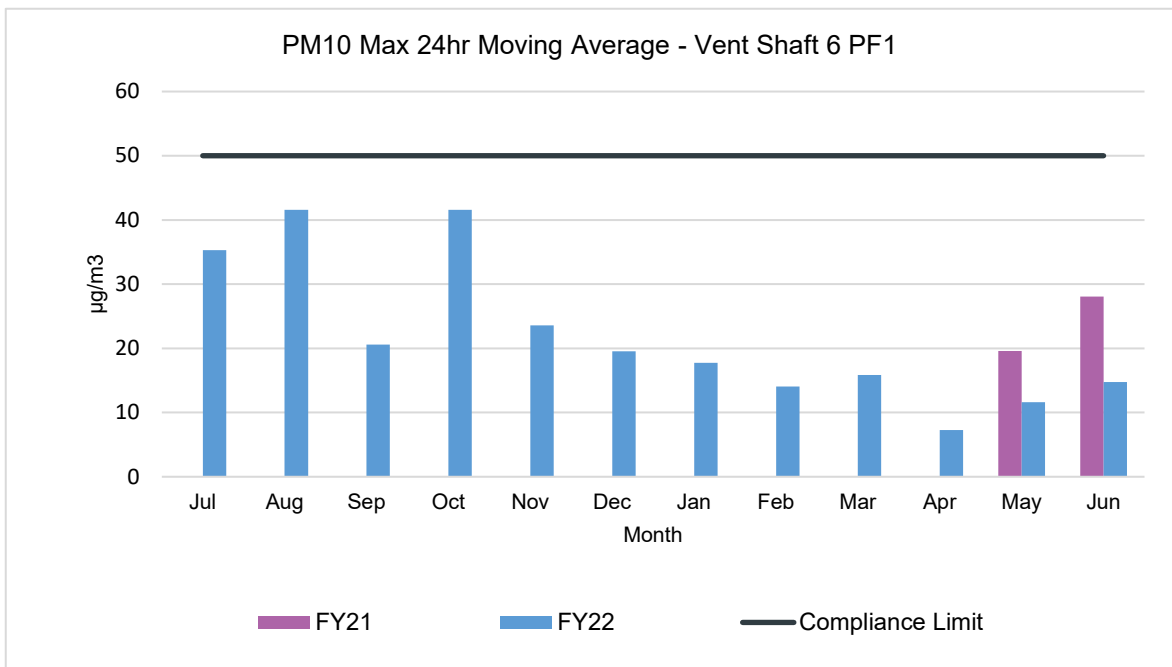
**Figure 2: PM<sub>10</sub> Maximum 24-hour Moving Average at Appin East PF3**



**Figure 3: PM<sub>10</sub> Maximum 24-hour Moving Average at Appin East PF1**



**Figure 4: PM<sub>10</sub> Maximum 24-hour Moving Average at Appin North PF1**



**Figure 5: PM<sub>10</sub> Maximum 24-hour Moving Average at Vent Shaft 6 PF1**



## **6.2 Erosion and Sediment**

### **6.2.1 Environmental Management**

Most activities at the Appin East, West, and North Pit Top sites are undertaken on relatively flat areas. Highly trafficked areas are generally sealed. There are minimal unsealed areas at sites. Internal unsealed roads are maintained to prevent dust, primarily through dust suppression sprays and water cart application. Sediment fences are installed where required to filter sediment from drainage and/or seepage points.

Sediment is controlled by multiple techniques across the three sites, however, the common practices include gravimetric separation using a series of dams and water treatment facilities. Water treatment techniques include use of flocculation and coagulation to increase the rate that particles settle out of suspension. Discharged water is monitored for suspended solids in accordance with EPL 2504.

The water management system across Appin Mine is regularly inspected by the site environmental representatives to check that each system is operating as efficiently as possible.

#### **6.2.1.1 Appin West**

A fixed sprinkler system and mobile road sweepers have been used as required during the reporting year to minimise dust emissions.

Operational areas at the Appin West Pit Top are contained within the catchment of the surface water dams, which are designed to capture and treat a 1:10 year, 72-hour rainfall event. The surface water dam contains a spillway designed for up to a 1:100-year rainfall event to maintain the engineering integrity of the structure and reduce the risk of erosion and sediment release (through LDP 25). Prior to the release of surface water from the surface water dam (via LDP 23 into Sandy Gully), water passes through a perlite filter (StormFilter®) unit which is designed to remove suspended solids and insoluble oil and grease.

#### **6.2.1.2 Ventilation Shaft 6**

The majority of the Ventilation Shaft 6 site is either vegetated or sealed, therefore surface runoff no longer requires treatment under normal operating conditions.

Stormwater is directed to, and settled in the surface water basins, allowing for gravimetric separation, and discharged to Harris Creek. The surface water dam contains a spillway designed for up to a 1:100-year rainfall event to maintain the engineering integrity of the structure and reduce the risk of erosion and sediment release.

The EPA varied EPL 2504 in May 2022 to remove LDP 36 and LDP 37 at Ventilation Shaft 6 as the quality of water at this location was essentially background quality from rehabilitated and hardstand areas.

#### **6.2.1.3 Appin East**

Appin East Pit Top utilises a series of surface water ponds capable of holding up to 22 ML of surface water. The surface water management is split into two dams. These earthen dams are used to capture, treat and recycle surface and stormwater runoff from the pit top.

Due to particle suspension of on-site dust and coal fines, surface and stormwater generated from pit-top runoff requires treatment prior to capture and storage in the surface dams. Surface water is dosed with a coagulant and flocculant prior to gravimetric separation, before passing through an overflow pipe into the main surface dam. Water from the main dam is used for dust suppression. Water can also be pumped into the sediment dam where it is drawn through the secondary-treatment system, the Dynasand filter, for discharge into the Georges River through LDP 19.



#### **6.2.1.4 Appin North**

The potential for erosion at the CWEA is managed in accordance with the CWEA Management Plan. The following activities are undertaken to minimise the likelihood of erosion within the CWEA:

- compaction of emplaced material;
- profiling of finished areas to designed gradients; and
- revegetation of the CWEA (once material is emplaced to meet design criteria).

Sediment is controlled by a series of sedimentation ponds, which have a combined capacity of ~200 ML. Water is treated at several locations across the site prior to transfer into BCD to comply with the water quality limits in EPL 2504.

#### **6.2.2 Environmental Performance**

Routine water quality monitoring of Total Suspended Solids (TSS) across Appin Mine has not identified any issues associated with erosion and sedimentation. The Appin West, Appin East and Appin North sites are operating within the licence limits for TSS.

### **6.3 Surface Water**

#### **6.3.1 Environmental Management**

Surface water management across Appin Mine is undertaken in accordance with EPL 2504 and the approved Appin Mine Water Management Plan (WMP). The WMP details the control measures, compliance procedures, monitoring programs, evaluation protocols, notification and communication processes for water management at Appin Mine. The plan has been prepared to satisfy Condition 16 of Schedule 4 of the Project Approval.

The site water management systems are provided in WMP which is available on the IMC website:

<https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

#### **6.3.2 Environmental Improvements**

##### **6.3.2.1 Appin West**

The filter modules at LDP 23 are planned to undergo routine maintenance annually or greater if required, including replacement of the filters and screens. Due to discharge volumes, and increased turbidity post-rainfall events, these filter modules were changed out twice in FY22.

All oily water separators undergo quarterly routine servicing, including complete cleaning and change out of the coalescing and baffle plates (passive separators) if damaged, and annual servicing and sleeve replacement of the centrifugal (active) separator.

##### **6.3.2.2 Appin East**

Appin East utilises a coagulant and flocculant dosing system to treat surface water runoff entering the pit top dams prior to controlled-discharge into the environment. As detailed last reporting period, upgrades were made to the system to allow for automated and variable dosing rates to accommodate fluctuations in surface water flow rate and changes in water quality. Commissioning, which continued throughout the FY22 reporting period, identified air supply and silt buildup issues. The upgrades have been delayed and are still in commissioning phase due to other significant upgrades required to the system such as a corroded dosing chamber. It is expected that the upgrades will be completed in early FY23.



The silt trap/dosing pit associated with the main surface water dam underwent routine maintenance during this reporting period, including silt removal.

The first flush system has undergone routine maintenance and cleaning during the reporting period. The Dynasands filtration system was inspected and required no servicing.

All oily water separators undergo quarterly routine servicing, including complete cleaning and change out of the coalescing and baffle plates (passive separators) if damaged.

As highlighted in the FY21 report, IMC installed two condensate cleaners to replace the older style baffle plate separator for the compressor condensate. The units did not require servicing during the reporting period.

### **6.3.2.3 Appin North**

Inspections of BCD are conducted regularly by IMC. Surveillance reports are prepared every five years by the consultant geotechnical engineer. The latest report was submitted to the Dams Safety Committee in March 2017. A safety review commenced in FY22 and is scheduled for completion early in FY23.

The temporary WTP was commissioned in FY21 with a long-term WTP to be completed in FY23. The WTPs will improve the overall water quality entering Brennans Creek as detailed in Section 4.4.3.

Further improvements at Appin North under the Georges River Aquatic Health Monitoring Program are discussed in Section 6.3.3.3.

Surface run-off associated with the CWEA is managed as detailed in the approved CWEA Management Plan which is available on the IMC website.

### **6.3.3 Environmental Performance**

Results of surface water monitoring are reported on the IMC website every 14 days as per the requirements of Section 66(6) of the *POEO Act* and Condition 11 of Schedule 6 of the Project Approval; and on an annual basis to the EPA via the Annual Return (see Appendix 1) and in the Annual Review. The online report is accessible at this link: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

A summary of results from the Appin Mine monitoring program is included in Table 16.

#### **6.3.3.1 Water Quality**

Compliance with water quality limits in Condition L2 of EPL 2504 was achieved across all monitoring sites at Appin Mine during the reporting period. There were no non-compliances recorded over the reporting period.

The trends for discharge water quality remain relatively consistent over the life of the operation.

#### **6.3.3.2 Water Discharge**

There were no non-compliances with the EPL 2504 discharge volume limits over the reporting period.

The overall trends for discharge volumes are relatively consistent over the life of the operation, taking into account the influence of rainfall. Discharge volumes are shown in Table 17.

Graphs of long-term trends for water quality and discharge are provided in Appendix 6.



**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data																										
Point 3/4	Yes	<p><b>BOD</b></p> <p>No exceedances of the BOD 100<sup>th</sup> percentile water quality criteria of 50 mg/L were recorded during the reporting period.</p> <p>There was no sample taken for the month of June 2022. This was due to no discharge being required over this monthly period and therefore no requirement to collect a sample. The average BOD for all samples for FY22 was 5.82 mg/L. This is a slight improvement on last year's performance (9.58 mg/L).</p> <p>Highest discharge over March 2022 due to high rainfall event (554 mm) over the month.</p>	<p>Point 4 - Biochemical Oxygen Demand</p> <table border="1"> <caption>Point 4 - Biochemical Oxygen Demand (mg/L)</caption> <thead> <tr> <th>Month</th> <th>BOD (mg/L)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>3</td></tr> <tr><td>Aug</td><td>3</td></tr> <tr><td>Sep</td><td>2</td></tr> <tr><td>Oct</td><td>3</td></tr> <tr><td>Nov</td><td>7</td></tr> <tr><td>Dec</td><td>2</td></tr> <tr><td>Jan</td><td>2</td></tr> <tr><td>Feb</td><td>3</td></tr> <tr><td>Mar</td><td>25</td></tr> <tr><td>Apr</td><td>5</td></tr> <tr><td>May</td><td>9</td></tr> <tr><td>Jun</td><td>0</td></tr> </tbody> </table>	Month	BOD (mg/L)	Jul	3	Aug	3	Sep	2	Oct	3	Nov	7	Dec	2	Jan	2	Feb	3	Mar	25	Apr	5	May	9	Jun	0
Month	BOD (mg/L)																												
Jul	3																												
Aug	3																												
Sep	2																												
Oct	3																												
Nov	7																												
Dec	2																												
Jan	2																												
Feb	3																												
Mar	25																												
Apr	5																												
May	9																												
Jun	0																												
Point 3/4	Yes	<p><b>pH</b></p> <p>All samples returned a pH result within the 50-percentile and 100-percentile limit for FY22. The average pH was 7.92. This is only slightly below the previous year's result of 8.05 pH.</p> <p>There was no sample taken for the month of June 2022. This was due to no discharge being required over this monthly period and therefore no requirement to collect a sample.</p>	<p>Point 4 - pH</p> <table border="1"> <caption>Point 4 - pH</caption> <thead> <tr> <th>Month</th> <th>pH</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>7.8</td></tr> <tr><td>Aug</td><td>7.9</td></tr> <tr><td>Sep</td><td>7.8</td></tr> <tr><td>Oct</td><td>7.8</td></tr> <tr><td>Nov</td><td>8.0</td></tr> <tr><td>Dec</td><td>8.1</td></tr> <tr><td>Jan</td><td>7.9</td></tr> <tr><td>Feb</td><td>8.0</td></tr> <tr><td>Mar</td><td>7.8</td></tr> <tr><td>Apr</td><td>7.8</td></tr> <tr><td>May</td><td>7.9</td></tr> <tr><td>Jun</td><td>0</td></tr> </tbody> </table>	Month	pH	Jul	7.8	Aug	7.9	Sep	7.8	Oct	7.8	Nov	8.0	Dec	8.1	Jan	7.9	Feb	8.0	Mar	7.8	Apr	7.8	May	7.9	Jun	0
Month	pH																												
Jul	7.8																												
Aug	7.9																												
Sep	7.8																												
Oct	7.8																												
Nov	8.0																												
Dec	8.1																												
Jan	7.9																												
Feb	8.0																												
Mar	7.8																												
Apr	7.8																												
May	7.9																												
Jun	0																												





**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 10	Yes	<p>Point 10 conductivity, pH and turbidity is monitored via an online continuous monitoring system. During the reporting period, the discharge did not rely upon Sydney Water dilution to achieve the conductivity limit of 2 mS/cm. This is because the water quality never exceeded 2 mS/cm. Additionally, the Drought condition detailed in EPL 2504 allows for discharge of water above the 80-percentile concentration limit during Level 1 Sydney Water Restrictions if required.</p> <p>The daily average for conductivity, pH and turbidity for Point 10 are illustrated in the associated graphs. There were no instances where the daily average of conductivity exceeded 2 mS/cm. Troughs in conductivity correlate with high rainfall events. There were no instances where average daily pH exceeded the licence limits. There is no licence limit for turbidity. Peaks in turbidity are generally attributed to high rainfall events, causing large catchment inflows to BCD. Monthly samples for TSS and Total Dissolved Solids (TDS) were within the compliance limits.</p> <p>There were no exceedances of alkalinity (as calcium carbonate), aluminium, arsenic, bicarbonate alkalinity cadmium, cobalt, copper, lead, manganese, nickel, nitrogen (total), oxidised nitrogen, zinc or chemical oxygen demand.</p> <p>The long-term trends indicate an improvement in discharge water quality over time, particularly in relation to copper, zinc, total nitrogen, nickel, lead, cobalt and aluminium. This is likely due to the implementation of the floating offtake in BCD.</p>	



**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
			<div> <p>Point 10 - Turbidity Daily Average</p> <p>The chart shows daily average turbidity levels at Point 10 from July 2021 to June 2022. The y-axis represents NTU, ranging from 0 to 600. The x-axis shows dates from 1/07/2021 to 1/06/2022. The data points fluctuate between approximately 300 and 550 NTU, with a notable peak in late February 2022.</p> </div> <div> <p>Point 10 - Total Suspended Solids</p> <p>The bar chart displays monthly total suspended solids (TSS) concentrations at Point 10 from July to June. The y-axis is in mg/L, ranging from 0 to 60. A horizontal yellow line indicates the 100 Percentile Limit at 50 mg/L. All monthly concentrations are below this limit, with the highest value in April at approximately 35 mg/L.</p> </div>



**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data																																																																														
Point 11	N/A	<p><b>TSS, pH and Conductivity</b></p> <p>There are no licence limits for Point 11. Point 11 is within the Georges River, upstream from the confluence of Brennans Creek and downstream from LDP 19. Monthly TSS, pH and conductivity are illustrated in these graphs.</p> <p>The increase in conductivity in October can be attributed to drier conditions during this period leading to a concentration of salts in pools in the Georges River. Increases in rainfall following October 2021 would have been flushed the Georges River with fresh water, resulting in a drop in conductivity from November onwards.</p> <p>Elevated TSS levels are evident in November 2021 and February 2022, which corresponds with rainfall events.</p>	<div> <p style="text-align: center;"><b>Point 11 - Total Suspended Solids</b></p> <table border="1"> <caption>Point 11 - Total Suspended Solids (mg/L)</caption> <thead> <tr><th>Month</th><th>TSS (mg/L)</th></tr> </thead> <tbody> <tr><td>Jul</td><td>5</td></tr> <tr><td>Aug</td><td>5</td></tr> <tr><td>Sep</td><td>5</td></tr> <tr><td>Oct</td><td>10</td></tr> <tr><td>Nov</td><td>30</td></tr> <tr><td>Dec</td><td>5</td></tr> <tr><td>Jan</td><td>5</td></tr> <tr><td>Feb</td><td>18</td></tr> <tr><td>Mar</td><td>5</td></tr> <tr><td>Apr</td><td>5</td></tr> <tr><td>May</td><td>5</td></tr> <tr><td>Jun</td><td>6</td></tr> </tbody> </table> </div> <div> <p style="text-align: center;"><b>Point 11 - pH</b></p> <table border="1"> <caption>Point 11 - pH</caption> <thead> <tr><th>Month</th><th>pH units</th></tr> </thead> <tbody> <tr><td>Jul</td><td>6.8</td></tr> <tr><td>Aug</td><td>6.2</td></tr> <tr><td>Sep</td><td>6.2</td></tr> <tr><td>Oct</td><td>6.2</td></tr> <tr><td>Nov</td><td>6.2</td></tr> <tr><td>Dec</td><td>6.0</td></tr> <tr><td>Jan</td><td>6.0</td></tr> <tr><td>Feb</td><td>5.2</td></tr> <tr><td>Mar</td><td>6.8</td></tr> <tr><td>Apr</td><td>7.2</td></tr> <tr><td>May</td><td>6.8</td></tr> <tr><td>Jun</td><td>6.8</td></tr> </tbody> </table> </div> <div> <p style="text-align: center;"><b>Point 11 - Conductivity</b></p> <table border="1"> <caption>Point 11 - Conductivity (µS/cm)</caption> <thead> <tr><th>Month</th><th>Conductivity (µS/cm)</th></tr> </thead> <tbody> <tr><td>Jul</td><td>170</td></tr> <tr><td>Aug</td><td>160</td></tr> <tr><td>Sep</td><td>170</td></tr> <tr><td>Oct</td><td>370</td></tr> <tr><td>Nov</td><td>210</td></tr> <tr><td>Dec</td><td>150</td></tr> <tr><td>Jan</td><td>160</td></tr> <tr><td>Feb</td><td>100</td></tr> <tr><td>Mar</td><td>150</td></tr> <tr><td>Apr</td><td>100</td></tr> <tr><td>May</td><td>160</td></tr> <tr><td>Jun</td><td>130</td></tr> </tbody> </table> </div>	Month	TSS (mg/L)	Jul	5	Aug	5	Sep	5	Oct	10	Nov	30	Dec	5	Jan	5	Feb	18	Mar	5	Apr	5	May	5	Jun	6	Month	pH units	Jul	6.8	Aug	6.2	Sep	6.2	Oct	6.2	Nov	6.2	Dec	6.0	Jan	6.0	Feb	5.2	Mar	6.8	Apr	7.2	May	6.8	Jun	6.8	Month	Conductivity (µS/cm)	Jul	170	Aug	160	Sep	170	Oct	370	Nov	210	Dec	150	Jan	160	Feb	100	Mar	150	Apr	100	May	160	Jun	130
Month	TSS (mg/L)																																																																																
Jul	5																																																																																
Aug	5																																																																																
Sep	5																																																																																
Oct	10																																																																																
Nov	30																																																																																
Dec	5																																																																																
Jan	5																																																																																
Feb	18																																																																																
Mar	5																																																																																
Apr	5																																																																																
May	5																																																																																
Jun	6																																																																																
Month	pH units																																																																																
Jul	6.8																																																																																
Aug	6.2																																																																																
Sep	6.2																																																																																
Oct	6.2																																																																																
Nov	6.2																																																																																
Dec	6.0																																																																																
Jan	6.0																																																																																
Feb	5.2																																																																																
Mar	6.8																																																																																
Apr	7.2																																																																																
May	6.8																																																																																
Jun	6.8																																																																																
Month	Conductivity (µS/cm)																																																																																
Jul	170																																																																																
Aug	160																																																																																
Sep	170																																																																																
Oct	370																																																																																
Nov	210																																																																																
Dec	150																																																																																
Jan	160																																																																																
Feb	100																																																																																
Mar	150																																																																																
Apr	100																																																																																
May	160																																																																																
Jun	130																																																																																



**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data																																																																														
Point 12	TSS, pH and Conductivity	Point 12 is situated downstream of the confluence of Brennans Creek. Monthly TSS, pH and conductivity are illustrated in these graphs. Water quality at Point 12 is generally consistent with the chemistry at Point 10. EC is generally influenced by discharge from BCD and response to high rainfall events flushing pools from upstream flows in the Georges River. This trend is evident in November 2021, February 2022 and April 2022, with higher TSS results and a corresponding lower EC result.	<div> <p>Point 12 - Total Suspended Solids</p> <table border="1"> <caption>Point 12 - Total Suspended Solids (mg/L)</caption> <thead> <tr><th>Month</th><th>TSS (mg/L)</th></tr> </thead> <tbody> <tr><td>Jul</td><td>5</td></tr> <tr><td>Aug</td><td>5</td></tr> <tr><td>Sep</td><td>5</td></tr> <tr><td>Oct</td><td>9</td></tr> <tr><td>Nov</td><td>23</td></tr> <tr><td>Dec</td><td>5</td></tr> <tr><td>Jan</td><td>5</td></tr> <tr><td>Feb</td><td>32</td></tr> <tr><td>Mar</td><td>5</td></tr> <tr><td>Apr</td><td>14</td></tr> <tr><td>May</td><td>5</td></tr> <tr><td>Jun</td><td>5</td></tr> </tbody> </table> </div> <div> <p>Point 12 - pH</p> <table border="1"> <caption>Point 12 - pH</caption> <thead> <tr><th>Month</th><th>pH units</th></tr> </thead> <tbody> <tr><td>Jul</td><td>8.8</td></tr> <tr><td>Aug</td><td>8.8</td></tr> <tr><td>Sep</td><td>8.5</td></tr> <tr><td>Oct</td><td>7.5</td></tr> <tr><td>Nov</td><td>7.8</td></tr> <tr><td>Dec</td><td>8.8</td></tr> <tr><td>Jan</td><td>8.8</td></tr> <tr><td>Feb</td><td>6.2</td></tr> <tr><td>Mar</td><td>8.8</td></tr> <tr><td>Apr</td><td>8.0</td></tr> <tr><td>May</td><td>8.8</td></tr> <tr><td>Jun</td><td>8.8</td></tr> </tbody> </table> </div> <div> <p>Point 12 - Conductivity</p> <table border="1"> <caption>Point 12 - Conductivity (µS/cm)</caption> <thead> <tr><th>Month</th><th>Conductivity (µS/cm)</th></tr> </thead> <tbody> <tr><td>Jul</td><td>1200</td></tr> <tr><td>Aug</td><td>1050</td></tr> <tr><td>Sep</td><td>1050</td></tr> <tr><td>Oct</td><td>500</td></tr> <tr><td>Nov</td><td>350</td></tr> <tr><td>Dec</td><td>1050</td></tr> <tr><td>Jan</td><td>1000</td></tr> <tr><td>Feb</td><td>180</td></tr> <tr><td>Mar</td><td>1200</td></tr> <tr><td>Apr</td><td>350</td></tr> <tr><td>May</td><td>1100</td></tr> <tr><td>Jun</td><td>1150</td></tr> </tbody> </table> </div>	Month	TSS (mg/L)	Jul	5	Aug	5	Sep	5	Oct	9	Nov	23	Dec	5	Jan	5	Feb	32	Mar	5	Apr	14	May	5	Jun	5	Month	pH units	Jul	8.8	Aug	8.8	Sep	8.5	Oct	7.5	Nov	7.8	Dec	8.8	Jan	8.8	Feb	6.2	Mar	8.8	Apr	8.0	May	8.8	Jun	8.8	Month	Conductivity (µS/cm)	Jul	1200	Aug	1050	Sep	1050	Oct	500	Nov	350	Dec	1050	Jan	1000	Feb	180	Mar	1200	Apr	350	May	1100	Jun	1150
Month	TSS (mg/L)																																																																																
Jul	5																																																																																
Aug	5																																																																																
Sep	5																																																																																
Oct	9																																																																																
Nov	23																																																																																
Dec	5																																																																																
Jan	5																																																																																
Feb	32																																																																																
Mar	5																																																																																
Apr	14																																																																																
May	5																																																																																
Jun	5																																																																																
Month	pH units																																																																																
Jul	8.8																																																																																
Aug	8.8																																																																																
Sep	8.5																																																																																
Oct	7.5																																																																																
Nov	7.8																																																																																
Dec	8.8																																																																																
Jan	8.8																																																																																
Feb	6.2																																																																																
Mar	8.8																																																																																
Apr	8.0																																																																																
May	8.8																																																																																
Jun	8.8																																																																																
Month	Conductivity (µS/cm)																																																																																
Jul	1200																																																																																
Aug	1050																																																																																
Sep	1050																																																																																
Oct	500																																																																																
Nov	350																																																																																
Dec	1050																																																																																
Jan	1000																																																																																
Feb	180																																																																																
Mar	1200																																																																																
Apr	350																																																																																
May	1100																																																																																
Jun	1150																																																																																
Point 18	Yes	IMC did not discharge from this point during the reporting period.																																																																															



**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 19	Yes	<p><b>pH</b></p> <p>FY22 displayed typical and expected compliance against pH criteria.</p> <p>pH units remained steady in-line with long-term trends influenced by rainfall and temperature. Typically, higher rainfall months see increased pH, with lesser impact from flocculant and coagulant dosing chemicals. However, with the added control of in-line pH probes acting as interlocks for the discharge pumps, the likelihood of an exceedance is low.</p> <p>No discharge performed in July 2021 as the Main AE Dam water level was low enough for future rainfall events.</p>	
Point 20	Yes	<p><b>TSS</b></p> <p>FY22 TSS concentration followed the long-term trends of being well below the EPL 100 percentile concentration limit. The reporting period saw nine samples (75%) below the limit of reporting. Similarly to the above, this performance is achieved through the discharge control.</p> <p>Historically, IMC has never exceeded this water quality criteria, with the highest recorded TSS concentration at &lt;50% of the 100<sup>th</sup> percentile limit.</p> <p>No discharge performed in July 2021 as the Main AE Dam water level was low enough for future rainfall events.</p>	



**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data																										
Point 23	Yes	<p><b>pH</b></p> <p>FY22 displayed typical and expected compliance against pH.</p> <p>pH units remained steady in-line with long-term trends dictated by rainfall and temperature.</p> <p>Historically, IMC has only seen two exceedances of the pH criteria at this location since February 2014.</p>	<p>Point 23 - pH</p> <table border="1"> <caption>Monthly pH Data (Estimated)</caption> <thead> <tr> <th>Month</th> <th>pH</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>7.8</td></tr> <tr><td>Aug</td><td>7.8</td></tr> <tr><td>Sep</td><td>7.4</td></tr> <tr><td>Oct</td><td>7.1</td></tr> <tr><td>Nov</td><td>7.8</td></tr> <tr><td>Dec</td><td>7.3</td></tr> <tr><td>Jan</td><td>7.6</td></tr> <tr><td>Feb</td><td>7.5</td></tr> <tr><td>Mar</td><td>7.7</td></tr> <tr><td>Apr</td><td>7.8</td></tr> <tr><td>May</td><td>7.8</td></tr> <tr><td>Jun</td><td>7.5</td></tr> </tbody> </table>	Month	pH	Jul	7.8	Aug	7.8	Sep	7.4	Oct	7.1	Nov	7.8	Dec	7.3	Jan	7.6	Feb	7.5	Mar	7.7	Apr	7.8	May	7.8	Jun	7.5
Month	pH																												
Jul	7.8																												
Aug	7.8																												
Sep	7.4																												
Oct	7.1																												
Nov	7.8																												
Dec	7.3																												
Jan	7.6																												
Feb	7.5																												
Mar	7.7																												
Apr	7.8																												
May	7.8																												
Jun	7.5																												
		<p><b>TSS</b></p> <p>FY22 TSS concentration followed the long-term trends of being well below the EPL 100 percentile concentration limit. The reporting period saw eight samples (~ 67%) below the limit of reporting. Similarly to the above, this performance is achieved through discharge control with the higher concentrations linked to periods of intense rainfall.</p> <p>Long-term trends indicate that the perlite filters installed as part of the treatment for this LDP must be monitored and replaced annually or after large rainfall events, to ensure TSS is not exceeded.</p>	<p>Point 23 - Total Suspended Solids</p> <table border="1"> <caption>Monthly TSS Data (Estimated)</caption> <thead> <tr> <th>Month</th> <th>TSS (mg/L)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>5</td></tr> <tr><td>Aug</td><td>5</td></tr> <tr><td>Sep</td><td>4</td></tr> <tr><td>Oct</td><td>1</td></tr> <tr><td>Nov</td><td>6</td></tr> <tr><td>Dec</td><td>5</td></tr> <tr><td>Jan</td><td>12</td></tr> <tr><td>Feb</td><td>7</td></tr> <tr><td>Mar</td><td>5</td></tr> <tr><td>Apr</td><td>5</td></tr> <tr><td>May</td><td>5</td></tr> <tr><td>Jun</td><td>9</td></tr> </tbody> </table>	Month	TSS (mg/L)	Jul	5	Aug	5	Sep	4	Oct	1	Nov	6	Dec	5	Jan	12	Feb	7	Mar	5	Apr	5	May	5	Jun	9
Month	TSS (mg/L)																												
Jul	5																												
Aug	5																												
Sep	4																												
Oct	1																												
Nov	6																												
Dec	5																												
Jan	12																												
Feb	7																												
Mar	5																												
Apr	5																												
May	5																												
Jun	9																												



**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data																										
Point 24	Yes	<p><b>pH</b></p> <p>FY22 displayed typical and expected compliance against pH. pH units fluctuated in-line with feed plant parameters and the changing chemistry of the source water. With the added control of the discharge coming from the WTP where pH correction takes place, the likelihood of an exceedance is reduced and would be related to a larger plant operational failure.</p> <p>Historically, IMC has only seen one exceedance since records began in 2012, most likely due to in-line probe drift.</p>	<table border="1"> <caption>Point 24 - pH Data</caption> <thead> <tr> <th>Month</th> <th>pH</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>7.5</td></tr> <tr><td>Aug</td><td>7.2</td></tr> <tr><td>Sep</td><td>7.7</td></tr> <tr><td>Oct</td><td>7.6</td></tr> <tr><td>Nov</td><td>7.8</td></tr> <tr><td>Dec</td><td>7.5</td></tr> <tr><td>Jan</td><td>7.9</td></tr> <tr><td>Feb</td><td>7.8</td></tr> <tr><td>Mar</td><td>8.2</td></tr> <tr><td>Apr</td><td>7.3</td></tr> <tr><td>May</td><td>7.0</td></tr> <tr><td>Jun</td><td>7.2</td></tr> </tbody> </table>	Month	pH	Jul	7.5	Aug	7.2	Sep	7.7	Oct	7.6	Nov	7.8	Dec	7.5	Jan	7.9	Feb	7.8	Mar	8.2	Apr	7.3	May	7.0	Jun	7.2
		Month	pH																										
Jul	7.5																												
Aug	7.2																												
Sep	7.7																												
Oct	7.6																												
Nov	7.8																												
Dec	7.5																												
Jan	7.9																												
Feb	7.8																												
Mar	8.2																												
Apr	7.3																												
May	7.0																												
Jun	7.2																												
<p><b>EC</b></p> <p>FY22 EC levels were well below the EPL 100-percentile concentration limit. This performance is achieved through discharge control.</p>	<table border="1"> <caption>Point 24 - Conductivity Data</caption> <thead> <tr> <th>Month</th> <th>Conductivity (µS/cm)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>220</td></tr> <tr><td>Aug</td><td>180</td></tr> <tr><td>Sep</td><td>230</td></tr> <tr><td>Oct</td><td>200</td></tr> <tr><td>Nov</td><td>120</td></tr> <tr><td>Dec</td><td>160</td></tr> <tr><td>Jan</td><td>190</td></tr> <tr><td>Feb</td><td>220</td></tr> <tr><td>Mar</td><td>380</td></tr> <tr><td>Apr</td><td>200</td></tr> <tr><td>May</td><td>110</td></tr> <tr><td>Jun</td><td>210</td></tr> </tbody> </table>	Month	Conductivity (µS/cm)	Jul	220	Aug	180	Sep	230	Oct	200	Nov	120	Dec	160	Jan	190	Feb	220	Mar	380	Apr	200	May	110	Jun	210		
Month	Conductivity (µS/cm)																												
Jul	220																												
Aug	180																												
Sep	230																												
Oct	200																												
Nov	120																												
Dec	160																												
Jan	190																												
Feb	220																												
Mar	380																												
Apr	200																												
May	110																												
Jun	210																												



**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
TSS		<p>FY22 TSS concentration followed the long-term trends of being well below the EPL 100 percentile concentration limit. The reporting period saw 100% of samples below the limit of reporting. Similarly to the above, the likelihood of an exceedance is slim and would be related to a larger plant operational failure.</p>	
pH Continuous Monitoring	Yes	<p>Similarly to the grab sample results for the reporting period, typical and expected compliance against continuous pH was achieved. pH units fluctuated in-line with plant target and focus.</p> <p>Over the period November 2021 to the end of FY22, the Appin West WTP was running at a reduced capacity resulting in less discharge to the environment.</p> <p><i>N.B. All instances of no data are a function of 'no discharge' periods.</i></p>	





**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
	N/A	<p><b>Conductivity Continuous Monitoring</b></p> <p>This data shows plant performance variation over the reporting period. The limit of 600 <math>\mu\text{S}/\text{cm}</math> is applicable to the 24-hour moving average, calculated for each hour of the day. Compliance with this limit was achieved over the reporting period.</p> <p>Over the period November 2021 to the end of FY22, the Appin West WTP was running at a reduced capacity resulting in less discharge to the environment. When there was no flow the instrumentation would drain, with an initial spike in readings once flow resumed.</p> <p><i>N.B. All instances of no data are a function of 'no discharge' periods.</i></p>	
Point 38	Yes	<p><b>BOD</b></p> <p>No exceedances of the BOD 100<sup>th</sup> percentile water quality criteria of 50 mg/L were recorded during the reporting period.</p> <p>As highlighted in the FY21 report, Point 38 was previously Point 22. The naming of this LDP was changed in a licence variation in March 2021.</p>	



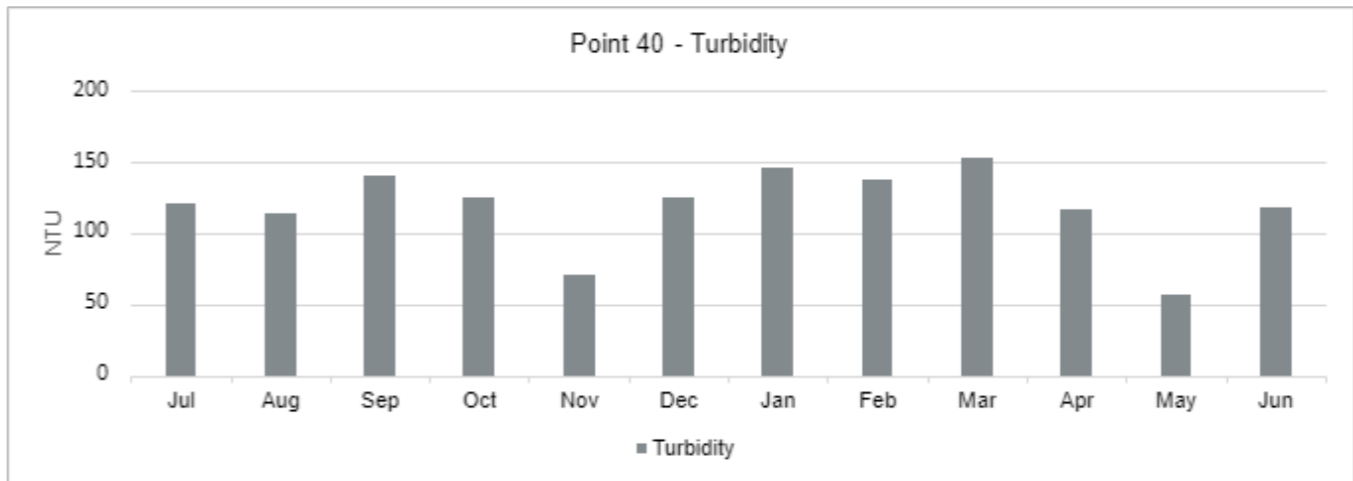
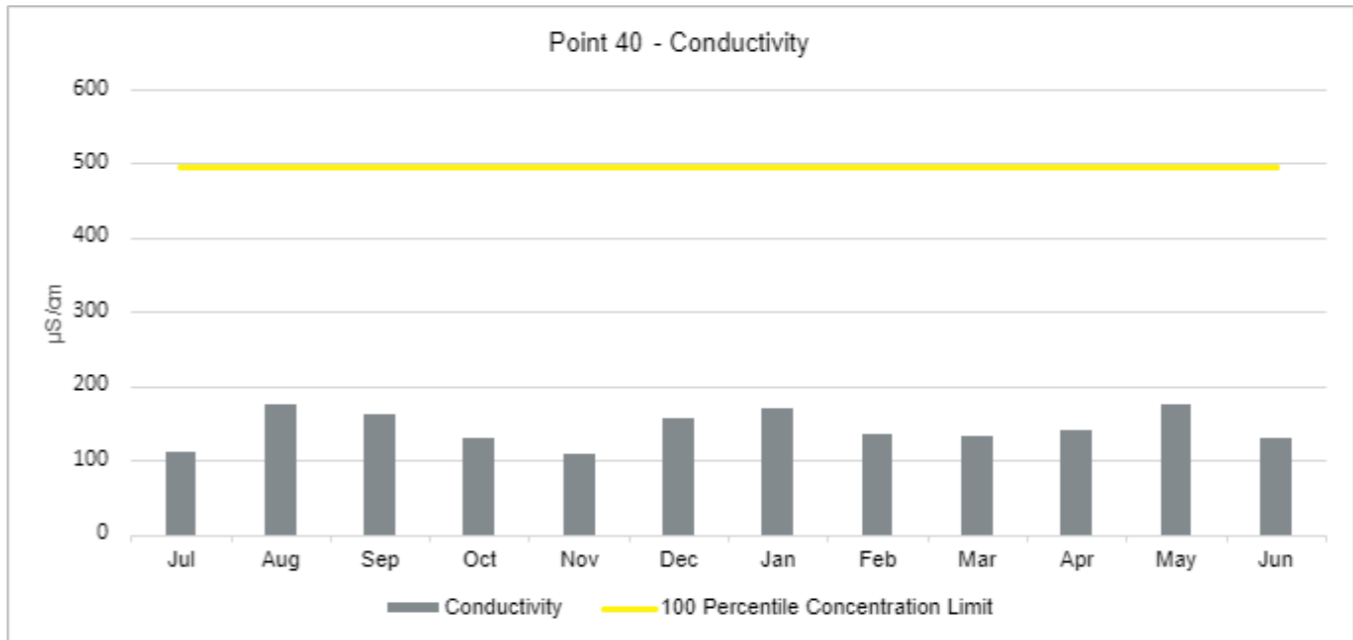
**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data																										
pH	Yes	<p>FY22 displayed typical and expected compliance against pH. pH units remained steady, in-line with long-term trends dictated by temperature. Warmer months see higher solar insolation and higher pH, most likely due to biological activity. Lower throughput periods also see decreases in pH, associated with over-oxygenation of the system.</p> <p>Note that the latest version of EPL 2504 (dated July 2022) does not include 50-percentile limits for pH.</p>	<p><b>Point 38 - pH</b></p> <table border="1"> <caption>Estimated Monthly pH Data for Point 38</caption> <thead> <tr> <th>Month</th> <th>pH (pH units)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>6.8</td></tr> <tr><td>Aug</td><td>7.3</td></tr> <tr><td>Sep</td><td>7.1</td></tr> <tr><td>Oct</td><td>6.4</td></tr> <tr><td>Nov</td><td>7.3</td></tr> <tr><td>Dec</td><td>6.4</td></tr> <tr><td>Jan</td><td>7.1</td></tr> <tr><td>Feb</td><td>7.3</td></tr> <tr><td>Mar</td><td>7.6</td></tr> <tr><td>Apr</td><td>7.4</td></tr> <tr><td>May</td><td>7.5</td></tr> <tr><td>Jun</td><td>7.3</td></tr> </tbody> </table>	Month	pH (pH units)	Jul	6.8	Aug	7.3	Sep	7.1	Oct	6.4	Nov	7.3	Dec	6.4	Jan	7.1	Feb	7.3	Mar	7.6	Apr	7.4	May	7.5	Jun	7.3
Month	pH (pH units)																												
Jul	6.8																												
Aug	7.3																												
Sep	7.1																												
Oct	6.4																												
Nov	7.3																												
Dec	6.4																												
Jan	7.1																												
Feb	7.3																												
Mar	7.6																												
Apr	7.4																												
May	7.5																												
Jun	7.3																												
Point 40	N/A	<p>Point 40 was added to EPL 2504 in March 2021 for the Appin North WTP discharge, which discharges in the vicinity of LDP 10 into Brennans Creek. The limits for LDP 40 do not apply until the commissioning of the long-term WTP.</p> <p>In-situ water quality from the temporary WTP, represented in the associated graphs, were within the EPL water quality concentration limits except for pH which fell below 6.5 in February 2022.</p> <p>All other parameters: bicarbonate alkalinity, aluminium, cobalt, copper, nickel and zinc also returned results within compliance limits except for Total Nitrogen which slightly exceeded the EPL criteria on nine occasions. As stated above, these exceedances are not considered an exceedance as licence limits are only set for the long-term WTP which will be commissioned in FY23.</p>	<p><b>Point 40 - pH</b></p> <table border="1"> <caption>Estimated Monthly pH Data for Point 40</caption> <thead> <tr> <th>Month</th> <th>pH (pH units)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>6.8</td></tr> <tr><td>Aug</td><td>7.2</td></tr> <tr><td>Sep</td><td>8.0</td></tr> <tr><td>Oct</td><td>7.3</td></tr> <tr><td>Nov</td><td>6.8</td></tr> <tr><td>Dec</td><td>7.6</td></tr> <tr><td>Jan</td><td>7.6</td></tr> <tr><td>Feb</td><td>6.4</td></tr> <tr><td>Mar</td><td>7.4</td></tr> <tr><td>Apr</td><td>7.5</td></tr> <tr><td>May</td><td>8.0</td></tr> <tr><td>Jun</td><td>7.1</td></tr> </tbody> </table>	Month	pH (pH units)	Jul	6.8	Aug	7.2	Sep	8.0	Oct	7.3	Nov	6.8	Dec	7.6	Jan	7.6	Feb	6.4	Mar	7.4	Apr	7.5	May	8.0	Jun	7.1
Month	pH (pH units)																												
Jul	6.8																												
Aug	7.2																												
Sep	8.0																												
Oct	7.3																												
Nov	6.8																												
Dec	7.6																												
Jan	7.6																												
Feb	6.4																												
Mar	7.4																												
Apr	7.5																												
May	8.0																												
Jun	7.1																												



**Table 16: Summary of Compliance with EPL Water Quality Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
-----------------	------------------------	----------	------





**Table 17: Summary of Compliance with EPL Discharge Volume Limits Across Appin Mine**

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 4	Yes	Point 4 discharges fluctuate depending on the demand and use of the bathhouse facilities at Appin North as well as the amount of rainfall received during the month. Irrigation occurs on average twice per month for approximately three hours at a time. The Sewage Treatment Plant (STP) operates under a licence issued by Wollondilly Shire Council. Flow data is recorded through a flow meter via telemetry. Zero values indicate that there was no discharge in that month.	
Point 10	Yes	<p>Flows from BCD consist of a gravity feed from the reclaim pond (Point 10, seepage from BCD), dilution waters as required (mixed with Point 10 and 13 waters), spillway overflows (Point 1) and dam discharge (Point 13) via a floating offtake. Flows do fluctuate with rainfall and dam storage volume. During the reporting period, IMC continued to provide supplementary flows to maintain pool levels downstream in the Georges River. Flows are automated based on dam water level and operate in accordance with the BCD Trigger Action Response Plan.</p> <p>There were multiple occasions where water spilled over the spillway during FY22. These events began in March 2022 and continued until June 2022. These resulted from high rainfall periods following 217 mm at the end of February followed by 554, 321 and 75 mm for March, April and May respectively. The EPA and relevant stakeholders were notified of these events accordingly.</p>	
Point 13	Yes	As per Point 10.	As per Point 10.
Point 18	Yes	IMC did not discharge from this point during the reporting period.	



**Table 17: Summary of Compliance with EPL Discharge Volume Limits Across Appin Mine**

Point 19	Yes	<p>FY22 discharge volume for LDP 19 is as expected. Daily maximum flow was well below the EPL volume limit. This is due to flow rate constraints with the system set-up. Risk management and compliance against this limit is achieved through engineering. Pump capacities are the limiting factor to ensure compliance is achieved.</p> <p>Average flow for the 12-month period and relative to long-term trends, show typical peaks and troughs. The system expects larger average flows biannually. Consequently, higher average flows are experienced due to the period of increased discharge.</p>	<table border="1"> <caption>Point 19 - Discharge Volume Data</caption> <thead> <tr> <th>Month</th> <th>Max Flow (kL/Day)</th> <th>Average Flow (kL/Day)</th> <th>EPL Volume Limit (kL/Day)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>0</td><td>0</td><td>2000</td></tr> <tr><td>Aug</td><td>1300</td><td>250</td><td>2000</td></tr> <tr><td>Sep</td><td>1300</td><td>250</td><td>2000</td></tr> <tr><td>Oct</td><td>1300</td><td>400</td><td>2000</td></tr> <tr><td>Nov</td><td>1300</td><td>300</td><td>2000</td></tr> <tr><td>Dec</td><td>1300</td><td>300</td><td>2000</td></tr> <tr><td>Jan</td><td>1300</td><td>250</td><td>2000</td></tr> <tr><td>Feb</td><td>1300</td><td>350</td><td>2000</td></tr> <tr><td>Mar</td><td>1350</td><td>1000</td><td>2000</td></tr> <tr><td>Apr</td><td>1500</td><td>1400</td><td>2000</td></tr> <tr><td>May</td><td>1450</td><td>300</td><td>2000</td></tr> <tr><td>Jun</td><td>1050</td><td>100</td><td>2000</td></tr> </tbody> </table>	Month	Max Flow (kL/Day)	Average Flow (kL/Day)	EPL Volume Limit (kL/Day)	Jul	0	0	2000	Aug	1300	250	2000	Sep	1300	250	2000	Oct	1300	400	2000	Nov	1300	300	2000	Dec	1300	300	2000	Jan	1300	250	2000	Feb	1300	350	2000	Mar	1350	1000	2000	Apr	1500	1400	2000	May	1450	300	2000	Jun	1050	100	2000																																							
Month	Max Flow (kL/Day)	Average Flow (kL/Day)	EPL Volume Limit (kL/Day)																																																																																											
Jul	0	0	2000																																																																																											
Aug	1300	250	2000																																																																																											
Sep	1300	250	2000																																																																																											
Oct	1300	400	2000																																																																																											
Nov	1300	300	2000																																																																																											
Dec	1300	300	2000																																																																																											
Jan	1300	250	2000																																																																																											
Feb	1300	350	2000																																																																																											
Mar	1350	1000	2000																																																																																											
Apr	1500	1400	2000																																																																																											
May	1450	300	2000																																																																																											
Jun	1050	100	2000																																																																																											
Point 20	Yes	IMC did not discharge from this point during the reporting period.																																																																																												
Point 24	Yes	<p>Daily maximum discharge volume limits, and monthly cumulative limits were compliant during the reporting period.</p> <p>Daily maximum flows fluctuated in-line with plant target and focus.</p>	<table border="1"> <caption>Point 24 - Daily Discharge Volume Data</caption> <thead> <tr> <th>Month</th> <th>Max Flow (kL/Day)</th> <th>Average Flow (kL/Day)</th> <th>EPL Volume Limit (kL/Day)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>2800</td><td>1800</td><td>4700</td></tr> <tr><td>Aug</td><td>2700</td><td>1700</td><td>4700</td></tr> <tr><td>Sep</td><td>2800</td><td>2000</td><td>4700</td></tr> <tr><td>Oct</td><td>3000</td><td>1700</td><td>4700</td></tr> <tr><td>Nov</td><td>1200</td><td>400</td><td>4700</td></tr> <tr><td>Dec</td><td>2600</td><td>800</td><td>4700</td></tr> <tr><td>Jan</td><td>2200</td><td>1100</td><td>4700</td></tr> <tr><td>Feb</td><td>2200</td><td>900</td><td>4700</td></tr> <tr><td>Mar</td><td>2000</td><td>600</td><td>4700</td></tr> <tr><td>Apr</td><td>2500</td><td>700</td><td>4700</td></tr> <tr><td>May</td><td>1600</td><td>700</td><td>4700</td></tr> <tr><td>Jun</td><td>1600</td><td>700</td><td>4700</td></tr> </tbody> </table> <table border="1"> <caption>Point 24 - Monthly Discharge Volume Data</caption> <thead> <tr> <th>Month</th> <th>Total flow (kL/Month)</th> <th>EPL Volume Limit (kL/Month)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>58,000</td><td>92,000</td></tr> <tr><td>Aug</td><td>52,000</td><td>92,000</td></tr> <tr><td>Sep</td><td>60,000</td><td>92,000</td></tr> <tr><td>Oct</td><td>53,000</td><td>92,000</td></tr> <tr><td>Nov</td><td>12,000</td><td>92,000</td></tr> <tr><td>Dec</td><td>26,000</td><td>92,000</td></tr> <tr><td>Jan</td><td>26,000</td><td>92,000</td></tr> <tr><td>Feb</td><td>24,000</td><td>92,000</td></tr> <tr><td>Mar</td><td>21,000</td><td>92,000</td></tr> <tr><td>Apr</td><td>21,000</td><td>92,000</td></tr> <tr><td>May</td><td>20,000</td><td>92,000</td></tr> <tr><td>Jun</td><td>21,000</td><td>92,000</td></tr> </tbody> </table>	Month	Max Flow (kL/Day)	Average Flow (kL/Day)	EPL Volume Limit (kL/Day)	Jul	2800	1800	4700	Aug	2700	1700	4700	Sep	2800	2000	4700	Oct	3000	1700	4700	Nov	1200	400	4700	Dec	2600	800	4700	Jan	2200	1100	4700	Feb	2200	900	4700	Mar	2000	600	4700	Apr	2500	700	4700	May	1600	700	4700	Jun	1600	700	4700	Month	Total flow (kL/Month)	EPL Volume Limit (kL/Month)	Jul	58,000	92,000	Aug	52,000	92,000	Sep	60,000	92,000	Oct	53,000	92,000	Nov	12,000	92,000	Dec	26,000	92,000	Jan	26,000	92,000	Feb	24,000	92,000	Mar	21,000	92,000	Apr	21,000	92,000	May	20,000	92,000	Jun	21,000	92,000
Month	Max Flow (kL/Day)	Average Flow (kL/Day)	EPL Volume Limit (kL/Day)																																																																																											
Jul	2800	1800	4700																																																																																											
Aug	2700	1700	4700																																																																																											
Sep	2800	2000	4700																																																																																											
Oct	3000	1700	4700																																																																																											
Nov	1200	400	4700																																																																																											
Dec	2600	800	4700																																																																																											
Jan	2200	1100	4700																																																																																											
Feb	2200	900	4700																																																																																											
Mar	2000	600	4700																																																																																											
Apr	2500	700	4700																																																																																											
May	1600	700	4700																																																																																											
Jun	1600	700	4700																																																																																											
Month	Total flow (kL/Month)	EPL Volume Limit (kL/Month)																																																																																												
Jul	58,000	92,000																																																																																												
Aug	52,000	92,000																																																																																												
Sep	60,000	92,000																																																																																												
Oct	53,000	92,000																																																																																												
Nov	12,000	92,000																																																																																												
Dec	26,000	92,000																																																																																												
Jan	26,000	92,000																																																																																												
Feb	24,000	92,000																																																																																												
Mar	21,000	92,000																																																																																												
Apr	21,000	92,000																																																																																												
May	20,000	92,000																																																																																												
Jun	21,000	92,000																																																																																												



**Table 17: Summary of Compliance with EPL Discharge Volume Limits Across Appin Mine**

Point 38	Yes	<p>FY22 daily discharge volumes for LDP 38 were compliant during the reporting period.</p> <p>The system is engineered to ensure compliance. Pump and discharge volumes can only be set to three settings; a daily maximum of 70 kL/day, 50 kL/day, or 30 kL/day to ensure compliance against the EPL.</p> <p>With discharge volumes dictated by sewage production, long-term trends are sporadic, which can be expected with fluctuations in personnel hours.</p> <p>As highlighted in the FY21 report, Point 38 was previously Point 22. The naming of this LDP was changed in a licence variation in March 2021.</p>	<p><b>Point 38 - Discharge Volume</b></p> <p>This chart displays monthly discharge data for Point 38. The y-axis represents volume in kL/Day, ranging from 0 to 90. The x-axis lists months from July to June. A horizontal black line at 80 kL/Day indicates the EPL Volume Limit. Grey bars represent Max Flow, which remains consistently below the limit, peaking at approximately 55 kL/Day in July and June. A yellow line represents Average Flow, which fluctuates between approximately 23 and 37 kL/Day throughout the year.</p> <table border="1"> <thead> <tr> <th>Month</th> <th>Max Flow (kL/Day)</th> <th>Average Flow (kL/Day)</th> <th>EPL Volume Limit (kL/Day)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>55</td><td>37</td><td>80</td></tr> <tr><td>Aug</td><td>50</td><td>31</td><td>80</td></tr> <tr><td>Sep</td><td>50</td><td>31</td><td>80</td></tr> <tr><td>Oct</td><td>50</td><td>31</td><td>80</td></tr> <tr><td>Nov</td><td>47</td><td>32</td><td>80</td></tr> <tr><td>Dec</td><td>47</td><td>32</td><td>80</td></tr> <tr><td>Jan</td><td>33</td><td>23</td><td>80</td></tr> <tr><td>Feb</td><td>44</td><td>32</td><td>80</td></tr> <tr><td>Mar</td><td>40</td><td>29</td><td>80</td></tr> <tr><td>Apr</td><td>36</td><td>27</td><td>80</td></tr> <tr><td>May</td><td>33</td><td>28</td><td>80</td></tr> <tr><td>Jun</td><td>55</td><td>32</td><td>80</td></tr> </tbody> </table>	Month	Max Flow (kL/Day)	Average Flow (kL/Day)	EPL Volume Limit (kL/Day)	Jul	55	37	80	Aug	50	31	80	Sep	50	31	80	Oct	50	31	80	Nov	47	32	80	Dec	47	32	80	Jan	33	23	80	Feb	44	32	80	Mar	40	29	80	Apr	36	27	80	May	33	28	80	Jun	55	32	80
Month	Max Flow (kL/Day)	Average Flow (kL/Day)	EPL Volume Limit (kL/Day)																																																				
Jul	55	37	80																																																				
Aug	50	31	80																																																				
Sep	50	31	80																																																				
Oct	50	31	80																																																				
Nov	47	32	80																																																				
Dec	47	32	80																																																				
Jan	33	23	80																																																				
Feb	44	32	80																																																				
Mar	40	29	80																																																				
Apr	36	27	80																																																				
May	33	28	80																																																				
Jun	55	32	80																																																				
Point 40	N/A	<p>Discharge volumes for LDP 40 recorded are from the temporary WTP. Volumes varied over FY22 and did not meet the overall requirement to maintain 1.5 ML/day minimum flow due to plant capacity and operational constraints.</p> <p>Minimum discharge requirements are only applicable for the long-term WTP and therefore not meeting the discharge requirement is not considered to be a non-compliance.</p>	<p><b>Point 40 - Discharge Volume</b></p> <p>This chart displays monthly discharge data for Point 40. The y-axis represents volume in kL/Day, ranging from 0 to 1600. The x-axis lists months from July to June. A horizontal black line at 1500 kL/Day indicates the EPL Volume Minimum Limit. Grey bars represent Max Flow, which fluctuates between approximately 750 and 1150 kL/Day. A yellow line represents Average Flow, which fluctuates between approximately 100 and 700 kL/Day. The data shows that discharge volumes are consistently below the minimum limit.</p> <table border="1"> <thead> <tr> <th>Month</th> <th>Max Flow (kL/Day)</th> <th>Average Flow (kL/Day)</th> <th>EPL Volume Minimum Limit (kL/Day)</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>1100</td><td>350</td><td>1500</td></tr> <tr><td>Aug</td><td>1150</td><td>350</td><td>1500</td></tr> <tr><td>Sep</td><td>1150</td><td>600</td><td>1500</td></tr> <tr><td>Oct</td><td>1100</td><td>650</td><td>1500</td></tr> <tr><td>Nov</td><td>1100</td><td>650</td><td>1500</td></tr> <tr><td>Dec</td><td>1150</td><td>550</td><td>1500</td></tr> <tr><td>Jan</td><td>1100</td><td>700</td><td>1500</td></tr> <tr><td>Feb</td><td>1100</td><td>700</td><td>1500</td></tr> <tr><td>Mar</td><td>1000</td><td>250</td><td>1500</td></tr> <tr><td>Apr</td><td>750</td><td>250</td><td>1500</td></tr> <tr><td>May</td><td>850</td><td>250</td><td>1500</td></tr> <tr><td>Jun</td><td>750</td><td>100</td><td>1500</td></tr> </tbody> </table>	Month	Max Flow (kL/Day)	Average Flow (kL/Day)	EPL Volume Minimum Limit (kL/Day)	Jul	1100	350	1500	Aug	1150	350	1500	Sep	1150	600	1500	Oct	1100	650	1500	Nov	1100	650	1500	Dec	1150	550	1500	Jan	1100	700	1500	Feb	1100	700	1500	Mar	1000	250	1500	Apr	750	250	1500	May	850	250	1500	Jun	750	100	1500
Month	Max Flow (kL/Day)	Average Flow (kL/Day)	EPL Volume Minimum Limit (kL/Day)																																																				
Jul	1100	350	1500																																																				
Aug	1150	350	1500																																																				
Sep	1150	600	1500																																																				
Oct	1100	650	1500																																																				
Nov	1100	650	1500																																																				
Dec	1150	550	1500																																																				
Jan	1100	700	1500																																																				
Feb	1100	700	1500																																																				
Mar	1000	250	1500																																																				
Apr	750	250	1500																																																				
May	850	250	1500																																																				
Jun	750	100	1500																																																				



### **6.3.3.3 Georges River Aquatic Health Monitoring Program**

The Georges River Aquatic Health Monitoring Program (GRAHMP), which is based on the previous Pollution Reduction Programs (PRPs) and Environment Improvement Programs (EIPs), was submitted to and approved by the EPA by 30 June 2020 in accordance with Condition E3 of EPL 2504 (as varied).

The monitoring program incorporates:

- quantitative sampling of macroinvertebrates;
- ecological assessment processes using DNA extracted from sediment;
- ecotoxicity testing;
- in-stream water quality;
- laboratory water quality testing; and
- pool level and flow monitoring.

The aim of the GRAHMP is to verify the changes associated with the construction of the Appin North WTP by:

- comparing water quality in the Georges River before and after commencement of the Appin North WTP;
- assessing any ecotoxicity of discharge waters from the Appin North WTP;
- comparing the in-stream and sediment biota of pools downstream of the discharge with reference sites (located upstream of the Brennans Creek confluence);
- calculating changes over time in the composition of in-stream and sediment biota, particularly downstream of the discharge; and
- assessing the downstream gradient changes in composition of the in-stream and sediment biota.

IMC has held regular meetings with community stakeholders to review progress of projects and monitoring results from previous PRPs and EIPs. Two meetings were held with the Georges River Stakeholder Group over this reporting period; on 14 October 2021 and 28 April 2022. The October 2021 meeting included updates on Brennans Creek Dam operation, GRAHMP and Platypus/Macquarie Perch eDNA sampling, ecotoxicity sampling results and an update on the Appin North WTPs. The April 2022 meeting included updates on Brennans Creek Dam operation, results from GRAHMP and Platypus/Macquarie Perch eDNA sampling, ecotoxicity sampling results, an update on the Appin North WTP and on the Georges River rehabilitation project.

These meetings have been held since 2014. Details of meetings prior to this reporting period are provided in previous Annual Reviews. The meetings include representatives from the EPA, Biodiversity and Conservation Science Directorate (BCS), Georges Riverkeeper, Wollondilly and Campbelltown local councils, Georges River Environmental Alliance; National Parks Association of NSW, Appin Mine Community Consultative Committee (ACCC) and Western Sydney University.

Monitoring of the Georges River and Brennans Creek was undertaken over FY22 and will continue into FY24 in line with the current GRAHMP. The following items were completed in FY22:

- quarterly ecotoxicity sampling occurred in August, November 2021 and February, May 2022;
- biannual macroinvertebrate monitoring, which occurred in October 2021 and May 2022;



- annual DNA Metabarcoding Ecological Assessment, which occurred in October 2021;
- one off Platypus and Macquarie Perch eDNA analysis;
- pool level monitoring, which is continuous from the installation date and collected biannually;
- flow monitoring, which is collected biannually at site GR\_UFS; and
- the Aquatic Health Monitoring Report which was provided by CSIRO in April 2022.

The next Aquatic Health Monitoring Report will be prepared in March 2023 in line with the GRAHMP monitoring schedule. This report will provide an analysis of the results of the aquatic health monitoring, particularly results from the macroinvertebrate and DNA metabarcoding.

#### **6.3.3.4 Georges River Aquatic Health Monitoring Report (2022) Results**

The 2022 Aquatic Health Monitoring Report identified the following long-term trends (2013 – 2021) in the Georges River monitoring sites:

- Macrobenthic Communities from the reference treatment were consistently different to the discharge monitoring treatments. The long-term mean SIGNAL scores for the reference sites ( $4.5 \pm 0.10$  S.E.) were greater than the discharge monitoring sites ( $3.8 \pm 0.14$  S.E.). *Leptophlebiidae* abundance increased in the spring 2021 Monitoring and this group was more abundant and frequent in reference sites.
- There was an improvement in water chemistry across downstream sites, with conductivity, copper, cobalt and nickel decreasing over time. With the exception of nickel, these parameters fell within the acceptable ANZG (2018) GV range in 2021 at several discharge monitoring sites.
- Ongoing toxicity observed for LDP 10 waters, particularly to *Ceriodaphnia dubia* reproduction, however acute toxicity (lethality) has decreased in *C. dubia* and *Melenotaenia splendida*.
- For the eukaryotes, the communities from the reference treatment were consistently different to the discharge monitoring treatments. Point 11 was showing community structure less similar to GRQ1 and GRUFS. Diatom communities are different in the reference treatments compared to the discharge monitoring treatment sites. Similarly, prokaryotic community composition differed between the reference treatments compared to the discharge monitoring treatment sites.

The 2022 report is available on the IMC website at: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>. Previous reports under the PRPs/EIPs are also available on the website.

## **6.4 Contaminated Land**

### **6.4.1 Environmental Management**

No significant land pollution events occurred during the reporting period at Appin Mine. A Preliminary Site Investigation (PSI) was undertaken by GHD in FY22. The PSI involved site inspections and a desktop assessment of previously reported areas of actual or potential contamination on site. A Targeted Site Investigation (TSI) is planned to be undertaken in FY23, using the results from the PSI.

As highlighted in the FY21 report, throughout that reporting period, dark/black sediment was observed in portions of a drainage line located within the Appin East site boundary that runs between the Main Dam spillway (LDP 21), discharge point LDP 19 and the Georges River (refer to FY21 Annual Review for additional detail).





During a planned inspection of the Appin East Ferric Chloride Facility by EPA on 17 February 2022, the drainage line was inspected, and the EPA representative acknowledged the monitoring works completed by site. No further or immediate actions were raised during the inspection.

## 6.5 Threatened Fauna and Flora

### 6.5.1 *Environmental Management*

Threatened flora and fauna communities at Appin Mine are managed in accordance with the following approved plans:

- CWEA Management Plan;
- Broad-headed Snake and Southern Brown Bandicoot Management Plan;
- *Persoonia hirsuta* Offset Management Plan;
- Biodiversity Management Plan;
- Ventilation Shaft 6 Biodiversity Offset Strategy;
- Shale Sandstone Transition Forest Offset Management Plan; and
- Adaptive Management Plan for Water Sensitive EPBC Listed Species.

These plans include the management and mitigation measures for threatened species or habitats that occur on Appin Mine sites and are available on the IMC website at <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

*Persoonia hirsuta* is listed as “Endangered” under both the NSW *Biodiversity Conservation Act 2016* and the *EPBC Act*. A substantial population of *Persoonia hirsuta* is known to exist on the Appin North site. Several of the *Persoonia hirsuta* plants are located within operational areas such as high voltage transmission lines on site.

*Acacia bynoeana* is listed as “Endangered” under the NSW *Biodiversity Conservation Act 2016* and “Vulnerable” under the *EPBC Act*. The species has previously been recorded along existing roads, tracks and disturbed areas at Appin North.

*Pultenaea aristata* is listed as “Vulnerable” under the NSW *Biodiversity Conservation Act 2016* and the *EPBC Act*. The species has been recorded in areas of impeded drainage in woodland adjoining the main access road and in the vicinity of the southern extent of the Stage 3 CWEA. *P. aristata* plants have been identified within the rehabilitating CWEA (See Appendix 7).

Flora and fauna aspects associated with mine subsidence are detailed in Section 6.14.

### 6.5.2 *Environmental Performance*

#### 6.5.2.1 *Broad-headed Snake and Southern Brown Bandicoot*

There have been no instances in the reporting period that required the implementation of mitigation measures for Broad-headed Snakes or Southern Brown Bandicoots (as outlined in the approved management plan).

In FY22 four artificial Broad-Headed Snake habitats were placed in the CWEA rehabilitation stages 1-3 to encourage an increase in Broad-Headed snake populations in the area. These habitats were made using locally sourced recycled pavers in an attempt to mimic conditions found in rocky outcrops that would usually be inhabited by Broad-Headed Snakes and their food source, the Velvet Gecko.



The pavers were placed on western facing slopes, near open tree hollows, with a relatively open canopy with varying paver and crevice sizes to provide specific microclimates. An example of an artificial habitat placed in the CWEA is provided in Plate 4.



**Plate 4: Artificial Broad-headed Snake habitat installed in CWEA**

#### **6.5.2.2 Persoonia hirsuta - Ongoing Research and Conservation Management**

IMC conducted the ninth round of annual condition monitoring of the *Persoonia hirsuta* population at Appin North during the reporting period. The monitoring was undertaken in accordance with the approved *P. hirsuta* Offset Management Plan, which complies with EPBC Approval Condition 2. The monitoring was completed by one Niche Environment and Heritage (Niche) ecologist and one IMC representative in Spring 2021 during the peak flowering period for the species. The report is included as Appendix 8.

In accordance with Condition 3 of EPBC Approval 2010/5350, IMC has undertaken targeted research on *P. hirsuta* including:

- habitat and demography;
- population genetics;
- seed biology, germination and recruitment and propagation, and
- pollination.

IMCs targeted research on *P. hirsuta* has been outlined in the *Persoonia hirsuta* Research Report, which was submitted to the Department of Agriculture, Water and the Environment (DAWE) in June



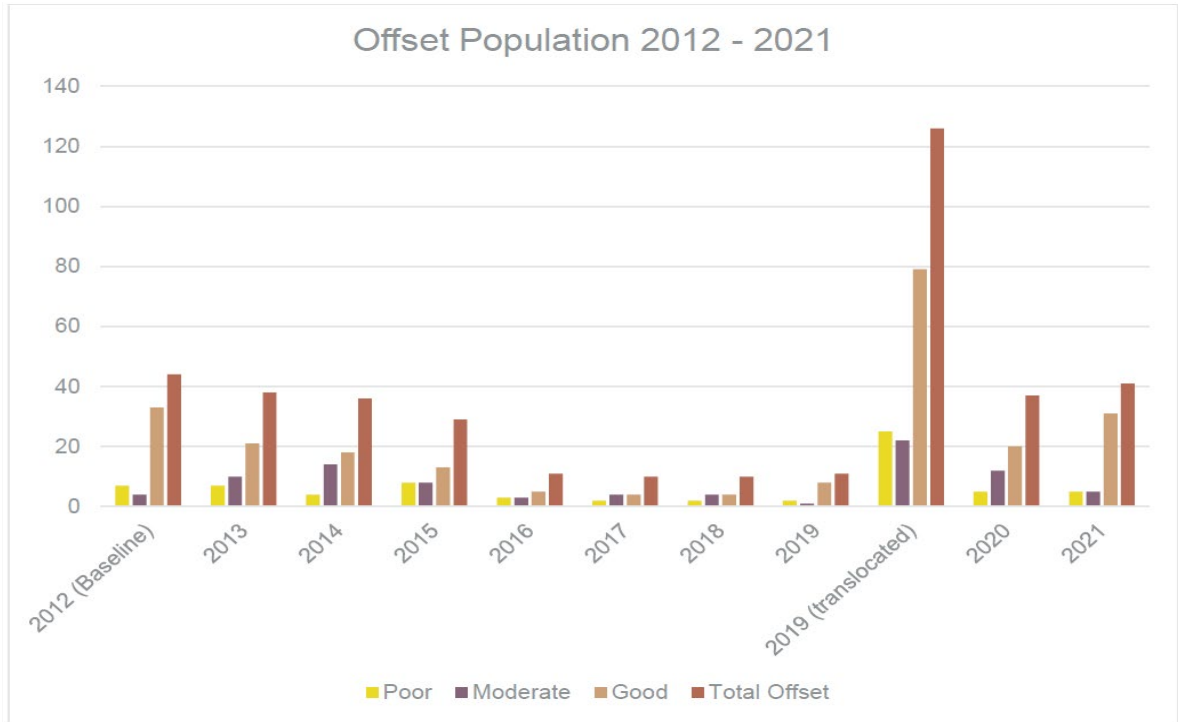
2021. The report explores the history of the endangered species; detailing current and past research, particularly the research and conservation efforts conducted to date by IMC. It also outlines what future conservation efforts could be conducted to promote an increase in overall species population in and around the Appin North mining area.

The *Persoonia hirsuta* Research Report is available on the IMC website at <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

In May 2019, 128 *P. hirsuta* propagates (including seedlings and cuttings) were translocated to the *Persoonia* Offset at Appin North. The plants had been propagated by the Mount Annan Australian Botanic Garden, some grown from seed, others from cuttings, collected from different locations. The aim of the translocation was to boost the population within the offset area to at least 44 individuals (back to baseline population) and develop a translocation procedure that can be applied to this species. The plants continued to be monitored during FY22. Mortality was relatively high, predominantly due to the drought and initial high herbivory rates. The total Offset plant population and health over time is included in Figure 6. Of the 128 translocated plants, 28 remained alive in the 2021 monitoring. Most alive plants have put on new growth since planting.

In May 2021, a second translocation was carried out with 90 *P. hirsuta* in the Stage 2 CWEA rehabilitation area. The site consists of a 50 m x 50 m plot within which plants are roughly 1 m apart, each with mammal plant guards to protect against predation (Plate 5). The translocates are between two and four years old and were from propagative material collected from several wild populations to include a wide level of genetic diversity. The translocation was watered and monitored by Mount Annan Australian Botanic Garden as well as IMC personnel with the aim of the translocation to supplement the existing population at Appin North. The 2021 monitoring revealed mortality of one plant at the time of monitoring, with 89 living plants in the second translocation remaining.

In May 2022, a third translocation was completed in the *Persoonia hirsuta* offset area at Appin North. This translocation included 102 individuals in an area roughly 50 m x 50 m in which plants are generally 1 m or greater apart. Each plant was planted with the installation of a mammal plant guard to protect against predation. The translocates were sourced from similar locations to the Stage 2 propagative material, having several different wild populations amongst the translocation. This encourages genetic diversity amongst the plants and will promote outcrossing. The plants were watered after planting to promote good root connection with the external soil, and natural wet weather events continued to supplement the establishing plants with sufficient watering post May 2022. This translocation will be included in the 2022 *Persoonia hirsuta* spring monitoring.



**Figure 6: *P. hirsuta* condition and population within the Offset during the 2021 Spring monitoring**



**Plate 5: Healthy *P. hirsuta* plant in the Stage 3 Translocation Area**



### **6.5.2.3 Shale Sandstone Transition Forest Offset/BioBank Site**

The EPBC approval conditions for Appin Mine require a biodiversity offset of at least 44.9 ha of Shale Sandstone Transition Forest (SSTF), as well as an Offset Management Plan. In 2012, IMC identified a suitable site in Douglas Park NSW, within the Wollondilly Local Government Area. The land is approximately 86 ha in size which includes bushland, a transmission line easement, a small paddock, and several access tracks. The offset area is comprised of two parcels of land, separated from each other by Douglas Park Drive.

In October 2015, IMC made an application to the NSW Office of Environment & Heritage (OEH) to have the SSTF offset secured via a BioBanking Agreement under Part 7A Division 2 of the *Threatened Species Conservation Act 1995*. The BioBanking Agreement was finalised and executed on 1 February 2017. The offset is now managed in accordance with the BioBanking Agreement, ID Number 215 (BA 215). BA 215 details an annual works program (weed management, tree planting, monitoring etc). These works are carried out by Landcare and are summarised in the 2022 Annual Report provided as Appendix 9.

### **6.5.2.4 Ventilation Shaft No.6 Offset**

The Appin No. 6 Ventilation Shaft Site project approval required IMC to secure, manage and monitor an 8.7 hectare offset of Cumberland Plain Woodland (CPW) such that an improve or maintain outcome would be achieved for threatened biodiversity.

The offset area (MZ5) is located to the north of the Appin No. 6 Ventilation Shaft site on the Mountbatten Stud property at Douglas Park NSW (Plan 7). The initial inspection of MZ5 resulted in identification of a population of the threatened plant, *Pimelea spicata* (spiked rice-flower), adding significant conservation value to the offset area.

In accepting the offset proposal, DPIE and DotE provided a number of approval conditions relating to the reservation, management and monitoring of management actions within MZ5. One of the conditions required IMC to implement a formal monitoring program for both the management of the native vegetation on the site and the extent and health of the *P. spicata* population.

Landcare were engaged to undertake weed management at the site during the reporting period. The works focused on the treatment/removal of African Olive and Blackberry, which are prevalent in the area. This will continue throughout FY23.

Compositionally, the 2021 data shows the woodland plots remaining below benchmark values for all growth forms in both MZ5 and MZ6, as was the case since 2014. In 2017 when the data updated to the Biodiversity Assessment Method (BAM) methodology, the benchmarks are much higher on a state level and may not comprehensively represent the local vegetation quality but the ultimate objective for good quality remnant vegetation. The average native species richness for MZ5 in 2021 was 15, which is an increase from the previous year. The average native species richness for MZ6 was 22, which is an increase from the previous year and equivalent to the last peak in 2017.

An assessment of the change in size and distribution of the threatened plant population of *P. spicata* was undertaken as part of the 2016/17 monitoring program and was repeated in the 2021/22 reporting period. The population census revealed an increase in an estimated 9,702 individuals from the 2017 census. This increase in population demonstrates that site management to date has been beneficial to the species. This report is provided in Appendix 13: Ventilation Shaft No. 6 Bush Regeneration Report - 2021/2022.

Recommendations in relation to the on-going management of the site include ensuring integrity of fencing through regular inspections of the site to limit stock incursions, implementing weed management focusing on large woody and vine weed removal in better condition areas and targeting Blackberry in MZ5 and MZ6 and removing Chilean Needle Grass and Blackthorn Thicket in the surrounding woodland to reduce Bell Bird populations. Additional recommendations are to make



bush regeneration staff familiar with *Pimelea spicata* so as to identify and avoid individuals during bush regeneration activities, especially weed spraying. Refer to Appendix 12 for the Annual Monitoring Report.

#### 6.5.2.5 Nepean River Biodiversity Stewardship Site

Niche was commissioned by IMC to conduct a BioBanking assessment of an offset site along Menangle Road at Douglas Park NSW, which is now referred to as the Nepean River BioBank Site. The assessment was conducted in May and November 2016. BioBanking Agreement 382 (BA 382) was made on 8 May 2018. The site provides in-perpetuity management and security for 67.41 hectares (ha) of woodland and forest communities, including two critically endangered ecological communities, as well as habitat that supports the threatened Cumberland Plain Land Snail.

BA 382 details an annual works program (weed management, tree planting, monitoring etc). These works are carried out by Landcare and are summarised in the 2022 Annual Report, provided as Appendix 10.

#### 6.5.2.6 Cataract River BioBank Site

A BioBanking agreement (BA 345) for the Cataract River BioBank Site was finalised on 6 February 2019. The site provides in-perpetuity management of approximately 8.53 ha (Lot 1, DP 572548). The property contains a critically endangered ecological community. IMC is required to undertake passive monitoring of the site until the BioBanking Trust Fund Deposit has reached 80 percent of the Total Fund Deposit. Once reached, IMC must commence all active management actions.

Three areas from which asbestos was removed were rehabilitated in 2020 with 500 seedlings of local grass, shrub species and 50 seedlings representing canopy species local to the area. The most recent 2022 monitoring observed a high success rate of seedlings on the previously disturbed site.

Additionally, exclusion fencing and security signage was installed at the Douglas Park Drive entrance of the site in the 2021 reporting period and no stock or evidence of grazing was observed over the 2022 reporting period. Since the previous reporting period there was a noticeable increase in the native vegetation and (to a lesser extent) weed growth across the site, which is likely attributed to an increase in rainfall during the reporting period and the installation of the exclusion fencing. An example of this notable increase in vegetation can be seen in the comparison figures below in Plate 6, which shows an image of photo point 3 from last year compared to this year's monitoring.



**Plate 6: Comparison of vegetation growth from photo point 3. FY20 (LHS image) and FY22 (RHS Image) at the Cataract River Biobank Site**

The Annual Report for BA 345 is provided as Appendix 11.



## **6.6 Weeds**

### **6.6.1 Environmental Management and Performance**

Weed control was significantly impacted by the ongoing rainfall throughout the reporting period.

#### **6.6.1.1 Appin East and Appin West**

Environmental inspections (which include weed identification) are undertaken at the Appin East and Appin West sites. When noxious weeds are identified they are removed and treated. During the reporting period active weed management included:

- regular spraying of weed zones by licenced contractors; and
- regular inspections that review the effectiveness of weed management activities.

#### **6.6.1.2 Appin North**

Ongoing grounds maintenance is undertaken by a contractor who has a regular schedule of work. The annual CWEA rehabilitation monitoring program includes the identification of weeds present and proposed management strategies to control weed growth within the CWEA. Targeted weed control within the CWEA was undertaken by a contractor during the year which included slashing of perennial grasses and weed spraying.

Additional weed spraying commenced around Appin North and WCCPP by site-based contractors, with particular focus on Crofton Weed and Pampas Grass removal.

## **6.7 Blasting**

No surface blasting activities were undertaken at Appin Mine during the reporting period. Minor blasting activities underground are undertaken in accordance with approved management plans.

## **6.8 Operational Noise**

### **6.8.1 Environmental Management**

Noise across Appin Mine is managed in accordance with the approved Noise Management Plan (NMP). The plan was prepared to satisfy Condition 5 of Schedule 4 of the Project Approval and details the relevant noise criteria, compliance procedures and controls relating to the mining operations.

A copy of the plan is available on the IMC website: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

#### **6.8.1.1 Monitoring Program**

A noise monitoring program has been developed to comply with Condition 5(f) of Schedule 4 of the Project Approval.

Assessment criteria have been established for each monitoring location, as outlined in the NMP. The criteria enable an assessment of compliance to be made against the noise levels outlined in the Project Approval. The site-specific assessment criteria were developed using the following methodology:

- adoption of the relevant noise criteria as outlined in the Project Approval; and



- where relevant, adjusting the noise levels (to take into account monitoring location versus receivers) using the noise contours from the Noise Impact Assessment.

The program consists of attended monitoring using handheld portable monitors and real time noise monitoring. The attended monitoring is undertaken at the nominated monitoring locations to confirm compliance.

#### **6.8.1.2 Additional Measurements at Appin West**

During the reporting period, additional monitoring was completed 10.5 m from the Appin West boom gate. The purpose of the monitoring was to evaluate the variability in noise emission from Appin West in the vicinity of the water treatment plant. The real time monitoring results confirmed the site emission range was consistent with the measurements and observations made at the AW-NS4 quarterly compliance location.

### **6.8.2 *Environmental Performance***

Quarterly attended monitoring was conducted in accordance with the approved monitoring program for the reporting period. Results of the monitoring are reported online and summarised in Table 18.

An investigation into the exceedances of noise impact assessment criteria at AE-NS5 was completed in FY22. As noted in the FY21 Annual Review, the recirculation valve at the Appin East Gas Extraction Plant was closed, and suction pressure control was undertaken at the Appin West Gas Extraction Plant with different valving arrangements. This was identified to be a suitable long-term solution to avoid exceedances of criteria at this location. No other options were determined to be suitable.

No exceedances of noise impact assessment criteria were recorded over the reporting period.

Graphs of long-term noise monitoring trends are provided in Appendix 6.





**Table 18: Noise Survey Points and Results**

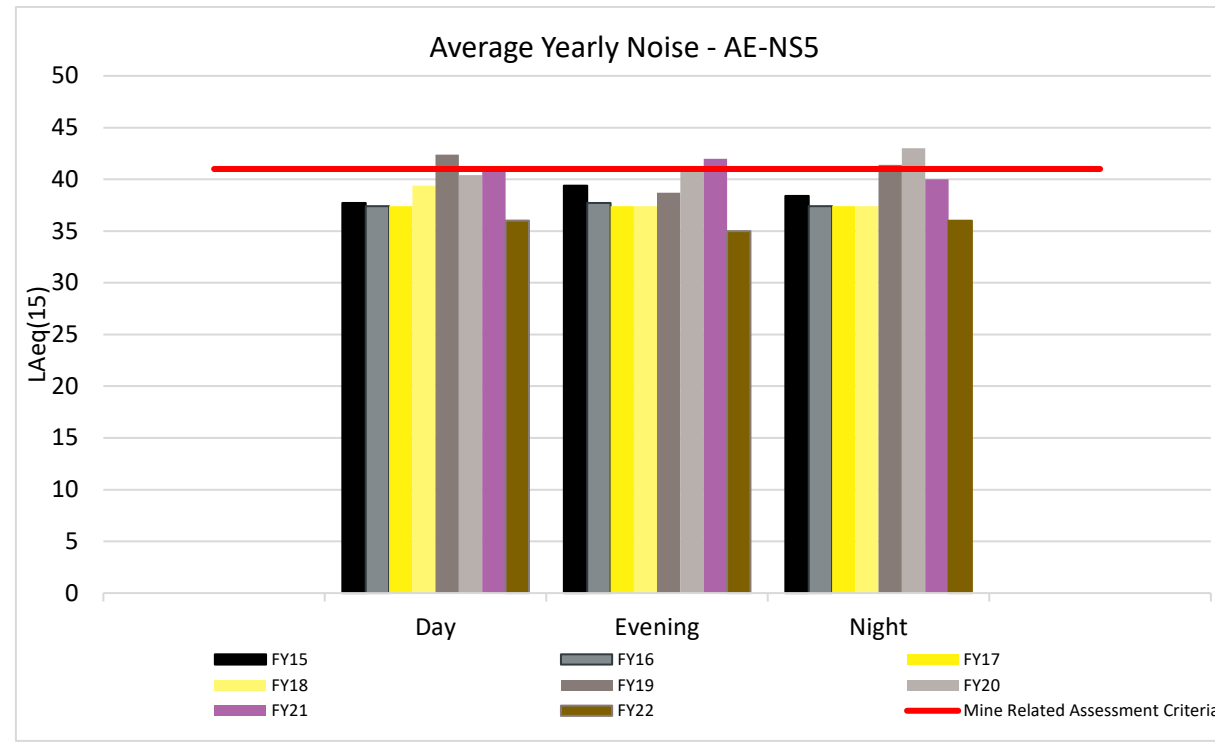
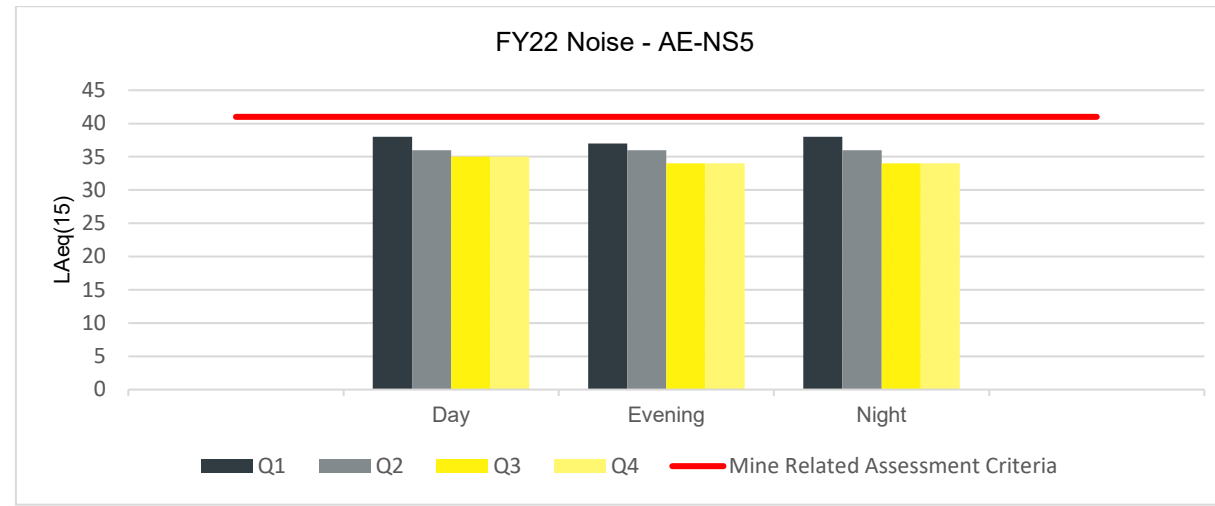
Survey Point ID	Type	Receivers	Assessment Criteria		Locality	Function	Data Summary	Comments
			LAeq(15 min)	LA1(1 min)				
AE-NS4	Attended	Appin township	43 (day, evening and night)	52 (night)	Located in paddock between Illawarra and Toggarai St North of Pit Top behind receiver 137.	Noise from AE Pit Top		<p><b>Compliant</b></p> <p>FY22 exhibited compliance with the assessment criteria. Noise generated from site was audible at the monitoring location. Appin Road still dominates as the overriding noise source.</p>



AE-NS5    Attended    Appin No.1 and No.2 receivers    41 (day, evening and night)    50 (night)

Northamptondale Road between the No.2 Shaft Site and power plant project and the nearest residential receivers in the South to East quadrant from site.

Noise levels between Shaft Site and the nearest residential receivers to the SE



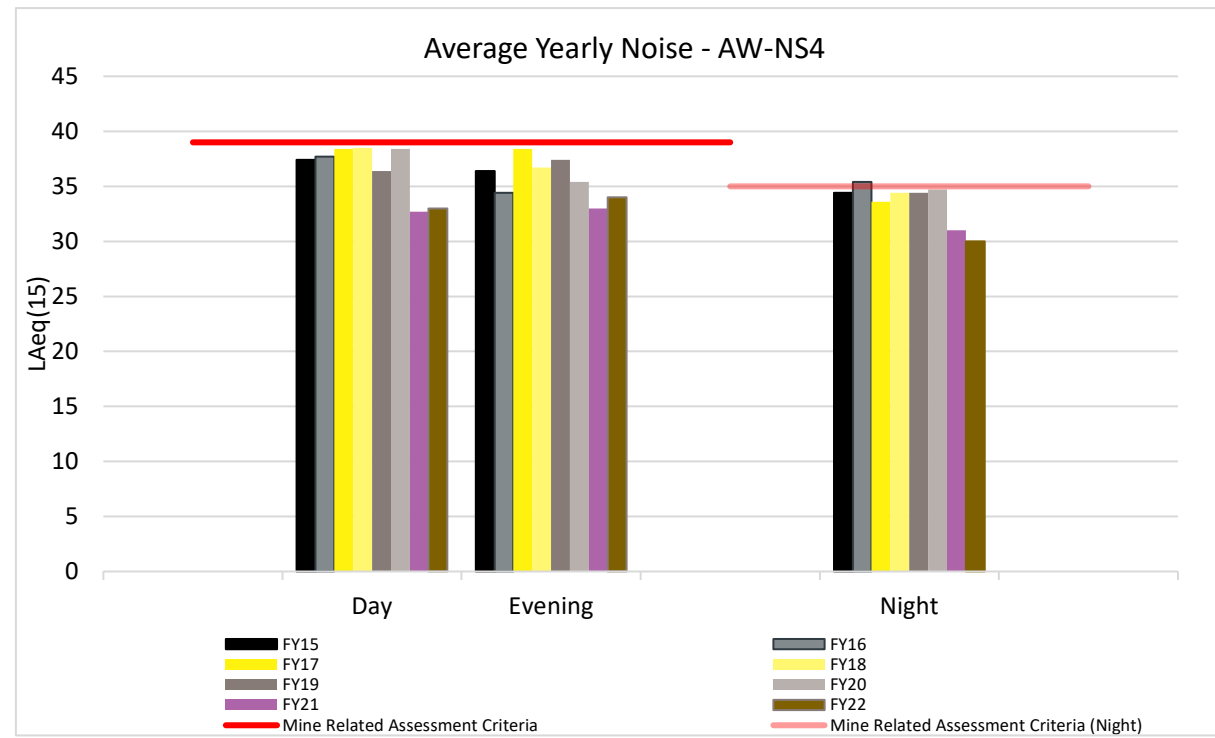
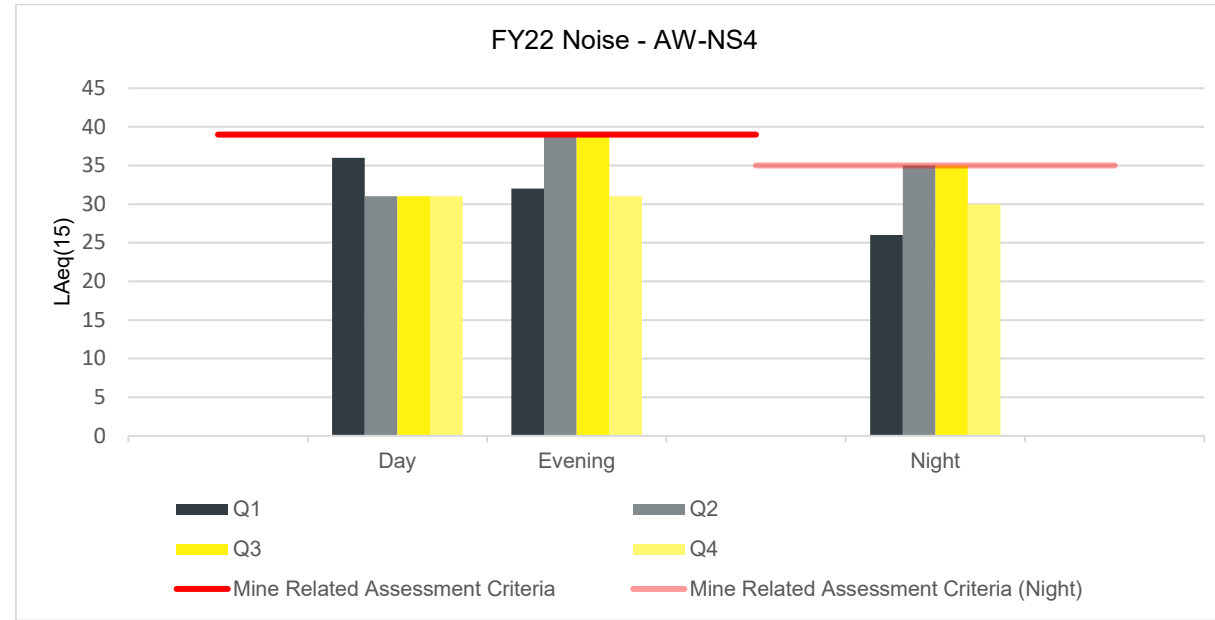
**Compliant**

FY22 exhibited compliance with the assessment criteria. Noise generated from site was audible at the monitoring location.



AW-NS4	Attended	Appin West receivers South-west of Appin West Pit Top	39 (day and evening) 35 (night)	49 (night)
--------	----------	---	------------------------------------	------------

Ashwood Road, South-west of Appin West Pit Top  
Noise level for Appin West Receivers South-west of Appin West pit top; and Appin West Receivers near Hume Highway



**Compliant**

FY22 exhibited compliance with the assessment criteria.

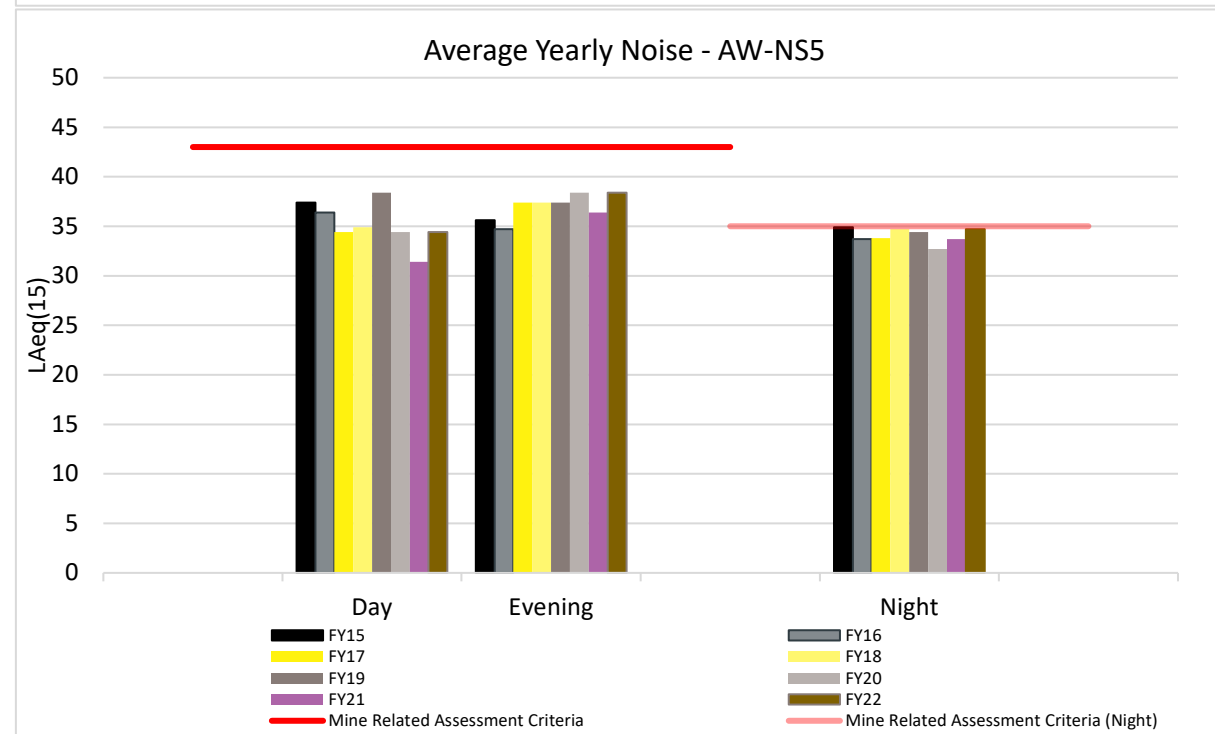
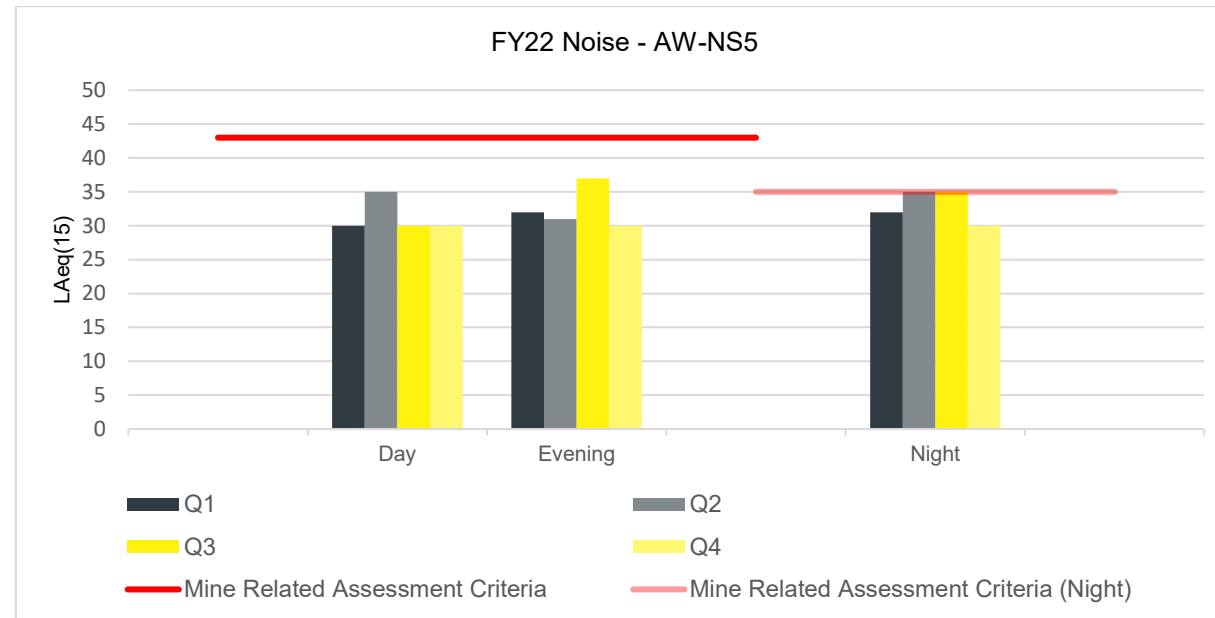
Monitoring still showing regular peaks and troughs associated with long-term trends.



AW-NS5 Attended All other Appin West receivers 43 (day and evening) 53 (night)

Between nearest residential receivers on Douglas Park Drive and the Appin West Pit Top

Noise level at AW property boundary; Noise levels between AW and nearest residential receivers on Douglas Park Drive



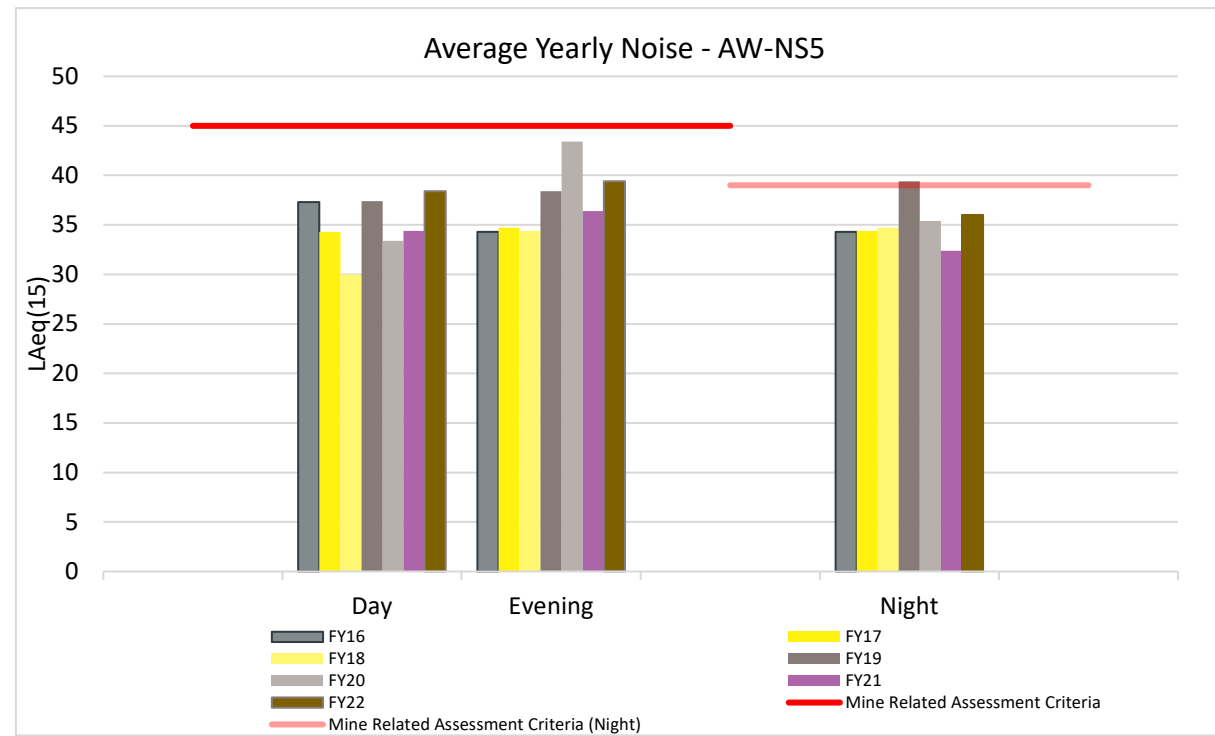
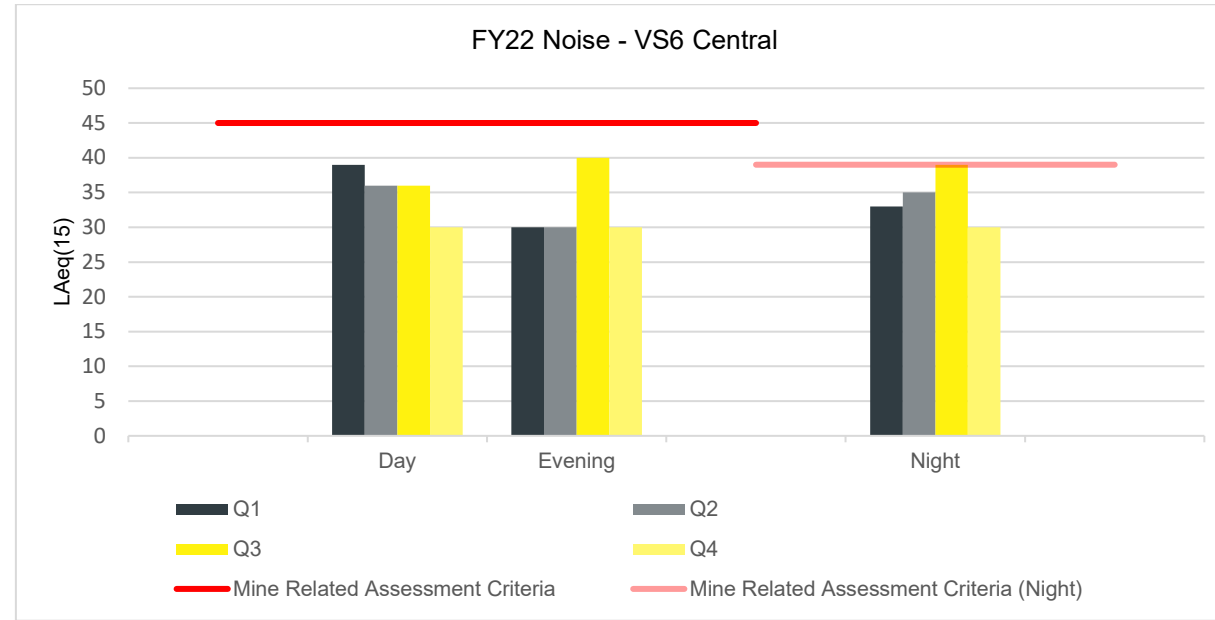
**Compliant**

FY22 exhibited compliance with the assessment criteria.

Evening monitoring displayed a slightly higher than average trend when compared to historic data, however, still showing regular peaks and troughs associated with long-term trends.



VS6 Central    Attended    Douglas Park Township and Receivers    45 day and evening)    49 (night)    Duggan Street behind Douglas Park Public School    Noise level between VS6 area and the nearest residential receivers to the West of site



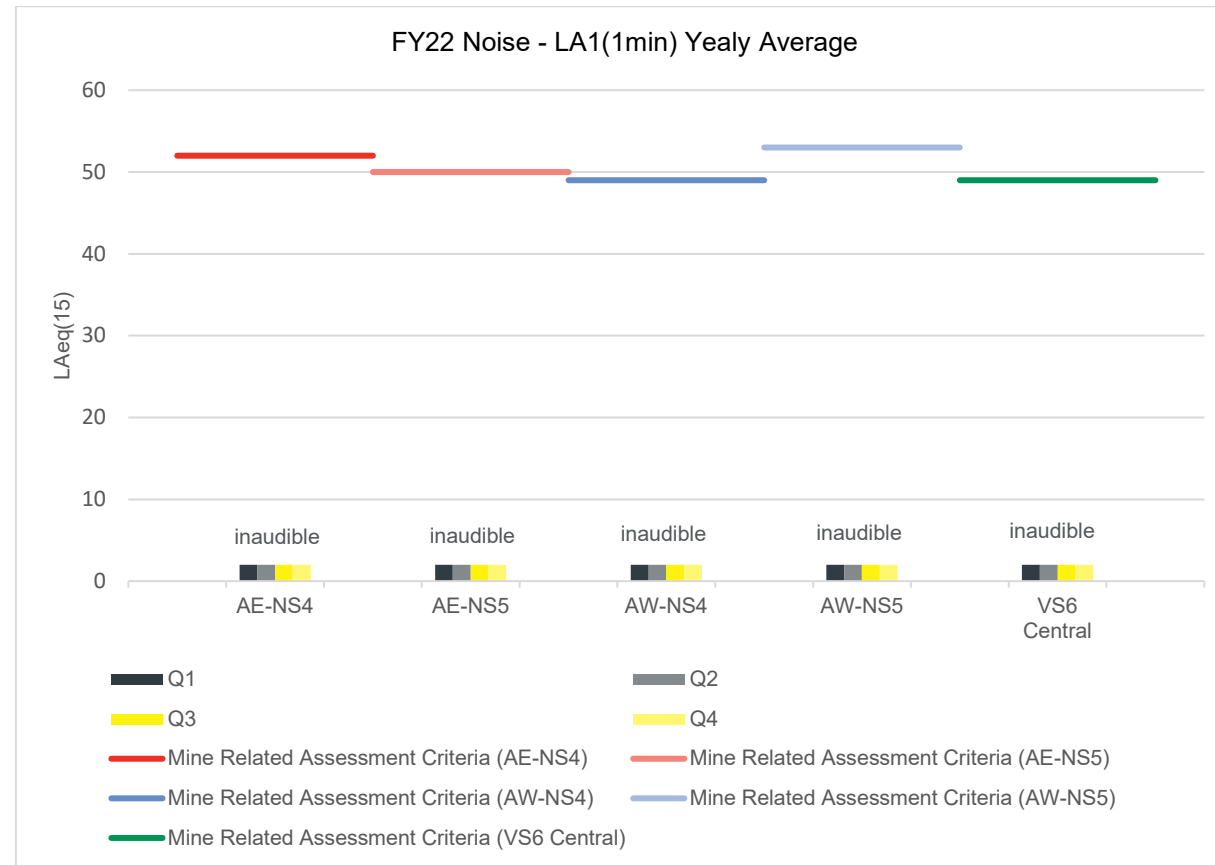
**Compliant:**

Site noise was not audible and the dominant noise source was the Hume Highway, with other sources such as local traffic and fauna across each sampling period.

Long term trend analysis shows the FY22 average typically within historic trends.



<b>LA<sub>1</sub>(1 min)</b>						
AE-NS4,						
AE-NS5,						
AW-NS4,	Attended	Various (see above)	N/A	49 to 53 (see graph)	Various (see above)	Various (see above)
AW-NS5,						
VS6 Central						



**Compliant:**

Noise levels measured were below the assessment criteria for LA<sub>1,1min</sub> across all monitoring sites for FY22.

For long-term graphs see Appendix 6.



## 6.9 Visual, Stray Light

The Appin West Pit Top is not directly visible by nearby residential receivers. Lighting located on the personnel and materials winder is partially visible from some residences at Wilton however it has not been raised by the community as an issue.

At Appin East, operations are not directly visible from nearby residential receiver locations. Lighting located at the top of the coal storage bins is partially visible from some residences however it has not been raised by the community as an issue.

Due to the relatively remote location of Appin North, there are no significant lighting issues.

There were no lighting impacts from construction activities undertaken during the reporting period.

To minimise the visual disturbance from the Vent Shaft No. 6 site, exposed areas have been revegetated. The most significant feature for minimising visibility of the site is the earthen noise barrier. This bund has also been revegetated.

## 6.10 Aboriginal Heritage

Aboriginal and natural heritage at Appin North is managed in accordance with the approved CWEA Management Plan. The plan outlines the management/mitigation measures relating specifically to each heritage site located within or in close proximity to the CWEA. A copy of the plan is available at: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

The location of known heritage sites at the CWEA are shown on Plan 14.

Aboriginal aspects associated with subsidence from the underground mining activities are detailed in Section 6.14.

## 6.11 Natural Heritage

Natural heritage aspects associated with subsidence from the underground mining activities are detailed in Section 6.14 of this report.

## 6.12 Spontaneous Combustion

No incidence of spontaneous combustion occurred within this reporting period.

Bulli Seam coal has a very low propensity to spontaneous combustion. Sampling programs (at Appin Mine) are in place to detect any changes in coal quality that could potentially lead to spontaneous combustion occurring in coal stockpiles or the CWEA.

Routine and statutory inspections are used to identify any heating or spontaneous combustion events. In addition, a real-time carbon monoxide (CO) monitoring system exists underground, and all mine officials carry CO handheld monitors.

## 6.13 Bushfire

The risk of bushfire across Appin Mine is managed by a combination of preventative and ready response activities. Bushfire management on all sites is achieved through the formation of fire breaks, Asset Protection Zones (APZs), and the establishment of an extensive firefighting water pipeline around most sites (with booster pump facilities).

APZs are maintained as required.

There were no bushfires on IMC property in the reporting period.



Appropriate site personnel are trained in emergency response and firefighting and have a supply of readily available firefighting equipment on the sites.

As highlighted in the FY21 report, IMC engaged a contractor to complete a risk assessment of the bushfire landscape at Appin Mine and provide a broad overview of the potential bushfire risks within and around the mine land holdings and indicate a range of bushfire protection measures that could be investigated and/or implemented to afford a greater level of bushfire resilience at these locations. The risk assessment was used to develop a Bushfire Management Plan for the Appin Operations, which was finalised in FY22.

## **6.14 Mine Subsidence**

### **6.14.1 Approvals**

#### **6.14.1.1 AA7 LW705 – LW710**

The Subsidence Management Plan (SMP) for AA7 LW705 to LW710 was approved by the Department of Trade, Investment, Regional Infrastructure and Services (DTIRIS) on 28 February 2012 (for LW705 and LW706) and 28 September 2012 (for LW707 to LW710). On 17 April 2020, the SMP submitted to DPIE on 1 July 2008, and its subsequent amendments, was granted a new approval from the Resources Regulator until 31 December 2024. A variation to the finishing end of LW708B (extending the panel by 94 m) was granted on 23 November 2020. The end date of the approval remains as 31 December 2024.

The LW705 to LW710 SMP is supported by management plans addressing social, cultural, environmental and infrastructure aspects of the mining area.

The LW709 to LW711 and LW905 Extraction Plan was approved by the Secretary on 29 July 2022. This approval replaces the SMP Approval for LW709 and LW710. However, management plans approved under the SMP are current for LW705 to LW708.

Appin LW708 is divided in to two sections - A and B, to step around a geological feature. LW708A has been extracted. LW708B began extraction in April 2020 and was completed on 3 January 2022. LW709 began extraction 22 February 2022 and as of the end of June 2022 had progressed approximately 601 m.

#### **6.14.1.2 AA9 LW901 - LW904**

The Extraction Plan (EP) for AA9 LW901 - LW904 was approved by the Department of Planning and Environment on 10 September 2014. The LW901 – LW904 EP is supported by management plans addressing social, cultural, environmental and infrastructure aspects of the mining area.

IMC applied to DPIE to vary the EP Approval for LW901 - LW904 on 24 March 2015 to shorten the commencing end of LW901 by 418 m. DPIE approved the variation on 29 April 2015. A variation to LW903 and LW904 was approved on 21 March 2019. The latest variation, to extend the finishing end of LW904 by 61 m, was approved on 18 December 2020.

The LW709 to LW711 and LW905 Extraction Plan was approved by the Secretary on 29 July 2022. LW905 is the final longwall currently planned in Area 9.

LW904 began extraction on 20 May 2021 and as of the end of June 2022 had progressed approximately 2026 m. LW904 was completed on 9 August 2022.

#### **Appin (West Cliff) Area 5 LW37 – LW38**

The Area 5 EP for LW37 and LW38 was approved by the Department of Planning and Infrastructure (now DPE) on 24 March 2014. Approval was granted by DTIRIS on 28 March 2014. The EP is





supported by management plans addressing cultural, environmental and infrastructure aspects of the mining area.

LW38 was completed on 1 February 2016. The area has undergone post-mining monitoring in the reporting period as part of the approved monitoring program.

#### **6.14.2 AA7 and AA9 Monitoring and Management Programs**

Surface features in the vicinity of mining during the reporting period include:

- the Nepean River and associated tributaries;
- Harris Creek and associated tributaries;
- cliffs, rocky outcrops and steep slopes;
- Aboriginal and European heritage; and
- buildings and infrastructure.

Monitoring activities within the EP/SMP area includes:

- water flow, pool water levels and water quality monitoring;
- photographic and observational monitoring to identify mining-induced fractures, strata gas releases, iron staining and rock falls;
- aquatic ecology monitoring;
- Aboriginal and European heritage items; and
- built features.

The results of these monitoring programs are provided below.

##### **6.14.2.1 Landscape Features**

During the reporting period monitoring of environmental features was carried out in accordance with the Appin LW705 to LW710 SMP and LW901 to LW904 EP. Monitoring was conducted within the zone of influence during baseline, mining and post-mining periods (where applicable).

No new AA7 gas release zones were identified on the Nepean River during the extraction of LW708B. Three previously reported gas zones were active at some point during the reporting period with just one gas zone observed to be active during the June 2022 inspection.

One new AA9 gas release zone was observed in the Nepean River during the reporting period. Twenty previously reported gas zones were observed to be active at some point during the reporting period. As of the June 2022 inspection, there were six active gas release zones observed.

Each gas zone had an estimated emission rate of less than 3000 L/min and triggered a TARP Level 1 response under the Water Management Plan.

For all observed impacts, the appropriate TARPs were applied, actions implemented, and key stakeholders notified as required by the approved SMP and EP. Table 19 includes the Nepean River gas release zones observed during the reporting period.

The LW903 End of Panel (EoP) Report was published in August 2021. The full report, including specialist assessments, can be accessed via the IMC website:

<https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.



---

#### **6.14.2.2 Surface Water**

Inspections of the Nepean River and tributaries around AA7 and AA9 are undertaken by the IMC Environmental Field Team (IMCEFT). Monitoring includes water quality and water level as well as visual inspections for any iron staining and gas releases. Gas release zones on the Nepean River are reported in Section 6.14.2.1. No areas of iron staining were identified during the reporting period. During FY22, flood events occurred throughout the Nepean catchment leading to water quality and water level fluctuations along the Nepean River, corresponding to heavy rainfall and changing flow conditions. Deviations in water quality results away from the baseline range were recorded downstream from the mining area however these were temporary, with similar changes recorded at the reference site, upstream from mining. No changes in water quality were attributed to mining activities.

Table 19 provides a summary of the predicted and observed impacts for surface waters during the reporting period. Further analysis of surface waters is included in the LW903 and LW708 EoP Reports.



**Table 19: Predicted vs Observed Impacts for Landscape Features for Area 7 and Area 9**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Surface waters	Unlikely for any significant change in water level along the Nepean River	No impacts observed	N/A
	Potential for surface water flow diversion is very low	No impacts observed	N/A
	Potential for surface water diversion directly above or adjacent the mining area	No impacts observed	N/A
	Low likelihood of ferruginous springs. Significant impacts on Nepean River pH, iron and dissolved oxygen not predicted	No impacts observed	N/A
Gas releases	Likely that strata gas emissions could occur in the Nepean River with some associated reduction in dissolved oxygen possible	Existing gas release zones observed for AA7 and AA9 during the reporting period. No new gas zones were identified in AA7. One new gas zone identified in AA9.	<ul style="list-style-type: none"> <li>Continued monitoring program</li> <li>Reported in the LW903 End of Panel Report</li> <li>Summary included in this report</li> </ul>
Iron staining	Minor iron flocs are expected to occur in the Nepean River. No change in water quality is predicted	No impacts observed	N/A
Fracturing	Minor fracturing may occur in the bed of the Nepean River	No impacts observed	N/A
Creeks	Possible for localised increase in ponding, flooding or scouring	No impacts observed	N/A
Cliffs	Possible minor isolated rock falls. Unlikely that any large cliff instabilities would occur	No impacts observed	N/A
Steep Slopes	Unlikely that there would be any significant impacts to steep slopes	No impacts observed	N/A



### **6.14.2.3 Groundwater**

Piezometer and bore monitoring data have been used to determine pre-mining groundwater levels and quality. Groundwater data is collected prior to and during the mining period, then analysed and interpreted for reporting in the EoP Report as outlined in the relevant SMP and EP.

#### **6.14.2.3.1 AA7**

Extraction of LW708A was carried out between April and October 2019. LW708B commenced in April 2020 and was completed in January 2022. The EoP Report for LW708 will incorporate results from 708A and 708B. Extraction of LW709 commenced in February 2022 and as of the end of June 2022 had retreated 601 m.

Borehole EAW5 (S1913) is located approximately 1.2 km north to northwest of LW708. Pressures in the Hawkesbury Sandstone (HBSS) have been monitored by three piezometers installed in the bore. At the end of the reporting period, the recorded water levels/pressures in the two upper piezometers were above the level of the Nepean River during the extraction of LW708. The water level/pressure in the lower piezometer located at 194 m was below the level of the Nepean River, as it has been since prior to the commencement of mining in AA7.

Borehole EAW7 (S1936) is located over LW706 and approximately 400 m southeast of LW708. Pressures in the HBSS have been monitored by one piezometer installed in the bore. Only the shallowest piezometer, installed at 65 m below ground level, has been operational during extraction of LW708. The remaining piezometers failed by shear and were disconnected during LW706 extraction for safety reasons. The water level/pressure in the piezometer showed a declining trend (<1 m during LW708), however no TARP triggers were exceeded.

Borehole S2308 is located approximately 500 m north of LW708. No water level/pressure changes were recorded during longwall extraction in the HBSS or underlying Bulgo and Scarborough Sandstones. The upper piezometer installed 70 m below the ground in the HBSS unit recorded a 16 m water head increase during longwall extraction.

A comprehensive groundwater assessment will be included in the LW708 EoP Report.

#### **6.14.2.3.2 AA9**

Extraction of LW903 commenced in November 2019 and was completed in April 2021. LW904 commenced May 2021 and was completed on 9 August 2022.

Borehole EAW9 (S1941) is located 280 m north of LW903 and above LW904. Pressures in HBSS have been monitored by three piezometers installed in the bore. During the extraction of AA9, a decline in groundwater pressure occurred in the HBSS at all three piezometers. The observed groundwater pressure reductions have declined by less than 5 m and are within the predicted range for the upper two sensors at 65 m and 125 m depth. Groundwater pressures represent a Level 1 TARP trigger for the sensor at 201.6 m depth, declining by 6.7 m. Groundwater pressures in the sensor at 201.6 m recovered above the Level 1 TARP trigger after 93 days.

Borehole EAW18 (S1954) is located 1.5 km northwest of LW903. Pressures in the HBSS and Wianamatta Group shale have been monitored by 12 piezometers installed in the bore. Groundwater pressures in the Wianamatta Group shale and HBSS declined by less than 3.6 m following mining at LW902 and LW903. Pressures in all the sensors remained above the elevation of the Nepean River following mining of LW901 - LW903.



No significant change in groundwater chemistry is noted for the reporting period. Groundwater inflow to the mine is calculated from the daily mine water balance. The 20-day moving average mine inflow during the extraction of LW903 was below the TARP Level 1 trigger of 2.7 ML/day.

Further groundwater information can be found in the LW903 End of Panel Report.

#### **6.14.2.4 Aquatic Ecology**

Within the AA7 and AA9 mining domains, significant aquatic habitat is limited to the Nepean River and its larger tributaries. Four species of aquatic macrophytes and five species of native fish were identified in baseline assessments for AA7 and AA9. No threatened fish or invertebrate species were identified during field surveys. The area is potentially within the range of two threatened species (Macquarie Perch and Sydney Hawk Dragonfly) listed under the *Biodiversity Conservation Act*.

The latest round of aquatic ecology monitoring for AA7, undertaken in December 2021, included post-extraction monitoring for LW705, LW706, LW707A, LW707B and LW708A, during extraction monitoring of LW708B, and pre-extraction monitoring for LW709 to LW710.

The latest round of monitoring for AA9 was undertaken in December 2021 and provided the second year of post-extraction monitoring for LW902, the first year of post extraction monitoring for LW903 and during extraction monitoring of LW904. Data collected up to and including the proposed survey also provided baseline data for LW905. Monitoring of LW701 to LW704 ceased in 2014, following the collection of at least two years of post-extraction data for each longwall. The next round of ecological monitoring is scheduled for November 2022 and results will be included in the Appin Mine Annual Review for FY23. Results presented below included specialist monitoring as well as latest observations from the IMCEFT.

Monitoring undertaken by IMC and other specialist consultants during extraction of AA7 and AA9 longwalls identified gas releases in the Nepean River. No fracturing, changes in water levels or flow have been attributed to mining. Some minor and short-term changes in water quality in the Nepean River in AA9 have been observed however these have not been attributed to mining.

There continues to be no observed impacts to indicators of aquatic ecology (number of taxa and biotic indices derived from macroinvertebrate sampling) attributed to extraction of AA7 and AA9 longwalls. This is expected given no more than minor gas releases and no change in water quality in the Nepean River associated with mining. No changes in water quality were observed due to gas releases, neither were any changes in water levels or diversions of flow. Statistically significant differences in these indicators among Phases (i.e. surveys) and Reaches on the Nepean River, where present, were attributed to natural spatial and temporal variation, rather than mining. During FY22, AUSRIVAS OE50 Taxa Scores on the Nepean River (a biotic index of habitat and water quality) ranged from Band B (macroinvertebrate assemblage impaired relative to reference condition) to Band A (macroinvertebrate assemblage comparable to reference condition) and were generally greater at the impact sites compared to the control sites. These data were comparable to previous surveys, with any apparent impaired macroinvertebrate assemblages unrelated to any potential mining impact.

Similarly, there was no evidence of any changes to fish and aquatic macrophytes attributable to mining. The fish assemblage sampled in the Nepean River following the commencement of extraction of these longwalls was comparable with that sampled prior to extraction and no fish kills or any other observations that may suggest an impact due to mining have been observed.

A summary of predicted and observed impacts on aquatic ecology for the reporting period for AA7 and AA9 is provided in Table 20 and Table 21 respectively. Further detailed information on aquatic ecology monitoring can be found in latest EoP reports for LW708 and LW903.



**Table 20: Predicted vs Observed Impacts for Aquatic Ecology for AA7**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Aquatic Ecology	Exposure of wetted substrata in some limited shallow areas of the river, potentially arising due to minor reductions in water depth caused by net uplift of the river bed	No reported change in water level apart from the normal fluctuations associated with rainfall and WaterNSW releases. No exposed wetted substrata observed	N/A
	Potential water loss or reduced flow due to fracturing of the river bed. However, this was not expected to result in significant water loss or reduced flow due to the flooded nature of this reach	No fracturing observed in the Nepean River and no water loss observed	N/A
	Components of aquatic ecology such as flow characteristics, connectivity and water quality should not be impacted by any predicted subsidence	No reported surface water flow diversions, impacts on water quality or connectivity of aquatic plant components	N/A
	Alterations to the composition of macrophyte beds due to small reductions in water depth. However, this is not expected to have a significant impact on the overall habitat in the survey area	No mining induced dieback has been observed though changes to bank and river bed morphology due to recent flood events appears to have resulted in substantial localised changes in the coverage of macrophytes, independent of mining.	N/A
	Possible that gas emissions may have impacts on water quality	No evidence of significant impacts on water quality due to gas releases	N/A
	Potential impacts on fish and macroinvertebrates due to mine subsidence are considered unlikely	No evidence of mining induced impact on either fish or macroinvertebrates	N/A

**Table 21: Predicted vs Observed Impacts for Aquatic Ecology for AA9**

Location	Attribute	Predicted Impacts	Observed Impacts	Completed Actions
Nepean River	Ponding, flooding and scouring of stream banks	There are unlikely to be any measurable impacts on the availability or connectivity of aquatic habitats in the downstream reach of the Nepean River due to its flooded nature and very low gradient.	None identified during observations of aquatic macroinvertebrates, fish and aquatic macrophytes at aquatic ecology monitoring sites in 2021. No impacts observed by IMCEFT as part of routine monitoring through the reporting period.	N/A
	Fracturing of bedrock and diversion of surface flows	It is considered unlikely that there would be any net loss of water from the catchment. No significant changes in the quantity or quality of permanent aquatic habitat.	None identified during observations of aquatic macroinvertebrates, fish and aquatic macrophytes at aquatic ecology monitoring sites in 2021 or during IMCEFT inspections throughout the reporting period.	N/A
	Gas releases	Minor gas releases, associated iron precipitate and reductions in concentrations of dissolved oxygen are likely to occur due to extraction.	None identified during observations of aquatic macroinvertebrates, fish and aquatic macrophytes at aquatic ecology monitoring sites in 2021. Gas releases observed however not associated with any reduction in dissolved oxygen.	N/A
Drainage Lines	Fracturing of bedrock and diversion of surface flows	Effects to aquatic habitat and biota due to any diversion of flows and draining of pools in drainage lines would be minimal, due to the limited aquatic habitat provided by these areas.	No fracturing observed in drainage lines.	N/A



#### 6.14.2.5 Terrestrial Ecology

Assessments of significance have been completed for an endangered community and threatened flora and fauna species in the mining area. The assessments focused on flora and fauna that could potentially be impacted by subsidence. The following aspects were assessed:

- native vegetation communities;
- threatened flora; and
- threatened fauna and fauna habitat.

Plant communities, fauna habitats, threatened species, populations and ecological communities have not been significantly impacted by subsidence during the reporting period as outlined in Table 22.

**Table 22: Predicted vs Observed Impacts for Terrestrial Ecology for AA7 and AA9**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Vegetation communities and fauna habitat	Minor impacts to riparian habitats on the Nepean River through changes in water levels, desiccation, gas release and minor fracturing	No impacts observed	N/A
	Minor impacts to vegetation due to rock falls, an increase in ponding, flooding or cracking to drainage lines and creeks	No impacts observed	N/A
Threatened flora	Unlikely that any threatened flora would be significantly impacted	No impacts observed	N/A
Threatened fauna	Unlikely that threatened fauna or habitats will be significantly impacted	No impacts observed	N/A

#### 6.14.2.6 Cultural Heritage

No impacts to historical sites or Aboriginal heritage sites were recorded during the reporting period.

#### 6.14.2.7 Surface Infrastructure

Surface infrastructure located within or near the mining areas includes the following:

- Optical fibre cables (Telstra, Optus, NextGen and Powertel).
- Main Southern Railway and associated infrastructure.
- HW2 Hume Highway and associated infrastructure.
- Local roads and drainage culverts.
- Power infrastructure.
- Copper telecommunications cables.
- Potable water and sewerage networks.
- Building structures, pools, water tanks and farm dams.
- Groundwater bores.
- Heritage structures.
- Nepean Twin Bridges at Douglas Park.
- Pumps in the Nepean River.



- Upper Canal, Cataract Tunnel and associated infrastructure.
- Survey Control Marks.

A summary of the observed surface infrastructure impacts during the reporting period for AA7 is provided in Table 23. Surface infrastructure impacts attributed to AA9 are summarised in Table 24.

### **6.14.3 Area 5 Monitoring and Management Programs**

LW38 ceased extraction on 1 February 2016. Monitoring of the Georges River continues, providing pre-remediation data for the Georges River Rehabilitation Plan (GRRP). Monitoring activities currently include:

- photographic and observational monitoring including the Georges River and its tributaries, cliff lines and landscape features;
- water flow, pool water levels and water quality monitoring; and
- shallow groundwater level monitoring.

Monthly monitoring is undertaken by the IMCEFT with fortnightly targeted inspections of Georges River pools that are observed to be below baseline level. Below baseline water levels were recorded during the FY22 reporting period. All pools that exhibited below baseline water levels have previously been reported. The occurrence of below baseline observations during FY22 was fewer than previous years following subsidence impacts. Below baseline pool levels are assessed in detail in the GRRP.

Remediation options for impacted sections of the Georges River as a result of LW32 to LW38 have been proposed in the GRRP. The GRRP incorporates findings from a pre-remediation study. This involved the cessation of discharge from BCD and the monitoring of water recession in pools, as well as incorporating the results from the Georges River Catchment Modelling. Pre-remediation data continued to be collected through the reporting period. This included pool water levels and quality, and surface flows.

The GRRP was approved by the Resources Regulator on 24 April 2020. It updates the proposed rehabilitation of the Georges River, following the completion of extraction of Area 5. IMC are currently arranging for land access agreements to undertake the approved GRRP. Results from the WC21 rehabilitation trial at Dendrobium Mine will confirm the specific methodology to be used in Georges River.

#### **6.14.3.1 Landscape Features**

Post-mining monitoring includes regular inspections of the Georges River as well as riparian features and cliffs. There were no new impacts identified as subsidence in Area 5 has ceased (see Table 25).

#### **6.14.3.2 Surface Water**

The monitoring program provides a basis for the comparison of flow, pool level and water quality in the area before, during and after mining as outlined in the Area 5 LW37 to LW38 EP.

During the reporting period field water quality in the Georges River and tributary sites generally remained within the baseline range, with no significant change in trend or adverse changes being observed. No TARP trigger levels were recorded for pH. The levels of nickel and zinc in the Georges River maintained similar pre-LW38 variability, with no significant change to the observed ranges as a result of extraction of LW38. Although, there has been a recent upward trend in dissolved manganese in FY22 and it will continue to be monitored into FY23.

An historic gas release recorded in Pool 28 of the Georges River was observed to be active during the reporting period (Plan 15).





---

A community report of gas being emitted from a Georges River fire trail was submitted in April 2022. IMC investigated this emission which was found to be unrelated to mine subsidence and likely the result of heavy rainfall causing air to be emitted from an old utility line beneath the surface of the fire trail.

A summary of the observed surface water impacts for LW38 is provided in Table 26.



**Table 23: Predicted vs Observed Impacts for Surface Infrastructure for Area 7**

Local Road	Minor cracking and localised heaving of the road surface in some locations above the longwall	Bump in subsidence profile and the pavement developed in two locations on Menangle Road during the extraction of LW708A	Menangle Road was proactively repaired on two occasions prior to the development of safety or serviceability issues
Hume Highway	No impacts on the safety or serviceability of the highway after the implementation of the management strategies	Minor crazing noted in pavement. Humps developed on both carriage ways and Partridge VC truck stop. No impact to safety or serviceability	Remediation by re-shaping of the pavement occurred.
Main Southern Railway	No impacts on the safety or serviceability of the railway after the implementation of the management strategies	Minor changes in track geometry but all were managed through the implementation of the Management Plan	Minor tamping required to fix a pre-existing issue with the track. Remediated in accordance with the Management Plan.
Douglas Park Twin Bridges	Impacts unlikely after the implementation of the TARP	No reported impacts	N/A
Moreton Park Road Bridge (south)	Impacts unlikely after the detailed investigation, analysis and implementation of the TARP	No reported impacts	N/A
Power Infrastructure	Impacts unlikely, but minor mitigation measures may be required	No reported impacts	N/A
Copper telecommunications cables	Impacts unlikely	No reported impacts	N/A
Optical fibre cables	Impacts unlikely with the implementation of the management strategies including OTDR monitoring and mitigation	No reported impacts	N/A
Building structures	A low frequency of minor impacts and very low frequency of more significant impacts were predicted	All building structures remained in safe and serviceable conditions during the extraction of LW708.	Claims that have been lodged are being managed by Subsidence Advisory NSW (SA NSW) through the relevant legislation
Pools	In ground pools could be more susceptible to ground strains	No reported Impact	N/A
Water tanks	Impacts unlikely	No reported impacts	Claims that have been lodged are being managed by SA NSW through the relevant legislation
Farm dams	Potential for minor cracking or leakage	No impacts attributed to mine subsidence	Claims that have been lodged are being managed by SA NSW through the relevant legislation
Heritage structures	Impacts unlikely	No reported impacts	N/A
Groundwater bores	Potential for blockage or reduction in the capacity of the groundwater bores	No reported impact	N/A
Pumps in the Nepean River	Impacts unlikely	No reported impacts	N/A
The Upper Canal, Cataract Tunnel and associated infrastructure	Impacts unlikely	No reported impacts	N/A
Survey control marks	Marks are likely to be exposed to the full range of mining induced subsidence movements. Marks within the area of influence have been noted as 'disturbed' in the SCIMS database.	Marks have been exposed to the full range of mining induced subsidence movements.	Following the completion of subsidence in the area a network of survey marks will be re-established to the satisfaction of NSW Spatial Services.



**Table 24: Predicted vs Observed Impacts for Surface Infrastructure for Area 9**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Local Road	Minor cracking and localised heaving of the road surface in some locations above the longwall	Minor damage to Menangle Road due to a localised compressive strain	Section of pavement milled and resurfaced.
Main Southern Railway	No impacts on the safety or serviceability of the railway after the implementation of the management strategies	No reported impacts	N/A
Douglas Park Twin Bridges	Impacts unlikely after the implementation of the TARP	No reported impacts.	N/A
Moreton Park Road Bridge (south)	Impacts unlikely after the detailed investigation, analysis and implementation of the TARP	No reported impacts	N/A
Power Infrastructure	Impacts unlikely, but minor mitigation measures may be required	No reported impacts.	N/A
Copper telecommunications cables	Impacts unlikely	No reported impacts	N/A
Optical fibre cables	Impacts unlikely with the implementation of the management strategies including OTDR monitoring and mitigation	No reported impacts	N/A
Potable Water network	Impacts unlikely, but minor mitigation measures may be required	No reported impacts	N/A
Sewerage Network	Impacts unlikely, but minor mitigation measures may be required	No reported impacts	N/A
Building structures	A low frequency of minor impacts and very low frequency of more significant impacts were predicted	Minor damage to some residential homes and sheds	Claims that have been lodged are being managed by SA NSW through the relevant legislation
Pools	In ground pools could be more susceptible to ground strains	Some pools out of level	Claims that have been lodged are being managed by SA NSW through the relevant legislation
Water tanks	Impacts unlikely	One impact to a water tank reported during LW903	Claims that have been lodged are being managed by SA NSW through the relevant legislation
Farm dams	Potential for minor cracking or leakage	No reported impacts.	Claims that have been lodged are being managed by SA NSW through the relevant legislation
Heritage structures	Impacts unlikely	No reported impacts	N/A
Groundwater bores	Potential for blockage or reduction in the capacity of the groundwater bores	Level 1 TARP triggered at bore S1941	Implementation of Level 1 TARP
Pumps in the Nepean River	Impacts unlikely	No reported impacts	N/A
The Upper Canal, Cataract Tunnel and associated infrastructure	Impacts unlikely	No reported impacts	N/A
Survey control marks	Marks are likely to be exposed to the full range of mining induced subsidence movements. Marks within the area of influence have been noted as 'disturbed' in the SCIMS database.	Marks have been exposed to the full range of mining induced subsidence movements. No reported damage to the survey control marks	Following the completion of subsidence in the area a network of survey marks will be re-established to the satisfaction of NSW Spatial Services.



**Table 25: Predicted vs Observed Impacts for Landscape Features for Area 5**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Georges River and tributaries	Negligible environmental consequences including: negligible diversion of flows or changes in the natural drainage behaviour of pools; negligible gas releases and iron staining; and negligible increase in water cloudiness. over at least 80% of the stream length subject to vertical subsidence >20mm. No subsidence impact or environmental consequence greater than minor.	No new impacts observed A historic gas release in Pool 28 of the Georges River was observed to be active during the reporting period.	N/A
Cliffs	Cliffs of "special significance": Negligible impact (that is occasional rock falls displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs) within any longwall mining domain. Other cliffs: Minor impacts (that is occasional rock falls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 3% of the total face area of such cliffs within any longwall mining domain)	No impacts observed	N/A
Access Track	Minor impacts	No impacts observed	N/A

**Table 26: Predicted vs Observed Impacts for Surface Water for Area 5**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Georges River	Negligible environmental consequences including: negligible diversion of flows or changes in the natural drainage behaviour of pools; negligible gas releases and iron staining; and Negligible increase in water cloudiness. Over at least 80% of the stream length subject to vertical subsidence >20mm. No subsidence impact or environmental consequence greater than minor.	Based on analysis of the long-term water quality records for designated upstream and downstream sites of LW38, no significant water quality impacts were observed or measured within the Georges River. Fracturing and diversion of flow with lower pool levels. Pool water levels respond to releases from BCD.	<ul style="list-style-type: none"> <li>Monitoring program continued</li> <li>Reported to key stakeholders</li> <li>Reported in EoP Report and Annual Review</li> <li>Monitoring program reviewed</li> <li>Impacts reviewed against Performance Measures</li> <li>Technical specialist notified and advice on Corrective Management Actions (CMAs) sought</li> <li>Impacts to Georges River included in GRRP, which was approved at the end of FY20.</li> </ul>



### **6.14.3.3 Groundwater**

Post mining monitoring of groundwater in the HBSS in Area 5 has continued as outlined in the LW 37-38 EP.

No adverse interconnection of aquifers and aquitards has been observed within 20 m of the plateau surface and no increased rate of groundwater recharge into the plateau has been observed in the post-mining period.

No TARP trigger levels related to aquifer or aquitard interconnection or changes in recharge have been observed in the post-mining period.

Water levels in piezometers GR27, GR28, GR70 and WC54 were not affected by subsidence during or after extraction of LW38. The water level in WC95 fell by approximately 9 m and was reported as a Level 1 TARP during LW38 extraction. At the end of the reporting period the water level in the borehole was 0.83 m above the pre-mining baseline level and about 10.13 m higher than the lowest level recorded following mining. These changes remain within predictions.

### **6.14.3.4 Aquatic Ecology**

No specialist aquatic ecology monitoring was undertaken during the reporting period as the post-mining period of this program is complete. Results from specialist aquatic ecology monitoring have been included in previous Annual Reviews.

Observations of aquatic ecology habitat is captured as part of monthly inspections undertaken by the IMCEFT. Apart from low water levels observed in some pools during the reporting period, no specific impacts to aquatic ecology were evident.

Specialist aquatic ecology monitoring will continue following the implementation of the GRRP.

A summary of predicted and observed impacts on aquatic ecology is provided in Table 27.

### **6.14.3.5 Terrestrial Ecology**

A baseline Terrestrial Flora and Fauna Assessment (Biosphere, 2009) was undertaken in support of the BSO Project Environmental Assessment. The Study Area for the assessment included LW37 and LW38. Supplementary field surveys for terrestrial biodiversity were undertaken by Niche (2013), for the purposes of the LW37 and LW38 EP.

Subsidence effects are unlikely to have a significant impact on any threatened flora or fauna species (Niche, 2013). However, impacts may lead to the alteration of habitat and the alteration of the natural flow regimes of rivers, stream, floodplains and wetlands following longwall mining (Niche, 2013).

Visual inspections of vegetation communities within the LW37 and LW38 Study Area are undertaken as a part of routine landscape and water monitoring programs. Post-mining monitoring focuses on detecting changes to vegetation communities and fauna habitat.

No impacts to vegetation have been observed in the post-mining period as shown in Table 28.



**Table 27: Predicted vs Observed Impacts for Aquatic Ecology for Area 5**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Aquatic Ecology	Threatened species, threatened populations, or endangered ecological communities: - negligible environmental consequences	No specialist monitoring undertaken in the reporting period. Observational monitoring continues with no impacts evident in the reporting period.	N/A

**Table 28: Predicted vs Observed Impacts for Terrestrial Ecology for Area 5**

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Terrestrial Ecology	Threatened species, threatened populations, or endangered ecological communities: - negligible environmental consequences	No impacts observed.	N/A



### 6.14.3.6 Cultural Heritage

No historical sites were located above LW38.

There were no post mining impacts identified as a result of longwall extraction in the reporting period. Impacts have previously been noted to Aboriginal shelter sites Georges River No. 2 (AHIMS # 52-2-2243) and Georges River No. 3 (AHIMS # 52-2-2243). These impacts were a result of subsidence movements from LW35 and LW36. Refer to the EoP Reports for further information.

### 6.14.3.7 Surface Infrastructure

Subsidence monitoring programmes are developed in consultation with key stakeholders and ensure that all key infrastructure and other surface features located above the extraction areas are closely monitored to assess subsidence movements and impacts.

Active mining concluded in Area 5 with the completion of LW38 on 1 February 2016. The area has undergone post mining monitoring as part of the approved monitoring program and no survey monitoring has been undertaken in FY22. There were no reported impacts to any built features or subsidence claims in FY22 in Area 5.

## 6.15 Hydrocarbon Contamination

Refer to Section 6.4.

## 6.16 Hazardous Material Management

### 6.16.1 Storage

Oils are stored in purpose-built facilities with appropriate bunding and firefighting provisions available. A licenced contractor is engaged to remove and recycle and/or dispose of used oil and grease products through appropriately licenced facilities.

Diesel fuel is brought to the Appin Pit Tops by road tanker and stored in above ground bunded tanks, from where it is transferred to diesel pods for underground use or direct to machinery.

Appin has two chlorine dioxide dosing plants in use; one at the Appin West Pit Top, and the other at BCD.

Details of the bulk chemical storage locations and manifest quantities associated with the Appin West and Appin North operations are provided in Table 29 and Table 30. No dangerous goods stored at Appin East are at manifest quantities.

As a result of a ferric chloride spill occurring at Appin East coagulant and flocculant dosing station during FY22, a bund audit was undertaken to determine the compliance of chemical and hydrocarbon storage facilities across the Appin Mine operations. The audit improvement opportunities were identified, leading to corrective actions being progressively implemented to rectify the issues identified.

**Table 29: Summary of Dangerous Goods Storage at manifest quantities - Appin West**

Storage Area ID	Proper Shipping Name	UN No.	Class / Division	PG	Type	Design Capacity	Typical Quantity
ABT 01	Hydrochloric Acid 33%	1789	8	II	AGT	23,000 L	23,000 L



ABT 02	Sodium Hydroxide 35%	1824	8	III	AGT	9,000 L	9,000 L
ABT 03	Sodium Hypochlorite 12.5%	1791	8	III	AGT	6,000 L	6,000 L
ABT 04	Hydrochloric Acid 9%	1789	8	III	AGT	3,000 L	3,000 L
ABT 05	Sodium Chlorite 7.5%	1908	8	III	AGT	3,000 L	3,000 L
ABT 06	Sodium Chlorite 7.5%	1908	8	III	AGT	2,000 L	2,000 L
ABT 07	Sodium Hydroxide 35%	1824	8	III	AGT	2,000 L	2,000 L
ABT 08	Citric Acid		N/A		AGT	2,100 L	2,100 L
ABT 09	Aluminium Chlorohydrate 100%		N/A		AGT	1,500 L	1,500 L
ABT 10	Aluminium Chlorohydrate 50%		N/A		AGT	1,500 L	1,500 L
ABT 11	Antiscalant Memguard		N/A		AGT	2,000 L	2,000 L
ABT 12	Permatreat Antiscalant		N/A		AGT	1,500 L	1,500 L

**Table 30: Summary of Dangerous Goods Storage at manifest quantities - Appin North**

Storage Area ID	Proper Shipping Name	UN No.	Class / Division	PG	Type	Design Capacity	Typical Quantity
ABT 01	Sodium Chlorite 7.5%	1908	8	III	AGT	4,000 L	3,000 L
ABT 02	Hydrochloric Acid 9%	1789	8	III	AGT	4,000 L	3,000 L
ABT 03	Sodium Hydroxide 25%		8		AGT	12,000 L	12,000 L
ABT 04	Sodium Hydroxide 46%		8		AGT	200 L	200 L
ABT 05	Sulfuric Acid 70%		8		AGT	10,000 L	10,000 L
ABT 06	Citric Acid		N/A		AGT	200 L	200 L
ABT 07	Biocide RO 1032		N/A		AGT	200 L	200 L
ABT 08	Memguard 102		N/A		AGT	200 L	200 L
ABT 09	Memguard 44 & 61		N/A		AGT	16 x 20 L	16 x 20 L





### 6.16.2 Explosives

All explosives/detonators for the Appin operations are currently stored at the explosives storage facility located at the Appin East mine site. IMC is currently in the process of relicensing the Appin West magazine. Storage facility capacity information for Appin East and Appin West is provided in Table 31 and Table 32 respectively.

**Table 31: Explosives and Detonator Storage – Appin East**

Site	Type	Capacity
Appin East	1.1D Explosive	550 kg
	1.1B Detonators	5,000 detonators

**Table 32: Explosives and Detonator Storage – Appin West**

Site	Type	Capacity
Appin West	1.1D Explosive	2,000 kg
	1.1B Detonators	5,000 detonators

### 6.16.3 Radiation Gauges

There is one monitoring gauge (moisture scanner) at the Appin East Surface Elevator Belt that contains low emission radioactive isotopes. This gauge is licenced and maintained as per the legal requirements. The gauge is housed in an appropriate container and is inspected and tested in accordance with legislative requirements.

There are several monitoring gauges (moisture scanners) in the WCCPP that contain low emission radioactive isotopes. These gauges are licenced and maintained as per legal requirements. All gauges are housed in appropriate containers and are inspected and tested in accordance with legislative requirements.

## 6.17 Methane Management

The in-seam gas content of Appin mining areas was approximately 29 Nm<sup>3</sup> of methane per tonne of in-situ coal in FY22. A comprehensive underground methane drainage program is maintained, which includes a network of drill holes and pipes to recover a large proportion of this gas by in-seam and cross-measure drainage. Methane drainage is necessary to provide a safe, compliant and productive underground mining environment.

Methane gas extraction, utilisation and venting rates are summarised and reported monthly for greenhouse gas (GHG) accounting. During this period the Appin monitoring systems, procedures and data were audited (reasonable assurance) as required by statutory and internal requirements.

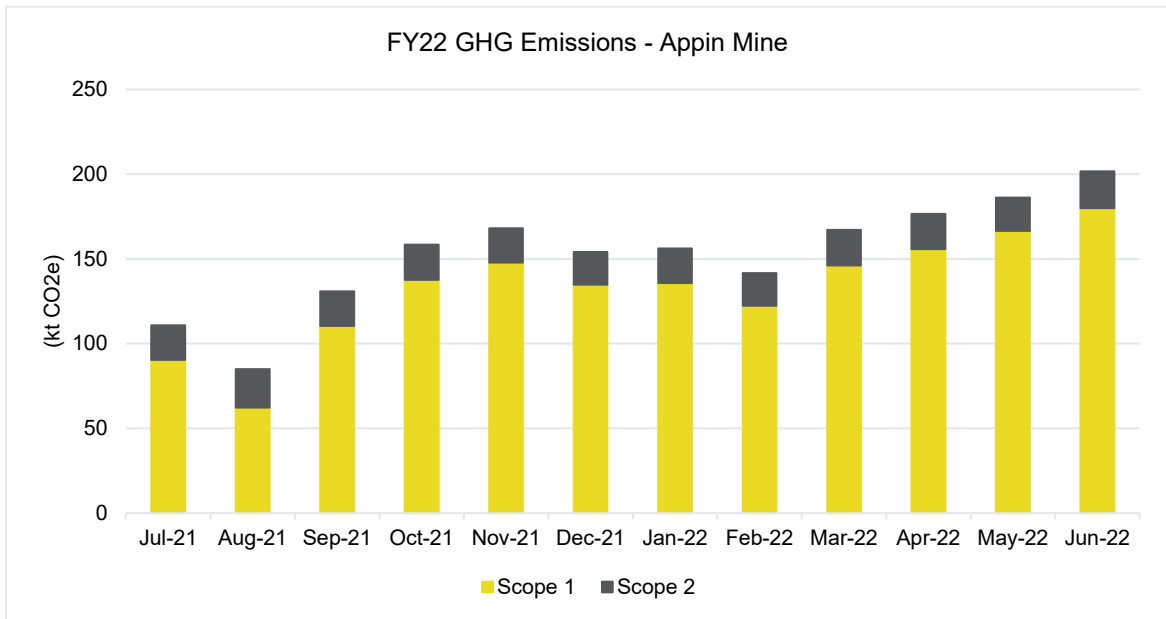
Results of the GHG accounting for FY22 are summarised in Table 33 and Figure 7.<sup>13</sup> Long-term results for FY15 to FY22 are shown in Figure 8.

<sup>13</sup> Figures are for NGER (National Greenhouse and Energy Reporting) Facility WCF01 and APN01.

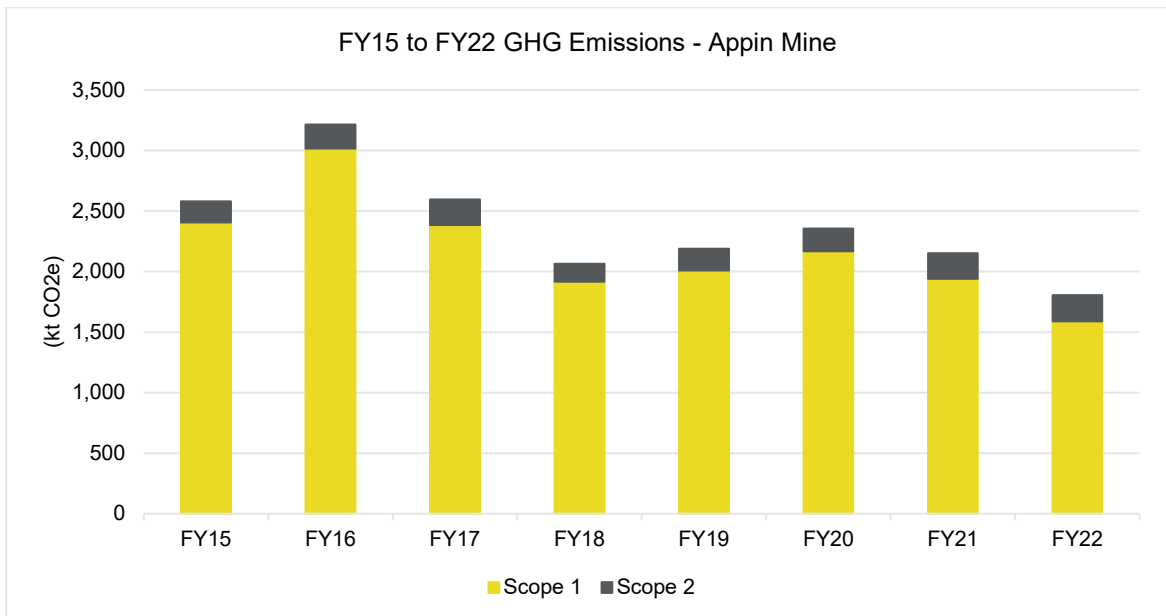


**Table 33: Summary of Greenhouse Emissions - Appin Mine**

Emission Type	Unit	FY21 Total	FY22 Total
Scope 1	kt CO <sub>2</sub> -e	1941	1590
Scope 2	kt CO <sub>2</sub> -e	210	216



**Figure 7: FY22 GHG Emissions - Appin Mine**



**Figure 8: FY15 to FY22 GHG Emissions - Appin Mine**



### **6.17.1 Mine Safety Gas Drainage**

In AA7 and AA9, gas drainage is now entirely undertaken by the underground gas drainage network before being piped to the surface and utilised by the Energy Developments Limited (EDL) Plants (West and East). When there is more gas available from the mine than can be utilised by EDL, the flaring systems are initiated to abate the methane content of the gas.

The flares at the Appin West Gas Drainage Plant were not in operation during FY22. The flares at the Appin East Gas Drainage Plant were used during the reporting period, however only on an as required basis when the EDL power station was non-operational, and gas could not be redirected to Appin West. Drained methane has been utilised at EDL for power generation, with some minor venting during plant changes and transitions.

### **6.17.2 Mine Methane Extraction**

The methane gas extracted from the coal seam by the underground gas extraction network is directed to the surface, via the gas drainage plants, from where it is piped to the electricity generation plants and used to generate electricity. A total of 2322 kt CO<sub>2</sub>-e was recovered and transferred (i.e. abated) to the EDL power stations.

### **6.17.3 Mine Ventilation Fans**

During the reporting period, approximately 1237 kt CO<sub>2</sub>-e was emitted to atmosphere from the Appin Mine Ventilation System, down 32% when compared to FY22 (1818 kt CO<sub>2</sub>-e). The average CH<sub>4</sub> concentration was 0.24% (down from 0.30% in FY21) and the average CO<sub>2</sub> concentration was 0.21% (up from 0.20% in FY21).

### **6.17.4 Decarbonisation Program**

South32 has established greenhouse gas emission targets. Since setting these, IMC has met its short-term goal of maintaining Scope 1 emissions at FY15 levels through to the end of FY21. IMC is now working towards its medium-term emissions reduction target of 50% by 2035 on a FY21 baseline (operational emissions only). The plan is then to progressively reduce emissions, such that the business is net carbon neutral by 2050. The goal of carbon neutrality by 2050 aligns South32 with the Paris Agreement, as well as the NSW aspirational target for 2050.

During FY19, IMC completed a concept level study that proposed a phased roadmap of projects with the aim of delivering the goal of carbon neutrality by 2050 through a combination of increased gas capture, treatment of ventilation air methane (VAM), and offsetting. During FY20, work towards delivering key projects associated with the roadmap to carbon neutrality began. In FY21, this work has focussed primarily on increasing the proportion of fugitive emissions generated by longwall production at Appin Mine that are captured by the gas drainage system and reticulated to abatement facilities (either power generation or flaring). This is measured by the post drainage capture efficiency (PDCE) metric. Dendrobium Mine has relatively low methane emissions in comparison to Appin Mine, which is why methane abatement at IMC is focussed on Appin Mine emissions.

Increases in longwall gas capture have been achieved with additional underground drilling programmes that began in FY20 and were continued into FY22. This includes directionally drilled holes targeting gas bearing strata below the longwall and into zones where it is thought gas can be extracted from the longwall goaf (the void formed by longwall extraction). Although the long-term target of an average PDCE of 67% has not yet been achieved, consistent increases in PDCE have been delivered with peak rates reaching or exceeding 67%. Average PDCE increased to approximately 56% in FY20, then to approximately 60% in FY21, and 63% in FY22. During South32's base year (FY15), PDCE was 51.4%. On several occasions during the previous three years, PDCE has reached 65-67% for periods of time, indicating the 67% annual target is achievable.



FY22 has seen South32 partner with CSIRO to move ahead with work to address fugitive emissions that cannot be addressed through increases in gas drainage capture. South32 and CSIRO aim to develop and field demonstrate a full scale next generation Thermal Flow Reversal Reactor (TFRR - known as thermal VAMMIT) and a safe ducting system at IMC's Appin Ventilation Shaft No 2. This demonstration facility will process approximately 17 Nm<sup>3</sup>/s ventilation air and run in a self-sustaining state at the low methane concentrations that are present in mine exhaust air (0.3 to 1% by volume).

The safe ducting system will provide critical safety features, such as fast responding laser type methane detectors, flame arrestor etc. to provide an intrinsically safe connection between a live coal mine and the thermal VAMMIT unit that will oxidise >96% VAM. The average achievable methane emissions reduction is estimated at approximately 30 kt CO<sub>2e</sub> per year, based on Appin's current exhaust average methane concentration.

## 6.18 Public Safety

No incidents involving the general public occurred during the reporting period. Complaints received over the reporting period are discussed in Section 9.1. Public safety risks associated with the site activities are addressed and controlled as listed in Table 34.

Site safety is managed under a Health and Safety Management System.

**Table 34: Safety Risks and Control Mechanisms**

Potential Safety Risk	Control Mechanism
Safety on Site	<p>Workers are required to undertake a site induction which outlines the accountabilities and responsibilities relating to safety whilst working on site, which enables them to gain access to site via the swipe card system using boom gates and turnstiles.</p> <p>Prior to visitors entering the Pit Top areas they are required to contact the Illawarra Access Controller (IAC) at the turnstile or their site contact to gain access to the site. From this point the visitor is accompanied by their site contact. Once on-site additional safety information is shared via:</p> <ul style="list-style-type: none"> <li>• safety training and awareness sessions are held for all personnel working on site which allow for two-way communication between management and the workforce;</li> <li>• pre-shift safety discussions and Toolbox Talks;</li> <li>• posters, and TV screens presenting safety information located around the site;</li> <li>• periodic business updates including email and newsletter material distributed to workers; and</li> <li>• various meeting forums include safety as an agenda item in addition to a dedicated site HSE Committee meeting.</li> </ul> <p>There is no access to operational sites for members of the public unless approved.</p> <p>Access to North Cliff is restricted with locked gates.</p>
Road Safety	<p>A Drivers' Code of Conduct is in place to encourage appropriate driver behaviour by personnel who drive through Douglas Park to the mine including employees, contractors and truck transports. The Code of Conduct is communicated to employees and contractors.</p> <p>Routine daily inspections of public roads are conducted for evidence of coal spilled from trucks with the use of road sweepers as required.</p>



**Table 34: Safety Risks and Control Mechanisms**

All trucks leaving Appin North and Appin East sites must pass through the truck wash and cover loads prior to exiting the site.

In vehicle monitoring is reviewed periodically to identify inappropriate driving behaviours.

## 6.19 Waste Management

### 6.19.1 General Waste

General waste is segregated on all sites to maximise reuse and recycling opportunities in accordance with the Appin Mine Waste Management Plan. The waste streams applicable to Appin Mine are listed in Table 35.

**Table 35: Main waste streams for Appin Mine**

Waste Stream	Treatment
Timber	Recycled off site
Cardboard and paper	Recycled off site
Commingle	Recycled off site
Printer cartridges	Recycled off site
Oils (mineral and synthetic)	Recycled off site
Oily waters	Treated on site or recycled or disposed off-site
Steel and scrap metal	Recycled off site
Sewage effluent	Appin North – Treated and irrigated on-site Appin West – Treated and irrigated on-site Appin East – Disposed via town sewerage system
Industrial filters (oil filters)	Off-site recycling, treatment and disposal
Bathroom water	Appin North - Spray irrigated to land on site Appin West - Spray irrigated to land on site Appin East – Connected to town sewerage system
Particulate filters (exhaust fumes)	Off-site treatment and disposal
Hazardous waste	Off-site treatment or disposal
General waste	Landfill and reused at ResourceCo
Weak acid cation (WAC) regenerate	Removed off site for treatment/disposal
Brine	Removed off site for disposal
Biosolids	Transfer to drill mud ponds at CWEA
Drilling muds and waters	Transfer to drill mud ponds at CWEA
Electronic waste	Recycled off site
Concrete waste	Recycled off site

Solid waste volumes generated at Appin Mine (including Appin West, Appin East, Appin North and WCCPP) for the reporting period are specified in Table 36. Waste generated from exploration activities (drilling muds) and by the Appin West WTP for FY22 are also included in Table 36.



**Table 36: Main waste quantities for Appin Mine**

Waste Stream	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
General Waste (tonnes)	1146	1323	1080	782	1023	335	347	299
General Waste (ResourceCo) (tonnes)	-	-	-	-	424	1255	808	1054
Industrial filters (tonnes)	381	380	268	243	352	754	836	815
Timber (tonnes)	234	225	147	62	75	5	5	22
Metal (tonnes)	1349	1344	935	936	967	1062	900	960
Cardboard (tonnes)	30	20	21	15	22	29	23	25
Commingle (tonnes)	17	17	14	7	17	388	14	35
WAC (ML)						4.5	5.9	5.5
Brine (ML)						123	139	117.1
Biosolids (ML)						0.5	0.7	0.7
Drilling Muds (ML)						5	8.4	2.35
Electronic Waste (tonnes)						0.026 <sup>14</sup>	0.2 <sup>15</sup>	1.87 <sup>16</sup>

### 6.19.2 Waste Reduction and Recycling

In FY19, IMC and its main waste contractor began redirecting wastes from landfill in an attempt to reduce the waste footprint of IMC. A Cleanaway and ResourceCo joint venture Resource Recovery Facility, located in Wetherill Park, processes dry non-recyclable waste. Combustible materials are turned into Processed Engineered Fuel (PEF), diverting approximately 94% of waste material from landfill. The PEFs, Low Calorific Value (CV) and High CV, comply with the requirement of the Clean Energy Regulator under the Emissions Reduction Fund.

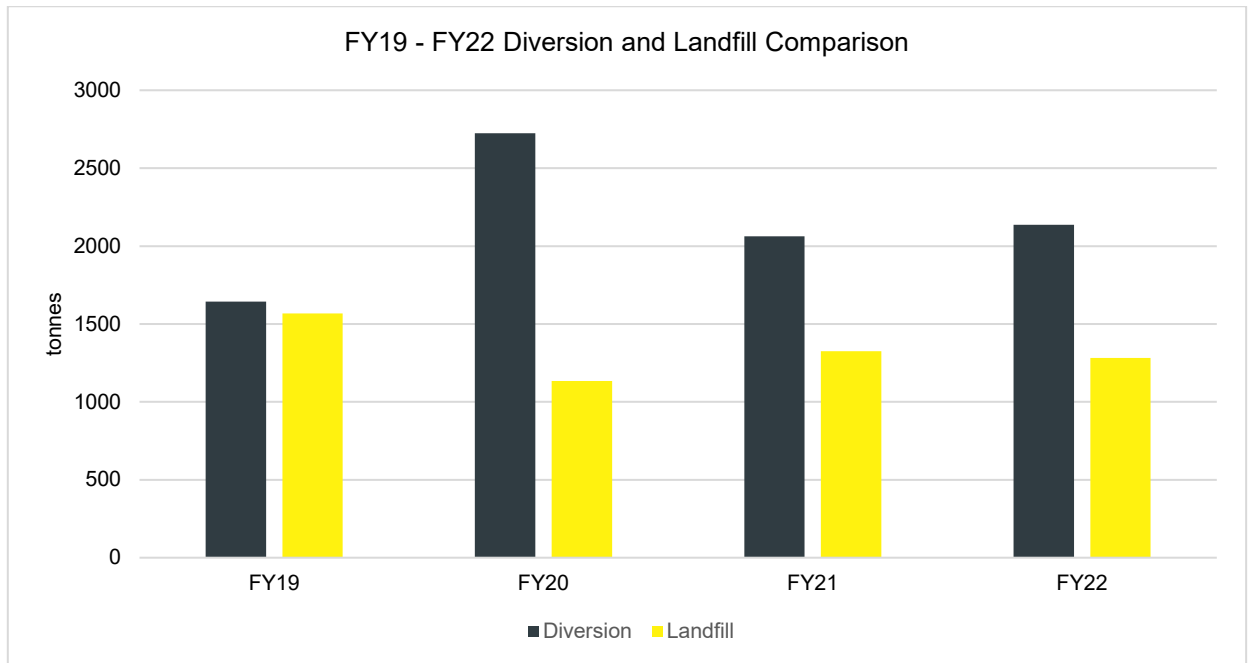
Based on FY22 waste figures from Appin Mine as highlighted in Table 36, an increase in recycling is evident. Redirecting this waste to the recycling facility is an alternative end-of-life treatment and final disposal of products opportunity.

A comparison of volumes from FY19 – FY22 diverted from and disposed of in landfill is provided in Figure 9.

<sup>14</sup> Recorded e-waste disposed at the Regional Operations Centre (ROC) via the University of Wollongong (UoW) e-waste bin. E-waste is recycled by an external recycling vendor.

<sup>15</sup> 68kg was disposed at the Regional Operations Centre (ROC) via the University of Wollongong (UoW) e-waste bin. 136kg was disposed via Certified Environmental Disposal services provided by DXC.

<sup>16</sup> Volume across IMC. All electronic waste is processed (recycled or disposed of) by ACT Logistics.



**Figure 9: FY19 – FY22 Diversion and Landfill Comparison**

### 6.19.2.1 Diesel Exhaust Emission Management – Long Life Diesel Particulate Filters

IMC undertook a change from cellulose and paper-based filters to a glass fibre filter across the diesel fleet (over 90 powered underground vehicles for travel and haulage purposes). IMC used a simple but inclusive approach which included filter analysis across three primary phases. These three primary phases consisted of the following, interview with machine operators to establish filter usage and performance, usage analysis using information from SAP and engine hours and trial done on a high utilisation Coal Tram machine. Implementation of the EIMCO, grader and dozer long life filter was completed.

Ongoing benefits include:

- Decreased transport cost to site and warehousing footprint.
- Improved machine maintenance and availability.
- Decreased filter waste and disposal.
- Increased efficiency (>90%).
- Increased temperature and pressure rating.
- Less exposure to diesel particulate for site personnel.

### 6.19.3 Coal Wash

Coal wash is a by-product of processing RoM coal. During FY22, a total of 0.934 Mt of coal wash was emplaced at the CWEA. This was comprised of 0.839 Mt of coal wash from the WCCPP and 0.095 Mt from the DCP.

The Stage 3 CWEA provides 33.5 Mt of coal wash emplacement with an expected emplacement life of approximately ten years as of June 2022 (based on projected coal wash volumes). The Stage 4 CWEA will provide an additional 26.0 Mt of coal wash emplacement with an expected life to 2048.

Table 37 outlines the capacity and status of each of the coal wash emplacement areas.



**Table 37: CWEA – Capacity and Status**

Emplacement Stage	Estimated Capacity (Mt)	Emplacement Status
1	4.6	Complete
2	20.8	Complete
3	33.5	Current
4	26.0	Not Yet Commenced

During the reporting period, IMC diverted approximately 0.280 Mt of coal wash from the DCPD for beneficial uses (i.e. as an engineered fill in housing developments and for the development of arterial and agricultural roads, and a further 0.258 Mt under Operational Purpose Deductions (OPDs) for engineering works development, with over 7 Mt diverted since 2009. IMC has a long-term agreement with Lend Lease at Calderwood, that should continue to see a large volume of coal wash diverted for beneficial uses in the second half of FY23 and beyond. IMC continues to develop a pipeline of major projects that will require engineered fill for the next five years.

Coal wash from the DCPD has been stored at Appin North in various stockpiles since 2019 pending approval for use in OPDs or for beneficial reuse. IMC are in discussions with the EPA regarding the administrative requirements associated with the storage of this material on site and for the emplacement of surplus coal wash in the CWEA.

The IMC Coal Wash Road Base Project has not yielded results to date.

Considerable previous work continues to be carried out on the alternative uses of coal wash, including ongoing monitoring of potential contaminants when coal wash is used for landfill or emplacement. This work has been reported in previous Annual Reviews.

IMC will continue to be involved in research, the development of, and implementation of alternative uses for coal wash in order to minimise the volume of coal wash emplaced at the CWEA in the future.

Approximately 233 kt of coal wash was exported to India during FY22 as a low-grade thermal coal. The product is used for power generation and the production of cement after blending with high CV thermal coal. Anticipated sales in FY23 are estimated at 450 kt.

#### **6.19.4 Sewage**

During the reporting period, ongoing monitoring and inspections were conducted on the two Appin Mine Sewage Treatment Plants (STPs).

Both STPs are ‘Smith and Loveless’ units, located at the Appin West and Appin North sites, that discharge into maturation ponds. The treated effluent is irrigated on site via LDP 38 (Appin West) and LDP 4 (Appin North). A wastewater maintenance contractor is engaged to review operational performance and assist with the operational aspects of the Appin West and Appin North STPs to minimise the likelihood of any issues occurring.

In order to meet the land capability and irrigation management requirements of the utilisation area at Appin West, there is a predicted overflow of the storage dams up to 2.5 times per year. This is under the assumption that a minimum of 3.8 ha of irrigation area is available; and wet-weather storage is triggered following >5 mm of rain.

As a result, overflow of treated effluent from the storage dam is permitted via LDP 39.

Monitoring of the STP effluent at both sites is completed monthly in accordance with EPL 2504. Monitoring results are reported annually via the EPA Annual Return and are made available to the public via the 14-day Report, available on the IMC website.





### **6.19.5 WAC Disposal**

WAC, a waste stream from the Appin West WTP, is transported off-site to a licenced waste management facility. The total volume of WAC transported off-site during the reporting period was 5.5 ML, a decrease of 0.4 ML compared to the previous reporting period. This was due to reduced throughput of the Appin West WTP.

### **6.19.6 Water Treatment Plant Biological Sludge**

The Appin West backwash treatment plant was commissioned in April 2009. One of the by-products of the Backwash Treatment process is an organic sludge. The total volume of sludge transferred to the CWEA in the reporting period was approximately 684 kL.

As part of the Appin North temporary WTP, a sludge waste is generated and transported offsite via a licenced contractor for disposal. The total volume of sludge generated and disposed for this plant during FY22 was approximately 831 kL.

### **6.19.7 Brine Disposal**

Brine is a by-product of the WTP process. Approximately 117 ML was generated in FY22 from the Appin West WTP, and 47.95 ML from the Appin North temporary WTP. The brine is transported by truck to LDP 5 under EPL 3241 located at Marley Place, Unanderra. The brine is discharged into the same location as the dewatering discharge from Dendrobium Mine, which provides dilution for the brine as it is released into Allans Creek.

## **6.20 North Cliff**

The North Cliff Mine Site and access road is located between O'Hares Creek and Stokes Creek and is located in the Dharawal National Park. The majority of the site is gently sloping in a northerly direction towards O'Hares Creek. The mine site covers an area of approximately 10.3 ha of which approximately 6.5 ha is undisturbed by mining activities. The North Cliff site is shown in Plan 12.

Access to the site is along Fire Trails 10B and 10C from an intersection on the Bulli/Appin Road, 6 km northwest of Bulli Pass.

### **6.20.1 Land Ownership and Approvals**

The North Cliff Mine Site and access road is covered by CCL 724, which includes the surface and land below to an unlimited depth over the mine site and to a depth of 15 m over the access road. Consent to establish the mine was granted in 1981 by the Minister for Planning and Environment under Section 101 of the *Environment Planning and Assessment Act 1979* and subsequently amended under Section 102 of the Act.

### **6.20.2 History**

Mining operations commenced at the site in 1983, with mining operations restricted to a single unit continuous miner. The RoM product was brought to the surface through the No. 4 shaft and into a 400-tonne surge bin, from which the product was loaded into trucks and transported to the WCCPP for processing.

Mining operations ceased at North Cliff in 1990 at which time all underground equipment was removed from the site. The two shafts were temporarily sealed with concrete caps with additional security fencing and associated signage installed to prevent unauthorised access. A number of the buildings and associated structures, and various other pieces of equipment were also removed from site. Periodic inspections are undertaken by the Specialist Environment.



### **6.20.3 Remaining Infrastructure**

Most of the infrastructure that was located on the North Cliff site was removed following closure of the mine in 1990. The major structures remaining on the site include:

- No. 3 shaft head frame;
- No. 4 shaft head frame; and
- sub-station base slabs.

There are also various items of redundant equipment on the site, including several large above ground water tanks. However, these are not posing an environmental or safety hazard. There has been no equipment removed from site during the reporting period.

### **6.20.4 Site Security**

The North Cliff Site is enclosed with a 1.8-metre-high fence with two locked entry gates. The site security fencing is inspected on a regular basis.

### **6.20.5 Site Rehabilitation**

An area on the site between the two shafts was used for the disposal of spoil excavated from the sinking of the shafts. The spoil heap, which covers an area of approximately 3.5 ha and contains 55,000 m<sup>3</sup> of loosely tipped shale and sandstone, has been graded, shaped and has partially regenerated with local species.

The Appin Mine Conceptual Closure Plan details the remaining site-specific closure works to be undertaken at this site. A summary is provided below:

- Determine a suitable methodology for accessing and sealing the shafts.
- Review and liaise with external stakeholders regarding final land use at the site.
- Prepare a site-specific Rehabilitation Management Plan (RMP) for North Cliff and gain external approvals from Resources Regulator and other relevant external stakeholders.
- Fill and seal No. 3 and No. 4 shafts in accordance with RMP and external approval requirements.
- Demolish and remove any redundant infrastructure from the site.
- Remediate any contaminated soil by removal, encapsulation or land farming on site.
- Re-profile site as per the final landform design to reduce the slope lengths by constructing contour banks and armouring channels to prevent erosion.
- Revegetate disturbed areas as per the final revegetation/landscape plan utilising local species.
- Other works as required to achieve the final land end use per the RMP.
- Develop ongoing maintenance management plans.

Post Closure works will include:

- monitor frequently until vegetation establishment, and then on a minimum 12 monthly basis for at least five years after works have been completed (or surface mining lease relinquished); and
- carry out weed control and replanting/reseeding as necessary.

Refer to Section 8.1.3 for studies undertaken during the reporting period.



### **6.20.6 Water Management**

Surface drainage mainly flows in open channels to the site pond located at the northwest corner of the site. The pond is a permeable structure that filters the water that passes through the wall. Water that overflows via the dam spillway in wet weather events or passes through the wall flows through open sedge-land before entering an unnamed creek and into O'Hares Creek. There is no environmental impact associated with these discharge events on the receiving environment. No significant issues were identified with the site drainage system during the reporting period. Minor works to lower the spillway of the sediment pond were undertaken in FY21. No hydrocarbons or chemicals are stored at the site.

### **6.20.7 Air Quality**

The generation of windblown dust from the North Cliff site is unlikely to cause any adverse impacts on air quality in the community due to the isolated location of the site or on the surrounding vegetation. A large proportion of the disturbed areas are largely compacted hence further reducing the likelihood of generating significant emissions of wind-blown dust.

### **6.20.8 Noxious Weeds**

The management measures to monitor and control the growth of noxious weeds on the site include the use of a weed control specialist to inspect the site if required.

No spot spraying for weeds occurred at the North Cliff site over FY22, however hand removal of noxious weeds including Crofton Weed, Pampas Grass and Prickly Pear was undertaken.

### **6.20.9 Archaeological Sites**

Archaeological surveys were carried out in 1977 and 1983. The studies identified one aboriginal site, a single axe groove on an exposed rock shelf; located within the fenced mine site area. No damage occurred to this site during the development or operation of the mine. No damage was identified at this site during the reporting period.

A Preliminary Historical Heritage Assessment was completed in FY22.

### **6.20.10 Environmental Inspections**

Regular environmental inspections of the North Cliff site were completed during the reporting period. The inspections cover multiple aspects including, but not limited to site security and safety, surface drainage, erosion, weed management, archaeological sites, dust and hydrocarbon management.

Surveys were also undertaken in FY22 to assess the stability of the North Cliff site dam wall following high rainfall in early FY22 and resulting visible seepage through the base of the wall. No movements have been detected from ongoing surveys and the seepage did not cause additional erosion. The wall was constructed to be semi permeable to allow for minor freshwater seepage into the downstream swamp site.



## 7. WATER MANAGEMENT

### 7.1 Water Licences

The water take for Appin Mine over the reporting period is provided in Table 38.

Note: 1 unit = 1 ML.

<b>Table 38: Water Take – Appin Mine</b>			
<b>Water Licence Ref No.</b>	<b>Water Sharing Plan, Source and Management Zone</b>	<b>Entitlement (units)</b>	<b>Total (ML)</b>
10AL117284	Greater Metropolitan Region Unregulated River Water Sources Hawkesbury and Lower Nepean Rivers Water Source Menangle Weir Management Zone	53	0.01
10AL117998	Greater Metropolitan Region Unregulated River Water Sources Southern Sydney Rivers Water Source Georges River Catchment Management Zone	2750	652
10AL118765	Greater Metropolitan Region Groundwater Sources Sydney Basin Central Groundwater Source	274	
10AL124671 <sup>17</sup>	Greater Metropolitan Region Groundwater Sources Sydney Basin Central Groundwater Source	98	
10AL118777	Greater Metropolitan Region Groundwater Sources Sydney Basin Nepean Groundwater Source Nepean Management Zone 2	303	538
10AL119248	Greater Metropolitan Region Groundwater Sources Sydney Basin Nepean Groundwater Source Nepean Management Zone 2	300	

### 7.2 Compensatory Water

Under relevant provisions of the Project Approval (Condition 14 of Schedule 4), IMC shall provide a compensatory water supply to any owner of privately-owned land whose water supply is adversely impacted (other than an impact that is negligible) as a result of the project, in accordance with the approved WMP. IMC is currently supplying compensatory water as detailed in Table 39.

<sup>17</sup> Issued 8 August 2022



**Table 39: Compensatory Water – Groundwater Bores**

<b>Bore</b>	<b>Mining Location</b>	<b>Impact</b>	<b>Current Status</b>	<b>Actions / Agreements</b>	<b>Water Supply Rate</b>
GW108312 (Partridge VC Rest Area)	AA7 LW707B	Pre-emptively grouted to avoid gas release in high traffic area. Rest area amenities water supply impacted.	Ongoing consultation with TfNSW on permanent arrangement.	Currently TfNSW organising water deliveries as required, with reimbursement sought from IMC.  Discussions regarding long-term replacement on-going with TfNSW continuing..	As required, due to significant seasonal fluctuations in water demand.
Initially Unregistered Licence: 10WA121956	AA9 LW901/ 902 chain pillar	Reduced yield due to initial reduction in SWL in shallow 20 m groundwater bore.	Remediation works underway.	Agreement made with Landowner on the drilling of a new bore. Design and specification of new arrangement in progress. Cartage of water to continue until finalised	2 x 13 kL loads per fortnight.
GW105388	AA7 LW709	Reduced yield.	On-hold pending completion of LW709 further negotiations following DPE Secretary Review.	Subject to DPE Secretary Review.	6 x 13 kL loads per week.

## 7.3 Groundwater

### 7.3.1 Appin West

During the reporting period, groundwater from the Appin underground operations was pumped to the surface at Appin West for treatment via the Appin West WTP. The treated water is either blended and piped underground for reuse, and/or discharged to the environment via LDP 24. Discharge volumes at LDP 24 are made available to the public via the 14-day Report, published on the IMC website. Refer to Table 17 for discharge volumes.

### 7.3.2 Appin East

During the reporting period, groundwater from the Appin Mine White Panel storage area was pumped to the surface and stored in a 1,400 L tank at Appin East. The water is dosed with sodium hypochlorite to inhibit microbiological growth, before being re-used underground for fire suppression, and mine-services uses (hose-down, belt maintenance, etc.).

### 7.3.3 Appin North

Water for underground use is transferred from BCD to the underground operations via a gravity fed pipeline. Water make resulting from strata water inflow is collected in pits and low points in the underground workings where it is mixed with water delivered underground from surface storage. This



strata water is brought to the surface either as moisture contained within the coal or as surplus underground water. Groundwater and surplus mine water can be pumped to the surface for use in the WCCPP from Area 5 if required which can be treated at the Appin North WTP (currently the temporary WTF as of FY22). During the reporting period approximately<sup>18</sup> 132 ML of water was transferred underground from BCD with 146 ML of surplus underground water pumped to the surface for use in the WCCPP and the Appin North Temporary WTP. The remaining ~548 ML<sup>19</sup> of BCD water was used in the WCCPP, for dust suppression (watercarts), washdown and the truck wash. Excess water in Pond 3 and Pond 4a was periodically used for dust suppression on the active CWEA with the water being filtered through the CWEA before entering the emplacement underdrainage system.

The Appin North temporary WTP was commissioned in May 2021 and allows for the treatment of groundwater pumped to the surface from Area 5. The treated groundwater that meets required limits is then directly discharged to Brennans Creek as permeate via LDP 40. Non-conforming water is discharged into a drainage line that feeds BCD. Discharge volumes and water quality at LDP 40 is made available to the public via the 14-day Report, available on the IMC website. Refer to Table 17 for discharge volumes.

The Appin North long-term WTP will treat water currently stored in Area 5, as well as underdrainage from the CWEA water management system. It is also planned for the backwash water to be treated following TSS removal.

There were no incidents of groundwater pollution within the report period.

## 7.4 Water Supply and Use

### 7.4.1 Appin West

Mine water is processed at the WTP, which has two trains (Integrated Membrane System (IMS) 1 and 2) to produce treated water (permeate). This treated water is supplied to the Appin Mine underground mining operations. Any shortfall in underground supply is supplemented by potable water provided by Sydney Water. Excess permeate is blended with backwash water and discharged to the environment via LDP 24. Potable water is used for site administration buildings, workshops, the bathhouse, fire emergency services, Appin West Gas Extraction Plant, and as a back-up for underground operations.

Table 40 provides an overview of the potable water usage associated with the Appin West site for the reporting period.

Table 40: Potable Water Usage for Appin West				
Area	Usage FY21 (ML)	Usage FY22 (ML)	Variance (ML)	Comments
Appin West	62	85	+13	Possibly due to more accurate reporting following flow meter replacement in March 2021 and increased personnel on site.

<sup>18</sup> BCD underground usage is calculated using the BCD to Surface flow meter. There are two flow meters that record flow leaving BCD, one is the total flow from BCD to the Surface and Underground (UG), and the other is BCD to the Surface only. Therefore, the flow of BCD water to UG needs to be calculated by subtracting the BCD to Surface flow from the BCD to Surface and UG flow. The BCD to Surface flow meter stopped turning in April 2020 and was not repaired until September 2020, therefore weekly averages from the previous financial year was used to supplement missing data.

<sup>19</sup> Figure is an approximation as it contains estimates (see Footnote above).



### 7.4.2 Appin East

Potable water is supplied by Sydney Water to the Appin East site via a 600 kL surface tank. This tank provides potable water for the bathhouse, workshops, administration buildings, fire emergency services, Appin No.2 shaft area, EDL Appin East Power Plant, and nearby mine-owned cottages.

Surface water runoff from rainfall is captured in the main surface dam and is reused as supply for the dust suppression on haulage roads and stockpiles, along with the dirty equipment hose down.

Table 41 provides an overview of the potable water usage associated with the Appin East site for the reporting period.

**Table 41: Potable Water Usage for Appin East**

Area	Usage FY21 (ML)	Usage FY22 (ML)	Variance (ML)	Comments
Appin East	185	345	+160	Water supply issues underground (increased draw down in White Panel) resulted in an increase in Sydney Water required for operational activities.

### 7.4.3 Appin North

The Appin North site is primarily reliant on water from BCD. Some potable water is trucked to site and stored in a surface tank for use in the bathhouse and office facilities. Most water is sourced from BCD from where it is pumped, following chlorine dioxide treatment, for use in the following areas:

- underground areas for dust suppression;
- WCCPP and associated infrastructure; and
- Appin North Pit Top.

A pipeline is in place to dilute discharge from BCD to reduce salinity levels in-line with the EPL if required. This pipeline will potentially be used as future water supply to the WCCPP during drought. Dilution of BCD discharges ceased in March 2020 following the addition of the drought condition for Point 10 (EPL 2504 Condition L2.6). No dilution occurred in FY22.

A summary of the water usage for the reporting period, compared to the previous reporting period, is provided in Table 42.

**Table 42: Water Usage Comparison – Appin North**

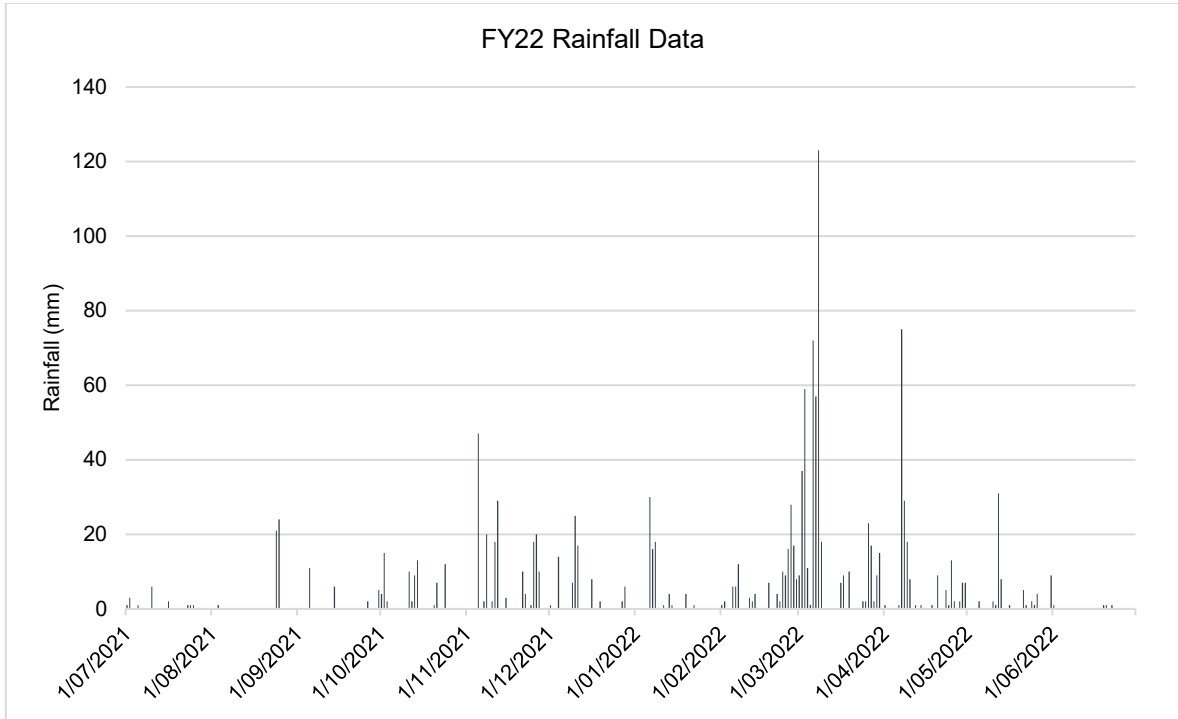
Type	Usage FY21 (ML)	Usage FY22 (ML)	Comment
Potable Water	1.63	4.62	Increase likely attributed to higher activity on site for FY22 following lifting of COVID19 site visitor restrictions and more personnel working from home during FY21.
Recycled (BCD) Water	643	681	Nil

## 7.5 Rainfall

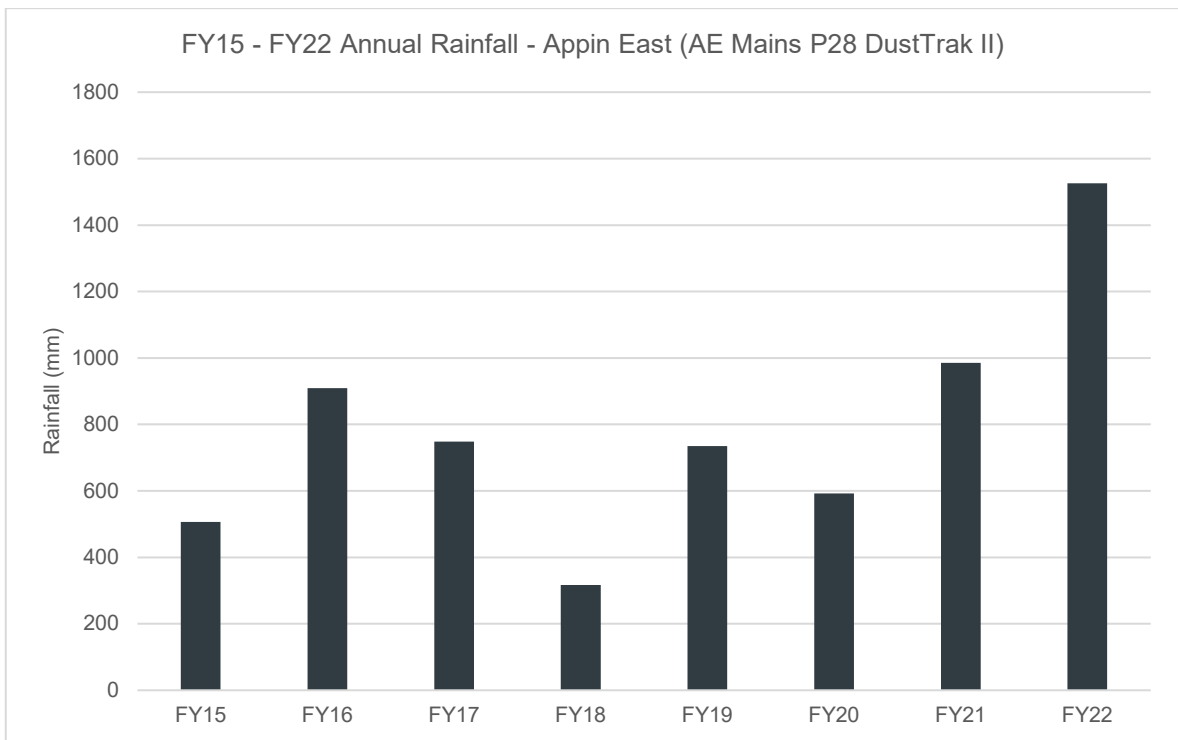
Figure 10 displays rainfall data for FY22 at Menangle (Menangle Bridge), NSW. Figure 11 shows the annual rainfall for the region since FY15 from the Appin East DustTrak unit. Figure 12 displays the



annual rainfall for the region since FY12 from the Bureau of Meteorology (BOM) station located at Menangle Bridge.

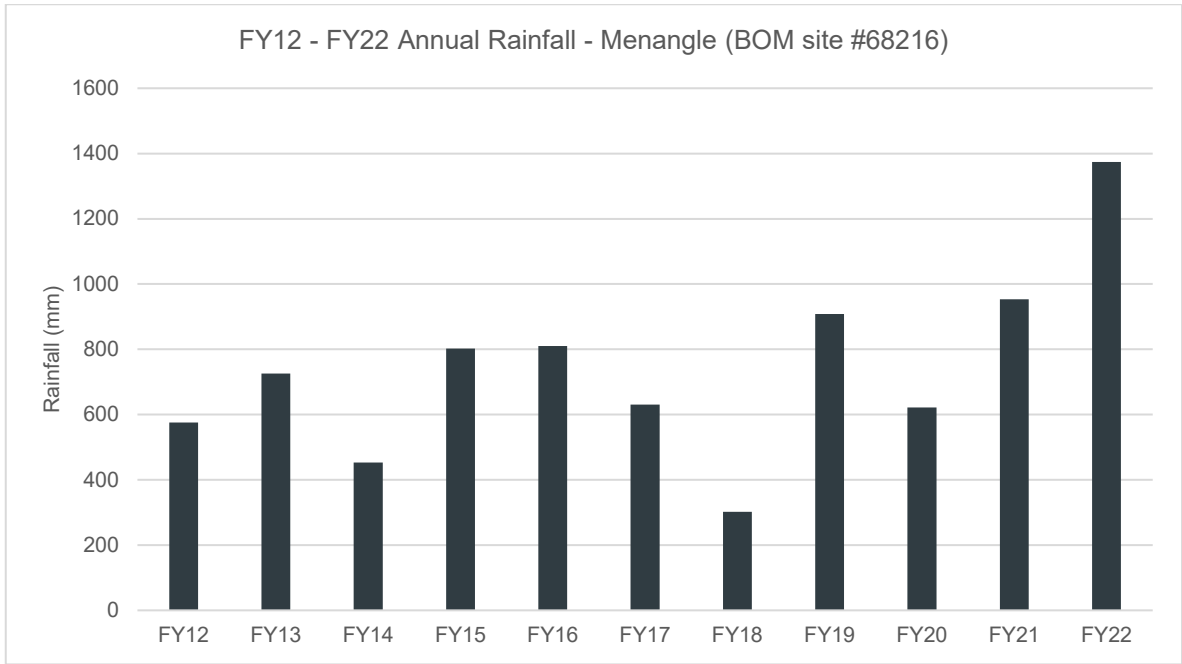


**Figure 10: FY22 rainfall data - Menangle (BOM site #68216)**



**Figure 11: FY15 - FY22 Annual Rainfall - Appin East (AE Mains P28 DustTrak II)**





**Figure 12: FY12 - FY22 Annual Rainfall - Menangle (BOM site #68216)**



## 8. REHABILITATION

### 8.1 Rehabilitation for the Reporting Period

#### 8.1.1 Buildings

No demolition of buildings was undertaken during the reporting period.

#### 8.1.2 Rehabilitation of Disturbed Land

Progressive rehabilitation of the CWEA has been undertaken during the reporting period in accordance with the approved CWEA Management Plan.

During the reporting period there was growth medium establishment for ~2.5 ha.

The success of the rehabilitation in Stage 2 is shown in Plate 7. Progress of rehabilitation in the CWEA is detailed in the Annual CWEA Monitoring Report (See Appendix 7).



**Plate 7: Stage 2 emplacement rehabilitation FY22 (Seeded in 2007)**

Monitoring of revegetation at the BioBanking sites was undertaken during the reporting period. For more detail, refer to Section 6.5.2 and the following annual reports included as appendices to this report:

- Appendix 8: Annual *Personia hirsuta* Condition Monitoring Report
- Appendix 9: Appin West BioBank Site Annual Report - 2021/2022
- Appendix 10: Nepean River BioBank Site Annual Report - 2021/2022
- Appendix 11: Cataract River BioBank Site Passive Management Annual Report - 2022
- Appendix 12: Ventilation Shaft No. 6 Offset Annual Monitoring Report - 2021/2022



The rehabilitation status for Appin Mine is provided in Table 43.

**Table 43: Rehabilitation Status (Cumulative)**

Location	Area Affected/Rehabilitation (ha)		
	Previous Report (FY21)	This Report (FY22)	Forecast (FY23)
A Total Mine Footprint	28377	28377 <sup>20</sup>	28377
B Total Active Disturbance	157	187	199
C Land Being Prepared for Rehabilitation	8	9 <sup>21</sup>	6
D Land Under Active Rehabilitation	17	5 <sup>22</sup>	9
E Completed Rehabilitation <sup>23</sup>	44	51 <sup>24</sup>	51

### 8.1.3 Legacy Sites and Rehabilitation Program

The Legacy Sites and Rehabilitation Program consisted predominantly of site investigations and approvals planning in the reporting period.

The following activities were progressed for the North Cliff site during the reporting period:

- Hazards Materials Assessment, including the removal of a small quantity of asbestos containing material;
- Preliminary Historical Heritage Assessment;
- Biodiversity Assessment;
- Initial consultation with external stakeholders; and
- Continued review of shaft sealing methodology.

Further investigations, consultation and preliminary approvals will be progressed in FY23.

## 8.2 Rehabilitation and Research

Details of the ongoing *Persoonia hirsuta* translocation trial are provided in Section 6.5.2.2. The research report required under Condition 3 of EPBC Approval 2010/5350 was submitted to DAWE on 29 June 2021. A copy of the research report is available on the IMC website at: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>.

In FY23, IMC plan to support the writing of an honours dissertation through Mount Annan Botanic Gardens and University of Technology Sydney around pollination ecology and pollinator networks commencing around July 2022 to May 2023. This will include an investigation into the pollinator community in the rehabilitation areas in the CWEA compared to remnant reference bushland in the surrounding area. This has the potential to benefit the *Persoonia hirsuta* population translocated within the rehabilitation area given its preference for outcrossing. The research may also serve as a

<sup>20</sup> Consists of the size of the Project Approval boundary for the BSO Project (mining lease footprint) only.

<sup>21</sup> Landform Establishment and Growth Medium Development phases.

<sup>22</sup> Ecosystem and Land Use Establishment Phase.

<sup>23</sup> Note that no areas of rehabilitation have been signed off as complete by the Resources Regulator to date.

<sup>24</sup> Ecosystem and Land Use Sustainability and Relinquishment Phases.



novel means to determine how the pollinator community returns to a rehabilitation area, which may be of value to rehabilitation outcomes in terms of ecosystem recovery and sustainable plant diversity.

A Bushfire Research and Trial literature review was completed in FY21, and coal wash sampling in the CWEA was undertaken in FY22. COVID 19 restrictions and excessive rainfall during the reporting period resulted in significant delays in implementing the project. The results of the sampling will be used to determine the next stage of the trial, including the development of a trial burn in established rehabilitation areas of the CWEA.

### 8.3 Further Development of the Final Rehabilitation Plan

Legislative Rehabilitative Reforms under the *Mining Act 1992* were passed by the government on 2 July 2021<sup>25</sup>. These reforms, through the *Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021*, prescribe new mining lease conditions relating to rehabilitation and set clear, achievable and enforceable requirements for rehabilitation.

A Rehabilitation Management Plan (RMP) was developed in FY22 to meet the requirements of the Form and Way documents published by the Resources Regulator. Rehabilitation Objectives and a Forward Plan were submitted to the Resources Regulator Portal. Rehabilitation criteria will be submitted in FY23 after the rehabilitation objectives are approved.

The Rehabilitation Cost Estimate (RCE) for Appin Mine was reviewed in FY22 according to the latest RCE tool as part of the RMP review. There have been no significant changes to the RCE from FY21. The latest RCE is attached <sup>26</sup> as Appendix 2.

Studies were undertaken in FY22 to inform the closure planning process. These studies included a:

- heritage building assessment, assessing existing infrastructure for current and future heritage value; and
- preliminary site investigation, assessing areas for further contamination investigation.

The following studies are planned in FY23:

- targeted site investigation for contamination;
- materials balance assessment for rehabilitation materials; and
- historic operations liability assessment.

---

<sup>25</sup> <https://www.resourcesregulator.nsw.gov.au/environment/rehabilitation/rehabilitation-and-compliance-reforms>.

<sup>26</sup> The RCE is Commercial in Confidence and is only provided to the Resources Regulator.



## 9. COMMUNITY

The closest township to Appin West surface operations is the village of Douglas Park, which is located approximately 4 km to the northwest of the surface operations. The current underground mining operations (i.e. AA7 and AA9) are located on the outskirts of the Douglas Park village.

The closest township to Appin North surface operations is the village of Appin, which is located approximately 4 km to the northwest of the operations.

Appin East Pit Top is located on the outskirts of the village of Appin.

At the completion of this reporting period, Appin Mine employed approximately 2000 people.

### 9.1 Complaints

IMC operates a 24 hour Community Call Line (free call 1800 102 210) and a general email address [illawarracommunity@south32.net](mailto:illawarracommunity@south32.net). The call line and email address enable the community to request and provide feedback about operational activities and lodge any complaints on any aspect of the Appin Mine operations. The call line number and email address have been advertised throughout the reporting period in all correspondence distributed to the community.

A complaint received by IMC in any format is investigated and resolved by the Corporate Affairs Team. The appropriate team member will investigate the complaint and seek assistance from the relevant site or operational personnel. Where required, additional details will be sought from the complainant where there is insufficient information for investigation (where contact details are provided).

Community complaints must be responded to within 24 hours of the complaint being received. Some complaints require ongoing investigation and remedial action to address the nature of the complaint.

Complaint information is provided publicly on the IMC website and to the ACCC, Douglas Park Advisory Panel (DPAP), Menangle Advisory Panel (MAP), IMC management, and government agencies on a regular basis.

Appin Mine operations received five complaints during this reporting period (including Pit Tops and exploration work). As shown in Figure 13, the concerns received during this period are related to:

- 40% dust;
- 40% stakeholder engagement; and
- 20% transport.

The number of community concerns decreased by 70% on the previous year, with 17 complaints reported in FY21 (refer to Figure 14). The decrease in community concern is likely related to the improvements in the stakeholder engagement process implemented for exploration activities and the introduction of an online engagement tool. Details of the complaints received, and the actions taken are provided in Appendix 5.

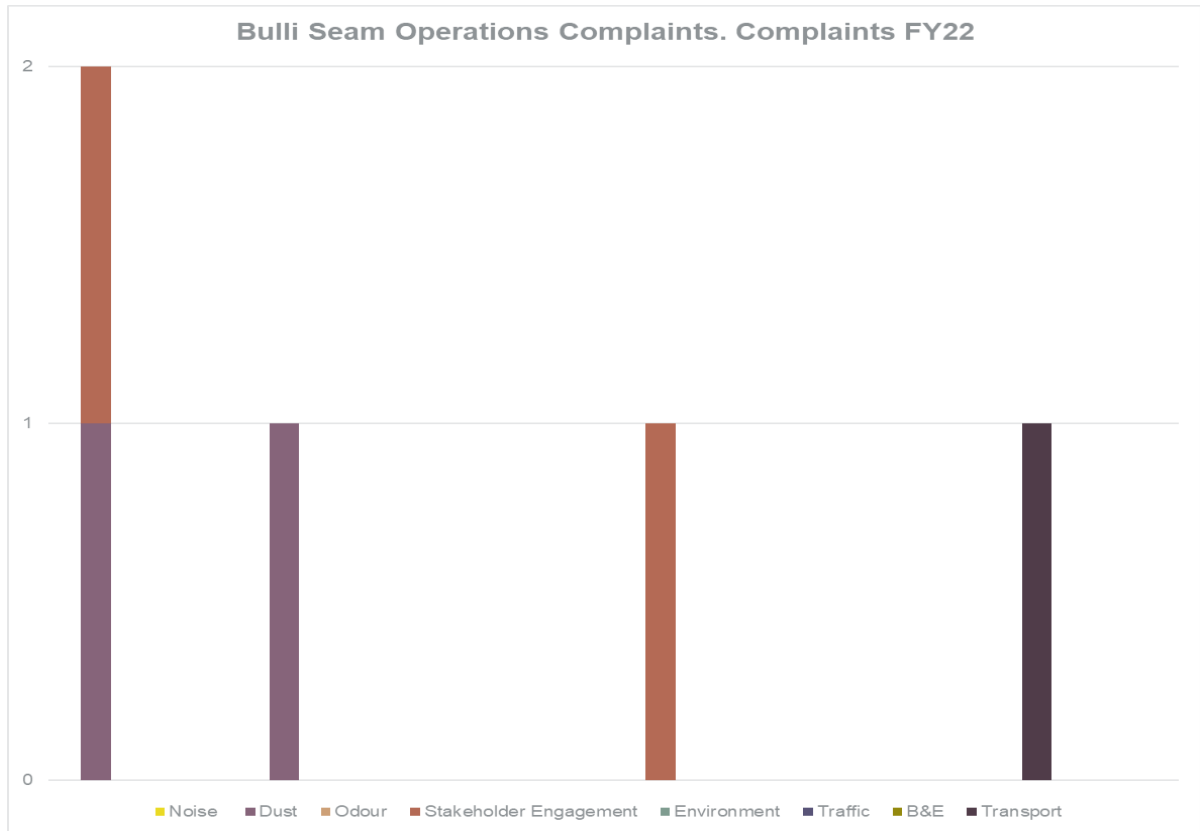


Figure 13: FY22 Community Complaints for Appin Mine

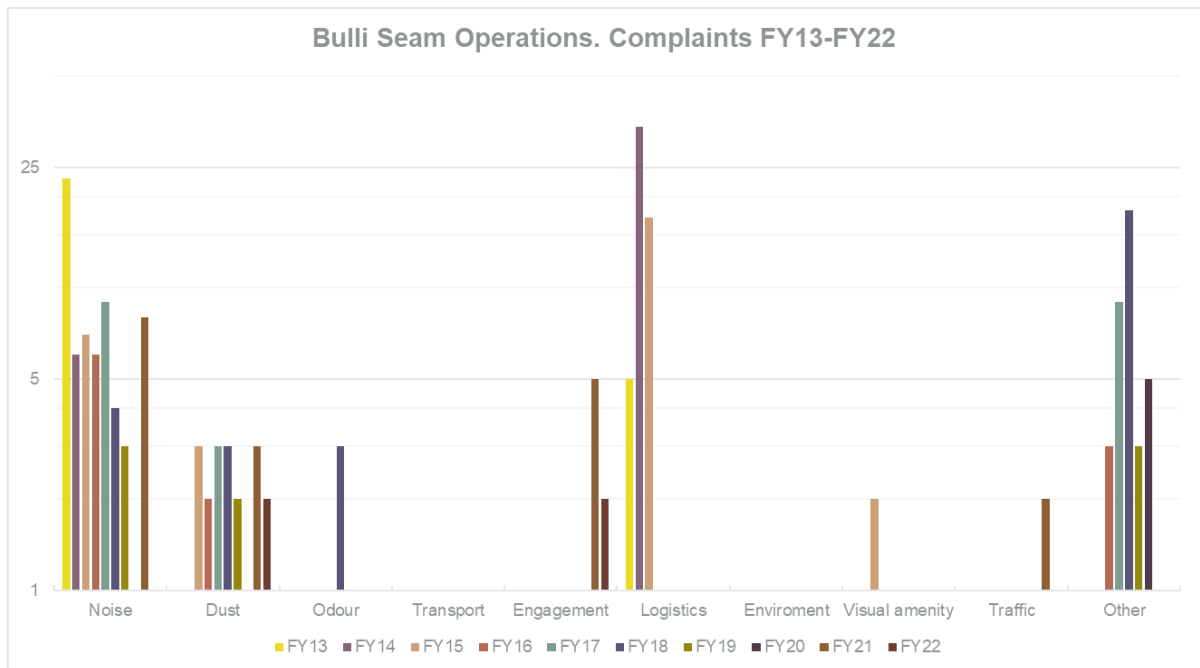


Figure 14: Community complaints from FY13 – FY22 for Appin Mine



## 9.2 Community Engagement

IMC's Corporate Affairs team manages regular community engagement activities as per the IMC Stakeholder Engagement Management Plan, with the support of operational and functional team members as appropriate. The plan identifies key stakeholders and appropriate communication and engagement methods.

Key regional stakeholders include:

- communities surrounding the Appin Mine operations;
- local government;
- State government agencies and authorities including DPE, WaterNSW, EPA, Resources Regulator, SA NSW and others;
- employees and contractors;
- community and special interest groups;
- the indigenous community – Tharawal Aboriginal Land Council and others;
- local schools and volunteer groups; and
- the broader regional community.

Community information is provided in accordance with the IMC Stakeholder Engagement Management Plan. Communication methods include:

- community newsletters via letter box drops;
- door knocks;
- community notice boards;
- community perception surveys;
- media releases and other media activities;
- IMC website, and project specific webpages; and
- stakeholder group presentations and information sessions.

IMC directly manages the following Appin Mine stakeholder committees and working groups:

- ACCC;
- DPAP;
- MAP; and
- IMC Community Partnerships Program Board.



### 9.2.1 ACCC

In accordance with Condition 6 of Schedule 6 of the Project Approval, IMC has established and operates the ACCC. The ACCC is operated in accordance with the Community Consultative Committee Guideline for State Significant Projects and has been operating since September 2012<sup>27</sup>.

The ACCC provides a forum that enables regular two-way communication between IMC and the community/stakeholders and promotes open discussion on IMC's Appin Mine operations. The basis of discussion includes information on mining operations, environmental performance of the mine, and community relations activities, and issues/outcomes as they arise during mining activity. Topics discussed in the meeting generally reflect community concerns and interests at the time.

The ACCC nominally comprises 11 members including representatives of IMC, Wollondilly Shire Council, local community and other key stakeholders who have an interest in IMC's operations and the potential impacts of mining in the area. The committee is chaired by an independent chairperson, who is appointed by the Secretary of DPE. Formal meetings are generally held every two months.

A summary of information presented to the ACCC during the reporting period includes but is not limited to:

- operational updates;
- Mountbatten House and Stable works;
- the GRRP implementation;
- personnel changes at IMC;
- gas release and infrastructure impacts updates;
- updates on the AMVA Project;
- End of Panel reports;
- VAMMIT Project;
- Nepean River Biobanking Site;
- Dendrobium Mine Extension Project;
- Appin North WTP progress;
- management plan approvals;
- future Appin extraction and exploration updates;
- community complaints/enquiries;
- general environmental issues;
- community investment updates; and
- general community issues.

The minutes of community meetings are made available to the public on the South32 webpage: <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>. Meetings are held locally, with some being held online during FY22 due to COVID-19 restrictions.

---

<sup>27</sup> The terms of reference for the ACCC was reviewed following the completion of the membership term in September 2021. Following this, a formal name change from the Illawarra Coal CCC to the Appin Mine CCC was endorsed.





### **9.2.2 DPAP**

A purpose-formed community representative group, DPAP was established by IMC in April 2010 to provide input to the preparation of the Ventilation Shaft No. 6 Environmental Assessment. Since approval and commencement of construction, meetings have continued with other local issues discussed including but not limited to mine subsidence. DPAP operates under an agreed Terms of Reference and is facilitated by IMC. The DPAP comprises seven representatives of the Douglas Park Township. Meetings are nominally held every three months in person at Douglas Park, with some presentations issued via email in lieu of in-person meetings due to COVID-19 restrictions or localised flooding impacts. A summary of information presented to DPAP during the reporting period includes but is not limited to:

- Mountbatten House and Stable works;
- exploration progress;
- infrastructure updates;
- local community investment fund distribution;
- AVMA Project update;
- Dendrobium Mine Extension Project;
- environment management updates (including air quality); and
- community relationship improvements.

During the reporting period, members of DPAP were also kept informed of operational matters relating to Appin Mine operations in Douglas Park through email updates.

### **9.2.3 MAP**

A purpose-formed community representative group, the MAP was established by IMC in March 2021 to support community engagement on the AVMA Project. It enables regular two-way communication between representatives of the local community and IMC on the Project.

The MAP operates under an agreed Terms of Reference and is facilitated by an Independent Chairperson. It is comprised of seven Menangle community representatives, one Douglas Park community representative and two IMC representatives. The community representatives include landholders nearby to the project location.

A summary of information discussed with the MAP during the reporting period includes:

- planning and approvals progress updates;
- concept design updates and project layout;
- community engagement and consultation;
- assessment report overviews (noise, traffic, air quality, geotechnical etc.);
- response to submissions review;
- visual impact – photometric analysis and 3D modelling tours;
- consultation on the construction environment management plan; and
- construction schedule updates.

IMC facilitated an underground tour of the Appin Mine for the MAP on 30 June 2022 in order to better understand the mining process and ventilation requirements.



### 9.3 IMC Community Partnerships Program (CPP)

IMC has an overriding commitment to supporting the communities in which we operate. As part of this commitment, the CPP was established to provide support for community projects and initiatives in the regions surrounding Appin Mine.

Since being established in 2004, the program has provided support to a range of community groups and not-for-profit organisations. The CPP is funded \$0.03 per saleable tonne of coal from Appin Mine. The program is administered by a board of community and IMC representatives, which enables community-based decision making on the allocation of funds.

During the past 12 months the Board has committed over \$70,000 for community projects in the local Wollondilly area. Groups that benefitted from program funding in 2021/22 included:

- Lifeline Macarthur;
- Douglas Park Public School;
- Appin Public School;
- Wilton Public School;
- Cawdor Public School;
- Shining Star Foundation;
- Wollondilly Community Links;
- Appin Rural Fire Brigade;
- Menangle Rural Fire Brigade; and
- Picton and Wilton Anglican Church.

The CPP continued its support for Life Education with funding to Appin, Douglas Park and Wilton Public Schools to enable children to visit the Life Education mobile learning centre. IMC has supported Life Education in the Wollondilly area since 2008.

Organisations in the local community are encouraged to apply for funding. Applications for funding under the CPP are assessed against a range of selection criteria, which can be viewed at:

[https://www.south32.net/docs/default-source/illawarra-coal-bulli-seam-operations/2020---illawarra-coal-cpp---grant-guidlines-application-form-and-compliance-certificate.pdf?sfvrsn=54afada7\\_8](https://www.south32.net/docs/default-source/illawarra-coal-bulli-seam-operations/2020---illawarra-coal-cpp---grant-guidlines-application-form-and-compliance-certificate.pdf?sfvrsn=54afada7_8).



## 10. INDEPENDENT AUDIT

### 10.1 Environmental Audits

During this reporting period the performance of Appin’s Environmental Management System was assessed in a comprehensive series of audits (shown in Table 44). SAI Global has endorsed a “governance check” process as a part of the ISO 14001 certification. This process involves reviewing relevant environmental management plans in accordance with the schedule and incorporates both a desktop review and in-field verification. If non-conformances are identified during audits, they are recorded and tracked via the action tracking system utilised by IMC.

**Table 44: Environmental Audits undertaken during reporting period**

Date	Type	Internal	External	Comments
October 2019	IEA		X	Undertaken by ERM
June 2022	Annual ISO 14001		X	Re-certification
April 2022	Self-Assessment	X		Self-assessment of compliance with the South32 Environment Standard
May 2022	2 <sup>nd</sup> Line Assurance Health Check	X		Verification of outcomes of self-assessment against the Environment Standard.
July 2022	Reasonable Assurance Audit	X	X	Review of externally reported GHG and water data
Ongoing	Management plan governance checks	X		Governance checks are conducted internally as a part of ISO 14001 certification. A schedule has been developed and checks are undertaken as per the schedule.

#### 10.1.1 Independent Environmental Audit (IEA)

An IEA of Appin Mine is undertaken every three years. The most recent IEA was conducted in October 2019, with the report submitted in December 2019. The IEA identified 12 non-compliances, 14 administrative non-compliances and six observations.

An action plan to address the non-compliances and observations was developed and submitted to DPIE and DoTEE. The action plan and progress update is provided in Appendix 4.

The next triennial IEA is scheduled to be undertaken in Q2 FY23.

#### 10.1.2 ISO 14001

The IMC Environmental Management System has been certified to the International Standard (ISO) 14001 since May 2003. ISO 14001 Certification for Appin Mine operations was maintained following an external audit over May and June 2022. No non-conformances were identified.

Appin East, Appin West, Appin North and the WCCPP are included in IMC’s schedule of certified ISO 14001:2015 sites. Each of these operational sites, as well as the CWEA has been regularly audited for compliance against this standard.

The auditing process requires demonstration of adequacy of systems to manage environmental aspects and impacts related to site activities. The systems audited include legal compliance, document control, records, corrective action, monitoring and control, training and management of risks.



### **10.1.3 Environment Standard**

The Environment Self Assessment for this reporting period was conducted by IMC personnel. It was found that the requirements of the Environment Standard are largely in place with some opportunities to update existing processes. All corrective actions were raised in the action tracking system utilised by IMC and will be closed out as required.

Personnel from South32 Group Environment undertook a 2<sup>nd</sup> Line Assurance Health Check of the Self Assessment in May 2022 to verify that the assessment was an accurate reflection of the Environment Standard implementation. Improvement opportunities identified will be addressed in FY23.

### **10.1.4 KPMG**

KPMG undertook a reasonable assurance audit for NGER and water data for the reporting period. This audit commenced in May and was completed in July 2022. There were no material findings.

### **10.1.5 Governance Reviews**

The below Governance Reviews were conducted for Appin Mine during the reporting period:

- Pollution Incident Response Management Plan;
- Adaptive Management Plan for Water Sensitive EPBC Act Listed Species;
- Broad-headed Snake and Southern Brown Bandicoot Management Plan;
- *Persoonia hirsuta* Offset Management Plan;
- CWEA Management Plan;
- SSTF Offset Management Plan;
- NMP; and
- WMP.

From these, the majority of corrective actions raised were administrative. All corrective actions were raised in the action tracking system utilised by IMC and closed out as required. Changes required to the respective management plan as a result of the Governance Review are recorded in the Management Plan Review Log.

## **10.2 Environmental Risk Register**

Environmental risks associated with the site operations are recorded in the Environmental Aspects and Impacts Register. The Environmental Aspects and Impacts Register is reviewed regularly and is the basis of the Environmental Improvement Plan. Environmental risks were entered into the action tracking system utilised by IMC in FY22.



## 11. INCIDENTS, NON-COMPLIANCES AND EXCEEDANCES DURING THE REPORTING PERIOD

Non-compliances recorded during the reporting period are detailed in Table 45, details of exceedances with criteria are provided in Table 46 and regulatory actions in the reporting period are provided in Table 47. Progress against non-compliances identified in the 2019 IEA is provided in Appendix 4.

<b>Table 45: Non-compliances during the reporting period</b>	
<b>NC1</b>	
Non-compliance	A modification was made to a bund storing ferric chloride that allowed the release of a small volume of ferric chloride to the sediment pond. This was a non-compliance with Condition O1 in EPL 2504 and Condition 12 of Schedule 2 of PA 08_0150.
Date	3 January 2022.
Details of non-compliance	A modification had been made to a concrete bund that reduced the capacity of the bund, allowing the release of a small volume of ferric chloride to the on-site sediment pond. There was no release of ferric chloride to the environment.
Location	Appin East Ferric Chloride Dosing Facility.
Cause of non-compliance	A spill of ferric chloride had occurred in the dosing shed as a result of corrosion of the storage container. The majority of the spilled material was absorbed using spill clean up materials, however the modification that had been made to the bund allowed a small volume of ferric chloride to flow into a sump, which overflowed to the sediment pond.
Actions taken to mitigate adverse effects of non-compliance	The water containing ferric chloride was pumped into the main dam and circulated. Ferric chloride is used in this location to dose sediment laden water to drop out suspended solids.  There was no actual environmental harm.
Actions taken to prevent reoccurrence	The modification to the bund was corrected to reinstate storage capacity.

<b>Table 46: Exceedances of criteria during reporting period</b>
<b>There were no exceedances of criteria over the reporting period.</b>



**Table 47: Regulatory action during reporting period**

<b>Regulatory Action</b>	<b>Detail</b>
Official Caution	An Official Caution was issued by the EPA in February 2022 in relation to the modification of the ferric chloride dosing area bund (See NC1).
Warning Letters	None issued.
Penalty Notices	None issued.
Prosecution Proceedings	None commenced.

Refer to the following reports for specific compliance information:

- Appendix 1: EPL 2504 Annual Return - 2021/2022;
- Appendix 3: Appin Mine Project Approval Condition Compliance Report;
- Appendix 4: Independent Environmental Audit Progress - FY22; and
- Appendix 14: EPBC Approval 2010/5350 Compliance Report - FY22.



## 12. ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

### 12.1 Mine Operations

During the next reporting period underground operations will continue in AA7 and AA9. Development and extraction will continue into the currently approved panels of LW904<sup>28</sup> and LW709 and beyond to LW905 and LWs 710-711 subject to all necessary approvals being in place.

Construction activities in the next reporting period are detailed in Section 12.3.

### 12.2 Exploration

The planned exploration activities for FY23 are concentrated in the EL 8972, A248 and EL4470 tenements, with the following boreholes planned in this area:

- Seven boreholes in AA7.
- Ten boreholes in Appin Area 10.
- Four boreholes in Appin Area 8/Western Exploration Area (WEA).
- Four boreholes in Appin Area 2/3.

In addition, four Surface to Inseam (STIS) boreholes are planned, thirteen 2D seismic lines and two 3D seismic surveys.

The planned locations of FY23 proposed activities across South32 IMC operations are shown in Plan 22.

### 12.3 Projects

The following projects will be progressed in the next reporting period:

- Construction of the Appin North long-term WTP to be completed in FY23.
- Construction of the proposed AVMA major works will commence in FY23. The construction phases include the installation of infrastructure and equipment required for the operation of ventilation shafts and mine access facilities. Preliminary works, including updates to management plans and minor construction, occurred in FY22.
- Upgrades to the Appin North bulk coal winder including updates to the electrical system, hoist monitoring and controls systems. This is a long-term project with expected completion in FY23.
- Commissioning of the Appin East surface water automated dosing system.
- Switchyard upgrades at multiple sites and locations across Appin Mine to replace old infrastructure. The project scope includes No. 2 Vent Shaft, Appin North, Appin East and Appin West. The project is partially complete and considered ongoing with upgrades to additional infrastructure being assessed for further completion in FY23.
- Installation of a new flow meter at the Appin North Point 16 underdrainage overflow pipe.
- Installation of the pump on the reclaim sump at BCD.

---

<sup>28</sup> LW904 was completed on 9 August 2022.



- Relocation of drill mud slurry ponds at Appin North.
- Engineering for the lifting and upgrade of Wedderburn Road has been planned for FY23 with construction to occur in FY24.
- Dust abatement water sprays are planned for installation on both the Coarse Coal Bins and conveyors at Appin North to reduce dust emissions. These sprays will source water from the process waters from the plant.
- Engineering designs to be developed in FY23 for the construction of EP4 to increase the capacity of the current tailings dams as the CWEA approaches EP2. Construction to commence in FY24.
- A feasibility study will commence for the current WCCPP product bins in FY23, with construction planned for FY24 to extend the life of the bins.
- Investigations into upgrading the Sewage Treatment System at Appin North commenced in early FY23 with works planned to continue later in the financial year. The plan currently includes upgrading the PLC unit, electrical systems, air compressors and pumps with investigations into tank upgrades. This will also include the implementation of a flow switch on the effluent holding pond for automated irrigation.
- Appin North and Appin East fire system upgrades are planned, with new fire pipes and pumps to be installed on the surface.
- Removal/emplacement of coal wash that had been stored at Appin North pending approval for an OPD or beneficial reuse.

## 12.4 Environmental Management

The following activities will be progressed in the next reporting period:

- Continue monitoring under the Georges River Aquatic Health Program.
- Continue monitoring of the *Persoonia hirsuta* translocation trials (1-3).
- Progress approvals, planning and environmental assessments required to undertake the work described in the GRRP.
- Continue to progress the current phase of the decarbonisation program.
- Conduct further investigations and consultation and progress preliminary approvals for rehabilitation of the North Cliff site.
- Initiate monitoring plan of habitat in the CWEA for the Broad-headed Snake.
- Explore uses of remote sensing to supplement the CWEA rehabilitation monitoring program.
- Install Native Bee habitat in the CWEA.
- Publishing of the 14-day Report from EQUiS.
- Design of a bushfire trial in established rehabilitation in the CWEA to progress closure requirements.





### 13. REFERENCES AND ASSOCIATED DOCUMENTS

- Bulli Seam Operations Project Approval 08\_0150 (as modified)
- Bulli Seam Operations EPBC Approval 2010/5350 (as modified)
- Biosphere, Bulli Seam Operations, Appendix F- Terrestrial Flora Assessment (2009).
- IMC, Appin Mine Air Quality and Greenhouse Gas Management Plan.
- IMC, Appin Mine Environmental Management Strategy.
- IMC, Appin Mine Mining Operations Plan – 1 October 2020 – 30 September 2024.
- IMC, Appin Mine Rehabilitation Management Plan.
- IMC, Appin Mine Water Management Plan.
- IMC, Appin Mine Coal Wash Emplacement Area Management Plan.
- IMC, Appin Mine Waste Management Plan.
- IMC, Georges River Rehabilitation Plan.
- IMC, Longwall 903 End of Panel Report (2021).
- Niche, West Cliff Longwalls 37-38 Extraction Plan Terrestrial Flora and Fauna Assessment (2013).
- NSW Department of Planning and Environment (2015). Annual Review Guideline, Post approval requirements for State Significant Developments, October 2015.
- NSW EPA (2022), Environment Protection Licence No. 2504.

#### 13.1 Acronyms used in Annual Review

Table 48: Acronyms used in Annual Review			
ACRONYM	DEFINITION	ACRONYM	DEFINITION
AA7	Appin Area 7 Mining Domain	IMS	Integrated membrane system
AA9	Appin Area 9 Mining Domain	ISO	International Standards Organisation
ACCC	Appin Mine Community Consultative Committee	LDP	Licence Discharge Point
APZ	Asset Protection Zone	LW	Longwall
AQMP	Air Quality and Greenhouse Gas Management Plan	ML	Mining Lease
BAM	Biodiversity Assessment Methodology	MAP	Menangle Advisory Panel
BCD	Brennans Creek Dam	MOP	Mining Operations Plan



BCS	Biodiversity and Conservation Science Directorate (previously OEH)	MPL	Mining Purposes Lease
BSO	Bulli Seam Operations	Mtpa	Million tonnes per annum
CCL	Consolidated Coal Lease	NGER	National Greenhouse and Energy Reporting
CMA	Corrective Management Action	NMP	Noise Management Plan
CO	Carbon monoxide	NSW	New South Wales
CO <sub>2e</sub>	Carbon dioxide equivalent	OEH	Office of Environment and Heritage
CPP	Community Partnerships Program	OPD	Operational Purpose Deduction
CPW	Cumberland Plain Woodland	PEF	Processed engineered fuel
CV	Calorific Value	PDCE	Post drainage capture efficiency
CWEA	Coal Wash Emplacement Area	PKCT	Port Kembla Coal Terminal
DAWE	Department of Agriculture, Water and the Environment (previously DoTE)	PM <sub>2.5</sub>	Particulate matter 2.5 microns
DCCEEW	Department of Climate Change, Energy, the Environment and Water (previously DAWE)	PM <sub>10</sub>	Particulate matter 10 microns
DCPP	Dendrobium Coal Preparation Plant	PRP	Pollution Reduction Program
DotE	Department of the Environment	PSI	Preliminary Site Investigation
DPAP	Douglas Park Advisory Panel	RCE	Rehabilitation Cost Estimate
DPE	Department of Planning and Environment (previously DPIE)	REF	Review of Environmental Factors
DPIE	Department of Planning, Industry and Environment <sup>29</sup>	RMP	Rehabilitation Management Plan
DNA	Deoxyribonucleic acid	RoM	Run of Mine

<sup>29</sup> Previously Department of Planning and Environment, Department of Planning, Department of Urban Affairs and Planning



DTIRIS	Department of Trade, Investment, Regional Infrastructure and Services	SA NSW	Subsidence Advisory NSW
EC	Electrical conductivity	SMP	Subsidence Management Plan
EDL	Energy Developments Limited	SSTF	Shale Sandstone Transition Forest
EIP	Environment Improvement Program	STIS	Surface to In-Seam drillhole
EFT	IMC Environmental Field Team	STP	Sewage Treatment Plant
EoP	End of Panel	TARP	Trigger Action Response Plan
EP	Extraction Plan	TfNSW	Transport for NSW
EPA	Environment Protection Authority	TFRR	Thermal flow reversal reactor
EPBC	Environment Protection and Biodiversity Conservation	TSI	Targeted Site Investigation
EPL	Environment Protection Licence	TSS	Total Suspended Solids
FY	Financial Year	UG	Underground
GHG	Greenhouse Gas	VAM	Ventilation Air Methane
GRAHMP	Georges River Aquatic Health Monitoring Program	VAMMIT	Ventilation Air Methane Mitigation
GRRP	Georges River Rehabilitation Plan	WAC	Weak acid cation
HBSS	Hawkesbury Sandstone	WEA	Western Exploration Area
IAC	Illawarra Access Controller	WTP	Water Treatment Plant
ICHPL	Illawarra Coal Holdings Pty Ltd	WMP	Water Management Plan
IEA	Independent Environmental Audit	WCCPP	West Cliff Coal Preparation Plant
IMC	Illawarra Metallurgical Coal		

## 13.2 Management Plans

The Management Plans in Table 49 are required by the Project Approval, EPBC Approvals or EPL 2504.



**Table 49: Management Plans**

<b>Management Plan</b>	<b>Approved Date</b>	<b>Next Review</b>
Adaptive Management Plan for Water Sensitive EPBC Act Listed Species	28/01/2021	31/01/2024
Air Quality & Greenhouse Gas Management Plan	9/12/2020	7/12/2023
AMVA Project Construction Environmental Management Plan – Early Works	17/06/2022	16/06/2023
Biodiversity Management Plan	16/02/2021	1/01/2024
Broad Headed Snake and Southern Brown Bandicoot Management Plan	28/01/2021	23/12/2023
Coal Wash Emplacement Area Management Plan	28/01/2021	16/12/2023
Environmental Management Strategy	1/10/2020	1/09/2023
Gas Drainage Management Plan	7/12/2020	3/12/2023
Heritage Management Plan	15/11/2021	1/11/2024
Noise Management Plan	7/12/2020	3/12/2023
<i>Persoonia hirsuta</i> Offset Management Plan	18/05/22	27/04/2025
Pollution Incident Response Management Plan EPL 2504	N/A	15/02/2023
Mining Operations Plan (MOP) <sup>30</sup>	9/10/2020	17/08/2024
Rehabilitation Management Plan	30/06/2022	30/06/2025
Shale Sandstone Transition Forest Offset Management Plan	1/07/2021	1/07/2025
Surface Activities Management Plan	1/10/2020	1/09/2023
Traffic Management Plan	23/07/2020	30/06/2023
Ventilation Shaft 6 Biodiversity Offset Strategy	20/11/2020	1/10/2041
Waste Management Plan	5/11/2020	1/11/2023
Water Management Plan	11/09/2020	1/07/2023

<sup>30</sup> Document became obsolete on 2 July 2022.

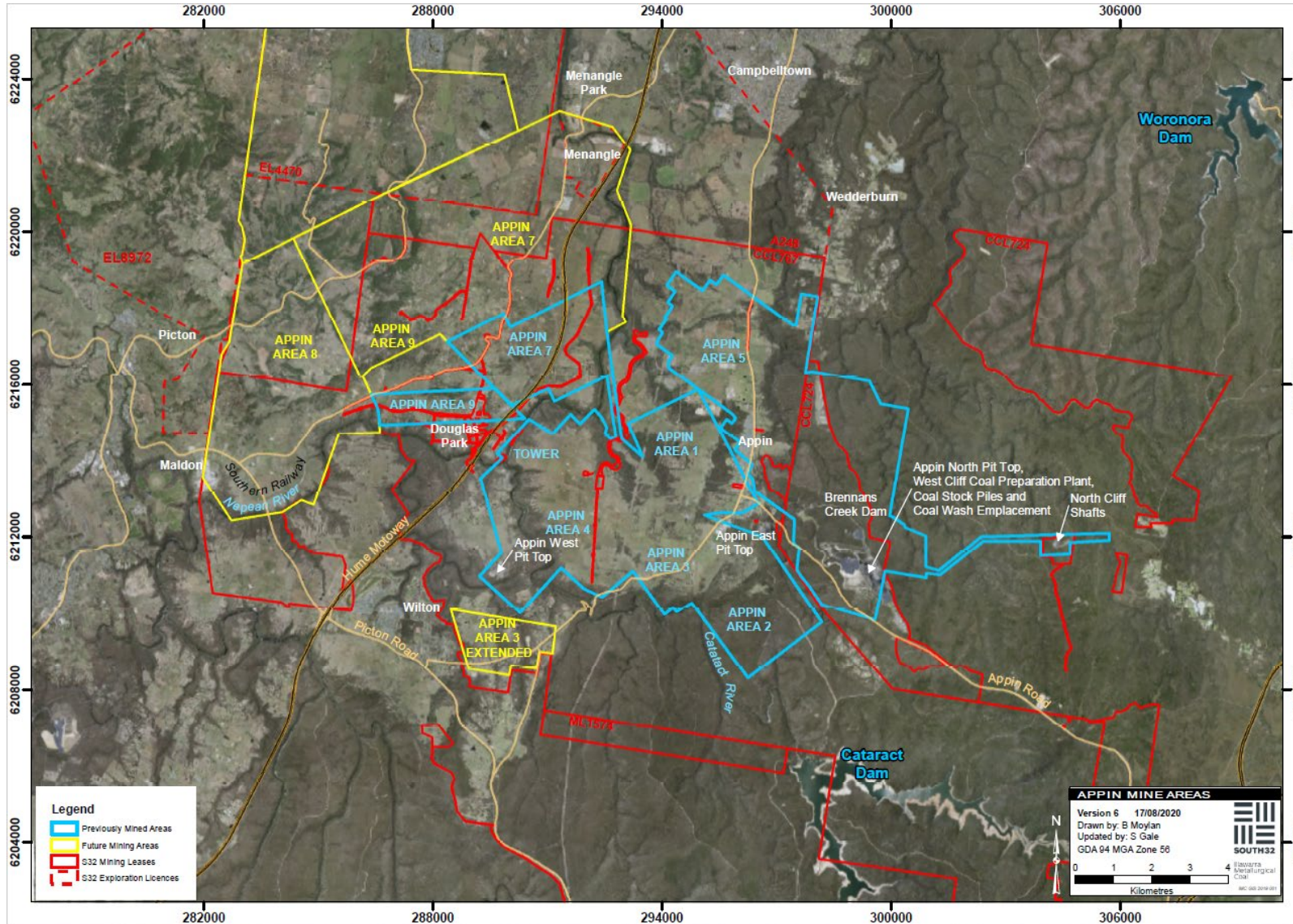


---

**14. PLANS**

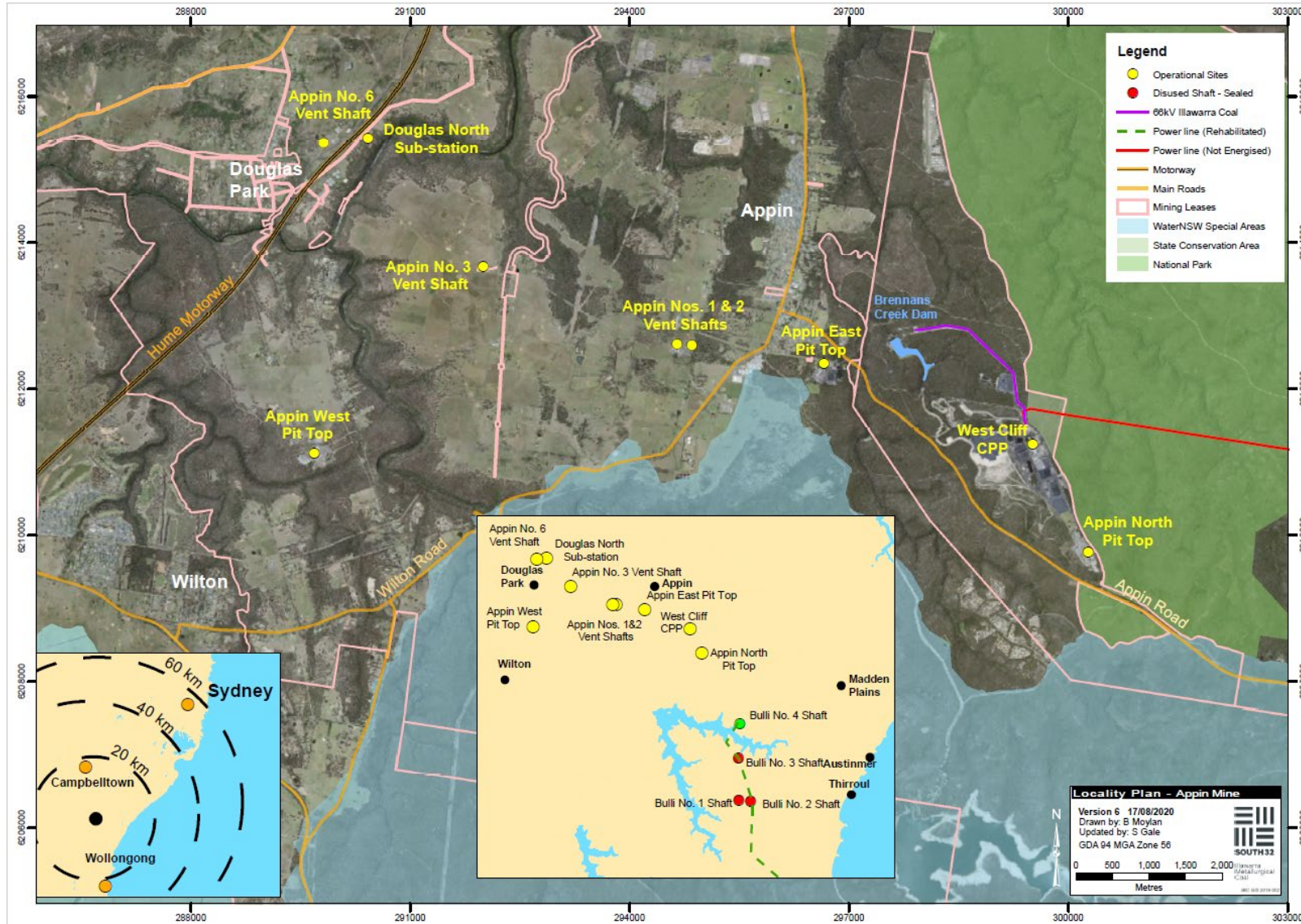


### Plan 1: Regional Location Plan showing Mining Domains



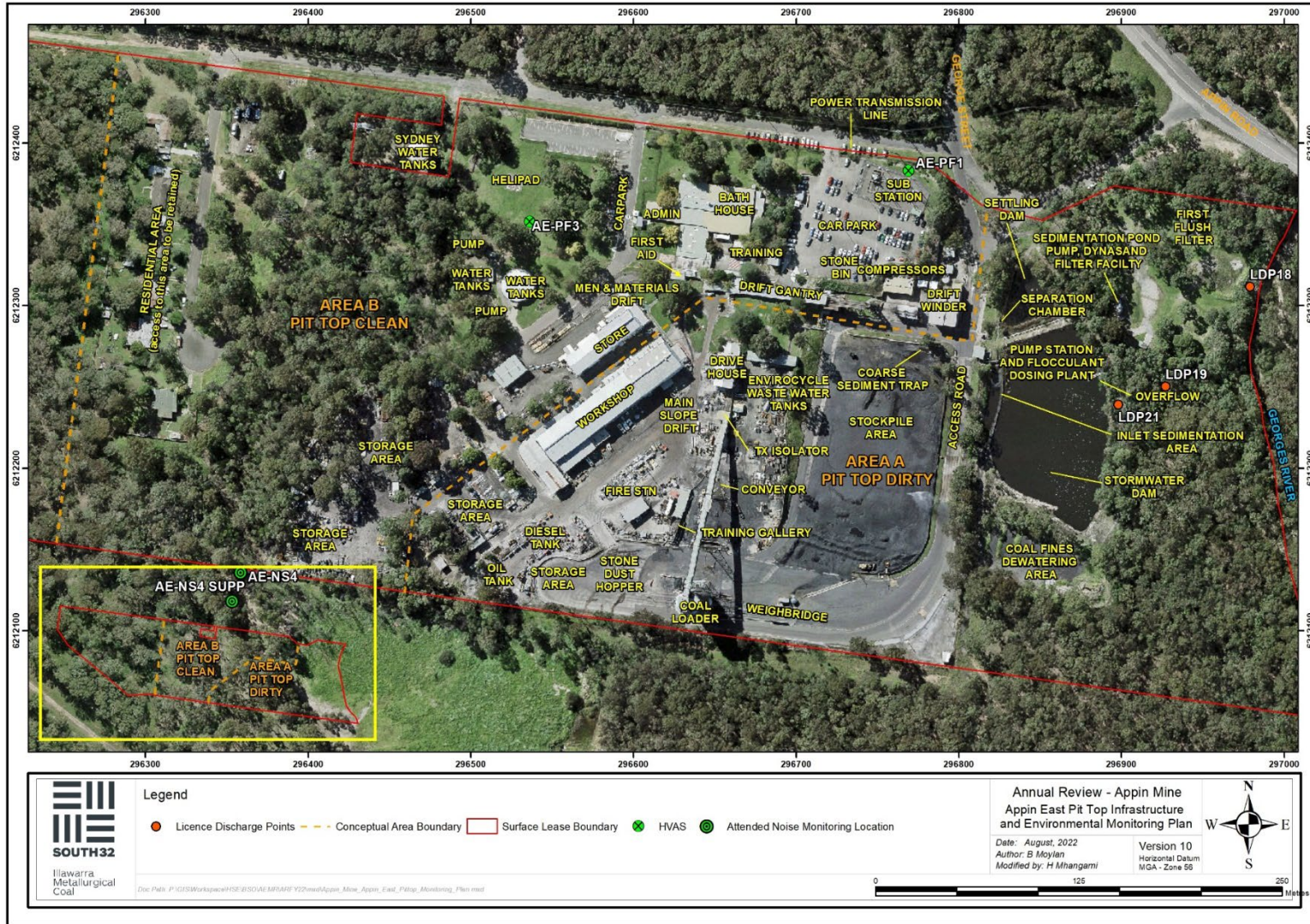


## Plan 2: Appin Shaft and Pit Top Locality Plan





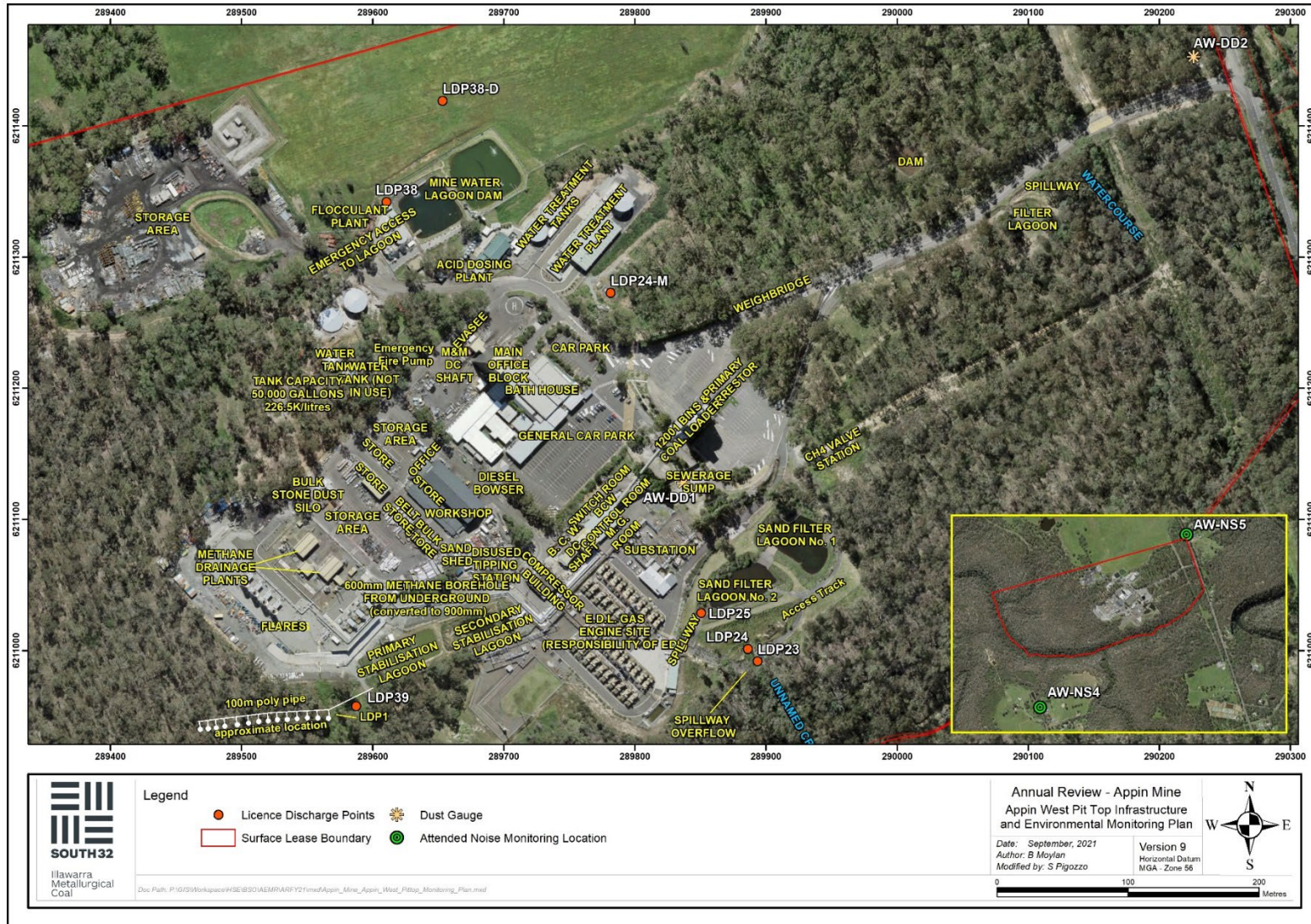
### Plan 3: Site Layout and Monitoring Locations - Appin East Pit Top





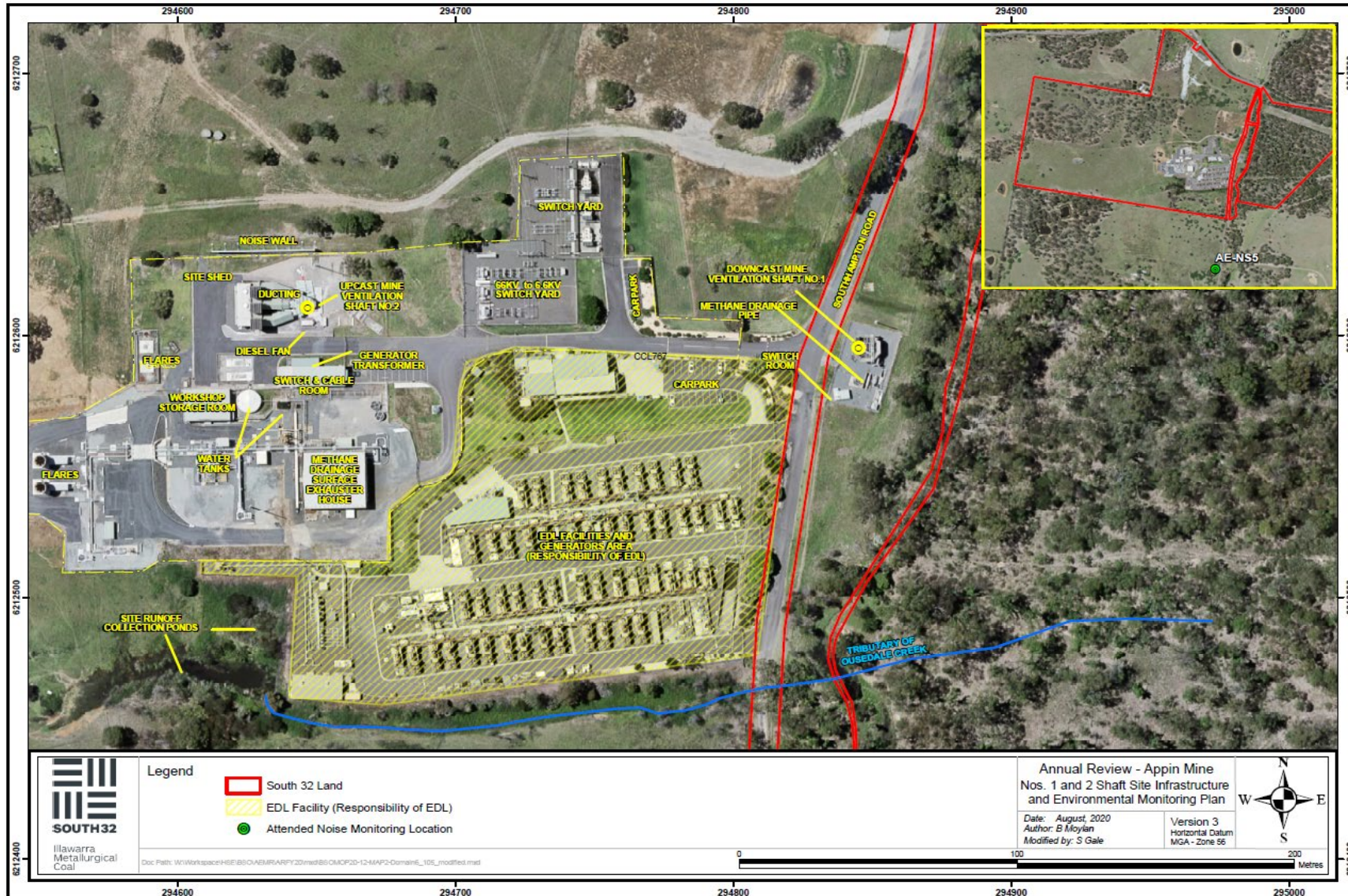


### Plan 4: Site Layout and Monitoring Locations - Appin West Pit Top



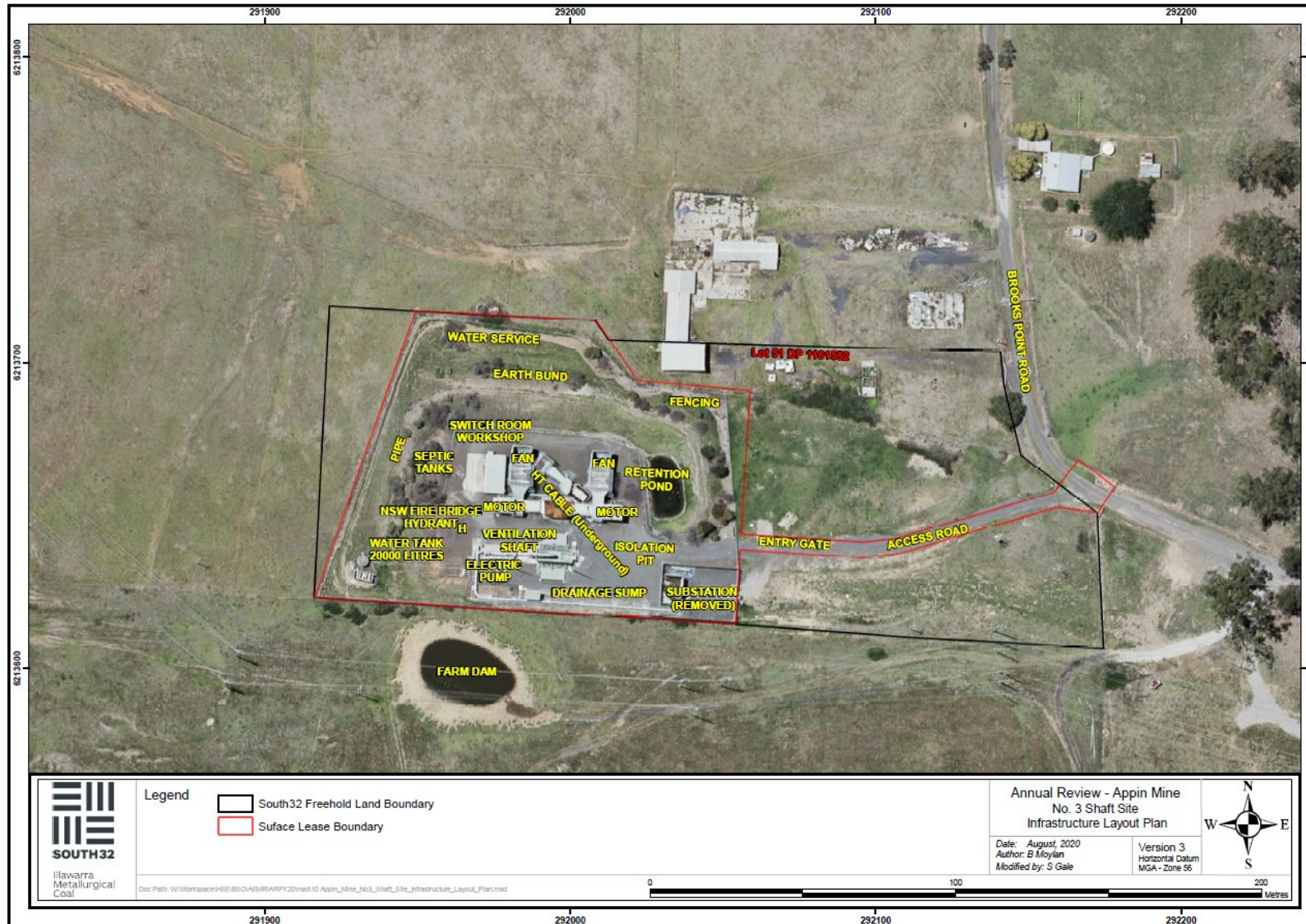


### Plan 5: Site Layout - Ventilation Shafts No. 1 and 2



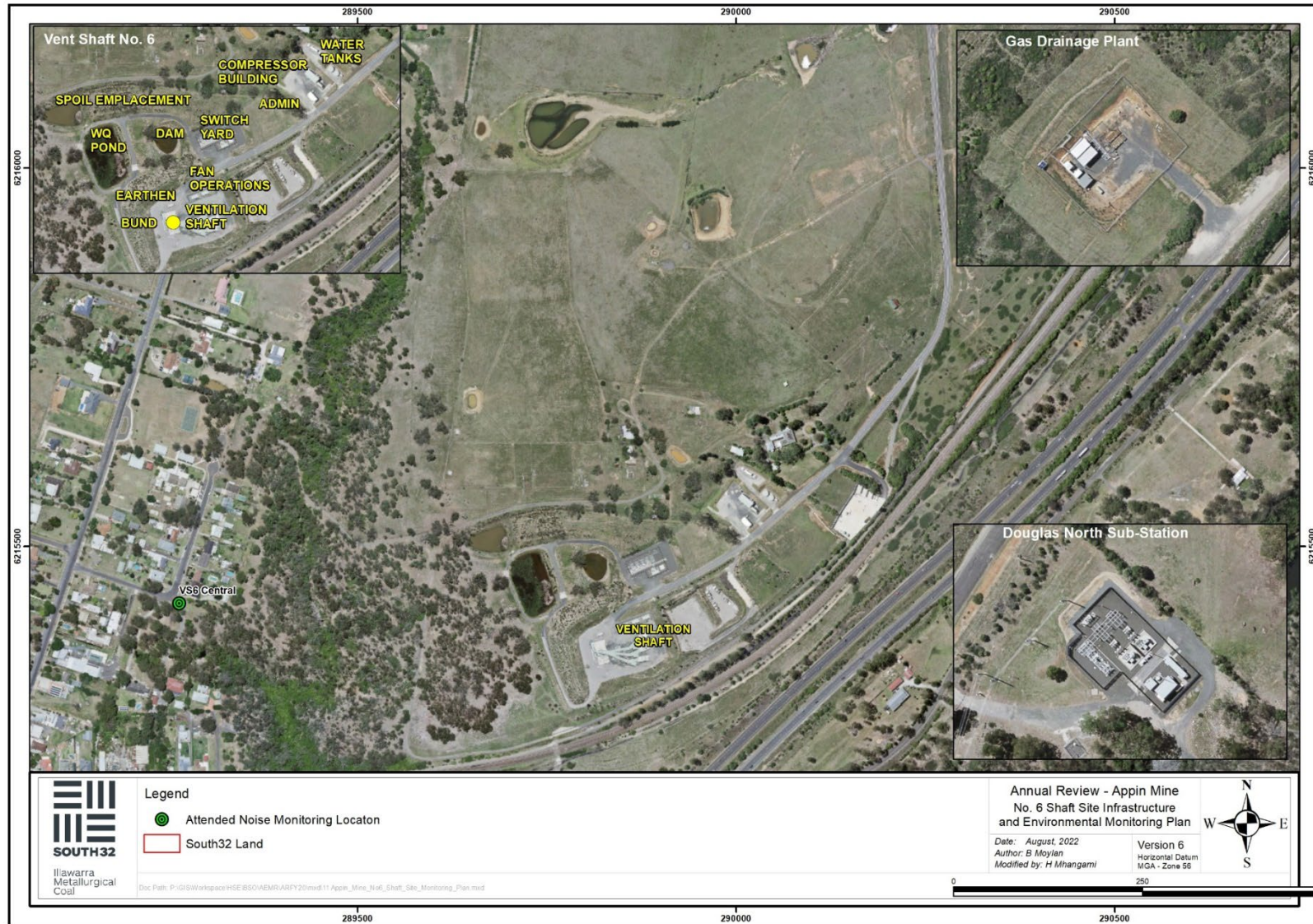


### Plan 6: Site Layout - Ventilation Shaft No. 3



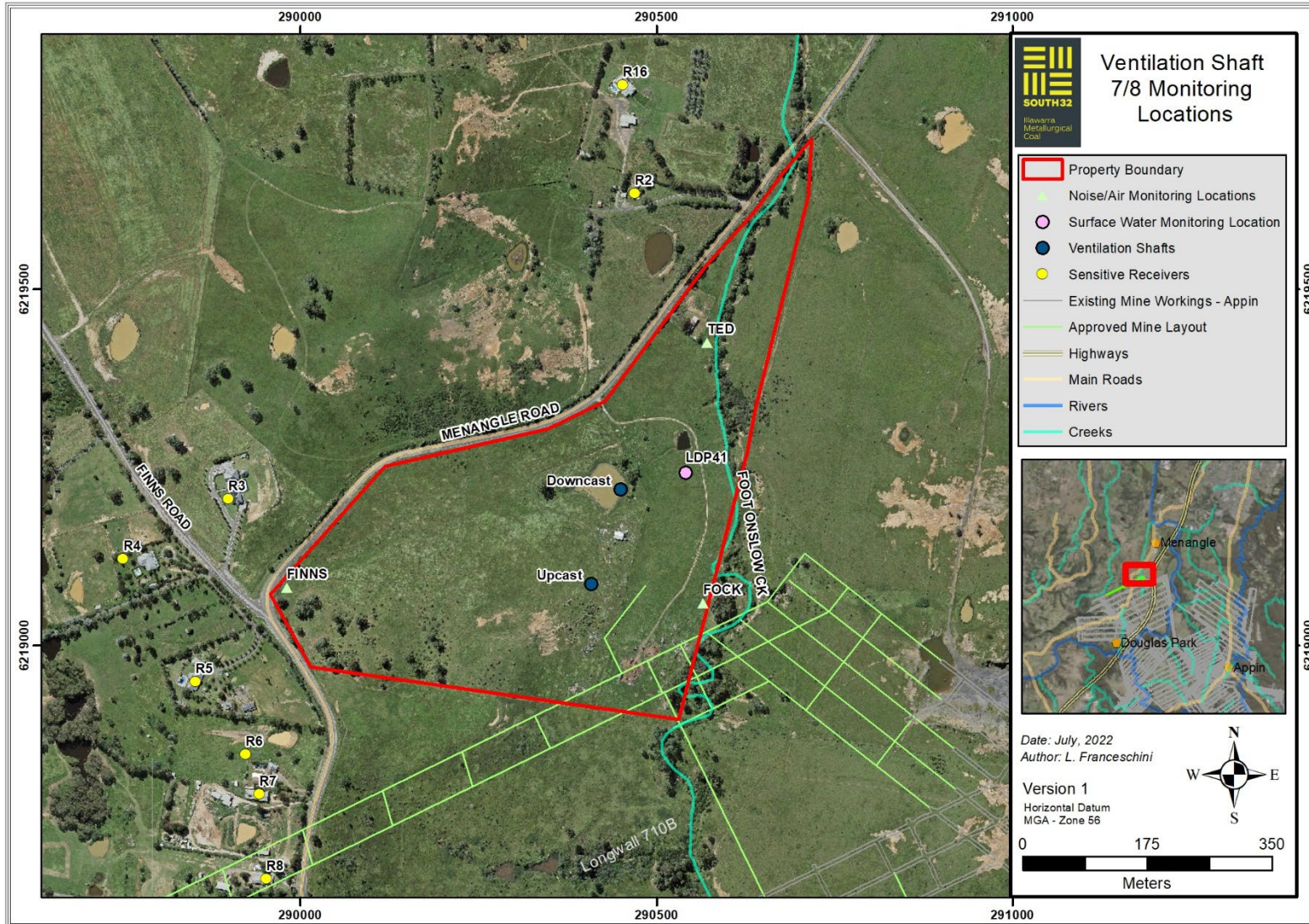


### Plan 7: Site Layout and Monitoring Locations - Ventilation Shaft No. 6



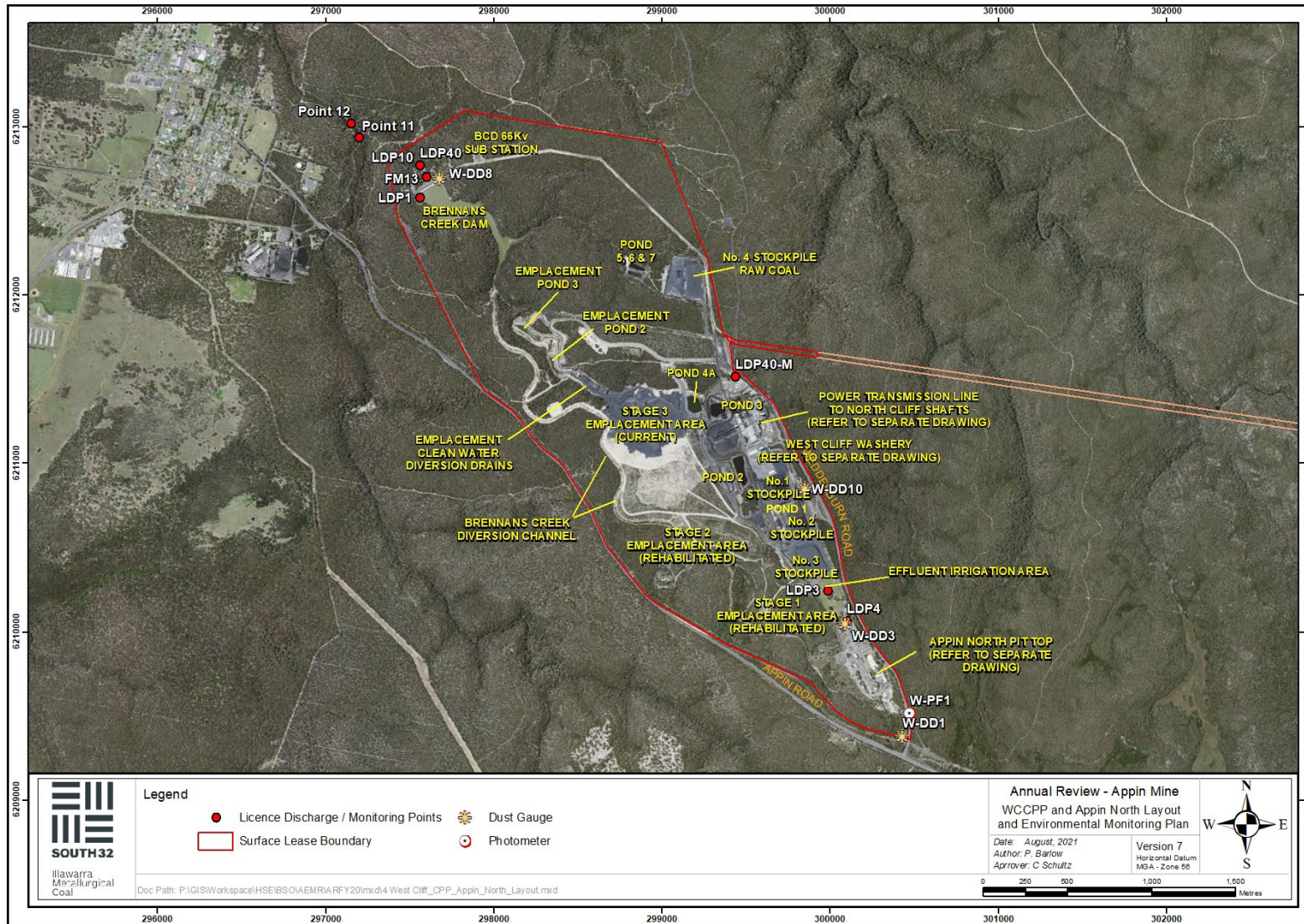


### Plan 8: Proposed Site Layout and Monitoring Locations- Ventilation Shaft No. 7 and 8 (AMVA Project)



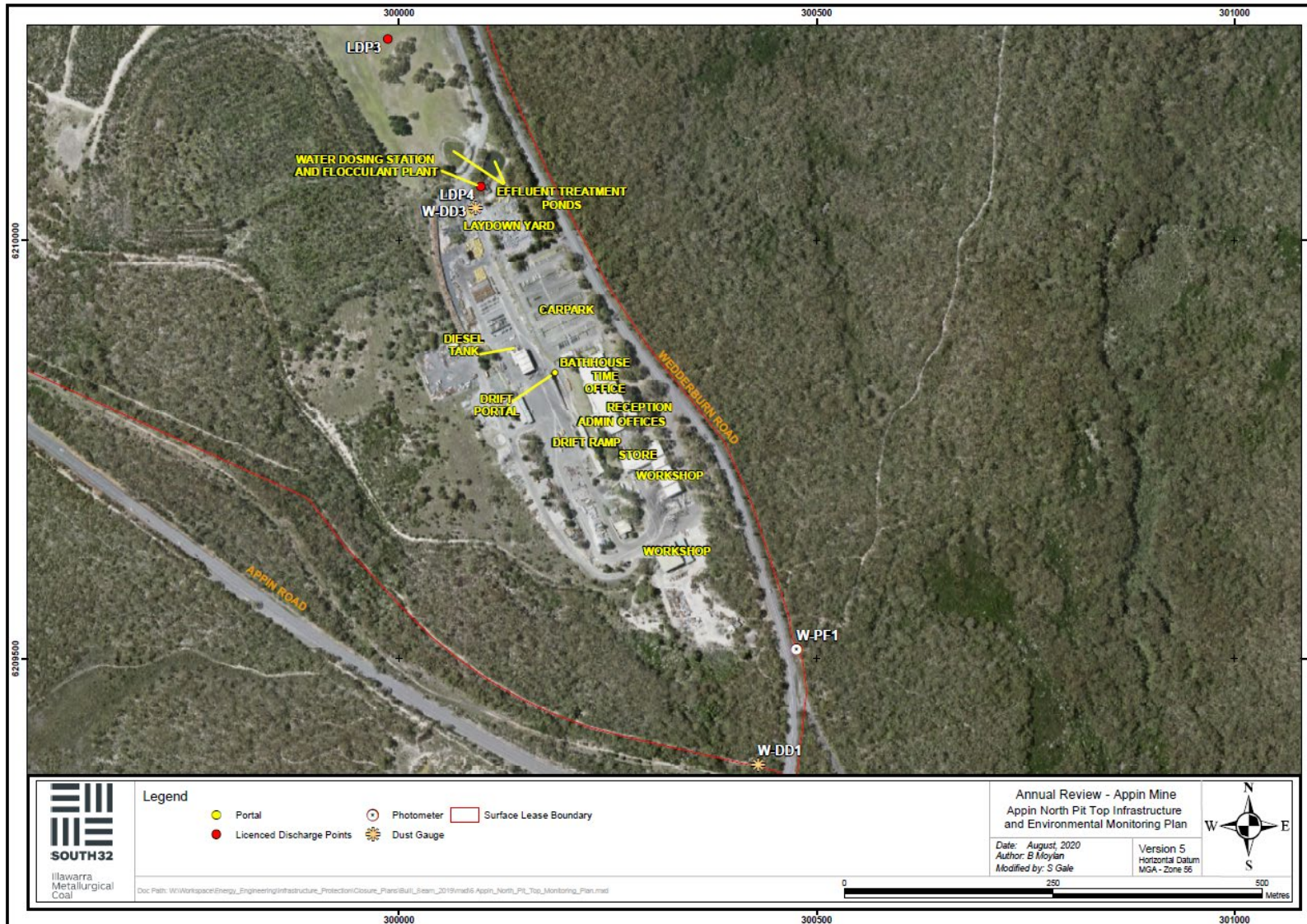


### Plan 9: Site Layout and Monitoring Locations - Appin North Pit Top and WCCPP



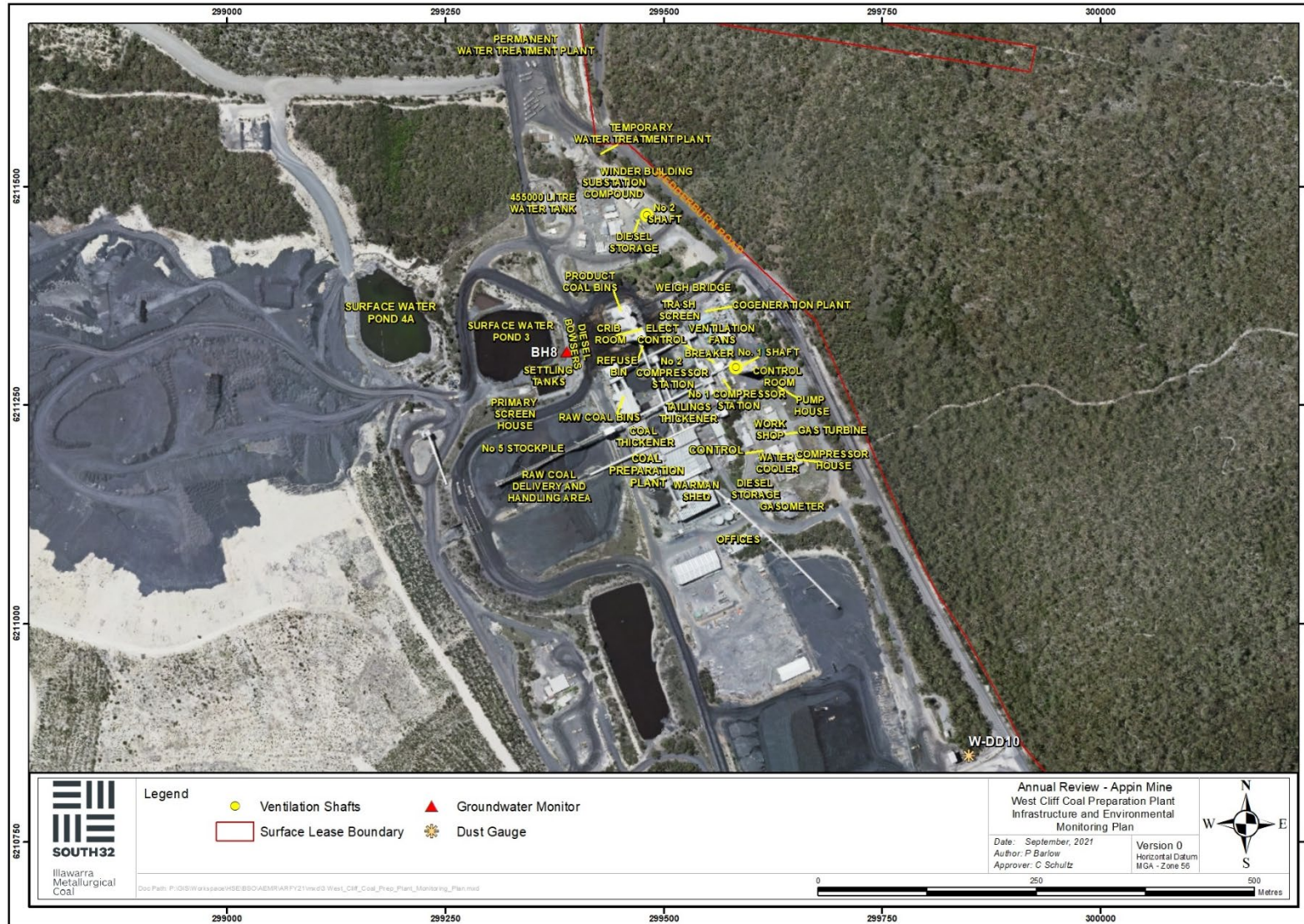


### Plan 10: Site Layout and Monitoring Locations- Appin North Pit Top





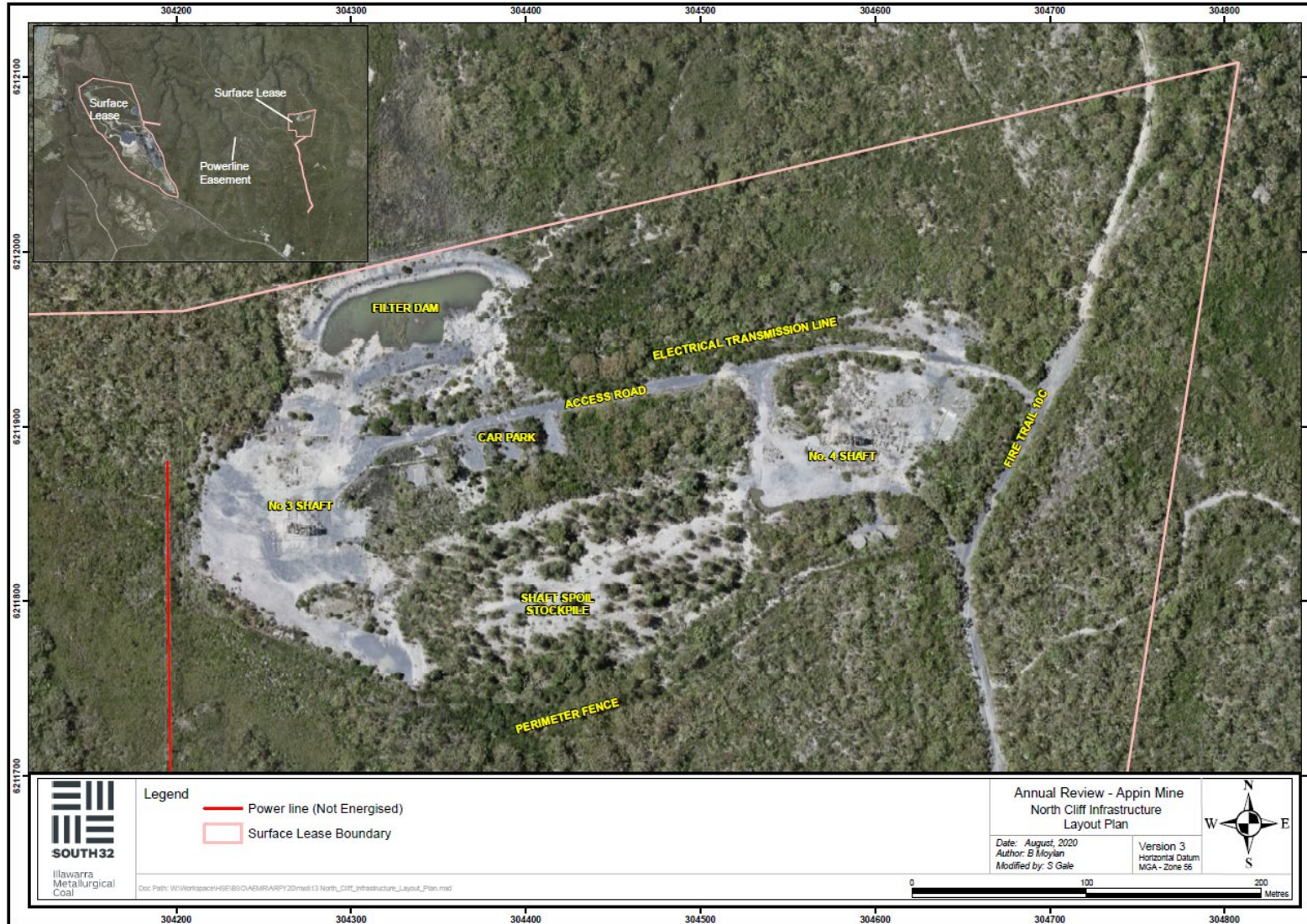
### Plan 11: Site Layout and Monitoring Locations- WCCPP







### Plan 12: Site Layout - North Cliff Pit Top



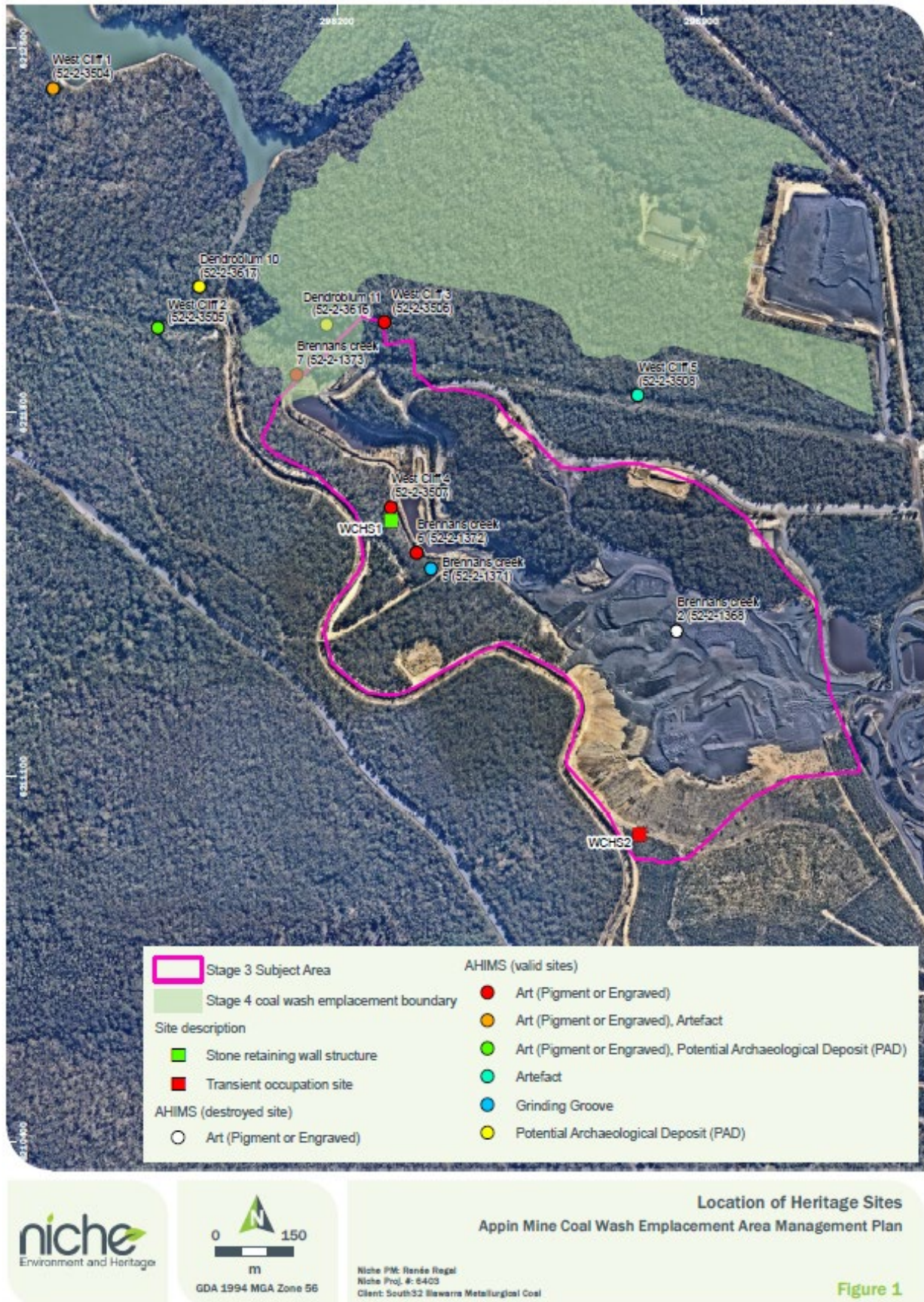


### Plan 13: Land Preparation Plan – CWEA





### Plan 14: CWEA Cultural Heritage Sites





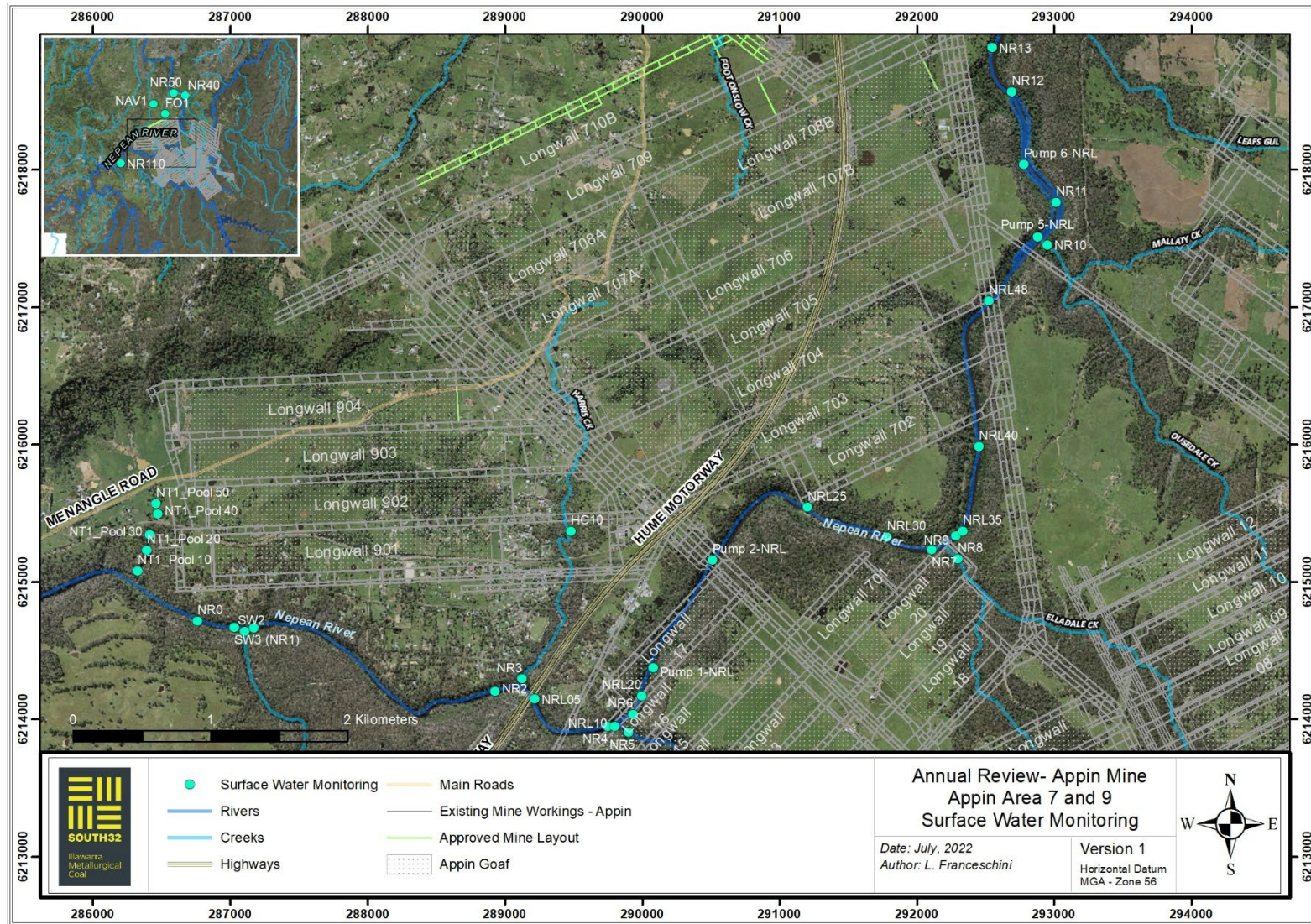
### Plan 15: Georges River Stream Features



Doc Path: P:\GIS\Workspace\HSE\Offsite\_FieldTeam\Bulli\_Seam\Annual Review\FY22\AppinAR\_Georges\_Subsidence\_FY22.mxd

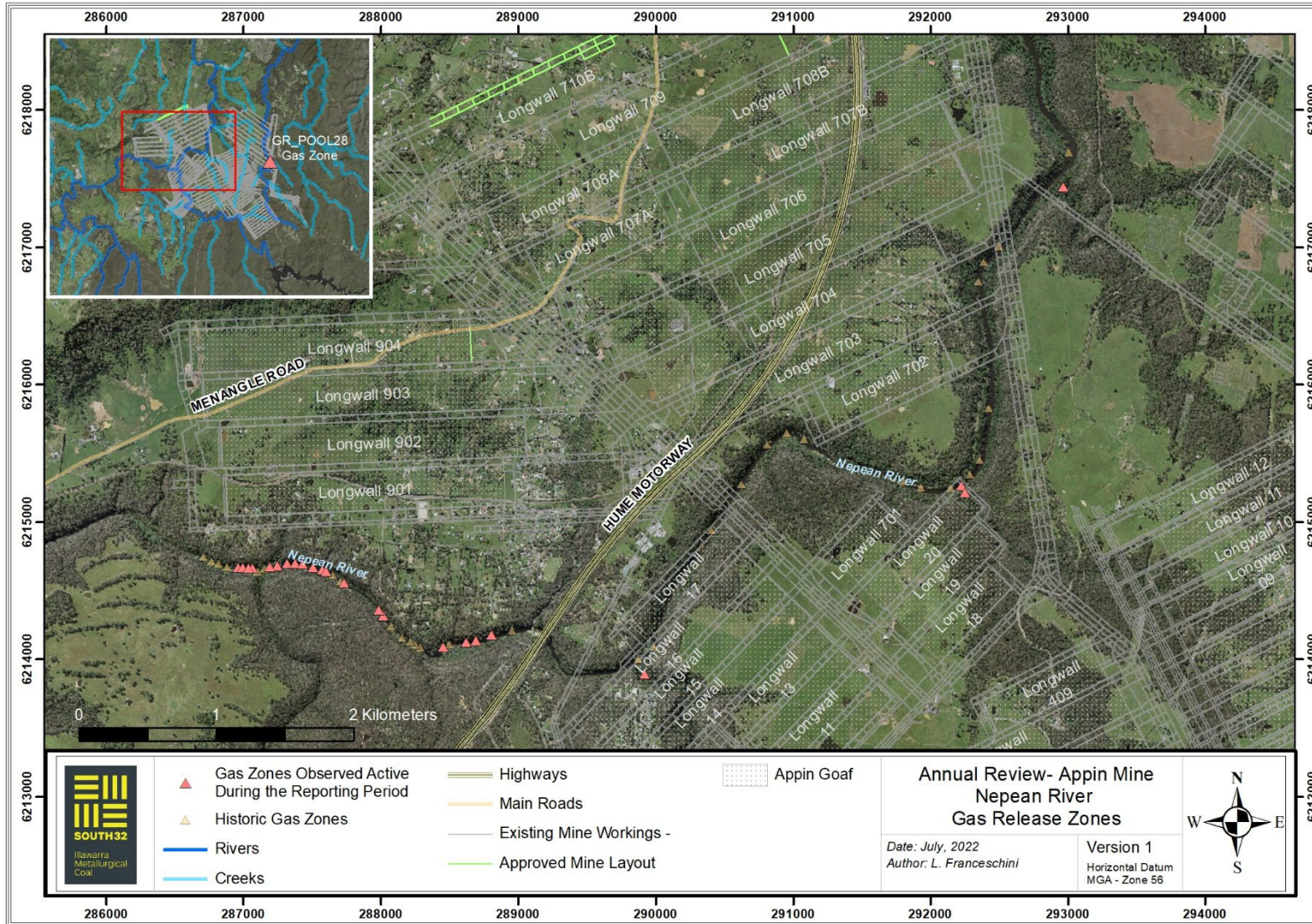


### Plan 16: Appin Area 7 and 9 Surface Water Monitoring Locations - FY22



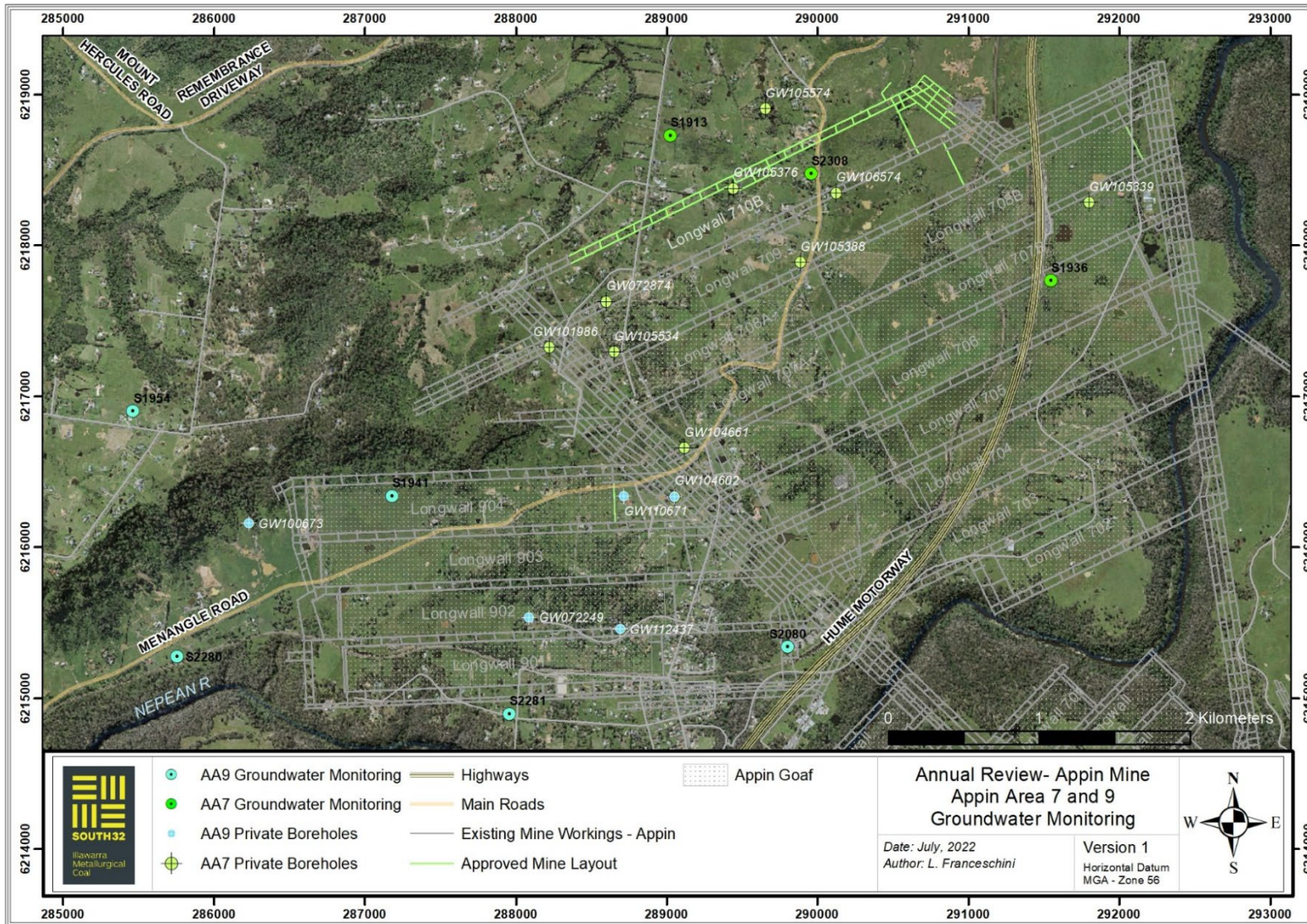


### Plan 17: Appin Area 7 and 9 Gas Zones - FY22



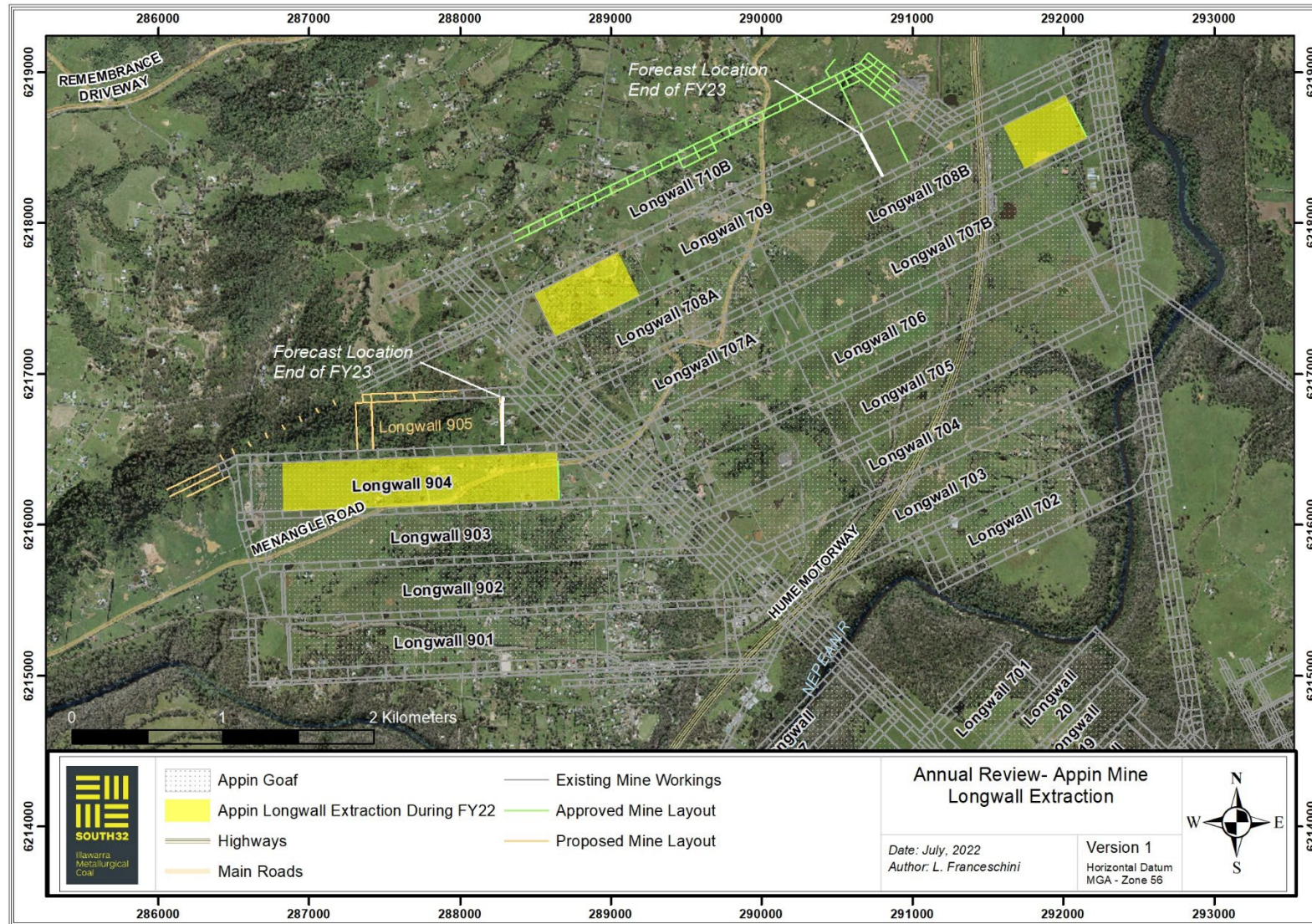


### Plan 18: Appin Area 7 and 9 Groundwater Monitoring – FY22





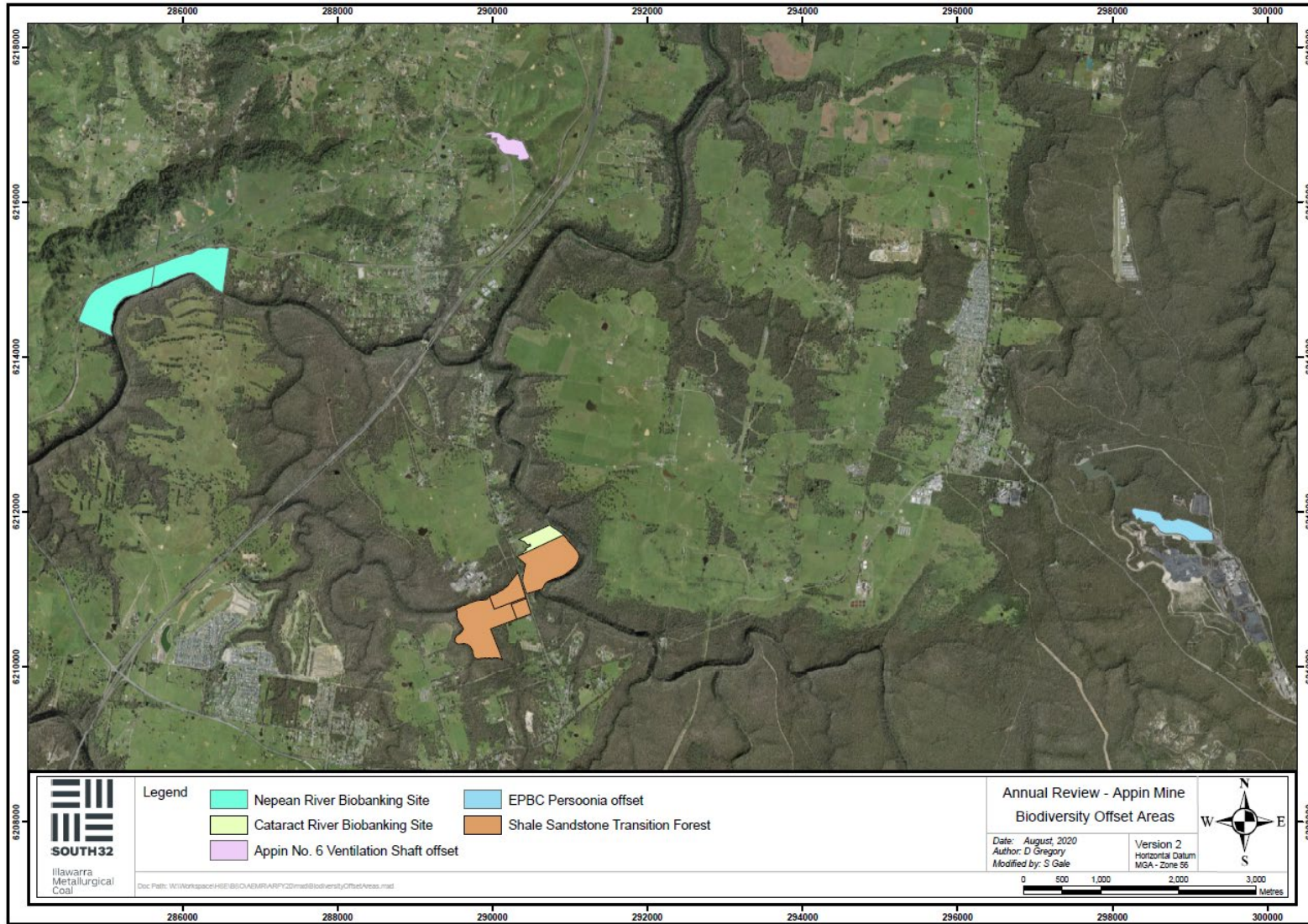
### Plan 19: Appin Area 7 and 9 Longwall Extraction - FY22 Actual and FY23 Forecast





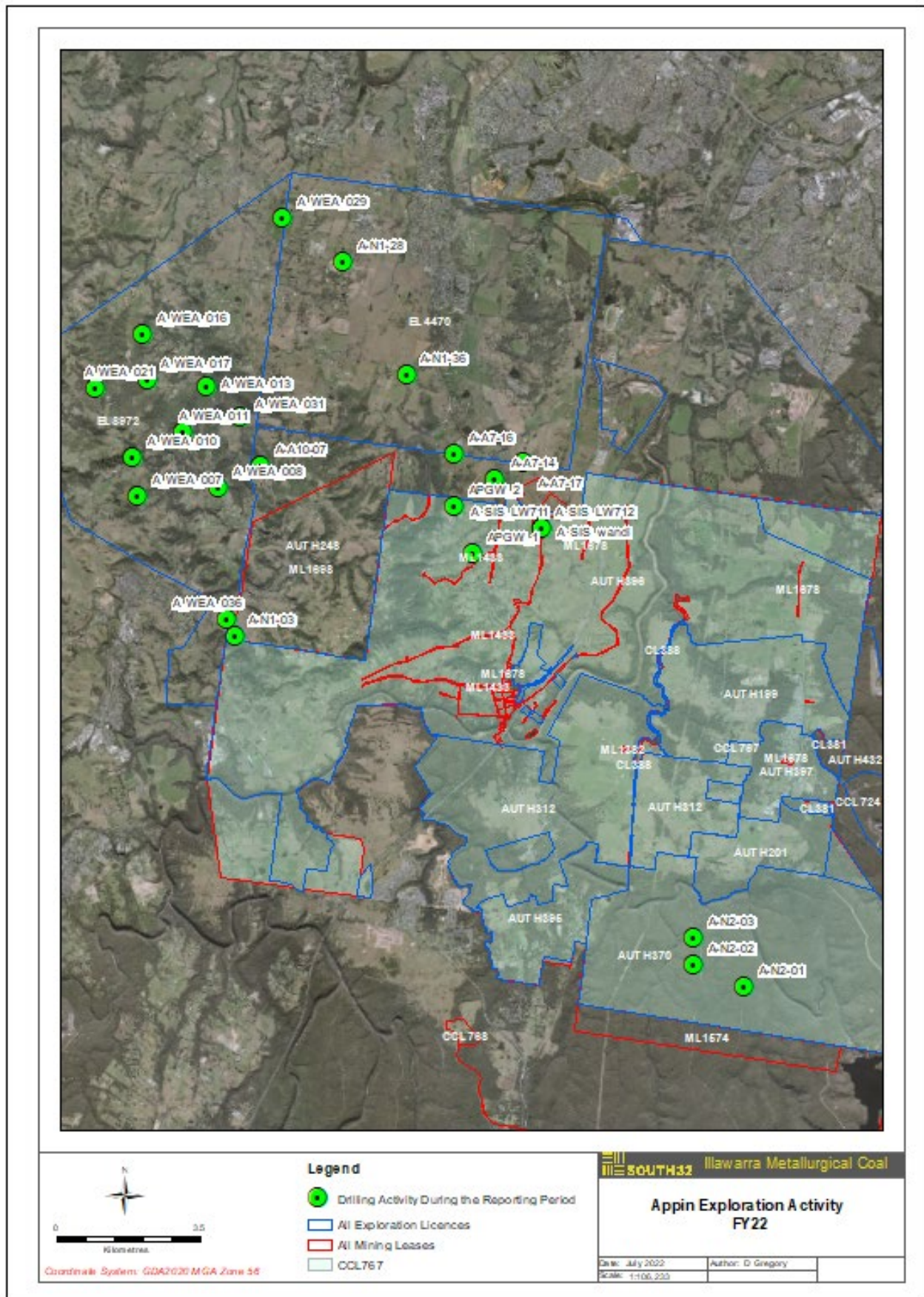


## Plan 20: Biodiversity Offset Areas



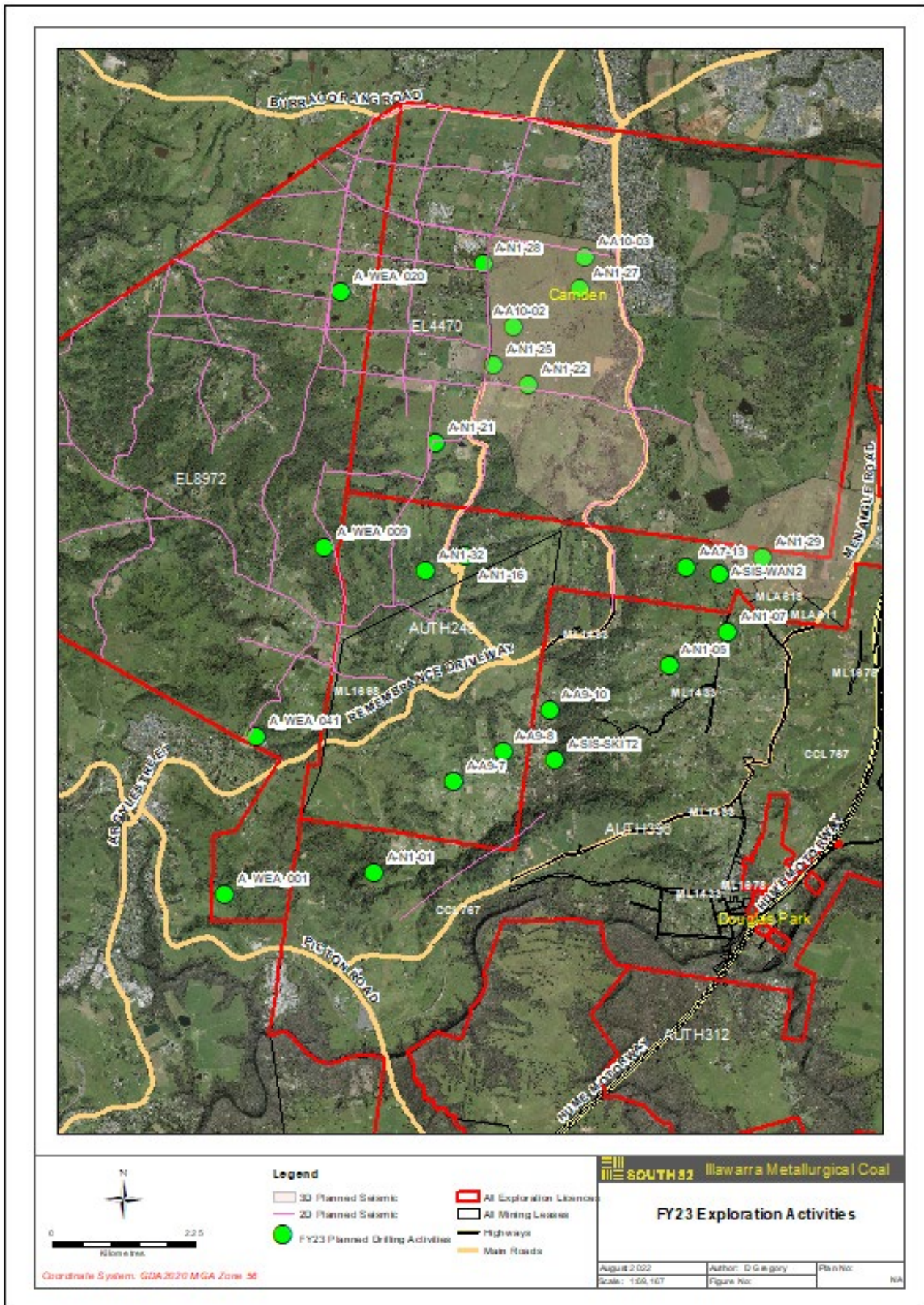


### Plan 21: Appin Exploration Activity - FY22





**Plan 22: Planned Appin Exploration Activity - FY23**





---

## **15. APPENDICES**

### **Appendix 1: EPL 2504 Annual Return - 2021/2022**



## A. Statement of Compliance - Licence Details

**ALL Licence holders must check that the Licence details in Section A are correct.**

If there are changes to any of these details, **you must advise Environment Protection Authority (EPA) and apply as soon as possible for a variation to your Licence or for a Licence transfer.**

Licence variation and transfer application forms are available on the EPA website at: <http://www.epa.nsw.gov.au/licensing-and-regulation/licensing> or from regional offices of the EPA, or by contacting by telephone 02 9995 5700.

If you are applying to vary or transfer your Licence, you must still complete and submit this Annual Return.

### A1. Licence holder

**Licence number** : 2504  
**Licence holder** : ENDEAVOUR COAL PTY LIMITED  
**Trading name (if applicable)** :  
**ABN** : 38 099 830 476  
**ACN** : 099 830 476  
**Reporting period** : From: 1-2-2021 To: 31-1-2022

### A2. Premises to which Licence Applies (if applicable)

**Common name (if any)** : 3. APPIN COLLIERY - NORTH (AND WESTCLIFF COAL PREP PLANT)  
**Premises** : WEDDERBURN ROAD APPIN 2560 NSW

### A3. Activities to which Licence Applies

Mining for coal  
Waste disposal (application to land)  
Coal works

### A4. Other Activities (if applicable)

Electricity generation  
Resource Recovery

### A5. Fee-Based Activity Classifications

**Note** that the fee based activity classification is used to calculate the administrative fee.



Fee-based activity	Activity scale	Unit of measure
Waste disposal by application to land	> 0.00	capacity
Coal works	> 2,000,000.00 - 5,000,000.00	T annual handing capacity
Mining for coal	> 3,500,000.00 - 5,000,000.00	T annual production capacity

## A6. Assessable Pollutants (if applicable)

**Note** that the identification of assessable pollutants is used to calculate the **load-based fee**.

The following assessable pollutants are identified for the fee-based activity classifications in the licence:

## B. Monitoring and Complaints Summary

### B1. Number of Pollution Complaints

Pollution Complaint Category	Complaints
Air	2
Water	0
Noise	0
Waste	0
Other	0
<b>Total complaints recorded by the licensee during the reporting period</b>	<b>2</b>

### B2. Concentration Monitoring Summary

For each concentration monitoring point identified in your licence, details are displayed below. If concentration monitoring is not required by your licence, **no data** will appear below.

If data was provided from an uploaded file, the file name will be displayed below instead of any data.

**Note** that this does not exclude the need to conduct appropriate concentration monitoring of assessable pollutants as required by load-based licensing (if applicable).

#### Monitoring Point 4

Discharge quality monitoring. Volume Monitoring, Sampling tap in settling chamber of sewage treatment plant.

lat. long. -34.231323 150.829629

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Biochemical oxygen demand	milligrams per litre	12	12	<2	4	14
pH	pH	12	12	7.8	8.0	8.5



## Discharge & Monitoring Point 10

### Discharge to waters

#### Discharge quality monitoring

Volume monitoring, Pipe discharge outlet from Brennans Creek dam to the creek.

lat. long. -34.206432 150.802706

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Aluminium (dissolved)	milligrams per litre	12	12	0.06	0.23	0.40
Arsenic (dissolved)	micrograms per litre	12	12	1	2	4
Bicarbonate alkalinity	milligrams per litre	12	12	534	704	828
Cadmium (dissolved)	micrograms per litre	12	12	<0.1	0	0
Cobalt (dissolved)	micrograms per litre	12	12	<1	1	2
Conductivity	microsiemens per centimetre	12	12	1340	1653	1820
Copper (dissolved)	micrograms per litre	12	12	1	4	18
Lead (dissolved)	micrograms per litre	12	12	<1	<1	<1
Manganese (dissolved)	micrograms per litre	12	12	2	11	35
Nickel (dissolved)	micrograms per litre	12	12	16	24	30
Nitrogen (ammonia)	micrograms per litre	12	12	10	32	60
Nitrogen (total)	micrograms per litre	12	12	200	467	1100
Oxidised nitrogen	micrograms per litre	12	12	<10	116	580
pH	pH	12	12	7.8	8.5	8.9
Total alkalinity	milligrams per litre	12	12	77	443	899
Total dissolved solids	milligrams per litre	12	12	812	1034	1260
Total suspended solids	milligrams per litre	12	12	<5	7	14
Turbidity	nephelometric turbidity units	Continuous	Continuous	3.24	24.48	157.51
Zinc (dissolved)	micrograms per litre	12	12	<5	8	25

## Monitoring Point 11

Ambient water quality monitoring, Georges River approximately 50 metres upstream of the confluence with Brennans Creek.

lat. long. -34.204883 150.798824

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Conductivity	microsiemens per centimetre	12	12	136	216	372
pH	pH	12	12	5.8	6.2	7.4
Total suspended solids	milligrams per litre	12	12	<5	8	30

## Monitoring Point 12

Ambient water quality monitoring, Georges River approximately 50 metres downstream of the confluence with Brennans Creek.

lat. long. -34.204099 150.798345

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Conductivity	microsiemens per centimetre	12	12	343	1008	1780
pH	pH	12	12	7.4	8.1	8.9
Total suspended solids	milligrams per litre	12	12	<5	7	23

## Discharge & Monitoring Point 18

Discharge to waters.

Discharge quality and volume monitoring, Underflow from the stormwater filter lagoon discharging through a v-notch weir.

lat. long. -34.210467 150.796312

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
pH	pH	0	0	0	0	0
Total suspended solids	milligrams per litre	0	0	0	0	0





## Discharge & Monitoring Point 19

Discharge to waters. Discharge quality and volume monitoring., Dyna Sand Filter outlet for treated stormwater.

lat. long. -34.211010 150.795734

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
pH	pH	11	11	6.7	7.3	8.0
Total suspended solids	milligrams per litre	11	11	<1	4	6

## Discharge & Monitoring Point 23

Discharge to waters

Water quality monitoring

Discharge volume monitoring, Piped discharge outlet for stormwater.

lat. long. -34.220956 150.719136

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
pH	pH	12	12	7.1	7.6	8.0
Total suspended solids	milligrams per litre	12	12	1	7	26

## Discharge & Monitoring Point 24

Discharge to waters

Water quality monitoring Discharge volume monitoring, Piped discharge of treated mine water at Appin (West).

lat. long. -34.220870 150.719059

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Aluminium (dissolved)	milligrams per litre	12	12	0.0006	0.0062	0.0200
Arsenic (dissolved)	micrograms per litre	12	12	0	2	5
Bicarbonate alkalinity	milligrams per litre	12	12	56	190	440
Cadmium (dissolved)	micrograms per litre	12	12	<0.02	0.05	<0.1



# Annual Return

ENDEAVOUR COAL PTY LIMITED

Licence 2504

Cobalt (dissolved)	micrograms per litre	12	12	0.06	0.48	1
Conductivity	microsiemens per centimetre	12	12	122	415	1020
Copper (dissolved)	micrograms per litre	12	12	<0.05	0.43	<1
Lead (dissolved)	micrograms per litre	12	12	<0.05	0.37	<1
Manganese (dissolved)	micrograms per litre	12	12	<0.05	0.71	2
Nickel (dissolved)	micrograms per litre	12	12	0.6	11.2	31
Nitrogen (ammonia)	micrograms per litre	12	12	21	180	380
Nitrogen (total)	micrograms per litre	12	12	150	286	500
Oxidised nitrogen	micrograms per litre	12	12	33	82	157
pH	pH	12	12	7.2	7.7	8.4
Total alkalinity	milligrams per litre	12	12	56	190	440
Zinc (dissolved)	micrograms per litre	12	12	0.5	3.3	7

## Monitoring Point 27

PM10 Monitoring, Photometer "AE-PF1" is located at the NE corner of the property boundary near the truck entry/exit point at Appin East.  
lat. long. -34.209797 150.794101

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
PM10	micrograms per cubic metre	Continuous	Continuous	0.57	12.72	210.54

## Monitoring Point 28

PM10 Monitoring, Photometer "AE-PF3" is located at the NW corner of the property boundary Appin East.  
lat. long -34.209197 150.789919



Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
PM10	micrograms per cubic metre	Continuous	Continuous	0.02	6.78	136.74

### Monitoring Point 35

PM10 Monitoring, Photometer "W-PF1" is located at the junction of Appin Road and Wedderburn Road at Appin North.

lat. long. -34.236380 150.833600

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
PM10	micrograms per cubic metre	Continuous	Continuous	0.96	13.32	209.55

### Discharge & Monitoring Point 36

Discharge to waters. Discharge quality monitoring - Douglas Park Vent Shaft No.6, Piped discharge outlet from stormwater dam.

lat. long. -34.180977 150.718149

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Conductivity	microsiemens per centimetre	5	5	364	488	594
pH	pH	5	5	7.3	7.7	8.3
Total suspended solids	milligrams per litre	5	5	2	9.6	14

### Discharge & Monitoring Point 38

Discharge to utilisation area

Water quality monitoring

Volume Monitoring, Pipe discharge to the utilisation area from the stabilisation lagoon of the sewage treatment plant at Appin West.

lat. Long. -34.217742 150.716151



Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
BOD	milligrams per litre	12	12	9	15.3	22
pH	pH	12	12	6.3	6.8	7.7

## Discharge & Monitoring Point 40

Discharge to water

Water quality monitoring

Discharge volume monitoring, Piped discharge of treated mine water at Appin (North).

lat. long. -34.206601 150.802954

Pollutant	Unit of measure	No. of samples required	No. of samples collected and analysed	Lowest sample value	Mean of sample	Highest sample value
Aluminium (dissolved)	milligrams per litre	9	9	0.0002	0.0016	0.01
Arsenic (dissolved)	micrograms per litre	9	9	0.1	0.4	1
Bicarbonate alkalinity	milligrams per litre	9	9	64	83.4	104
Cadmium (dissolved)	micrograms per litre	9	9	<0.02	0.03	0.10
Cobalt (dissolved)	micrograms per litre	9	9	<0.02	0.1	1
Conductivity	microsiemens per centimetre	9	9	108.4	150.1	193
Copper (dissolved)	micrograms per litre	9	9	<0.02	0.2	1
Lead (dissolved)	micrograms per litre	9	9	<0.05	0.2	1
Manganese (dissolved)	micrograms per litre	9	9	<0.05	0.2	1
Nickel (dissolved)	micrograms per litre	9	9	0.3	0.6	1
Nitrogen (ammonia)	micrograms per litre	9	9	150	308	444
Nitrogen (total)	micrograms per litre	9	9	230	352	460
Oxidised nitrogen	micrograms per litre	9	9	14	27	48
pH	pH	9	9	6.9	7.2	8.1



Total alkalinity	milligrams per litre	9	9	64	87	105
Turbidity	nephelometric turbidity units	9	9	0	6.13	19.8
Zinc (dissolved)	micrograms per litre	9	9	<0.5	2.3	6.4

### B3. Volume or Mass Monitoring Summary

For each volume or mass monitoring point identified in your licence, details are displayed below. If volume or mass monitoring is not required by your licence, **no data** will appear below.

If data was provided from an uploaded file, the file name will be displayed below instead of any data.

**Note** that this does not exclude the need to conduct appropriate volume or mass monitoring of assessable pollutants are required by load-based licensing (if applicable).

#### Monitoring Point 4

Discharge quality monitoring. Volume Monitoring, Sampling tap in settling chamber of sewage treatment plant.

lat. long. -34.231323 150.829629

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
kilolitres per day	Continuous	Continuous	0	99.1	403.5

#### Discharge & Monitoring Point 10

Discharge to waters

Discharge quality monitoring

Volume monitoring, Pipe discharge outlet from Brennans Creek dam to the creek.

lat. long. -34.206432 150.802706

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
kilolitres per day	Continuous	Continuous	310	365	526

#### Monitoring Point 13

Volume monitoring, Flow monitoring location for point 10 discharge

lat. long. -34.207050 150.803135

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
kilolitres per day	Continuous	Continuous	284	1930	3782

#### Discharge & Monitoring Point 18



**Discharge to waters.**  
**Discharge quality and volume monitoring, Underflow from the stormwater filter lagoon discharging through a v-notch weir.**  
**lat. long. -34.210467 150.796312**

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
kilolitres per day	Continuous during discharge	Continuous	0	0	0

### Discharge & Monitoring Point 19

**Discharge to waters. Discharge quality and volume monitoring., Dyna Sand Filter outlet for treated stormwater.**  
**lat. long. -34.211010 150.795734**

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
kilolitres per day	Continuous during discharge	Continuous	0	396	1321

### Discharge & Monitoring Point 24

**Discharge to waters**  
**Water quality monitoring Discharge volume monitoring, Piped discharge of treated mine water at Appin (West).**  
**lat. long. -34.220870 150.719059**

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
kilolitres per day	Continuous during discharge	Continuous	0	1817	4003
KL/month	Continuous during discharge	Continuous	11731	54593	81743

### Discharge & Monitoring Point 38

**Discharge to utilisation area**  
**Water quality monitoring**  
**Volume Monitoring, Pipe discharge to the utilisation area from the stabilisation lagoon of the sewage treatment plant at Appin West.**  
**lat. Long. -34.217742 150.716151**

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
kilolitres per day	Continuous	Continuous	0	33	63

### Discharge & Monitoring Point 40



**Discharge to water**

**Water quality monitoring**

Discharge volume monitoring, Piped discharge of treated mine water at Appin (North).

lat. long. -34.206601 150.802954

Unit of measure	Frequency	No. of measurements made	Lowest result	Mean result	Highest result
kilolitres per day	Continuous	Continuous	0	505.2	1147.2

## C. Statement of Compliance - Licence Conditions

### C1. Compliance with Licence Conditions

Were all conditions of the licence complied with (including monitoring and reporting requirements)?	<b>No</b>
---	-----------

### C2. Details of Non-Compliance with Licence

<b>Licence condition number not complied with ▼</b>
O2.1
<b>Summary of particulars of the non-compliance ▼</b>
Modifications made to dosing shed bund at Appin East allowing release of ferric chloride to sediment pond.
<b>Further details on particulars of non-compliance, if required ▼</b>
A spill of ferric chloride occurred in the dosing shed at Appin East. The majority of the spilled material was captured in the bund, with a small volume entering the Appin East sediment pond. The ferric chloride was able to enter the pond due to a modification to the bund. There was no environmental harm associated with the event.
<b>Number of times occurred ▼</b>
1
<b>Date(s) when the non-compliance occurred, if applicable ▼</b>
3/1/2022
<b>Cause of non-compliance ▼</b>
Modifications made to dosing shed bund.
<b>Action taken or that will be taken to mitigate any adverse effects of the non-compliance ▼</b>
The modification to the bund was corrected. A review of all bunds across Illawarra Metallurgical Coal sites was undertaken.
<b>Action taken or that will be taken to prevent a recurrence of the non-compliance ▼</b>
Bund integrity will continue to be reviewed during site inspections.
<b>Uploaded Document Name ▼</b>



Uploaded Document Description ▼

## D. Statement of Compliance - Load Based Fee Calculation

If you are not required to monitor assessable pollutants by your licence, **no data** will appear below.

If assessable pollutants have been identified on your licence, the following worksheets for each assessable pollutant will determine your load based fee for the licence fee period to which this Annual Return relates.

**Loads of assessable pollutants must be calculated using any of the methods provided in EPA's Load Calculation Protocol for the relevant activity.** A Load Calculation Protocol would have been already sent to you with your licence. If you require additional copies, you can download the Protocol from the EPA's website or you can contact us on telephone 02 9995 5700.

You are required to keep all records used to calculate licence fees for four years after the licence fee was paid or became payable, whichever is the later date.

## E. Statement of Compliance - Requirement to Prepare PIRMP

<b>Have you prepared a Pollution Incident Response Management Plan (PIRMP) as required under section 153A of the Protection of the Environment Operations (POEO) Act 1997?</b>	<b>Yes</b>
Is the PIRMP available at the premises?	<b>Yes</b>
Is the PIRMP available in a prominent position on a publicly accessible website?	<b>Yes</b>
Address of the web page where the PIRMP can be accessed ▼	
<a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>	
Has the PIRMP been tested?	<b>Yes</b>
The PIRMP was last tested on	<b>26-10-2021</b>
Has the PIRMP been updated?	<b>Yes</b>
The PIRMP was last updated on	<b>29-11-2021</b>
Number of times the PIRMP was activated in this reporting period?	<b>0</b>
The PIRMP was activated on	<b>N/A</b>

## F. Statement of Compliance - Requirement to Publish Pollution Monitoring Data

<b>Are there any conditions attached to your licence that require pollution monitoring to be undertaken as required under section 66(6) of the Protection of the Environment Operations (POEO) Act 1997?</b>	<b>Yes</b>
--	------------





# Annual Return

ENDEAVOUR COAL PTY LIMITED

Licence 2504

Do you operate a website?	Yes
Is the pollution monitoring data published on your website in accordance with the EPA's written requirements for publishing pollution monitoring data?	Yes
Address of the web page where the pollution monitoring data can be accessed ▼	
<a href="http://www.south32.net/what-we-do/places-we-work/illawarra-metallurgical-coal/illawarra-coal-documents2">http://www.south32.net/what-we-do/places-we-work/illawarra-metallurgical-coal/illawarra-coal-documents2</a>	

## G. Statement of Compliance - Environment Management System and Practices

Do you have an ISO 14001 certified Environmental Management System (EMS) OR any other system that EPA considers is equivalent to the accountability, procedures, documentation and record keeping requirements of an ISO 14001 certified EMS?	Yes
When was the last check (As per ISO 14001) of the EMS completed?	4-6-2021
Were there any non-conformances related to environmental issues identified in the last check of the EMS?	No
If there were non-conformances identified, were these non-conformances rectified?	

## H. Signature and Certification

**This Annual Return may only be signed by person(s) with legal authority to sign it as set out in following categories: an Individual, a Company, a Public authority or a Local council.**

**It is an offence under section 66 of the Protection of the Environment Operations Act 1997 to supply any information in this form that is false or misleading in a material respect, or to certify a statement that is false or misleading in a material respect. There is a maximum penalty of \$250,000 for a corporation and \$120,000 for an individual.**

I/We

- declare that the information in the Monitoring and Complaints Summary in Section B of this Annual Return application is correct and not false or misleading in a material respect, and
- certify that the information in the Statement and Compliance in sections A, C, D, E, F, G and H and any other pages attached to Section C is correct and not false or misleading in a material respect.

### Signed by: Delegate of Company

Name	Chris Schultz
Position	Superintendent Environment
Email Address	Chris.Schultz1@South32.net
Phone Number	0407888423

Signature	
-----------	--



# Annual Return

ENDEAVOUR COAL PTY LIMITED

Licence 2504

<b>Name</b>	
<b>Position</b>	
<b>Date</b>	/ /
<b>Declaration</b>	
<p><b>I declare that the information in the Monitoring and Complaints Summary in section B of this Annual Return is correct and not false or misleading in a material respect, and</b></p>	
<p><b>I certify that the information in the Statement of Compliance in section A,C,D,E,F and G and any pages attached to Section C is correct and not false or misleading in a material respect.</b></p>	



---

## **Appendix 2: Rehabilitation Cost Estimate**

Rehabilitation cost estimate provided only for Department of Regional NSW (Resources Regulator). The Rehabilitation Cost estimate is commercial in nature.

Please contact the Department or IMC representative for further information.



### Appendix 3: Appin Mine Project Approval Condition Compliance Report

Condition of Approval	Status	Comments
<b>SCHEDULE 2: ADMINISTRATIVE CONDITIONS</b>		
<b>OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT</b>		
1. In addition to meeting the specific performance criteria established under this approval, the Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.	Compliant	Management Plans developed and implemented to minimise harm to the environment.
<b>TERMS OF APPROVAL</b>		
The Proponent must carry out the project generally in accordance with the: (a) generally in accordance with the EA, Statement of Commitments and PPR; (b) in accordance with the conditions of this approval; and (c) in accordance with any written directions of the Planning Secretary. Note: The general layout of the project is shown in Appendices 2 to 4	Non-compliant	A non-compliance was recorded of Condition 12 of Schedule 2. This is discussed in more detail in Section 11.
3. If there is any inconsistency between the above documents, the more recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.	Noted	
4. Consistent with the requirements of this approval, the Planning Secretary may make written directions to the Proponent in relation to: (a) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this approval, including those that are required to be, and have been, approved by the Planning Secretary; and (b) the implementation of any actions or measures contained in any such document referred to in condition 4(a).	Compliant	Requirements of the Secretary have been addressed as required.
<b>LIMITS ON APPROVAL</b>		
<b>Mining Operations</b>		
5. The Proponent may carry out mining operations on the site until 31 December 2041.  Notes: • Under this approval, the Proponent is required to decommission and rehabilitate the site and perform additional undertakings in relation to mining operations. Consequently, this approval will continue to apply in all other respects other than the right to conduct mining operations until the rehabilitation of the site and these additional undertakings have been carried out satisfactorily. • Mining operations and rehabilitation are also regulated under the Mining Act 1992.	Compliant	Mining operations were undertaken during the reporting period. The cessation date has not been triggered.
<b>Coal Extraction and Production</b>		
6. The Proponent shall not: (a) extract more than 10.5 million tonnes of ROM coal from the site in a financial year, or	Compliant	Coal extraction and transportation was below the limits as specified in the approval during the reporting period.



(b) transport more than 9.3 million tonnes of product coal from the site in a financial year.																
<b>Appin Ventilation Shaft No. 6</b>																
<p>6A. The Proponent may operate Appin Ventilation Shaft No. 6 until 31 December 2041, unless otherwise agreed by the Planning Secretary.</p> <p>Note: Under this approval, the Proponent is required to rehabilitate the site and perform additional undertakings, to the satisfaction of the Planning Secretary and DRE. Consequently, this approval will continue to apply in all other respects other than the right to bore and operate the ventilation shaft until the site has been properly rehabilitated.</p>	Compliant	Ventilation occurred during the reporting period. The cessation date has not been triggered.														
<b>Hours of Operation</b>																
7. The Proponent may undertake mining operations and mine ventilation activities 24 hours a day, 7 days a week	Compliant	Mining operations and construction are in accordance with hours of operation.														
<p>7A The Proponent shall comply with the construction and operating hours listed in Table 1A for the Appin Ventilation Shaft No.6:</p> <p><i>Table 1A: Construction and operating hours</i></p> <table border="1"> <thead> <tr> <th>Activity</th> <th>Hours (Other than for emergency purposes)</th> </tr> </thead> <tbody> <tr> <td><b>Construction</b> Road and site access* -site preparation, liner construction, spoil management, drilling of boreholes, provision of services; related activities, post construction rehabilitation.</td> <td>7.00am to 6.00pm, Monday to Saturday No works on Sunday or Public Holidays</td> </tr> <tr> <td>Shaft drilling and lining and water management works. Any works that are inaudible at residential premises.</td> <td>24 hours per day, 7 days per week</td> </tr> <tr> <td><b>Operation of Ventilation Shaft</b> Including commissioning of fans</td> <td>24 hours per day, 7 days per week</td> </tr> <tr> <td><b>Operation of Service Boreholes</b> Delivery of concrete to the site and associated surface operations</td> <td>24hrs per day, 7 days per week</td> </tr> <tr> <td>Delivery of other materials to the site and associated surface operations</td> <td>7.00am to 6.00pm, Monday to Saturday</td> </tr> <tr> <td>Provision of supplies, consumables or utilities to underground</td> <td>24hrs per day, 7 days per week</td> </tr> </tbody> </table> <p><i>Notes:</i></p> <ul style="list-style-type: none"> <li>*Some road works potentially requiring traffic management measures, such as cutting in the access road to Menangle Road, line marking the intersection and installation of asphaltic concrete, may be undertaken outside these hours (subject to Council's approval) to take advantage of reduced traffic volumes.</li> <li>Emergency purposes refers to instances where the cessation of construction or operating activities would have the potential to generate serious harm to the environment or serious safety issues. Should these activities be conducted outside of the hours permitted, a report must be provided to the Department within 7 days of the event containing relevant information and/or to demonstrate the specific emergency purposes and circumstances at the time</li> </ul>	Activity	Hours (Other than for emergency purposes)	<b>Construction</b> Road and site access* -site preparation, liner construction, spoil management, drilling of boreholes, provision of services; related activities, post construction rehabilitation.	7.00am to 6.00pm, Monday to Saturday No works on Sunday or Public Holidays	Shaft drilling and lining and water management works. Any works that are inaudible at residential premises.	24 hours per day, 7 days per week	<b>Operation of Ventilation Shaft</b> Including commissioning of fans	24 hours per day, 7 days per week	<b>Operation of Service Boreholes</b> Delivery of concrete to the site and associated surface operations	24hrs per day, 7 days per week	Delivery of other materials to the site and associated surface operations	7.00am to 6.00pm, Monday to Saturday	Provision of supplies, consumables or utilities to underground	24hrs per day, 7 days per week	Compliant	Activities at the ventilation shaft have been undertaken in accordance with the listed hours.
Activity	Hours (Other than for emergency purposes)															
<b>Construction</b> Road and site access* -site preparation, liner construction, spoil management, drilling of boreholes, provision of services; related activities, post construction rehabilitation.	7.00am to 6.00pm, Monday to Saturday No works on Sunday or Public Holidays															
Shaft drilling and lining and water management works. Any works that are inaudible at residential premises.	24 hours per day, 7 days per week															
<b>Operation of Ventilation Shaft</b> Including commissioning of fans	24 hours per day, 7 days per week															
<b>Operation of Service Boreholes</b> Delivery of concrete to the site and associated surface operations	24hrs per day, 7 days per week															
Delivery of other materials to the site and associated surface operations	7.00am to 6.00pm, Monday to Saturday															
Provision of supplies, consumables or utilities to underground	24hrs per day, 7 days per week															
<p>7B. The Proponent must comply with the construction and operating hours listed in Table 1B for the Appin Mine Ventilation and Access Site:</p> <p><i>Table 1B: Construction and operating hours</i></p> <table border="1"> <thead> <tr> <th>Activity</th> <th>Hours (Other than for emergency or safety purposes as approved by the Planning Secretary in the Construction Traffic Management Plan required under Schedule 4A Condition 12)</th> </tr> </thead> <tbody> <tr> <td><b>Construction, including:</b> <ul style="list-style-type: none"> <li>Appin Mine Ventilation and Access Site early works</li> <li>fans, evase(s), ancillary site infrastructure and mine access infrastructure (winder, headframe, etc)</li> <li>Shaft sinking activities prior to the construction of acoustic sheds/mitigation</li> </ul> </td> <td>7.00am to 6.00pm, Monday to Friday 8.00am to 1.00pm Saturday No works on Sunday or Public Holidays</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>Shaft sinking activities once the acoustic sheds/mitigation is in place</li> <li>Any works that are inaudible at residential premises.</li> </ul> </td> <td>24 hours per day, 7 days per week</td> </tr> <tr> <td><b>Operation, including:</b> <ul style="list-style-type: none"> <li>Operation of the site and site access</li> <li>Operation and commission of the ventilation shafts</li> </ul> </td> <td>24 hours per day, 7 days per week</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>Heavy vehicle movements to and from the site except concrete deliveries during shaft sinking activities once the acoustic sheds/ mitigation is in place</li> </ul> </td> <td>7.00am to 6.00pm, Monday to Saturday No movements on Sunday or Public Holidays</td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>Concrete deliveries during shaft sinking activities once the acoustic sheds/ mitigation is in place</li> </ul> </td> <td>24 hours per day, 7 days per week</td> </tr> </tbody> </table>	Activity	Hours (Other than for emergency or safety purposes as approved by the Planning Secretary in the Construction Traffic Management Plan required under Schedule 4A Condition 12)	<b>Construction, including:</b> <ul style="list-style-type: none"> <li>Appin Mine Ventilation and Access Site early works</li> <li>fans, evase(s), ancillary site infrastructure and mine access infrastructure (winder, headframe, etc)</li> <li>Shaft sinking activities prior to the construction of acoustic sheds/mitigation</li> </ul>	7.00am to 6.00pm, Monday to Friday 8.00am to 1.00pm Saturday No works on Sunday or Public Holidays	<ul style="list-style-type: none"> <li>Shaft sinking activities once the acoustic sheds/mitigation is in place</li> <li>Any works that are inaudible at residential premises.</li> </ul>	24 hours per day, 7 days per week	<b>Operation, including:</b> <ul style="list-style-type: none"> <li>Operation of the site and site access</li> <li>Operation and commission of the ventilation shafts</li> </ul>	24 hours per day, 7 days per week	<ul style="list-style-type: none"> <li>Heavy vehicle movements to and from the site except concrete deliveries during shaft sinking activities once the acoustic sheds/ mitigation is in place</li> </ul>	7.00am to 6.00pm, Monday to Saturday No movements on Sunday or Public Holidays	<ul style="list-style-type: none"> <li>Concrete deliveries during shaft sinking activities once the acoustic sheds/ mitigation is in place</li> </ul>	24 hours per day, 7 days per week	N/A	Not triggered during the reporting period.		
Activity	Hours (Other than for emergency or safety purposes as approved by the Planning Secretary in the Construction Traffic Management Plan required under Schedule 4A Condition 12)															
<b>Construction, including:</b> <ul style="list-style-type: none"> <li>Appin Mine Ventilation and Access Site early works</li> <li>fans, evase(s), ancillary site infrastructure and mine access infrastructure (winder, headframe, etc)</li> <li>Shaft sinking activities prior to the construction of acoustic sheds/mitigation</li> </ul>	7.00am to 6.00pm, Monday to Friday 8.00am to 1.00pm Saturday No works on Sunday or Public Holidays															
<ul style="list-style-type: none"> <li>Shaft sinking activities once the acoustic sheds/mitigation is in place</li> <li>Any works that are inaudible at residential premises.</li> </ul>	24 hours per day, 7 days per week															
<b>Operation, including:</b> <ul style="list-style-type: none"> <li>Operation of the site and site access</li> <li>Operation and commission of the ventilation shafts</li> </ul>	24 hours per day, 7 days per week															
<ul style="list-style-type: none"> <li>Heavy vehicle movements to and from the site except concrete deliveries during shaft sinking activities once the acoustic sheds/ mitigation is in place</li> </ul>	7.00am to 6.00pm, Monday to Saturday No movements on Sunday or Public Holidays															
<ul style="list-style-type: none"> <li>Concrete deliveries during shaft sinking activities once the acoustic sheds/ mitigation is in place</li> </ul>	24 hours per day, 7 days per week															
<b>SURRENDER OF CONSENTS AND APPROVALS</b>																
8. By 31 December 2012, or as otherwise agreed by the Planning Secretary, the Proponent shall surrender all existing development consents and project approvals for mining operations relied on by the Proponent for the site (other than this approval) in accordance with Sections 75YA and 104A of the EP&A Act.		Letters sent on 29 July 2014 to DoPE and 1 Aug 2014 to WSC advising that Illawarra Coal Holdings Pty Ltd surrenders all existing development consents and project approvals for mining														



<p>Note: This requirement does not extend to the surrender of construction and occupation certificates for existing and proposed building works under Part 4A of the EP&amp;A Act. Surrender of a consent or approval should not be understood as implying that works legally constructed under a valid consent or approval can no longer be legally maintained or used.</p>		<p>(including Wollondilly Shire Council approvals for: Shaft and Electrical Substation 22 January 1972; Appin Mine 22 February 1972; West Cliff Mine 17 April 1975; West Cliff Extended 3 September 1986; Washing of Appin Coal at West Cliff 25 March 1997) operations relied on by the Proponent for the site (other than the Project Approval), subject to and in accordance with the regulations. A notice of Modification under Section 75W of the Environmental Planning and Assessment Act 1979 28 October 2016 incorporated the VS#6 Approval requirements into the Project Approval.</p>
<p>9. Prior to the surrender of these consents and/or approvals, the conditions of this approval (including any notes) shall prevail to the extent of any inconsistency with the conditions of these consents and/or approvals.</p>	<p>Compliant</p>	<p>Conditions transferred to updated management plans.</p>
<p><b>STRUCTURAL ADEQUACY</b></p>		
<p>10. The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structure, that are part of the project are constructed in accordance with: (a) the relevant requirements of the BCA; and (b) any additional requirements of the MSB where the building or structure is located on land within declared Mine Subsidence Districts.</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>Under Part 4A of the EP&amp;A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works.</li> <li>Part 8 of the EP&amp;A Regulation sets out the requirements for the certification of the project.</li> </ul>	<p>Compliant</p>	<p>New buildings and structures were project managed by the engineering team to the relevant building codes.</p> <p>The only new structures constructed in the reporting period were associated with the Appin North long-term treatment plant.</p>
<p><b>DEMOLITION</b></p>		
<p>11. The Proponent shall ensure that all demolition work is carried out in accordance with Australian Standard AS 2601-2001: The Demolition of Structures, or its latest version</p>	<p>Compliant</p>	<p>Demolition is undertaken to the required standard.</p> <p>No demolition was undertaken during the reporting period.</p>
<p><b>OPERATION OF PLANT AND EQUIPMENT</b></p>		
<p>12. The Proponent shall ensure that all plant and equipment used at the site is: (a) maintained in a proper and efficient condition; and (b) operated in a proper and efficient manner.</p>	<p>Non-compliant</p>	<p>Operations are conducted in accordance with approved management plans. Daily, weekly and monthly inspections of plant, equipment and site areas are conducted as required. This includes a number of system generated maintenance work orders. Regular site environmental inspections are undertaken to address inspections for leaking machinery and equipment. Mine machinery and equipment are</p>



		<p>maintained and serviced accordingly.</p> <p>A modification to the ferric chloride dosing bund was identified in the reporting period (See NC1)</p>
<b>STAGED SUBMISSION OF STRATEGIES, PLANS OR PROGRAMS</b>		
<p>13. With the approval of the Planning Secretary, the Proponent may submit any strategies, plans or programs required by this approval on a progressive basis.</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>While any strategy, plan or program may be submitted on a progressive basis, the Proponent will need to ensure that the existing operations on site are covered by suitable strategies, plans or programs at all times; and</li> <li>If the submission of any strategy, plan or program is to be staged, then the relevant strategy, plan or program must clearly describe the specific stage to which the strategy, plan or program applies, the relationship of this stage to any future stages, and the trigger for updating the strategy, plan or program.</li> </ul>	<p>Compliant</p>	<p>Strategies, plans and programs are submitted as reviewed.</p> <p>Approval was sought and approved for the submission of a Constriction Environmental Management Plan for the AMVA Project – Early Works.</p>
<b>STRATEGIC BIODIVERSITY OFFSETS</b>		
<p>14. If the proponent is required to provide a biodiversity offset pursuant to this approval (including any biodiversity offset that is required under the conditions of a subordinate approval issued in accordance with this approval), the Planning Secretary may, in consultation with BCD, accept in satisfaction of the requirement for the biodiversity offset, the provision of land that has conservation values which exceed the conservation values required to meet the relevant offsetting requirement.</p> <p>If the Planning Secretary accepts such an offset under this condition, the Planning Secretary shall issue a written statement to the proponent advising:</p> <ol style="list-style-type: none"> <li>the details of the proposed offset land;</li> <li>the offset requirements that are being met;</li> <li>the conservation values that have been relied upon to meet the offsetting requirements;</li> <li>that in the opinion of the Planning Secretary:             <ol style="list-style-type: none"> <li>the land has conservation values in addition to those that have been relied upon to meet the offsetting requirement in condition 14(b); or</li> <li>if the land has been subject to a previous statement from the Planning Secretary under this condition, confirmation that the land continues to have conservation values in addition to those that have been relied upon to meet the previous offsetting requirement or that there are no further conservation values available in respect of the land.</li> </ol> </li> </ol> <p>If the Planning Secretary has issued a statement under this condition, the proponent can rely on that statement and the residual conservation values that the land</p>	<p>Compliant</p>	<p>Approved biodiversity offset strategy is in place.</p>



<p>subject to the statement may hold, to meet further offsetting requirement(s) that may be required under this approval or the development consent for the Dendrobium Coal Mine (60-3-2001).</p> <p>The Planning Secretary's statement under this condition can be relied on a number of times in respect of the same land until all of the conservation values of the land the subject of the Planning Secretary's statement have been relied upon to meet offsetting requirements under this approval or the development consent for the Dendrobium Coal Mine (60-3-2001).</p> <p>The proponent shall make suitable arrangements to provide appropriate long-term security for the biodiversity offset area(s) accepted under this condition, within 2 years of the date of the Planning Secretary's statement in respect of that land, unless otherwise agreed with the Planning Secretary.</p>		
---	--	--

**SCHEDULE 3 – SPECIFIC ENVIRONMENTAL CONDITIONS – UNDERGROUND MINING**

**SUBSIDENCE**

**Performance Measures – Natural and Heritage Features, etc**

<p>1. The Proponent shall ensure that the project does not cause any exceedances of the performance measures in Table 1, to the satisfaction of the Planning Secretary.</p> <p><i>Table 1: Subsidence Impact Performance Measures</i></p> <table border="1"> <thead> <tr> <th colspan="2"><b>Watercourses</b></th> </tr> </thead> <tbody> <tr> <td>Nepean River</td> <td>Negligible environmental consequences including:                             <ul style="list-style-type: none"> <li>• negligible diversion of flows or changes in the natural drainage behaviour of pools;</li> <li>• negligible gas releases and iron staining; and</li> <li>• negligible increase in water cloudiness.</li> </ul> </td> </tr> <tr> <td>Georges River</td> <td>Negligible environmental consequences including:                             <ul style="list-style-type: none"> <li>• negligible diversion of flows or changes in the natural drainage behaviour of pools;</li> <li>• negligible gas releases and iron staining; and</li> <li>• negligible increase in water cloudiness over at least 80% of the stream length subject to vertical subsidence &gt;20 mm.</li> </ul>                             No subsidence impact or environmental consequence greater than minor.                         </td> </tr> <tr> <td>Other watercourses</td> <td>No greater subsidence impact or environmental consequences than predicted in the EA and PPR.</td> </tr> <tr> <th colspan="2"><b>Land</b></th> </tr> <tr> <td>Dharawal State Conservation Area</td> <td>Negligible environmental consequences.</td> </tr> <tr> <td>Cliffs of "special significance" (ie cliffs longer than 200 m and/or higher than 40 m; and cliff-like rock faces higher than 5 m that constitute waterfalls)</td> <td>Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs within any longwall mining domain).</td> </tr> <tr> <td>Other cliffs flanking the Nepean River</td> <td>Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs within any longwall mining domain).</td> </tr> <tr> <td>Other cliffs</td> <td>Minor environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 3% of the total face area of such cliffs within any longwall mining domain).</td> </tr> <tr> <th colspan="2"><b>Biodiversity</b></th> </tr> <tr> <td>Threatened species, threatened populations, or endangered ecological communities</td> <td>Negligible environmental consequences.</td> </tr> <tr> <th colspan="2"><b>Aboriginal heritage</b></th> </tr> <tr> <td>Sites determined to hold "special significance" as a result of studies required for Extraction Plans</td> <td>Negligible impact or environmental consequence.</td> </tr> <tr> <td>Sites determined to hold high or moderate significance as a result of studies required for Extraction Plans</td> <td>Less than 10% of such sites across the mining area are affected by subsidence impacts (other than negligible impacts or environmental consequence).</td> </tr> <tr> <td>Other Aboriginal heritage sites</td> <td>Less than 10% of such sites (or 1 such site, whichever is the greater) within any longwall mining domain are/is affected by subsidence impacts (other than minor impacts or environmental consequence).</td> </tr> <tr> <th colspan="2"><b>Historic heritage</b></th> </tr> <tr> <td>St James Church (Menangle)</td> <td>Negligible loss of heritage value.</td> </tr> <tr> <td>St Mary's Tower (Douglas Park)</td> <td>Negligible impact on structural integrity or external fabric.</td> </tr> <tr> <td>Broughtons Pass Weir</td> <td>Negligible loss of heritage value.</td> </tr> <tr> <td>Other buildings or structures of State or National heritage significance</td> <td>Negligible loss of heritage value.</td> </tr> </tbody> </table>	<b>Watercourses</b>		Nepean River	Negligible environmental consequences including: <ul style="list-style-type: none"> <li>• negligible diversion of flows or changes in the natural drainage behaviour of pools;</li> <li>• negligible gas releases and iron staining; and</li> <li>• negligible increase in water cloudiness.</li> </ul>	Georges River	Negligible environmental consequences including: <ul style="list-style-type: none"> <li>• negligible diversion of flows or changes in the natural drainage behaviour of pools;</li> <li>• negligible gas releases and iron staining; and</li> <li>• negligible increase in water cloudiness over at least 80% of the stream length subject to vertical subsidence &gt;20 mm.</li> </ul> No subsidence impact or environmental consequence greater than minor.	Other watercourses	No greater subsidence impact or environmental consequences than predicted in the EA and PPR.	<b>Land</b>		Dharawal State Conservation Area	Negligible environmental consequences.	Cliffs of "special significance" (ie cliffs longer than 200 m and/or higher than 40 m; and cliff-like rock faces higher than 5 m that constitute waterfalls)	Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs within any longwall mining domain).	Other cliffs flanking the Nepean River	Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs within any longwall mining domain).	Other cliffs	Minor environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 3% of the total face area of such cliffs within any longwall mining domain).	<b>Biodiversity</b>		Threatened species, threatened populations, or endangered ecological communities	Negligible environmental consequences.	<b>Aboriginal heritage</b>		Sites determined to hold "special significance" as a result of studies required for Extraction Plans	Negligible impact or environmental consequence.	Sites determined to hold high or moderate significance as a result of studies required for Extraction Plans	Less than 10% of such sites across the mining area are affected by subsidence impacts (other than negligible impacts or environmental consequence).	Other Aboriginal heritage sites	Less than 10% of such sites (or 1 such site, whichever is the greater) within any longwall mining domain are/is affected by subsidence impacts (other than minor impacts or environmental consequence).	<b>Historic heritage</b>		St James Church (Menangle)	Negligible loss of heritage value.	St Mary's Tower (Douglas Park)	Negligible impact on structural integrity or external fabric.	Broughtons Pass Weir	Negligible loss of heritage value.	Other buildings or structures of State or National heritage significance	Negligible loss of heritage value.	<p>Compliant</p>	<p>For all observed impacts, the appropriate TARPs were applied, actions implemented, and key stakeholders notified as required by the approved Subsidence Management Plan and Extraction Plan. See Section 6.14 of this Annual Review for a summary of the predicted vs observed impacts.</p>
<b>Watercourses</b>																																										
Nepean River	Negligible environmental consequences including: <ul style="list-style-type: none"> <li>• negligible diversion of flows or changes in the natural drainage behaviour of pools;</li> <li>• negligible gas releases and iron staining; and</li> <li>• negligible increase in water cloudiness.</li> </ul>																																									
Georges River	Negligible environmental consequences including: <ul style="list-style-type: none"> <li>• negligible diversion of flows or changes in the natural drainage behaviour of pools;</li> <li>• negligible gas releases and iron staining; and</li> <li>• negligible increase in water cloudiness over at least 80% of the stream length subject to vertical subsidence &gt;20 mm.</li> </ul> No subsidence impact or environmental consequence greater than minor.																																									
Other watercourses	No greater subsidence impact or environmental consequences than predicted in the EA and PPR.																																									
<b>Land</b>																																										
Dharawal State Conservation Area	Negligible environmental consequences.																																									
Cliffs of "special significance" (ie cliffs longer than 200 m and/or higher than 40 m; and cliff-like rock faces higher than 5 m that constitute waterfalls)	Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs within any longwall mining domain).																																									
Other cliffs flanking the Nepean River	Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs within any longwall mining domain).																																									
Other cliffs	Minor environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 3% of the total face area of such cliffs within any longwall mining domain).																																									
<b>Biodiversity</b>																																										
Threatened species, threatened populations, or endangered ecological communities	Negligible environmental consequences.																																									
<b>Aboriginal heritage</b>																																										
Sites determined to hold "special significance" as a result of studies required for Extraction Plans	Negligible impact or environmental consequence.																																									
Sites determined to hold high or moderate significance as a result of studies required for Extraction Plans	Less than 10% of such sites across the mining area are affected by subsidence impacts (other than negligible impacts or environmental consequence).																																									
Other Aboriginal heritage sites	Less than 10% of such sites (or 1 such site, whichever is the greater) within any longwall mining domain are/is affected by subsidence impacts (other than minor impacts or environmental consequence).																																									
<b>Historic heritage</b>																																										
St James Church (Menangle)	Negligible loss of heritage value.																																									
St Mary's Tower (Douglas Park)	Negligible impact on structural integrity or external fabric.																																									
Broughtons Pass Weir	Negligible loss of heritage value.																																									
Other buildings or structures of State or National heritage significance	Negligible loss of heritage value.																																									

**Offsets**

<p>2. If the Proponent exceeds the performance measures in Table 1 and the Planning Secretary determines that:</p>	<p>N/A</p>	<p>Condition not triggered during reporting period</p>
--	------------	--





<p>(a) it is not reasonable or feasible to remediate the impact or environmental consequence; or (b) remediation measures implemented by the Proponent have failed to satisfactorily remediate the impact or environmental consequence; then the Proponent shall provide a suitable offset to compensate for the impact or environmental consequence, to the satisfaction of the Planning Secretary.</p> <p>Note: Any offset required under this condition must be proportionate with the significance of the impact or environmental consequence</p>														
<p><b>Performance Measures – Built Features</b></p>														
<p>3. The Proponent shall ensure that the project does not cause any exceedances of the performance measures in Table 2, to the satisfaction of the Planning Secretary.</p> <p><i>Table 2: Subsidence Impact Performance Measures</i></p> <table border="1"> <thead> <tr> <th colspan="2"><b>Built features</b></th> </tr> </thead> <tbody> <tr> <td>Key public infrastructure: • Main Southern Railway; • Hume Highway; and • Key <b>WaterNSW</b> infrastructure (Nepean Tunnel, Cataract Tunnel, Upper Canal, Broughtons Pass Weir and other weirs)</td> <td>Always safe and serviceable.  Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.</td> </tr> <tr> <td>Other public infrastructure (including water supply pipelines; high pressure gas pipelines and the gas distribution network; electricity transmission and distribution lines; telecommunications cables and optical fibre networks; roads, trails and associated structures).</td> <td>Always safe.  Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.</td> </tr> <tr> <td>Houses, industrial premises, swimming pools, farm dams and other built features or improvements</td> <td>Damage must be fully repaired or fully compensated, or else the damaged built feature or damaged infrastructure component must be replaced.</td> </tr> <tr> <th colspan="2"><b>Public safety</b></th> </tr> <tr> <td>Public Safety</td> <td>Negligible additional risk.</td> </tr> </tbody> </table> <p><i>Notes:</i></p> <ol style="list-style-type: none"> <li>1) The Proponent will be required to define more detailed performance indicators for each of these performance measures in Built Features Management Plans or Public Safety Management Plan (see condition 5 below).</li> <li>2) Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Planning Secretary will be the final arbiter.</li> <li>3) The requirements of this condition only apply to the impacts and consequences of mining operations undertaken following the date of this approval.</li> <li>4) Requirements regarding safety or serviceability do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.</li> </ol>	<b>Built features</b>		Key public infrastructure: • Main Southern Railway; • Hume Highway; and • Key <b>WaterNSW</b> infrastructure (Nepean Tunnel, Cataract Tunnel, Upper Canal, Broughtons Pass Weir and other weirs)	Always safe and serviceable.  Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.	Other public infrastructure (including water supply pipelines; high pressure gas pipelines and the gas distribution network; electricity transmission and distribution lines; telecommunications cables and optical fibre networks; roads, trails and associated structures).	Always safe.  Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.	Houses, industrial premises, swimming pools, farm dams and other built features or improvements	Damage must be fully repaired or fully compensated, or else the damaged built feature or damaged infrastructure component must be replaced.	<b>Public safety</b>		Public Safety	Negligible additional risk.		<p>For all observed impacts, the appropriate TARPs were applied, actions implemented and key stakeholders notified as required by the approved Subsidence Management Plan and Extraction Plan. See Section 6.14 of this Annual Review for a summary of the predicted vs observed impacts.</p>
<b>Built features</b>														
Key public infrastructure: • Main Southern Railway; • Hume Highway; and • Key <b>WaterNSW</b> infrastructure (Nepean Tunnel, Cataract Tunnel, Upper Canal, Broughtons Pass Weir and other weirs)	Always safe and serviceable.  Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.													
Other public infrastructure (including water supply pipelines; high pressure gas pipelines and the gas distribution network; electricity transmission and distribution lines; telecommunications cables and optical fibre networks; roads, trails and associated structures).	Always safe.  Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.													
Houses, industrial premises, swimming pools, farm dams and other built features or improvements	Damage must be fully repaired or fully compensated, or else the damaged built feature or damaged infrastructure component must be replaced.													
<b>Public safety</b>														
Public Safety	Negligible additional risk.													
<p>4. Any dispute between the Proponent and the owner of any built feature over the interpretation, application or implementation of the performance measures in Table 2 is to be settled by the Planning Secretary, following consultation with SA NSW and the Resources Regulator. Any decision by the Planning Secretary shall be final and not subject to further dispute resolution under this approval.</p>	<p>Compliant</p>	<p>For all observed impacts, the appropriate TARPs were applied, actions implemented and key stakeholders notified as required by the approved Subsidence Management Plan and Extraction Plan. See Section 6.14 of this Annual Review for summary of the predicted vs observed impacts.</p>												
<p><b>Extraction Plans</b></p>														
<p>5. The Proponent shall prepare and implement an Extraction Plan for first and second workings within each longwall mining domain to the satisfaction of the Planning Secretary. Each extraction plan must: (a) be prepared by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary; (b) be approved by the Planning Secretary before the Proponent carries out any of the second workings covered by the plan;</p>	<p>Compliant</p>	<p>SMPs and Extraction Plans have been prepared as required to include the required information.</p> <p>Approved plans are available on the regulatory website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a></p>												



<p>(c) include detailed plans of existing and proposed first and second workings and any associated surface development;</p> <p>(d) include detailed performance indicators for each of the performance measures in Tables 1 and 2;</p> <p>(e) provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this approval;</p> <p>(f) describe the measures that would be implemented to ensure compliance with the performance measures in Tables 1 and 2, and manage or remediate any impacts and/or environmental consequences;</p> <p>(g) include a Built Features Management Plan, which has been prepared in consultation with DRE and the owners of affected public infrastructure, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which:</p> <ul style="list-style-type: none"> <li>• addresses in appropriate detail all items of key public infrastructure and other public infrastructure and all classes of other built features;</li> <li>• has been prepared following appropriate consultation with the owner/s of potentially affected feature/s;</li> <li>• recommends appropriate pre-mining mitigatory measures to reduce subsidence impacts;</li> <li>• recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate all predicted impacts on potentially affected built features in a timely manner; and</li> <li>• in the case of all key public infrastructure, and other public infrastructure except roads, trails and associated structures, reports external auditing for compliance with ISO 31000 (or alternative standard agreed with the infrastructure owner) and provides for annual auditing of compliance and effectiveness during extraction of longwalls which may impact the infrastructure;</li> </ul> <p>(h) include a Water Management Plan, which has been prepared in consultation with BCD, WaterNSW and DPE Water, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on watercourses and aquifers, including:</p> <ul style="list-style-type: none"> <li>• surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality;</li> <li>• a program to monitor and report stream flows and assess any changes resulting from subsidence impacts;</li> <li>• a program to monitor and report groundwater inflows to underground workings; and</li> <li>• a program to predict, manage and monitor impacts on groundwater bores on privately-owned land;</li> </ul> <p>(i) include a Biodiversity Management Plan, which has been prepared in consultation with BCD and DPI (Fisheries), which provides for the management of the</p>		
---	--	--



<p>potential impacts and/or environmental consequences of the proposed second workings on aquatic and terrestrial flora and fauna, with a specific focus on threatened species, populations and their habitats; endangered ecological communities; and water dependent ecosystems, including (for Appin Areas 7, 8 and 9):</p> <ul style="list-style-type: none"> <li>• additional targeted surveys for threatened species, sufficient to identify any actions required to protect significant populations from potential impacts;</li> </ul> <p>(j) include a Land Management Plan, which has been prepared in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general, with a specific focus on cliffs and steep slopes;</p> <p>(k) include a Heritage Management Plan, which has been prepared in consultation with Heritage NSW and relevant stakeholders for both Aboriginal and historic heritage, to manage the potential environmental consequences of the proposed second workings on both Aboriginal and non-Aboriginal heritage items, and which:</p> <ul style="list-style-type: none"> <li>• includes additional investigations (such as surveys and current register searches) for Aboriginal heritage items (including previously known sites) and historic heritage items, sufficient to identify the significance (including “special significance”) of all sites which may be impacted by subsidence and to identify any actions required to ensure that the performance measures in Table 1 are met; and</li> <li>• is prepared in accordance with the relevant requirements for preparation of the Heritage Management Plan required under condition 23 of Schedule 4;</li> </ul> <p>(l) include a Public Safety Management Plan, which has been prepared in consultation with DRE, to ensure public safety in the mining area;</p> <p>(m) include a subsidence monitoring program, which has been prepared in consultation with DRE, BCD and WaterNSW, to:</p> <ul style="list-style-type: none"> <li>• provide data to assist with the management of the risks associated with subsidence;</li> <li>• validate the subsidence predictions;</li> <li>• analyse the relationship between the predicted and resulting subsidence effects and predicted and resulting impacts under the plan and any ensuing environmental consequences; and</li> <li>• inform the contingency plan and adaptive management process;</li> </ul> <p>(n) include a regional seismic event monitoring program, which has been prepared in consultation with DRE, and which includes analysis of outcomes and proposed triggers for review of potential correlations with mining operations;</p> <p>(o) include a contingency plan that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Tables 1 and 2, or where any such exceedance appears likely;</p>		
--	--	--



<p>(p) proposes appropriate revisions to the Rehabilitation Management Plan required under condition 33 of Schedule 4; and (q) include a program to collect sufficient baseline data for future Extraction Plans.</p> <p>Notes: To identify the longwall mining domains referred to in this condition, see Appendix 3. An SMP that is substantially consistent with this condition and which is approved by DRE prior to 30 September 2012 is taken to satisfy the requirements of this condition.</p>		
<p>6. The Proponent shall ensure that the management plans required under condition 5(g)-(l) above include: (a) an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval; and (b) a detailed description of the measures that would be implemented to remediate predicted impacts.</p>	Compliant	<p>The Subsidence Management Plans and Extraction Plans include the required information and are available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a></p>
<b>First Workings</b>		
<p>7. The Proponent may carry out first workings within the project area, other than in accordance with an approved extraction plan, provided that DRE is satisfied that the first workings are designed to remain stable and non-subsiding, except insofar as they may be impacted by approved second workings.</p> <p>Note: The intent of this condition is not to require an additional approval for first workings, but to ensure that first workings are built to geotechnical and engineering standards sufficient to ensure long term stability, with zero resulting subsidence impacts.</p>	Compliant	<p>First workings have been carried out as required.</p> <p>Link to Subsidence Management Plans and Extraction Plans <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a></p>
<b>Payment of Reasonable Costs</b>		
<p>8. The Proponent shall pay all reasonable costs incurred by the Department to engage suitably qualified, experienced and independent experts to review the adequacy of any aspect of an Extraction Plan.</p>	N/A	Condition not triggered during the reporting period.
<b>Improved Understanding and Prediction of Subsidence Impacts</b>		
<p>9. The Proponent shall prepare and implement a program to improve its prediction and understanding of subsidence impacts (in particular sub-surface impacts and impacts on groundwater resources), to the satisfaction of the Planning Secretary. This program must be prepared in consultation with DRE and be submitted to the Planning Secretary for approval by 30 September 2012 and must include proposals for: (a) testing (including core testing and in situ testing) to further define the mechanical, hydrogeological and geochemical properties of rock strata within each longwall domain, including:</p> <ul style="list-style-type: none"> <li>• testing and validation of assumptions regarding regional continuity of modelled hydraulic properties (including mass porosity and permeability);</li> <li>• identifying hydraulic properties of rock strata close to water-dependent ecosystems; and</li> <li>• identifying the presence and distribution of iron-bearing minerals that might contribute to surface water quality impairment;</li> </ul>	Compliant	<p>The environmental research program was approved by DPIE on 13 May 2021.</p>



<p>(b) installation of a regional network of deep pore pressure monitoring bores with vertical arrays of pore pressure transducers to assess and quantify the height and impacts of subsurface fracturing;</p> <p>(c) a census of boreholes which may be impacted by subsidence, the gathering of relevant borehole and groundwater quality data and a regular monitoring program;</p> <p>(d) regular enhancement, calibration and verification of the project's regional groundwater model, and the further development of this model on a mining-domain scale; and</p> <p>(e) regular recalibration of methodologies and models used for subsidence effect and impact prediction, as they are applied within the project area.</p> <p>Note: Results of this program are to be incorporated within subsequent Extraction Plans, including the subplans required under condition 5(g)-(l) above.</p>		
--	--	--

**Improved Understanding and Prediction of Environmental Consequences on Significant Natural Features**

<p>10. The Proponent shall prepare and implement a Research Program to the satisfaction of the Planning Secretary and allocate \$1,000,000 in total to this program for expenditure over a period of seven years from the date of the program's approval. This program must be prepared in consultation with BCD, WaterNSW and DRE, be submitted to the Planning Secretary for approval by 30 September 2012, and be:</p> <p>(a) directed at research into improving the prediction, assessment, remediation and/or avoidance of subsidence impacts and environmental consequences on significant natural features in the Project Area; and</p> <p>(b) targeted at genuine research, as opposed to implementing the matters required by this approval.</p>	Compliant	The environmental research program was approved by DPIE on 13 May 2021.
--	-----------	---

**SCHEDULE 4 SPECIFIC ENVIRONMENTAL CONDITIONS – GENERAL NOISE**

**Noise impact Assessment Criteria**

<p>1. From the end of June 2013, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.</p> <p><i>Table 1: Interim Noise Criteria dB(A)</i></p> <table border="1"> <thead> <tr> <th colspan="2">Location</th> <th>Day</th> <th>Evening</th> <th colspan="2">Night</th> </tr> <tr> <th>Area</th> <th>Receiver Number</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>A1</sub> (1 min)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Appin Township</td> <td>136, 137, 139, 142, 143</td> <td>44</td> <td>44</td> <td>44</td> <td rowspan="3">52</td> </tr> <tr> <td>135</td> <td>43</td> <td>43</td> <td>43</td> </tr> <tr> <td>100-134, 141, 146-160, 194-197, 200-209, 211, 236-278, 283-284</td> <td>42</td> <td>42</td> <td>42</td> </tr> </tbody> </table> <p><i>Notes to Tables 1, 2 and 3:</i></p> <ul style="list-style-type: none"> <li>To identify the locations referred to in Table 1, 2 and 3, refer to Appendix 5; and</li> <li>Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.</li> </ul> <p>However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement.</p>	Location		Day	Evening	Night		Area	Receiver Number	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>A1</sub> (1 min)	Appin Township	136, 137, 139, 142, 143	44	44	44	52	135	43	43	43	100-134, 141, 146-160, 194-197, 200-209, 211, 236-278, 283-284	42	42	42	N/A	This condition has been superseded by Condition 2 of Schedule 4.
Location		Day	Evening	Night																								
Area	Receiver Number	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>A1</sub> (1 min)																							
Appin Township	136, 137, 139, 142, 143	44	44	44	52																							
	135	43	43	43																								
	100-134, 141, 146-160, 194-197, 200-209, 211, 236-278, 283-284	42	42	42																								
<p>2. From the end of December 2014, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on</p>	Compliant	There were no exceedances or non-compliances recorded																										



<p>privately-owned land or on more than 25 percent of any privately-owned land.</p> <p>Table 2: Noise Criteria dB(A)</p> <table border="1"> <thead> <tr> <th colspan="2">Location</th> <th>Day</th> <th>Evening</th> <th colspan="2">Night</th> </tr> <tr> <th>Area</th> <th>Receiver Number</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>A1</sub> (1 min)</th> </tr> </thead> <tbody> <tr> <td>Appin West Receivers south-west of Appin West</td> <td>1-7, 9-11, 13, 184, 188- 189</td> <td>39</td> <td>39</td> <td>35</td> <td>49</td> </tr> <tr> <td>Appin West receivers near Hume Highway</td> <td>185-187, 190</td> <td>35</td> <td>35</td> <td>35</td> <td>53</td> </tr> <tr> <td rowspan="3">All other Appin West Receivers</td> <td>14, 26</td> <td>45</td> <td>45</td> <td>35</td> <td rowspan="3">53</td> </tr> <tr> <td>15-25, 27-48, 50-56</td> <td>43</td> <td>43</td> <td>35</td> </tr> <tr> <td>58, 67, 71, 72</td> <td>41</td> <td>41</td> <td>41</td> </tr> <tr> <td rowspan="4">Appin No. 3 Receivers</td> <td>68, 74, 75</td> <td>40</td> <td>40</td> <td>40</td> <td rowspan="4">49</td> </tr> <tr> <td>69, 70, 76,</td> <td>39</td> <td>39</td> <td>39</td> </tr> <tr> <td>217, 218, 233, 279-282</td> <td>35</td> <td>35</td> <td>35</td> </tr> <tr> <td>82, 91, 216</td> <td>42</td> <td>42</td> <td>42</td> </tr> <tr> <td rowspan="3">Appin No. 1 and No. 2 Receivers</td> <td>83, 85</td> <td>41</td> <td>41</td> <td>41</td> <td rowspan="3">50</td> </tr> <tr> <td>78, 84, 86-90, 199,</td> <td>40</td> <td>40</td> <td>40</td> </tr> <tr> <td>212-215, 226, 228-230, 232, 234, 235</td> <td>35</td> <td>35</td> <td>35</td> </tr> <tr> <td rowspan="2">Appin Township</td> <td>136, 137, 139, 142, 143</td> <td>44</td> <td>44</td> <td>44</td> <td rowspan="2">52</td> </tr> <tr> <td>135</td> <td>43</td> <td>43</td> <td>43</td> </tr> <tr> <td>Douglas Park</td> <td>All privately-owned</td> <td>45</td> <td>45</td> <td>39</td> <td>49</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Location</th> <th>Day</th> <th>Evening</th> <th colspan="2">Night</th> </tr> <tr> <th>Area</th> <th>Receiver Number</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>A1</sub> (1 min)</th> </tr> </thead> <tbody> <tr> <td></td> <td>residences</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="2">All other privately-owned land (excluding receivers in Table 3)</td> <td>35</td> <td>35</td> <td>35</td> <td>45</td> </tr> </tbody> </table> <p>However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement.</p>	Location		Day	Evening	Night		Area	Receiver Number	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>A1</sub> (1 min)	Appin West Receivers south-west of Appin West	1-7, 9-11, 13, 184, 188- 189	39	39	35	49	Appin West receivers near Hume Highway	185-187, 190	35	35	35	53	All other Appin West Receivers	14, 26	45	45	35	53	15-25, 27-48, 50-56	43	43	35	58, 67, 71, 72	41	41	41	Appin No. 3 Receivers	68, 74, 75	40	40	40	49	69, 70, 76,	39	39	39	217, 218, 233, 279-282	35	35	35	82, 91, 216	42	42	42	Appin No. 1 and No. 2 Receivers	83, 85	41	41	41	50	78, 84, 86-90, 199,	40	40	40	212-215, 226, 228-230, 232, 234, 235	35	35	35	Appin Township	136, 137, 139, 142, 143	44	44	44	52	135	43	43	43	Douglas Park	All privately-owned	45	45	39	49	Location		Day	Evening	Night		Area	Receiver Number	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>A1</sub> (1 min)		residences					All other privately-owned land (excluding receivers in Table 3)		35	35	35	45		<p>during the quarterly noise monitoring in FY22.</p>
Location		Day	Evening	Night																																																																																																												
Area	Receiver Number	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>A1</sub> (1 min)																																																																																																											
Appin West Receivers south-west of Appin West	1-7, 9-11, 13, 184, 188- 189	39	39	35	49																																																																																																											
Appin West receivers near Hume Highway	185-187, 190	35	35	35	53																																																																																																											
All other Appin West Receivers	14, 26	45	45	35	53																																																																																																											
	15-25, 27-48, 50-56	43	43	35																																																																																																												
	58, 67, 71, 72	41	41	41																																																																																																												
Appin No. 3 Receivers	68, 74, 75	40	40	40	49																																																																																																											
	69, 70, 76,	39	39	39																																																																																																												
	217, 218, 233, 279-282	35	35	35																																																																																																												
	82, 91, 216	42	42	42																																																																																																												
Appin No. 1 and No. 2 Receivers	83, 85	41	41	41	50																																																																																																											
	78, 84, 86-90, 199,	40	40	40																																																																																																												
	212-215, 226, 228-230, 232, 234, 235	35	35	35																																																																																																												
Appin Township	136, 137, 139, 142, 143	44	44	44	52																																																																																																											
	135	43	43	43																																																																																																												
Douglas Park	All privately-owned	45	45	39	49																																																																																																											
Location		Day	Evening	Night																																																																																																												
Area	Receiver Number	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>A1</sub> (1 min)																																																																																																											
	residences																																																																																																															
All other privately-owned land (excluding receivers in Table 3)		35	35	35	45																																																																																																											
<p><b>Construction Noise – Appin East Mine Safety Gas Management Project</b></p>			<p>2A. The Applicant shall ensure that the noise generated by construction activities relating to the Appin East Mine Safety Gas Management Project is managed in accordance with the requirements of the Interim Construction Noise Guideline (DECC, 2009), as may be updated from time to time.</p>	<p>N/A</p>	<p>No activities relating to this project were conducted during this reporting period.</p>																																																																																																											
<p>2B The Proponent shall ensure that the construction noise generated by the Appin Ventilation Shaft No. 6 project, does not exceed the noise impact assessment criteria set out in Table 2A at any residence on privately-owned land, or on more than 25 percent of any privately-owned land.</p>			<p>Table 2A: Construction noise criteria dB(A)</p> <table border="1"> <thead> <tr> <th rowspan="2">Location</th> <th>Day</th> <th>Evening</th> <th colspan="2">Night</th> </tr> <tr> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>A1</sub> (1 min)</th> </tr> </thead> <tbody> <tr> <td>All privately owned residences – 7.00am to 6.00pm, Monday to Saturday and 8.00 am to 1.00 pm Saturday</td> <td>50</td> <td>45</td> <td>39</td> <td>49</td> </tr> <tr> <td>All privately owned residences – outside the above hours</td> <td>45</td> <td>45</td> <td>39</td> <td>49</td> </tr> </tbody> </table>	Location	Day	Evening	Night		L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>A1</sub> (1 min)	All privately owned residences – 7.00am to 6.00pm, Monday to Saturday and 8.00 am to 1.00 pm Saturday	50	45	39	49	All privately owned residences – outside the above hours	45	45	39	49	<p>N/A</p>	<p>No construction activities relating to this project were conducted during this reporting period.</p>																																																																																								
Location	Day	Evening	Night																																																																																																													
	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>A1</sub> (1 min)																																																																																																												
All privately owned residences – 7.00am to 6.00pm, Monday to Saturday and 8.00 am to 1.00 pm Saturday	50	45	39	49																																																																																																												
All privately owned residences – outside the above hours	45	45	39	49																																																																																																												
<p><b>Operational Noise - Appin Mine Ventilation and Access Site</b></p>			<p>2C. The Proponent must ensure that the noise generated by operational activities at the Appin Mine Ventilation and Access Site does not exceed the noise impact assessment criteria set out in Table 2B at any residence on privately-owned land, or on more than 25 percent of any privately-owned land.</p> <p>Table 2B: Operational noise criteria dB(A)</p> <table border="1"> <thead> <tr> <th rowspan="2">Location</th> <th>Day</th> <th>Evening</th> <th colspan="2">Night</th> </tr> <tr> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Aeq</sub> (15 min)</th> <th>L<sub>Amax</sub></th> </tr> </thead> <tbody> <tr> <td>All privately owned residences</td> <td>43</td> <td>43</td> <td>39</td> <td>54</td> </tr> </tbody> </table>	Location	Day	Evening	Night		L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Amax</sub>	All privately owned residences	43	43	39	54	<p>N/A</p>	<p>No construction activities relating to this project were conducted during this reporting period.</p>																																																																																													
Location	Day	Evening	Night																																																																																																													
	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Aeq</sub> (15 min)	L <sub>Amax</sub>																																																																																																												
All privately owned residences	43	43	39	54																																																																																																												



<p>However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement. Notes: • To identify the privately owned residences referred to in Table 2B, refer to titled “Appin Mine Ventilation and Access Project – Sensitive Receivers” in Appendix 5; and • Noise generated by the Appin Ventilation and Access Site is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the Noise Policy for Industry (EPA, 2017).</p>				
<p><b>Noise Mitigation</b></p>				
<p>3. Upon receiving a written request from the owner of any residence listed in Table 3, the Proponent shall implement noise mitigation measures (such as double-glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner. These measures must be reasonable and feasible. If within 3 months of receiving this request from the owner, the Proponent and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.</p> <p><i>Table 3: Land where noise mitigation measures are available on request</i></p> <table border="1"> <thead> <tr> <th>Receiver Number</th> </tr> </thead> <tbody> <tr> <td>57,60, 63, 64, 66, 79, 80, 138, 140, 144, 165</td> </tr> </tbody> </table>	Receiver Number	57,60, 63, 64, 66, 79, 80, 138, 140, 144, 165	<p>N/A</p>	<p>No requests for noise mitigation measures were received during the reporting period.</p>
Receiver Number				
57,60, 63, 64, 66, 79, 80, 138, 140, 144, 165				
<p><b>Operating Conditions</b></p>				
<p>4. The Proponent shall: (a) implement best management practice, including all reasonable and feasible noise mitigation measures, to minimise the construction, operational and road traffic noise generated by the project; (b) operate a comprehensive noise management system on site that uses real-time noise monitoring data for mining operations and the implementation of noise mitigation measures to ensure compliance with the relevant conditions of this approval; and (c) regularly assess the real-time noise monitoring to ensure compliance with the relevant conditions of this approval, to the satisfaction of the Planning Secretary.</p>	<p>Compliant</p>	<p>Best practice measures and the monitoring program are detailed in the Noise Management Plan. Real-time noise monitoring was undertaken.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p>		
<p><b>Noise Management Plan</b></p>				
<p>5. The Proponent shall prepare a Noise Management Plan for the project to the satisfaction of the Planning Secretary. This plan must: (a) be prepared in consultation with EPA and WSC, and submitted to the Planning Secretary for approval by 30 September 2012; (b) include provisions to ensure that the road haulage fleet attains and maintains best practices in both equipment and operations; (c) seek to minimise road traffic noise generated by employee commuter vehicles on public roads, particularly Douglas Park Drive and Macarthur Road; (d) describe the measures that would be implemented to ensure compliance with the relevant conditions of this approval;</p>	<p>Compliant</p>	<p>The Noise Management Plan was submitted and approved on 7 December 2020.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p> <p>The NMP was revised in 2022. Consultation with the EPA was undertaken and the revised NMP submitted to the Department for approval.</p>		



<p>(e) outline procedures to manage responses to any complaints or issues raised by the owners of affected residences; and</p> <p>(f) include a noise monitoring program that:</p> <ul style="list-style-type: none"> <li>• uses a combination of real-time and supplementary attended monitoring to evaluate the performance of the project, including at the Appin Mine Ventilation and Access Site; and</li> <li>• includes a protocol for determining exceedances of the relevant conditions of this approval and <ul style="list-style-type: none"> <li>• (g) prior to commencement of construction of the operational winder/cage, describe the outcome of investigations into alternatives to the use and implementation of audible warning alarms for the operation of the winder/cage at the Appin Mine Ventilation and Access Site.</li> </ul> </li> </ul>		
<p>5A. The Proponent must implement the Noise Management Plan approved by the Planning Secretary.</p>	Compliant	The requirements of the plan are being implemented.
<p><b>Road Traffic Noise Mitigation</b></p>		
<p>6. If after the end of June 2013, road traffic noise generated by the project (including employee vehicles) results in an exceedance by more than 2 dB(A) of the NSW criteria for road traffic noise on Douglas Park Drive or Macarthur Road at any residence on privately-owned land, then the Proponent shall, upon receiving a written request from the landowner, implement reasonable and feasible noise mitigation measures (such as double-glazing, insulation, and/or air conditioning) at the residence in consultation with the landowner. If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.</p>	N/A	<p>There have been no complaints regarding traffic noise on Douglas Park Drive or Macarthur Road during the reporting period and no written requests for noise mitigation received.</p>
<p><b>AIR QUALITY &amp; GREENHOUSE GAS</b></p>		
<p><b>Odour</b></p>		
<p>7. The Proponent shall ensure that no offensive odours are emitted from the site, as defined under the POEO Act.</p>	Compliant	Odour has not been raised as a wider community concern during the reporting period.
<p><b>Greenhouse Gas Emissions</b></p>		
<p>8. The Proponent shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site to the satisfaction of the Planning Secretary.</p>	Compliant	<p>The Air Quality and Greenhouse Gas Management Plan has been submitted and approved.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p> <p>See Section 6.17.4 for information on the decarbonisation program.</p>
<p><b>Air Quality Criteria</b></p>		
<p>9. The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the particulate emissions generated by the project do not exceed the criteria listed in Tables 4, 5 and 6 at any residence on privately-owned land or on more than 25 percent of any privately-owned land,, and that the particulate emissions from the Appin Mine</p>	Compliant	<p>Air quality criteria were achieved during the reporting period. No exceedances of criteria were recorded during the reporting period as a result of hazard reduction activity in the area (excluded as</p>





<p>Ventilation and Access Site do not exceed the criteria listed in Tables 4 - 6A at any residence on privately-owned land or on more than 25 percent of any privately-owned land..</p> <p><i>Table 4. Long term criteria for particulate matter</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th><sup>d</sup> Criterion</th> </tr> </thead> <tbody> <tr> <td>Total suspended particulate (TSP) matter</td> <td>Annual</td> <td><sup>a</sup> 90 µg/m<sup>3</sup></td> </tr> <tr> <td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td> <td>Annual</td> <td><sup>a</sup> 30 µg/m<sup>3</sup></td> </tr> </tbody> </table> <p><i>Table 5. Short term criterion for particulate matter</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th><sup>d</sup> Criterion</th> </tr> </thead> <tbody> <tr> <td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td> <td>24 hour</td> <td><sup>a</sup> 50 µg/m<sup>3</sup></td> </tr> </tbody> </table> <p><i>Table 6. Long term criteria for deposited dust</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th>Maximum increase in deposited dust level</th> <th>Maximum total deposited dust level</th> </tr> </thead> <tbody> <tr> <td><sup>c</sup> Deposited dust</td> <td>Annual</td> <td><sup>b</sup> 2 g/m<sup>2</sup>/month</td> <td><sup>a</sup> 4 g/m<sup>2</sup>/month</td> </tr> </tbody> </table> <p><i>Table 6A. Criteria for Appin Mine Ventilation and Access Site</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th><sup>d</sup> Criterion</th> </tr> </thead> <tbody> <tr> <td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td> <td>Annual</td> <td><sup>a</sup> 25 µg/m<sup>3</sup></td> </tr> <tr> <td>Particulate matter &lt; 2.5 µm (PM<sub>2.5</sub>)</td> <td>Annual</td> <td><sup>a</sup> 8 µg/m<sup>3</sup></td> </tr> <tr> <td>Particulate matter &lt; 2.5 µm (PM<sub>2.5</sub>)</td> <td>24 hour</td> <td><sup>a</sup> 25 µg/m<sup>3</sup></td> </tr> </tbody> </table> <p><i>Notes for Tables 4-6A:</i></p> <ul style="list-style-type: none"> <li><sup>a</sup> Total impact (ie incremental increase in concentrations due to the project plus background concentrations due to other sources);</li> <li><sup>b</sup> Incremental impact (ie incremental increase in concentrations due to the project on its own);</li> <li><sup>c</sup> Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and</li> <li><sup>d</sup> Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed to by the Planning Secretary in consultation with EPA.</li> </ul> <p>However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the Proponent has advised the Department in writing of the terms of this agreement.</p>	Pollutant	Averaging period	<sup>d</sup> Criterion	Total suspended particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>	Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 30 µg/m <sup>3</sup>	Pollutant	Averaging period	<sup>d</sup> Criterion	Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>a</sup> 50 µg/m <sup>3</sup>	Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level	<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month	<sup>a</sup> 4 g/m <sup>2</sup> /month	Pollutant	Averaging period	<sup>d</sup> Criterion	Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 25 µg/m <sup>3</sup>	Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	Annual	<sup>a</sup> 8 µg/m <sup>3</sup>	Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	24 hour	<sup>a</sup> 25 µg/m <sup>3</sup>		<p>classified as an extraordinary event).</p> <p>Air quality data is reported on the IMC website at: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p>
Pollutant	Averaging period	<sup>d</sup> Criterion																																			
Total suspended particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>																																			
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 30 µg/m <sup>3</sup>																																			
Pollutant	Averaging period	<sup>d</sup> Criterion																																			
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>a</sup> 50 µg/m <sup>3</sup>																																			
Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level																																		
<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month	<sup>a</sup> 4 g/m <sup>2</sup> /month																																		
Pollutant	Averaging period	<sup>d</sup> Criterion																																			
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 25 µg/m <sup>3</sup>																																			
Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	Annual	<sup>a</sup> 8 µg/m <sup>3</sup>																																			
Particulate matter < 2.5 µm (PM <sub>2.5</sub> )	24 hour	<sup>a</sup> 25 µg/m <sup>3</sup>																																			
<p><b>Air Quality Acquisition Criteria</b></p> <p>10. If the particulate matter emissions generated by the project exceed the criteria in Tables 7, 8 and 9 at any residence on privately-owned land or on more than 25 percent of any privately owned land, then upon receiving a written request for acquisition from the landowner the Proponent shall, subject to the independent review procedure in Conditions 2 – 3 of Schedule 5, acquire the land in accordance with the procedures in Conditions –4-5 of Schedule 5.</p> <p><i>Table 7. Long term acquisition criteria for particulate matter</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th><sup>d</sup> Criterion</th> </tr> </thead> <tbody> <tr> <td>Total suspended particulate (TSP) matter</td> <td>Annual</td> <td><sup>a</sup>90 µg/m<sup>3</sup></td> </tr> <tr> <td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td> <td>Annual</td> <td><sup>a</sup>30 µg/m<sup>3</sup></td> </tr> </tbody> </table> <p><i>Table 8. Short term acquisition criteria for particulate matter</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th><sup>d</sup> Criterion</th> </tr> </thead> <tbody> <tr> <td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td> <td>24 hour</td> <td><sup>a</sup>150 µg/m<sup>3</sup></td> </tr> <tr> <td>Particulate matter &lt; 10 µm (PM<sub>10</sub>)</td> <td>24 hour</td> <td><sup>a</sup>50 µg/m<sup>3</sup></td> </tr> </tbody> </table> <p><i>Table 9. Long term acquisition criteria for deposited dust</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th>Maximum increase in deposited dust level</th> <th>Maximum total deposited dust level</th> </tr> </thead> <tbody> <tr> <td><sup>c</sup> Deposited dust</td> <td>Annual</td> <td><sup>b</sup> 2 g/m<sup>2</sup>/month</td> <td><sup>a</sup> 4 g/m<sup>2</sup>/month</td> </tr> </tbody> </table> <p><i>Notes for Tables 7 - 9:</i></p> <ul style="list-style-type: none"> <li><sup>a</sup> Total impact (ie incremental increase in concentrations due to the project plus background concentrations due to other sources);</li> <li><sup>b</sup> Incremental impact (ie incremental increase in concentrations due to the project on its own);</li> <li><sup>c</sup> Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and</li> <li><sup>d</sup> Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed to by the Planning Secretary in consultation with EPA.</li> </ul>	Pollutant	Averaging period	<sup>d</sup> Criterion	Total suspended particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>	Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 30 µg/m <sup>3</sup>	Pollutant	Averaging period	<sup>d</sup> Criterion	Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>a</sup> 150 µg/m <sup>3</sup>	Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>a</sup> 50 µg/m <sup>3</sup>	Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level	<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month	<sup>a</sup> 4 g/m <sup>2</sup> /month	<p>N/A</p>	<p>There have been no requests for land acquisition during the reporting period.</p>									
Pollutant	Averaging period	<sup>d</sup> Criterion																																			
Total suspended particulate (TSP) matter	Annual	<sup>a</sup> 90 µg/m <sup>3</sup>																																			
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	<sup>a</sup> 30 µg/m <sup>3</sup>																																			
Pollutant	Averaging period	<sup>d</sup> Criterion																																			
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>a</sup> 150 µg/m <sup>3</sup>																																			
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	<sup>a</sup> 50 µg/m <sup>3</sup>																																			
Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level																																		
<sup>c</sup> Deposited dust	Annual	<sup>b</sup> 2 g/m <sup>2</sup> /month	<sup>a</sup> 4 g/m <sup>2</sup> /month																																		
<p><b>Operating Conditions</b></p> <p>11. The Proponent shall:</p> <p>(a) implement best practice air quality management on site, including all reasonable and feasible measures to</p>	<p>Non-compliant</p>	<p>Best practice measures are detailed in the Air Quality and</p>																																			



<p>minimise the off-site odour, fume and dust emissions generated by the project, including from any spontaneous combustion on site, (b) minimise any visible air pollution generated by the project; and (c) regularly assess the air quality monitoring and meteorological forecasting data, and relocate, modify and/or stop operations on site to ensure compliance with the relevant conditions of this approval; to the satisfaction of the Planning Secretary.</p>		<p>Greenhouse Gas Management Plan. The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p> <p>The requirements of the plan are being implemented.</p>
<p><b>Air Quality &amp; Greenhouse Gas Management Plan</b></p>		
<p>12. The Proponent shall prepare a detailed Air Quality &amp; Greenhouse Gas Management Plan for the project to the satisfaction of the Planning Secretary. This plan must: (a) be prepared in consultation with EPA, and submitted to the Secretary for approval by 30 September 2012; (b) describe the measures that would be implemented to ensure compliance with the relevant conditions of this approval, including consideration of applying a real-time air quality management system that employs both reactive and proactive mitigation measures; (c) describe the measures that would be implemented to minimise the release of greenhouse gas emissions from the site; and (d) include an air quality monitoring that evaluates the performance of the project, and includes a protocol for determining exceedances with the relevant conditions of this approval and (e) include a site specific air quality monitoring and management plan for the Appin Mine Ventilation and Access Site which includes: - an odour management plan and gaseous emissions monitoring program for the operation of the ventilation shafts; - a comprehensive air quality management system that uses real-time monitoring and implements both proactive and reactive air quality mitigation measures; and.</p>	<p>Compliant</p>	<p>The Air Quality and Greenhouse Gas Management Plan has been submitted and approved. The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p> <p>The DustTraks in use provide real time air quality monitoring data.</p>
<p>12A The Proponent must implement the Air Quality and Greenhouse Gas Management Plan approved by the Planning Secretary.</p>	<p>Compliant</p>	<p>The requirements of the plan are being implemented.</p>
<p><b>METEOROLOGICAL MONITORING</b></p>		
<p>13. During the life of the project, the Proponent shall ensure that there is a suitable meteorological station operating in the vicinity of the site that: (a) complies with the requirements in the Approved Methods for Sampling of Air Pollutants in New South Wales guideline; and (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the NSW Industrial Noise Policy.</p>	<p>Compliant</p>	<p>Weather stations operate in the vicinity of the operation that generally meet these requirements.</p>
<p><b>SOIL &amp; WATER</b></p>		
<p>Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Proponent is required to obtain the necessary water licences for the project.</p>	<p>Compliant</p>	<p>Water licences have been obtained as required. These are listed in Sections 1 and 3 of the Annual Review.</p>
<p><b>Compensatory Water Supply</b></p>		
<p>14. The Proponent shall provide a compensatory water supply to any owner of privately-owned land whose water supply is adversely impacted (other than an impact that is negligible) as a result of the project, in</p>	<p>Compliant</p>	<p>Compensatory water supplies have been provided as required.</p>



<p>accordance with the approved Surface Water Management Plan.</p> <p>The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributed to the project. Equivalent water supply must be provided (at least on an interim basis) within 24 hours of the loss being identified.</p> <p>If the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Planning Secretary for resolution.</p> <p>If the Proponent is unable to provide an alternative long-term supply of water, then the Proponent shall provide alternative compensation to the satisfaction of the Planning Secretary.</p>		
<p><b>Surface Water Discharges</b></p>		
<p>15. The Proponent shall ensure that all surface water discharges from the site (including from the Brennans Creek Dam) comply with the discharge limits (both volume and quality) set for the project in any EPL.</p>	<p>Compliant</p>	<p>Surface water discharges complied with the relevant water quality criteria for discharge limits.</p>
<p><b>Surface Water Management Plan</b></p>		
<p>16. The Proponent must update the Surface Water Management Plan for the project to the satisfaction of the Planning Secretary. This plan must be prepared in consultation with DPE Water and EPA by suitably qualified and experienced persons whose appointment has been endorsed by the Planning Secretary, and submitted to the Planning Secretary for approval by 31 January 2017. This plan must include:</p> <p>(a) a comprehensive water balance for the project, that includes details of:</p> <ul style="list-style-type: none"> <li>• sources and security of water supply and water make;</li> <li>• water use; and</li> <li>• water discharges; and</li> </ul> <p>(b) management plans for the surface facilities sites, that include:</p> <ul style="list-style-type: none"> <li>• a detailed description of water management systems for each site, including: <ul style="list-style-type: none"> <li>- clean water diversion systems;</li> <li>- erosion and sediment controls;</li> <li>- on-site sewage management systems; and</li> <li>- any water storages;</li> </ul> </li> <li>• measures to minimise potable water use and to reuse and recycle water;</li> <li>• trigger levels for investigating any potentially adverse impacts on water resources or water quality;</li> <li>• a Water Response Plan, which describes the measures and/or procedures that would be implemented to: <ul style="list-style-type: none"> <li>- investigate, notify and mitigate any ground or surface water exceedances;</li> <li>- minimise, prevent or offset any adverse impacts to ground or surface water resources;</li> </ul> </li> </ul>	<p>Compliant</p>	<p>The Water Management Plan was submitted and approved on 11 September 2020.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p> <p>The WMP was reviewed in 2022 to reflect the operation of the temporary water treatment plant at Appin North. It has been submitted to the Department for review.</p>



<ul style="list-style-type: none"> <li>- provide compensatory water supply to any owner of privately-owned land whose water supply is adversely impacted (other than an impact that is negligible) as a result of the project; and</li> <li>• measures to comply with surface water discharge limits;</li> <li>• implementation of any pollution reduction program relating to mine water discharges from Brennans Creek Dam and identification of 5, 7 and 10 year commitments to substantially reduce the impacts on biota of salinity and other pollutants in such discharges; and</li> <li>• monitoring and reporting procedures including:             <ul style="list-style-type: none"> <li>- collection of baseline data on surface water quality in creeks and other waterbodies that could potentially be affected by the project; and</li> </ul> </li> <li>- surface water and stream health impact assessment criteria.</li> </ul>		
<p>16A. The Proponent must implement the Surface Water Management Plan approved by the Planning Secretary.</p> <p>Note: This plan must be suitably integrated with the Water Management Plans that form part of Extraction Plans.</p>	Compliant	The requirements of the plan are being implemented.
<b>WEST CLIFF COAL WASH EMPLACEMENT AREA</b>		
<p>17. The Proponent shall prepare a West Cliff Coal Wash Emplacement Area Management Plan for the project to the satisfaction of the Planning Secretary. This plan must be prepared in consultation with BCD and be submitted to the Planning Secretary for approval by the end of June 2013. This plan must include:</p> <p>(a) detailed design plans which include options for reducing, avoiding and/or managing impacts on Aboriginal heritage sites in and adjacent to the southwestern fringe of the proposed Stage 4 footprint (including sites 52-2-2228/3617, 52-2-1373, 52-2-3533/3613 and 52-2-3506);</p> <p>(b) management strategies to ensure no impacts to Aboriginal heritage site 52-2-3505 other than negligible impacts, including consideration of potential staged development of the emplacement and/or buffer areas;</p> <p>(c) management strategies for the protection and conservation of <i>Persoonia hirsuta</i>;</p> <p>(d) management strategies for the protection and conservation of the Broad-headed Snake and the Southern Brown Bandicoot;</p> <p>(e) a comprehensive water monitoring program for the emplacement;</p> <p>(f) provide for progressive rehabilitation of the emplacement area, including through:</p> <ul style="list-style-type: none"> <li>• maximising opportunities for natural regeneration;</li> <li>• maximising retention of suitable habitat species;</li> <li>• appropriate weed and pest control strategies; and</li> <li>• planting only endemic species in habitat mixes appropriate for soil, slope and aspect; and</li> </ul>	Compliant	<p>The Coal Wash Emplacement Area Management Plan has been submitted and approved.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p>
<p>17A. The Proponent must implement the West Cliff Coal Wash Emplacement Area Management Plan approved by the Planning Secretary.</p>	Compliant	The requirements of the plan are being implemented.
<b>West Cliff Coal Wash Emplacement Area Biodiversity Offset Strategy</b>		



<p>18. The Proponent shall provide a suitable biodiversity offset strategy to compensate for the impacts of Stage 4 of the West Cliff Coal Wash Emplacement Area, to the satisfaction of the Planning Secretary. This offset strategy must:</p> <p>(a) be prepared in consultation with BCD;</p> <p>(b) be submitted to the Planning Secretary for approval by the end of December 2012, or as otherwise agreed by the Planning Secretary; and</p> <p>(c) fulfil “maintain or improve” and seek to fulfil “like for like or better” conservation outcomes for the vegetation associations and the <i>Persoonia hirsuta</i> impacted by clearing.</p>	<p>Compliant</p>	<p>Throughout the period from 2013-2016, IMC undertook numerous meetings and held discussions with senior officers of the Department of Environment and Planning, Office of Environment and Heritage, relevant Ministerial Offices and Water NSW in relation to the suitability of the proposed offsets.</p> <p>In March 2016, the final Strategic Biodiversity Offset was submitted to the Department of Planning and Environment for approval. The final Strategy was endorsed by OEH.</p>
<p>19. The Proponent shall make suitable arrangements to provide appropriate long-term security for the offset areas by 31 December 2012, or other date agreed by the Planning Secretary, to the satisfaction of the Planning Secretary.</p>	<p>Compliant</p>	<p>In March 2016, the final Strategic Biodiversity Offset was submitted to the Department of Planning and Environment for approval. The final Strategy was endorsed by OEH.</p>
<p><b>Underground Coal Wash Emplacement Trial</b></p>		
<p>20. The Proponent shall prepare and undertake an Underground Coal Wash Emplacement Trial for the project to the satisfaction of the Planning Secretary. The design of the trial must:</p> <p>(a) be undertaken in consultation with BCD;</p> <p>(b) be submitted to the Planning Secretary for approval by the end of December 2012;</p> <p>(c) contain a two year program to undertake both pilot scale and demonstration scale trials of underground coal wash disposal;</p> <p>(d) include commitments for ongoing development and/or implementation of underground emplacement options following this two-year trial; and</p> <p>(e) include 6 monthly progress reporting to the Department and BCD.</p>	<p>Compliant</p>	<p>IMC received advice from DPIE on 3 September 2020 that the Department considers that South32 has met the intent of Condition 20 of Schedule 4.</p>
<p><b>PROJECT SURFACE INFRASTRUCTURE MANAGEMENT</b></p>		
<p><b>Gas Drainage Management Plan</b></p>		
<p>21. The Proponent shall prepare a Gas Drainage Management Plan in respect of construction and use of future gas drainage infrastructure (ie for any gas drainage not subject to approval at the date of this instrument) to the satisfaction of the Planning Secretary. This plan must be submitted to the Planning Secretary for approval prior to the construction of any future gas drainage infrastructure and must include details of the proponent's commitments regarding:</p> <p>(a) community consultation;</p> <p>(b) landholder agreements;</p> <p>(c) assessment of noise, air quality, traffic, biodiversity, heritage, public safety and other impacts in accordance with approved methods;</p> <p>(d) avoidance of significant impacts and minimisation of impacts generally;</p> <p>(e) flaring or use of drained hydrocarbon gases, wherever practicable;</p> <p>(f) achievement of applicable standards and goals;</p> <p>(g) mitigation and/or compensation for significant noise, air quality and visual impacts; and</p> <p>(h) rehabilitation of disturbed sites.</p>	<p>Compliant</p>	<p>The Gas Drainage Management Plan has been submitted and approved.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p>



21A. The Proponent must implement the Gas Drainage Management Plan approved by the Planning Secretary.	N/A	There was no gas drainage infrastructure installed during the reporting period.
<b>Surface Activities Management Plan</b>		
22. The Proponent shall prepare and implement a Surface Activities Management Plan in respect of construction and use of service boreholes, pipelines, electrical infrastructure, works to public infrastructure, communications equipment and monitoring equipment, to the satisfaction of the Secretary. This plan must: (a) be submitted to the Secretary for approval by 30 April 2017, unless the Secretary agrees otherwise; and (b) include the following: <ul style="list-style-type: none"> <li>• a community consultation strategy;</li> <li>• a protocol for landholder agreements;</li> <li>• commensurate assessment of noise, air quality, traffic, biodiversity, heritage, public safety and other impacts in accordance with approved methods;</li> <li>• measures to avoid and/or minimise impacts;</li> <li>• measures to achieve performance with applicable standards and goals;</li> <li>• mitigation measures and/or compensation for significant noise, air quality and visual impacts at privately-owned residences; and</li> <li>• measures for the rehabilitation of disturbance.</li> </ul>	Compliant	The Surface Activities Management Plan has been submitted and approved.  The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a> .
22A. The Proponent must implement the Surface Activities Management Plan approved by the Planning Secretary	N/A	There were no surface activities as detailed in the plan undertaken during the reporting period.
<b>Upper Canal</b>		
23. The Proponent shall not cause any damage to the Upper Canal during the construction and operation of the Appin East Mine Gas Safety Management Project.	Compliant	No impacts have been identified to date. This project has been completed.
23A. Prior to construction of the Appin East Mine Gas Safety Management Project, the Proponent shall: (a) undertake a dilapidation survey of the Upper Canal, in consultation with WaterNSW and Heritage NSW; (b) prepare final detailed design plans in consultation with WaterNSW; and (c) undertake vibration monitoring for all earthworks undertaken within 25 metres of the Upper Canal, to the satisfaction of the Planning Secretary.	Compliant	A dilapidation survey of the canal was completed.
23B. Following the completion of construction of the Appin East Mine Gas Safety Management Project, the Proponent shall: (a) undertake a dilapidation survey of the Upper Canal in consultation with WaterNSW and Heritage NSW; and (b) repair, or pay the full costs associated with repairing, any damage to the Upper Canal caused by the project in consultation with WaterNSW and Heritage NSW, to the satisfaction of the Planning Secretary.	Compliant	A dilapidation survey of the canal was completed. No repairs were required.
<b>HERITAGE</b>		
<b>Heritage Management Plan</b>		
24. The Proponent prepare a Heritage Management Plan for the project to the satisfaction of the Planning Secretary. This plan must: (a) be prepared in consultation with Heritage NSW, the Aboriginal community, Council, any local historical organisations and relevant landowners;	Compliant	The Heritage Management Plan has been submitted and approved.  The plan is available on the website:



<p>(b) be submitted to the Planning Secretary for approval by 31 January 2017;</p> <p>(c) include the following program/procedures for managing Aboriginal heritage management within the project area:</p> <ul style="list-style-type: none"> <li>• recording, salvaging, excavating and/or managing the Aboriginal sites and potential archaeological deposits within the site;</li> <li>• conserving, managing, and monitoring the Aboriginal sites outside the site;</li> <li>• managing the discovery of any new Aboriginal objects or skeletal remains during the project;</li> <li>• maintaining and managing access to archaeological sites by the Aboriginal community; and</li> <li>• ongoing consultation and involvement of the Aboriginal communities in the conservation and management of Aboriginal cultural heritage within the project area.</li> </ul> <p>(d) include the following program/procedures for managing other heritage on site:</p> <ul style="list-style-type: none"> <li>• preparing conservation management plans and/or photographic and archival recording of potentially affected heritage items;</li> <li>• making the conservation management plans and photographic and archival recording publicly available for buildings or structures of State or National heritage significance once they are completed;</li> <li>• protection and monitoring of heritage items outside the site;</li> <li>• baseline dilapidation surveys of all heritage items potentially affected by subsidence and/or blasting;</li> <li>• monitoring, notifying and managing the effects of subsidence and/or blasting on potentially affected heritage items (including the Mountbatten Group); and</li> <li>• additional archaeological excavation and/or recording of any significant heritage items requiring demolition.</li> </ul>		<p><a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>. The requirements of the plan are being implemented.</p>
<p>24A The Proponent must implement the Heritage Management Plan approved by the Planning Secretary.</p> <p>Note: This plan must be suitably integrated with Heritage Management Plans that form part of Extraction Plans, and the West Cliff Coal Wash Emplacement Area Management Plan.</p>	<p>Compliant</p>	<p>The requirements of the plan are being implemented.</p>
<p><b>TRANSPORT</b></p>		
<p><b>Monitoring of Coal Transport</b></p>		
<p>25. The Proponent shall:</p> <p>(a) keep accurate records of the amount of coal transported from the site (on a daily basis); and</p> <p>(b) make these records publicly available on its website at the end of each financial year.</p>	<p>Compliant</p>	<p>Records of coal transport are maintained.</p> <p>These records are on the IMC website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a></p>
<p><b>Traffic Management Plan</b></p>		



<p>26. The Proponent shall update the approved Traffic Management Plan for the project to the satisfaction of the Planning Secretary. This plan must be:</p> <p>(a) prepared in consultation with the TfNSW, WCC, WSC and the CaCC;</p> <p>(b) submitted to the Planning Secretary for approval by 31 January 2017;</p> <p>(c) propose an appropriate program and schedule of works for any intersection upgrades to be undertaken or contributed to by the Proponent over the life of the project, including an upgrade of the intersection of West Cliff Mine Access Road and Appin Road that is generally in accordance with the requirements of the RMS and that is to be completed before the Level of Service at this intersection drops below LOS C; and</p> <p>(d) include strategies to manage construction traffic, including road closure protocols, community consultation and measures to avoid potential road safety conflicts with other road users.</p>	<p>Compliant</p>	<p>The Traffic Management Plan has been submitted and approved.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p>
<p>26A. The Proponent shall ensure that safe access to Ventilation Shaft No.6 is provided from public roads.</p>	<p>Compliant</p>	<p>The intersection was constructed to ensure safe access to the site.</p>
<p>26B. If it is determined that the corridor of the proposed Outer Sydney Orbital Stage 1 would intersect with the Appin Ventilation and Access Site, the Proponent must develop a specific Infrastructure Management Plan in consultation with, and to the satisfaction of, TfNSW. The plan must include:</p> <p>(a) detailed design and engineering parameters required for co-existence;</p> <p>(b) measures to ensure the ongoing safety and serviceability of the site and Outer Sydney Orbital Stage 1 during construction and operation;</p> <p>(c) any upgrades or augmentations required to the site associated with the construction and operation of the Outer Sydney Orbital Stage 1;</p> <p>(d) assessment of risks generated by co-location of surface infrastructure; and</p> <p>(e) costings of proposed measures and cost sharing arrangements.</p>	<p>Compliant</p>	<p>The requirements of the plan are being implemented.</p>
<p>26C The Proponent must implement the Traffic Management Plan approved by the Planning Secretary.</p>		
<p><b>VISUAL</b></p>		
<p><b>Visual Amenity and Lighting</b></p>		
<p>27. The Proponent shall:</p> <p>a) minimise the visual impacts, and particularly the off-site lighting impacts, of the main infrastructure area and associated ancillary surface works;</p> <p>b) take all practicable measures to further mitigate off-site lighting impacts from the project; and</p> <p>c) ensure that all external lighting associated with the project complies with Australian Standard AS4282 (INT) 1995 - Control of Obtrusive Effects of Outdoor Lighting, to the satisfaction of the Planning Secretary.</p>	<p>Compliant</p>	<p>Lighting has been installed to minimise off-site impacts.</p>
<p><b>Visual Screening of Appin Mine Ventilation and Access Site</b></p>		
<p>27A. The Proponent must:</p> <p>(a) ensure that the visual appearance of all new buildings, structures, facilities or works (including paint colours and specifications) at the Appin Mine Ventilation</p>	<p>N/A</p>	<p>Construction of the AMVA Project had not commenced as at 30 June 2022.</p>





<p>and Access Site are aimed at blending as far as possible with the surrounding landscape; and (b) implement site-specific landscaping strategies at the Appin Mine Ventilation and Access Site and at the privately owned residences at 310 Menangle Road and 30 Finns Road, Menangle to minimise the visual impacts of the Appin Mine Ventilation and Access Site, including;</p> <ul style="list-style-type: none"> <li>i. notification and consultation with affected residents and WSC;</li> <li>ii. carrying out screen tree planting at the residences prior to the commencement of construction of the Appin Mine Ventilation and Access Site;</li> <li>iii. maintenance and/or replacement of the planted trees established over the life of the Appin Ventilation and Access Site to maintain an effective visual screen to the satisfaction of the Planning Secretary.</li> </ul> <p>Note: b(ii) and b(iii) do not apply if the Proponent has a written agreement with the landowners at 310 Menangle Road and 30 Finns Road, Menangle in relation to visual impact mitigation, and the Proponent has advised the Department in writing of the terms of this agreement.</p>		
<b>WASTE</b>		
<p>28. The Proponent shall:</p> <ul style="list-style-type: none"> <li>(a) minimise the waste (including coal reject) generated by the project; and</li> <li>(b) ensure that the waste generated by the project is appropriately stored, handled and disposed of, and</li> <li>(c) manage on-site sewage treatment and disposal in accordance with the requirements of EPA and WSC; to the satisfaction of the Planning Secretary.</li> </ul>	Compliant	Waste management has been undertaken in accordance with the Waste Management Plan. See Section 6.19.
<p>29. The Proponent shall prepare and implement a Waste Management Plan for the project to the satisfaction of the Planning Secretary. This plan must be submitted to the Planning Secretary by 30 September 2012.</p>	Compliant	<p>The Waste Management Plan has been submitted and approved.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p> <p>The requirements of the plan are being implemented.</p>
<b>BUSHFIRE MANAGEMENT</b>		
<p>30. The Proponent shall:</p> <ul style="list-style-type: none"> <li>(a) ensure that the project is suitably equipped to respond to any fires on site; and</li> <li>(b) assist the Rural Fire Service and emergency services as much as possible if there is a fire in the surrounding area.</li> </ul>	Compliant	<p>Sites are equipped to manage bushfires.</p> <p>Asset protection zones are maintained as required.</p>
<b>REHABILITATION</b>		
<b>Rehabilitation Objectives</b>		
<p>31. The Proponent shall rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the project under the Mining Act 1992. This rehabilitation must be generally consistent with the proposed rehabilitation strategy</p>	Compliant	Rehabilitation is conducted in accordance with the MOP/Rehabilitation Management Plan.



<p>described in the EA and the PPR, and comply with the objectives in Table 10.</p> <p><i>Table 10 Rehabilitation Objectives</i></p> <table border="1"> <thead> <tr> <th>Feature</th> <th>Objective</th> </tr> </thead> <tbody> <tr> <td>Mine site (as a whole)</td> <td>Safe, stable &amp; non-polluting</td> </tr> <tr> <td>Project Surface infrastructure</td> <td>To be decommissioned and removed, unless the Resources Regulator agrees otherwise</td> </tr> <tr> <td>Portals and vent shafts</td> <td>To be decommissioned and made safe and stable. Retain habitat for threatened species (eg bats), where practicable</td> </tr> <tr> <td>Watercourses of 3<sup>rd</sup> order or above subject to subsidence impacts</td> <td>Restore pre-mining surface flow and pool holding capacity as soon as reasonably practicable Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than prior to mining</td> </tr> <tr> <td>Other watercourses subject to subsidence impacts</td> <td>Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than prior to mining</td> </tr> <tr> <td>Cliffs</td> <td>No additional risk to public safety compared to prior to mining</td> </tr> <tr> <td>Other land affected by the project</td> <td>Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of:                     <ul style="list-style-type: none"> <li>local native plant species (unless the Resources Regulator agrees otherwise); and</li> <li>a landform consistent with the surrounding environment</li> </ul> </td> </tr> <tr> <td>Built features damaged by mining operations</td> <td>Repair to pre-mining condition or equivalent unless                     <ul style="list-style-type: none"> <li>the owner agrees otherwise; or</li> <li>the damage is fully restored, repaired or compensated for under the Mine Subsidence Compensation Act 1961.</li> </ul> </td> </tr> <tr> <td>Community</td> <td>Ensure public safety Minimise the adverse socio-economic effects associated with mine closure</td> </tr> </tbody> </table> <p><i>Notes:</i></p> <ol style="list-style-type: none"> <li>These rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by mining taking place after the date of this approval, and to all project surface infrastructure part of the project, whether constructed prior to or following the date of this approval.</li> <li>Rehabilitation of subsidence impacts and environmental consequences caused by mining which took place prior to the date of this approval may be subject to the requirements of other approvals (eg under a mining lease or an Subsidence Management Plan approval) or the Proponent's commitments.</li> <li>In the case of the West Cliff Emplacement Area, final landform may be significantly different from that existing prior to mining, but must still be safe, stable and non-polluting and generally consistent with the surrounding landforms.</li> </ol>	Feature	Objective	Mine site (as a whole)	Safe, stable & non-polluting	Project Surface infrastructure	To be decommissioned and removed, unless the Resources Regulator agrees otherwise	Portals and vent shafts	To be decommissioned and made safe and stable. Retain habitat for threatened species (eg bats), where practicable	Watercourses of 3 <sup>rd</sup> order or above subject to subsidence impacts	Restore pre-mining surface flow and pool holding capacity as soon as reasonably practicable Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than prior to mining	Other watercourses subject to subsidence impacts	Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than prior to mining	Cliffs	No additional risk to public safety compared to prior to mining	Other land affected by the project	Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of: <ul style="list-style-type: none"> <li>local native plant species (unless the Resources Regulator agrees otherwise); and</li> <li>a landform consistent with the surrounding environment</li> </ul>	Built features damaged by mining operations	Repair to pre-mining condition or equivalent unless <ul style="list-style-type: none"> <li>the owner agrees otherwise; or</li> <li>the damage is fully restored, repaired or compensated for under the Mine Subsidence Compensation Act 1961.</li> </ul>	Community	Ensure public safety Minimise the adverse socio-economic effects associated with mine closure		<p>The MOP expired on 2 July 2022 and has been replaced with the Rehabilitation Management Plan.</p>
Feature	Objective																					
Mine site (as a whole)	Safe, stable & non-polluting																					
Project Surface infrastructure	To be decommissioned and removed, unless the Resources Regulator agrees otherwise																					
Portals and vent shafts	To be decommissioned and made safe and stable. Retain habitat for threatened species (eg bats), where practicable																					
Watercourses of 3 <sup>rd</sup> order or above subject to subsidence impacts	Restore pre-mining surface flow and pool holding capacity as soon as reasonably practicable Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than prior to mining																					
Other watercourses subject to subsidence impacts	Hydraulically and geomorphologically stable, with riparian vegetation that is the same or better than prior to mining																					
Cliffs	No additional risk to public safety compared to prior to mining																					
Other land affected by the project	Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of: <ul style="list-style-type: none"> <li>local native plant species (unless the Resources Regulator agrees otherwise); and</li> <li>a landform consistent with the surrounding environment</li> </ul>																					
Built features damaged by mining operations	Repair to pre-mining condition or equivalent unless <ul style="list-style-type: none"> <li>the owner agrees otherwise; or</li> <li>the damage is fully restored, repaired or compensated for under the Mine Subsidence Compensation Act 1961.</li> </ul>																					
Community	Ensure public safety Minimise the adverse socio-economic effects associated with mine closure																					
<p><b>Progressive Rehabilitation</b></p>																						
<p>32. The Proponent shall carry out the rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance.</p>	<p>Compliant</p>	<p>Rehabilitation is conducted in accordance with the MOP/Rehabilitation Management Plan.</p> <p>Rehabilitation activities are detailed in Section 8</p>																				
<p><b>Rehabilitation Management Plan</b></p>																						
<p>33. The Proponent shall prepare and implement a Rehabilitation Management Plan for the project, with specific reference to all surface facilities sites, to the satisfaction of the Executive Director Mineral Resources. This plan must:</p> <ol style="list-style-type: none"> <li>be prepared in consultation with the Department, OEH, DPI Water, Council and the CCC;</li> <li>be prepared in accordance with any relevant DRE guideline and be consistent with the rehabilitation objectives in the EA and in Table 11;</li> <li>provide for detailed mine closure planning, including measures to minimise socio-economic effects due to mine closure, to be conducted prior to the site being placed on care and maintenance;</li> <li>build, to the maximum extent practicable, on the other management plans required under this approval; and</li> <li>be submitted to the Executive Director Mineral Resources for approval by 30 September 2012.</li> </ol>	<p>Compliant</p>	<p>The MOP/Rehabilitation Management Plan has been submitted and approved.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p> <p>The requirements of the plan are being implemented.</p>																				



<p>Note: The Rehabilitation Management Plan should address all land impacted by the project, whether prior to or following the date of this approval.<sup>31</sup></p>		
<p>33. The Proponent shall prepare and implement a Rehabilitation Management Plan for the project in accordance with the conditions imposed on the mining lease(s) associated with the project under the <i>Mining Act 1992</i>, with specific reference to all surface facilities sites. This plan must be prepared in consultation with BCD, DPE Water, WCC, WSC and the CCC.</p> <p>Note: The Rehabilitation Management Plan should address all land impacted by the project, whether prior to or following the date of this approval.<sup>32</sup></p>	<p>Compliant</p>	<p>A Rehabilitation Management Plan compliant with this condition was prepared in June 2022.</p>
<p><b>BIODIVERSITY</b></p>		
<p><b>Appin East Mine Gas Safety Management Project</b></p>		
<p>34. By 31 January 2017, the Proponent shall enter into a suitable arrangement to offset the clearing of Cumberland Plain Woodland to develop the Appin East Mine Gas Drainage Project, to the satisfaction of the Planning Secretary.</p>	<p>Compliant</p>	<p>The Appin East Mine Safety Gas Project biodiversity requirements have been incorporated into the Biodiversity Management Plan.</p> <p>The Biodiversity Management Plan has been submitted and approved.</p>
<p><b>Ventilation Shaft No. 6</b></p>		
<p>35. The Proponent shall prepare and implement a biodiversity offset strategy to compensate for the impact of Ventilation Shaft No. 6 on Cumberland Plain Woodland. The offset strategy must:</p> <ul style="list-style-type: none"> <li>(a) be prepared in consultation with BCD and to the satisfaction of the Planning Secretary;</li> <li>(b) incorporate at least 8.7 hectares of existing Cumberland Plain Woodland vegetation; and</li> <li>(c) make suitable arrangements to protect and manage this offset area in perpetuity.</li> </ul> <p>Note: The 8.7 hectare size for the Biodiversity Offset Area identified above is based on Cumberland Plain Woodland vegetation on shale (HN529) in good condition. An equivalent minimum offset for Cumberland Plain Woodland on flats vegetation (HN528) in good condition is 9.4 hectares.</p>	<p>Compliant</p>	<p>The Ventilation Shaft 6 Biodiversity Offset Strategy has been submitted and approved.</p>
<p><b>Appin Mine Ventilation and Access Site</b></p>		
<p>35A. Within 6 months of the commencement of Appin Mine Ventilation and Access Site early works, unless otherwise agreed by the Planning Secretary, the Proponent must retire two (2) ecosystem credits for the clearing of Plant Community Type (PCT) 849 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion associated with the construction of the Appin Mine Ventilation</p>	<p>N/A</p>	<p>These credits will be retired in FY23.</p>

<sup>31</sup> Condition prior to MOD 3.

<sup>32</sup> Condition post MOD 3 approval.



<p>CONSOLIDATED CONSENT 24 and Access Site. The credits must be retired in accordance with the Biodiversity Offsets Scheme of the BC Act.</p>		
<p><b>Biodiversity Management Plan</b></p>		
<p>36. The Proponent shall prepare and implement a Biodiversity Management Plan for the Appin East Mine Gas Safety Management Project and Ventilation Shaft No. 6 and Appin Mine Ventilation and Access Site, to the satisfaction of the Planning Secretary. The plan must:</p> <p>(a) be prepared in consultation with BCD, and submitted to the Planning Secretary for approval by 31 January 2017;</p> <p>(b) describe how the implementation of offsets would be integrated with the overall rehabilitation of the site;</p> <p>(c) include:</p> <p>(i) a description of the short, medium and long term measures that would be implemented to:</p> <ul style="list-style-type: none"> <li>• implement offset strategy; and</li> <li>• manage the remnant vegetation and habitat on the site and in the offset areas;</li> </ul> <p>(ii) detailed performance and completion criteria for the implementation of the offset strategy;</p> <p>(iii) details of vegetation clearing protocols, including procedures to:</p> <ul style="list-style-type: none"> <li>• minimise the amount of the clearing required;</li> <li>• compensate the loss of hollow-bearing trees for the Appin East Mine Gas Safety Management Project; and</li> <li>• translocate the Cumberland Plain Snail (<i>Meridolum corneovirens</i>) affected by the clearing of Cumberland Plain Woodland for the Appin East Mine Gas Safety Management Project;</li> </ul> <p>(iv) details of location and timing of tree screenings to minimise visual impacts of the project;</p> <p>(v) a description of the measures that would be implemented in ongoing 5 year periods, including the procedures to be implemented to:</p> <ul style="list-style-type: none"> <li>• implement revegetation and regeneration within disturbed areas;</li> <li>• minimise the clearing of native vegetation;</li> <li>• control weeds and feral pests;</li> <li>• manage grazing and agriculture on site; and <input type="checkbox"/> control unauthorised access;</li> </ul> <p>(vi) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;</p> <p>(vii) a description of the potential risks to successful revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and</p> <p>(viii) details of who would be responsible for monitoring, reviewing, and implementing the plan.</p>	<p>Compliant</p>	<p>A Biodiversity Management Plans is in place.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p>
<p>36A The Proponent must implement the Biodiversity Management Plan approved by the Planning Secretary.</p>	<p>Compliant</p>	<p>The requirements of the plan are being implemented.</p>



<b>SCHEDULE 4A</b>												
<b>CONSTRUCTION SPECIFIC ENVIRONMENTAL CONDITIONS – APPIN MINE VENTILATION AND ACCESS SITE</b>												
<b>CONSTRUCTION NOISE</b>												
1. The Proponent must ensure that the noise generated by the Appin Mine Ventilation and Access Site early works are managed in accordance with the requirements of the Interim Construction Noise Guideline (DECC, 2009), as may be updated from time to time.	N/A	Not yet triggered.  Construction had not commenced in the reporting period.										
2. The Proponent must ensure that the noise generated by construction of the Appin Mine Ventilation and Access Site does not exceed the noise impact assessment criteria set out in Table 2B of condition 2C, Schedule 4 at any residence on privately-owned land, or on more than 25 percent of any privately-owned land.	N/A	Not yet triggered.  Construction had not commenced in the reporting period.										
<b>CONSTRUCTION BLASTING</b>												
<b>Blasting Criteria</b>												
3. The Proponent must ensure that the construction blasting at the Appin Mine Ventilation and Access Site does not cause exceedances of the criteria in Table 11. <small>Table 11: Construction blasting criteria</small>	N/A	Not yet triggered.  Construction had not commenced in the reporting period.										
<table border="1"> <thead> <tr> <th>Location</th> <th>Airblast overpressure (dB(Lin Peak))</th> <th>Ground vibration (mm/s)</th> <th>Allowable exceedance</th> </tr> </thead> <tbody> <tr> <td></td> <td>120</td> <td>10</td> <td>0%</td> </tr> <tr> <td>Residence on privately owned land</td> <td>115</td> <td>5</td> <td>5% of the total number of blasts over a period of 12 months</td> </tr> </tbody> </table> <p>However, these criteria do not apply if the Proponent has a written agreement with the relevant owner and the Proponent has advised the Department in writing of the terms of this agreement, or if other criteria is agreed by the Planning Secretary</p>			Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance		120	10	0%	Residence on privately owned land	115
Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance									
	120	10	0%									
Residence on privately owned land	115	5	5% of the total number of blasts over a period of 12 months									
<b>Blasting Hours</b>												
4. Unless the Planning Secretary agrees otherwise, the Proponent must only carry out blasting on the Appin Mine Ventilation and Access Site Monday to Friday 9 am to 5 pm and Saturday 9 am to 1 pm. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Planning Secretary unless an additional blast is required following a blast misfire.	N/A	Not yet triggered.  Construction had not commenced in the reporting period.										
5. If the Proponent decides to seek the Planning Secretary's approval to carry out blasting outside of the hours specified in condition 5 above, then it must demonstrate that the airblast overpressure levels from the blasting complies with the night-time L <sub>Amax</sub> sleep disturbance maximum noise trigger level criteria specified in Table 2B of condition 2C, Schedule 4.	N/A	Not yet triggered.  Construction had not commenced in the reporting period.										
<b>Blasting Frequency</b>												
6. The Proponent may carry out a maximum of 1 blast per 24 hour period at each of the Appin Mine Ventilation and Access Site ventilation shafts, unless an additional blast is required following a blast misfire.  This condition does not apply to blasts required to ensure the safety of the mine or its workers.  Note: For the purposes of this condition, a blast refers to a single blast event, which may involve a number of individual blasts fired in quick succession in a ventilation shaft of the site.	N/A	Not yet triggered.  Construction had not commenced in the reporting period.										



<b>Property Inspections</b>		
<p>7. If the Proponent receives a written request from the owner of any privately-owned land within 1 kilometre of vent shaft no 7 or vent shaft no 8, for a property inspection to establish the baseline condition of any buildings and/or structures on his/her land, then within 2 months of receiving this request the Proponent must:</p> <p>(a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties, to:</p> <p>i. establish the baseline condition of any buildings and/or structures on the land, or update the previous property inspection report; and</p> <p>ii. identify any measures that should be implemented to minimise the potential blasting impacts of the project on these buildings and/or structures; and</p> <p>(b) give the landowner a copy of the new or updated property inspection report.</p> <p>If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Planning Secretary for resolution.</p>	<p>N/A</p>	<p>Not yet triggered.</p> <p>Construction had not commenced in the reporting period.</p>
<b>Property Investigations</b>		
<p>8. If the owner of any privately-owned land within 1 kilometre of vent shaft no 7 or vent shaft no 8 claims in writing that buildings or structures on their land have been damaged as a result of blasting on the Appin Mine Ventilation and Access Site, and the Planning Secretary is satisfied that an investigation is warranted, then within 2 months of receiving this claim in writing from the landowner the Proponent must:</p> <p>(a) commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties, to investigate the claim; and</p> <p>(b) give the landowner a copy of the property investigation report.</p> <p>If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent must repair the damages to the satisfaction of the Planning Secretary.</p> <p>If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Planning Secretary for resolution.</p>	<p>N/A</p>	<p>Not yet triggered.</p> <p>Construction had not commenced in the reporting period.</p>
<b>Operating Conditions</b>		
<p>9. During blasting operations on the Appin Mine Ventilation and Access Site, the Proponent must:</p> <p>(a) engage suitably qualified and experienced person/s to oversee the process of blasting, including blast planning, design, supervision and monitoring;</p> <p>(b) implement best management practice to:</p> <p>i. protect the safety of people (including road users) and livestock in the surrounding area;</p>	<p>N/A</p>	<p>Not yet triggered.</p> <p>Construction had not commenced in the reporting period.</p>



<p>ii. protect public or private infrastructure/property in the surrounding area from any damage; and iii. minimise the dust and fume emissions of any blasting; to the satisfaction of the Planning Secretary.</p>		
<p><b>Site Entrance</b></p>		
<p>10. Prior to the commencement of construction on the Appin Mine Ventilation and Access Site, the Proponent must construct the Appin Mine Ventilation and Access Site entrance and its intersection with Menangle Road to the satisfaction of WSC and TfNSW.</p>	<p>N/A</p>	<p>Not yet triggered.  Construction had not commenced in the reporting period.</p>
<p><b>CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN</b></p>		
<p>11. Prior to the commencement of Appin Mine Ventilation and Access Site early works, the Proponent must prepare a Construction Environmental Management Plan for the construction phase of the Appin Mine Ventilation and Access Site to the satisfaction of the Planning Secretary. This plan must:</p> <p>(a) be prepared in consultation with the EPA; (b) provide specific environmental management and monitoring measures for construction works, including for:</p> <p>i. minimising construction-related noise, dust, visual impacts, and surface disturbance; ii. stormwater management including erosion and sediment controls and clean water diversion; iii. monitoring and managing groundwater inflows and impacts to groundwater resources as a result of shaft construction activities at the Appin Mine Ventilation and Access Site; (c) include details of vegetation clearing protocols, including procedures to minimise the amount of clearing required on the Appin Mine Ventilation and Access Site; (d) include a Construction Blast Management Plan prepared by a suitably qualified and experienced person/s in consultation with the EPA that:</p> <p>i. describes the measures that would be implemented to ensure compliance with the relevant conditions of this approval and that best management practice is being employed; ii. includes a real-time automated monitoring program prepared in accordance with the guidelines provided in Australian Standard 2187.2-2006: Explosives-Storage and use, Part 2: Use of explosives to:</p> <ul style="list-style-type: none"> <li>• evaluate the performance of the project and compliance with the applicable criteria;</li> <li>• control flyrock; and</li> <li>• minimise fume emissions from the site;</li> </ul> <p>iii. includes public notification procedures to enable members of the public, particularly surrounding residents, to get up-to-date information on the proposed blast schedule; iv. includes a protocol for investigating and responding to blast-related complaints; and v. includes a protocol for investigating and responding to noise complaints. (e) include a Construction Traffic Management Plan prepared in consultation with the TfNSW and WSC, that:</p> <p>i. includes strategies to manage construction traffic, including road closure protocols, community</p>	<p>N/A</p>	<p>Not yet triggered.  Construction had not commenced in the reporting period.</p>



<p>consultation and measures to avoid potential road safety conflicts with other road users;</p> <p>ii. includes a program for conducting road safety audits, including both pre and post construction, of the intersection of the Appin Mine Ventilation and Access Site entrance with Menangle Road;</p> <p>iii. includes a vehicle movement plan for:</p> <ul style="list-style-type: none"> <li>• managing light, heavy and over-dimensional vehicles during construction works;</li> <li>• transporting construction waste materials; and</li> <li>• restricting construction or transportation hours to avoid road user conflicts; and</li> </ul> <p>(f) include a Construction Noise Management Plan that:</p> <p>i. describes the measures that would be implemented to ensure compliance with the noise conditions of this approval;</p> <p>ii. includes a noise monitoring program that:</p> <ul style="list-style-type: none"> <li>• uses a combination of real-time and supplementary attended monitoring to evaluate noise generated by the project during construction; and</li> <li>• includes a protocol for determining exceedances of the relevant conditions of this approval.</li> </ul> <p>(g) include a Construction Air Quality Management Plan that:</p> <p>i. describes the proactive and reactive air quality mitigation measures that would be implemented to ensure compliance with Condition 9 of Schedule 4 of this approval;</p> <p>ii. includes an air quality monitoring program that:</p> <ul style="list-style-type: none"> <li>• includes real time monitoring to evaluate air quality impacts during construction; and</li> <li>• includes a protocol for determining exceedances of the relevant conditions of this approval.</li> </ul>		
<p><b>SCHEDULE 5: ADDITIONAL PROCEDURES</b></p>		
<p><b>NOTIFICATION OF LANDOWNERS</b></p>		
<p>1. As soon as practicable and no longer than 7 days after obtaining monitoring results showing:</p> <p>(a) an exceedance of any relevant criteria in schedule 4, the Proponent shall notify affected landowners in writing of the exceedance, and provide regular monitoring results to each affected landowner until the project is again complying with the relevant criteria; and</p> <p>(b) an exceedance of any relevant air quality criteria in schedule 4, the Proponent shall send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners and/or existing tenants of the land (including the tenants of any mine-owned land).</p>	<p>N/A</p>	<p>No exceedances of criteria were reported in the reporting period.</p>
<p><b>INDEPENDENT REVIEW</b></p>		
<p>2. If an owner of privately-owned land considers the project to be exceeding the relevant criteria in Schedule 4, then he/she may ask the Planning Secretary in writing for an independent review of the impacts of the project on his/her land.</p> <p>If the Planning Secretary is satisfied that an independent review is warranted, then within 2 months of the Planning Secretary's decision the Proponent shall:</p>	<p>N/A</p>	<p>Condition not triggered during reporting period.</p>





<p>(a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Planning Secretary, to:</p> <ul style="list-style-type: none"> <li>consult with the landowner to determine his/her concerns;</li> <li>conduct monitoring to determine whether the project is complying with the relevant criteria in Schedule 4; and</li> <li>if the project is not complying with these criteria then identify the measures that could be implemented to ensure compliance with the relevant criteria; and</li> </ul> <p>(b) give the Planning Secretary and landowner a copy of the independent review.</p>		
<p>3. If the independent review determines that the project is complying with the relevant criteria in Schedule 4, then the Proponent may discontinue the independent review with the approval of the Planning Secretary. If the independent review determines that the project is not complying with the relevant impact assessment criteria in Schedule 4, and that the project is primarily responsible for this non-compliance, then the Proponent shall:</p> <p>(a) implement all reasonable and feasible mitigation measures, in consultation with the landowner and appointed independent person, and conduct further monitoring until the project complies with the relevant criteria; or</p> <p>(b) secure a written agreement with the landowner to allow exceedances of the relevant criteria, to the satisfaction of the Planning Secretary.</p> <p>If the independent review determines that any relevant acquisition criteria in schedule 4 are being exceeded and that the project is primarily responsible for this non-compliance, then upon receiving a written request from the landowner, the Proponent shall acquire all or part of the landowner's land in accordance with the procedures in Conditions 4-5 below.</p>	<p>N/A</p>	<p>Condition not triggered during reporting period.</p>
<p><b>LAND ACQUISITION</b></p>		
<p>4. Within 3 months of receiving a written request from a landowner with acquisition rights, the Proponent shall make a binding written offer to the landowner based on:</p> <p>(a) the current market value of the landowner's interest in the land at the date of this written request, as if the land was unaffected by the project, having regard to the:</p> <ul style="list-style-type: none"> <li>existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and</li> <li>presence of improvements on the land and/or any approved building or structure which has been physically commenced on the land at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of any additional noise mitigation measures under Condition 6 of Schedule 4;</li> </ul> <p>(b) the reasonable costs associated with:</p>	<p>N/A</p>	<p>Condition not triggered during reporting period.</p>



<ul style="list-style-type: none"> <li>• relocating within the Wollondilly local government area, or to any other local government area determined by the Planning Secretary; and</li> <li>• obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired; and</li> </ul> <p>(c) reasonable compensation for any disturbance caused by the land acquisition process.</p> <p>If the Proponent and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired within 28 days after the Proponent makes its written offer, then either party may refer the matter to the Planning Secretary for resolution.</p> <p>Upon receiving such a request, the Planning Secretary will request the President of the NSW Division of the Australian Property Institute to appoint a qualified independent valuer to:</p> <ul style="list-style-type: none"> <li>• consider submissions from both parties;</li> <li>• determine a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;</li> <li>• prepare a detailed report setting out the reasons for any determination; and</li> <li>• provide a copy of the report to both parties.</li> </ul> <p>Within 14 days of receiving the independent valuer's report, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.</p> <p>However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the Planning Secretary for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the Planning Secretary will determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in paragraphs (a)-(c) above, the independent valuer's report, the detailed report disputing the independent valuer's determination, and any other relevant submissions.</p> <p>Within 14 days of this determination, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the Planning Secretary's determination.</p> <p>If the landowner refuses to accept the Proponent's binding written offer under this condition within 6 months of the offer being made, then the Proponent's obligations to acquire the land shall cease, unless the Planning Secretary determines otherwise.</p>		
<p>5. The Proponent shall pay all reasonable costs associated with the land acquisition process described in Condition 4 above, including the costs associated</p>	<p>N/A</p>	<p>Condition not triggered during reporting period.</p>



with obtaining Council approval for any plan of subdivision (where permissible), and registration of this plan at the Office of the Registrar-General.		
<b>SCHEDULE 6: ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING</b>		
<b>ENVIRONMENTAL MANAGEMENT</b>		
<b>Environmental Management Strategy</b>		
<p>1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Planning Secretary. This strategy must:</p> <p>(a) be prepared in consultation with WSC and be submitted to the Planning Secretary for approval;</p> <p>(b) provide the strategic framework for environmental management of the project;</p> <p>(c) identify the statutory approvals that apply to the project;</p> <p>(d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;</p> <p>(e) describe the procedures that would be implemented to:</p> <ul style="list-style-type: none"> <li>• keep the local community and relevant agencies informed about the operation and environmental performance of the project, including a specific community and stakeholder notification and engagement strategy during the construction and operation of the Appin Mine Ventilation and Access Site;</li> <li>• receive, handle, respond to, and record complaints;</li> <li>• resolve any disputes that may arise during the course of the project;</li> <li>• respond to any non-compliance;</li> <li>• respond to emergencies; and</li> </ul> <p>(f) include:</p> <ul style="list-style-type: none"> <li>• references to all relevant strategies, plans and programs approved under the conditions of this approval; and</li> <li>• a clear plan depicting all the monitoring required to be carried out under the conditions of this approval.</li> </ul>	Compliant	<p>The Environmental Management Strategy was submitted and approved on 1 October 2020.</p> <p>The plan is available on the website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p> <p>The requirements of the plan are being implemented.</p> <p>The EMS was submitted for approval in July 2022 following the approval of MOD 3.</p>
<b>Management Plan Requirements</b>		
<p>2. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:</p> <p>(a) detailed baseline data;</p> <p>(b) a description of:</p> <ul style="list-style-type: none"> <li>• the relevant statutory requirements (including any relevant approval, licence or lease conditions);</li> <li>• any relevant limits or performance measures/criteria;</li> <li>• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;</li> </ul> <p>(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;</p> <p>(d) a program to monitor and report on the:</p>	Compliant	<p>Management Plans have been prepared in accordance with relevant guidelines.</p> <p>Additional information will be included where identified during the review/approval process.</p>



<ul style="list-style-type: none"> <li>• impacts and environmental performance of the project;</li> <li>• effectiveness of any management measures (see c above);</li> </ul> <p>(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;</p> <p>(f) a program to investigate and implement ways to improve the environmental performance of the project over time;</p> <p>(g) a protocol for managing and reporting any:</p> <ul style="list-style-type: none"> <li>• incidents;</li> <li>• complaints;</li> <li>• non-compliances with statutory requirements; and</li> <li>• exceedances of the impact assessment criteria and/or performance criteria; and</li> </ul> <p>(h) a protocol for periodic review of the plan.</p> <p>Note: The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.</p>		
<p><b>Adaptive Management</b></p>		
<p>3. The Proponent must assess and manage project-related risks to ensure that there are no exceedances of the criteria and/or performance measures in Schedules 3 and 4. Any exceedance of these criteria and/or performance measures constitutes a breach of this approval and may be subject to penalty or offence provisions under the EP&amp;A Act or EP&amp;A Regulation. Where any exceedance of these criteria and/or performance measures has occurred, the Proponent must, at the earliest opportunity:</p> <p>(a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;</p> <p>(b) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and</p> <p>(c) implement remediation measures as directed by the Planning Secretary,</p> <p>to the satisfaction of the Planning Secretary.</p>	<p>Compliant</p>	<p>Actions will be implemented to address exceedances of criteria as required.</p>
<p><b>Annual Review</b></p>		
<p>4. By 30 September 2012, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Planning Secretary. This review must:</p> <p>(a) describe the development (including any rehabilitation) that was carried out in the past financial year, and the development that is proposed to be carried out over the next year;</p> <p>(b) include a comprehensive review of the monitoring results and complaints records of the project over the past financial year, which includes a comparison of these results against the:</p> <ul style="list-style-type: none"> <li>• relevant statutory requirements, limits or performance measures/criteria;</li> <li>• requirements of any plan or program required under this approval;</li> <li>• monitoring results of previous years; and</li> </ul>	<p>Compliant</p>	<p>This condition has been addressed in this Annual Review.</p>



<ul style="list-style-type: none"> <li>relevant predictions in the EA;</li> </ul> <p>(c) identify any non-compliance over the past financial year, and describe what actions were (or are being) taken to ensure compliance;</p> <p>(d) identify any trends in the monitoring data over the life of the project;</p> <p>(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and</p> <p>(f) describe what measures will be implemented over the current financial year to improve the environmental performance of the project.</p>		
<p><b>Revision of Strategies, Plans and Programs</b></p>		
<p>5. Within 3 months of:</p> <p>(a) the submission of an annual review under Condition 4 above;</p> <p>(b) the submission of an incident report under Condition 7 below;</p> <p>(c) the submission of an audit report under Condition 9 below; and</p> <p>(d) any modification to the conditions of this approval, (unless the conditions require otherwise), or</p> <p>(e) a direction of the Planning Secretary under Condition 4 of Schedule 2;</p> <p>the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Planning Secretary.</p> <p>Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.</p>	<p>Compliant</p>	<p>Management Plans are reviewed as required by this condition.</p> <p>A CEMP for Early Works was submitted to meet the requirements of the revised conditions associated with MOD 3.</p> <p>Improvements identified during the reviews are recorded in the Management Plan Review Log.</p>
<p><b>Community Consultative Committee</b></p>		
<p>6. The Proponent shall establish and operate a new Community Consultative Committee (CCC) for the project to the satisfaction of the Planning Secretary. This CCC must be operated in general accordance with the Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects (Department of Planning, 2007, or its latest version), and be operating by 30 September 2012.</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval.</li> <li>In accordance with the guideline, the Committee should be comprised of an independent chair and appropriate representation from the Proponent, Council, recognised environmental groups and the local community.</li> </ul>	<p>Compliant</p>	<p>The Appin Mine Community Consultative Committee is in place and operating in accordance with the Department's <i>Community Consultative Committee Guidelines: State Significant Projects</i>.</p>
<p><b>REPORTING</b></p>		
<p><b>Incident Notification, Reporting and Response</b></p>		
<p>7. The Proponent shall notify, at the earliest opportunity, the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the project, the Proponent shall notify the Secretary and any other relevant agencies as soon</p>	<p>Compliant</p>	<p>No incidents causing or threatening to cause material environmental harm occurred during the reporting period.</p>



<p>as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.<sup>33</sup></p>		<p>Exceedances of limits will be notified to the Department as required.</p>
<p>7. The Planning Secretary must be notified in writing via the Major Projects website immediately after the Proponent becomes aware of an incident. The notification must identify the project (including the development application number and the name of the development if it has one) and set out the location and nature of the incident. Subsequent notification requirements must be given, and reports submitted in accordance with the requirements set out in Appendix 7.<sup>34</sup></p>	<p>Compliant</p>	<p>No incidents causing or threatening to cause material environmental harm occurred during the reporting period.</p> <p>No exceedances of criteria were reported during the reporting period.</p>
<p><b>Non-Compliance Notification</b></p>		
<p>7A. The Secretary must be notified in writing via the Major Projects website within seven days after the Proponent becomes aware of any non-compliance. A non-compliance notification must identify the project and the application number for it, set out the condition of approval that the project is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.</p> <p><i>Note: A non-compliance which has been notified as an incident does not need to also be notified as a noncompliance.</i></p>	<p>Compliant</p>	<p>No non-compliances have been recorded since this condition was included post approval of MOD 3.</p>
<p><b>Regular Reporting</b></p>		
<p>8. The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval.</p>	<p>Compliant</p>	<p>Monitoring data is reported in the 14-day EPL Report. This data is available on the IMC website at: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p>
<p><b>INDEPENDENT ENVIRONMENTAL AUDIT</b></p>		
<p>9. By the end of December 2013, and every 3 years thereafter, unless the Planning Secretary directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:</p> <p>(a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Planning Secretary;</p> <p>(b) include consultation with the relevant agencies;</p> <p>(c) assess the environmental performance of the project and assess whether it is complying with the requirements in this approval and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals);</p> <p>(d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; and</p>	<p>Compliant</p>	<p>Environmental Resources Management Australia Pty Ltd (ERM) was engaged by IMC to carry out an Independent Environmental Audit of Appin Mine in FY20</p> <p>A copy of the Audit findings and Response to Recommendations can be found on the IMC webpage. <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a> and a progress report is provided in Appendix 4</p>

<sup>33</sup> Condition prior to MOD 3.

<sup>34</sup> Condition post MOD 3.



<p>(e) recommend appropriate measures or actions to improve the environmental performance of the project, and/or any assessment, plan or program required under the abovementioned approvals.</p> <p><i>Note: This audit team must be led by a suitably qualified auditor and include experts in any field specified by the Planning Secretary.</i></p>		<p>An IEA is scheduled to occur in FY23.</p>
<p>10. Within 6 weeks of the completion of this audit, or as otherwise agreed by the Planning Secretary, the Proponent shall submit a copy of the audit report to the Planning Secretary, together with its response to any recommendations contained in the audit report.</p>	<p>Compliant</p>	<p>The audit report, dated December 2019, was provided to the Department within the required timeframe.</p>
<p><b>ACCESS TO INFORMATION</b></p>		
<p>11. From 30 June 2012, the Proponent shall:</p> <p>(a) make copies of the following publicly available on its website:</p> <ul style="list-style-type: none"> <li>• the documents referred to in Condition 2 of Schedule 2;</li> <li>• all current statutory approvals for the project;</li> <li>• all approved strategies, plans and programs required under the conditions of this approval;</li> <li>• a comprehensive summary of the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs;</li> <li>• a complaints register, updated on a monthly basis;</li> <li>• minutes of CCC meetings;</li> <li>• the annual reviews of the project;</li> <li>• any independent environmental audit of the project, and the Proponent's response to the recommendations in any audit;</li> <li>• any other matter required by the Planning Secretary; and</li> </ul> <p>(b) keep this information up-to-date, to the satisfaction of the Planning Secretary.</p>	<p>Compliant</p>	<p>All approved plans, strategies and monitoring results are on the South32 webpage. <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a></p>
<p><b>APPENDIX 7: INCIDENT NOTIFICATION AND REPORTING REQUIREMENTS</b></p>		
<p><b>WRITTEN INCIDENT NOTIFICATION REQUIREMENTS</b></p>		
<p>1. A written incident notification addressing the requirements set out below must be submitted to the Planning Secretary via the Major Projects website within seven days after the Proponent becomes aware of an incident.</p>	<p>Compliant</p>	<p>No incidents causing or threatening to cause material environmental harm occurred during the reporting period.</p> <p>No exceedances of criteria were reported during the reporting period.</p>
<p>2. Written notification of an incident must:</p> <p>(a) identify the project and application number;</p> <p>(b) provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident);</p> <p>(c) identify how the incident was detected;</p> <p>(d) identify when the Proponent became aware of the incident;</p> <p>(e) identify any actual or potential non-compliance with conditions of approval;</p> <p>(f) describe what immediate steps were taken in relation to the incident;</p>	<p>Compliant</p>	<p>No incidents causing or threatening to cause material environmental harm occurred during the reporting period.</p> <p>No exceedances of criteria were reported during the reporting period.</p>



<p>(g) identify further action(s) that will be taken in relation to the incident; and (h) identify a project contact for further communication regarding the incident.</p>		
<p>3. Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Planning Secretary, the Proponent must provide the Planning Secretary and any relevant public authorities (as determined by the Planning Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested.</p>	<p>Compliant</p>	<p>No incidents causing or threatening to cause material environmental harm occurred during the reporting period.  No exceedances of criteria were reported during the reporting period.</p>
<p>4. The Incident Report must include: (a) a summary of the incident; (b) outcomes of an incident investigation, including identification of the cause of the incident; (c) details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence; and (d) details of any communication with other stakeholders regarding the incident.</p>	<p>Compliant</p>	<p>No incidents causing or threatening to cause material environmental harm occurred during the reporting period.  No exceedances of criteria were reported during the reporting period.</p>





## Appendix 4: Independent Environmental Audit Progress - FY22

### Minister's Conditions of Approval PA 08\_0150

Item No.	Assessment Requirement	Comment	Audit Classification	Response/Action	IMC Response December 2019	Status as at 30 June 2022								
2.1	In addition to meeting the specific performance criteria established under this approval, the Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.	<p>The audit team observed inadequate storage of chemicals, oils and waste oil including bunds filled with water and other debris, bunds with insufficient capacity and drains to sumps blocked at the maintenance workshops, laydown areas and waste storage areas at Appin East and West.</p> <p>A bund, sump and oily water management procedure has been developed and it is understood a review of facilities has been conducted in accordance with the procedure. Actions are to be prioritised and implemented on a risk basis and capital availability.</p>	Observation – Non Compliance	Implement the actions from the review.	<p>IMC will continue to review and implement hydrocarbon and chemical facility improvement projects on the basis of risk and funding availability.</p> <p>Bunds will continue to be maintained on an ongoing basis.</p>	<p>IMC will continue to review and implement hydrocarbon and chemical facility improvement projects on the basis of risk and funding availability.</p> <p>Bunds will continue to be maintained on an ongoing basis.</p> <p>A bund audit was undertaken in March 2022. Outcomes from that audit are being progressively implemented.</p> <p><b>Ongoing</b></p>								
4.2	<p>From the end of December 2014, the Proponent shall ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.</p> <p><i>Table2: Noise Criteria dB(A)</i></p> <table border="1"> <thead> <tr> <th>LOCATION</th> <th>DAY</th> <th>EVENING</th> <th>NIGHT</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	LOCATION	DAY	EVENING	NIGHT					<p>Attended noise monitoring is conducted on a quarterly basis. Since 2019 noise monitoring has been conducted by ERM, prior to which it was conducted internally.</p> <p>Noise levels were above the assessment criteria on three occasions during 2019. Exceedances of assessment</p>	Non Compliance	Continue to investigate sources of noise exceedances and implement corrective actions.	<p>IMC will continue to investigate sources of noise exceedances and implement corrective actions where appropriate.</p>	<p>IMC will continue to investigate sources of noise exceedances and implement corrective actions where appropriate.</p>
LOCATION	DAY	EVENING	NIGHT											



Area	Receiver Number	LAeq (15min)	LAeq (15min)	LAeq (15min)	LA1 (1min)
Appin West Receivers south-west of Appin West	1-7, 9-11, 13, 184, 188-189	39	39	35	49
Appin West receivers near Hume Highway	185-187, 190	35	35	35	53
All other Appin West receivers	14, 26	45	45	35	53
	15-25, 27-48, 50-56	43	43	35	

LOCATION		DAY	EVENING	NIGHT	
Area	Receiver Number	LAeq (15min)	LAeq (15min)	LAeq (15min)	LA1 (1min)
Appin No. 3 receivers	58, 67, 71, 72	41	41	41	49
	68, 74, 75	40	40	40	
	69, 70, 76	39	39	39	
	217-218, 233, 279-282	35	35	35	

criteria were recorded at Appin No. 1 & 2 in June and September and at Vent Shaft 6 in March 2019. Investigations into the exceedances did not identify and significant issues with the vent fans however there is a plan to replace attenuators and inlet vanes to determine if that will resolve the issue. No regulatory action has been taken.

There were no noise exceedances reported in FY22.

**Ongoing**



	Appin No.1 and No.2 Receivers	82, 91, 216	42	42	42	50					
		83, 85	41	41	41						
		78, 84, 86-90, 199	40	40	40						
		212-215, 226, 228-230, 232, 234, 235	35	35	35						
	Appin Township	136, 137, 139, 142, 143	44	44	44	52					
		135	43	43	43						
		All other privately owned property	44	44	44						
	Douglas Park	All privately owned residences	45	45	39	49					
	All other privately owned land (excluding receivers in Table 3)		35	35	35	45					
	<p>However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the criteria, and the</p>										



	Proponent has advised the Department in writing of the terms of this agreement.					
4.14	<p>The Proponent shall provide a compensatory water supply to any owner of privately-owned land whose water supply is adversely impacted (other than an impact that is negligible) as a result of the project, in accordance with the approved Surface Water Management Plan.</p> <p>The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributed to the project. Equivalent water supply must be provided (at least on an interim basis) within 24 hours of the loss being identified.</p> <p>If the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.</p> <p>If the Proponent is unable to provide an alternative long-term supply of water, then the Proponent shall provide alternative compensation to the satisfaction of the Secretary.</p>	<p>It is understood that BSO receive approximately half a dozen compensatory water requests per year. These have been historically handled through the subsidence advisory board. However, the new process is that the claims are now received directly by BSO.</p> <p>Short term solutions include a water truck taking water to affected landholders. Long term solutions can include new bore/s and drilling deeper at current bore.</p> <p>Claims are reviewed and tracked through the monthly Subsidence Review Meeting.</p> <p>Currently there is one case that has been referred to the Secretary for resolution and is currently with the department for consideration.</p>	Observation - Compliant	Ensure BSO continues to work with DPIE to resolve compensatory water dispute.	IMC will continue to work with DPIE to resolve compensatory water requests as applicable.	<p>IMC will continue to work with DPIE to resolve compensatory water requests as applicable.</p> <p><b>Ongoing</b></p>
4.15	The Proponent shall ensure that all surface water discharges from the site (including from the Brennans Creek Dam) comply with the discharge limits (both volume and quality) set for the project in any EPL.	Refer to EPL P1.3, L2.4, L3.1	Non Compliance	Refer EPL Compliance.	IMC will continue to investigate any exceedances of water quality criteria as they occur and implement corrective actions where identified.	<p>IMC will continue to investigate any exceedances of water quality criteria as they occur and implement corrective actions where identified.</p> <p>There were no exceedances of water quality criteria recorded in FY22.</p> <p><b>Ongoing</b></p>



6.5	<p>Within 3 months of:</p> <ul style="list-style-type: none"> <li>(a) The submission of an annual review under Condition 4 above;</li> <li>(b) The submission of an incident report under Condition 7 below;</li> <li>(c) The submission of an audit report under Condition 9 below; and</li> <li>(d) Any modification to the conditions of this approval, (unless the conditions require otherwise), the Proponent shall review, and if necessary revise, the strategies, plans and programs required under this approval to the satisfaction of the Secretary.</li> </ul> <p><i>NOTE: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.</i></p>	<p>Management plan reviews have generally been conducted on an annual basis however some reviews are overdue. Reviews have not been conducted following submission of incident reports. It is noted that BSO has developed a management plan review log and reviews are now being documented.</p>	<p>Administrative Non Compliance</p>	<p>Ensure management plans are reviewed and revised as required by this condition.</p>	<p>Management Plan Review Log in place and reviews will be undertaken as required.</p>	<p>Management Plan Review Log in place and reviews will be undertaken as required.</p> <p><b>Ongoing</b></p>
6.7	<p>The Proponent shall notify, at the earliest opportunity, the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the project, the Proponent shall notify the Secretary and any other relevant agencies as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.</p>	<p>Ferric chloride discharge. Initial notification was to EPA hotline – refer to EPL for details. Letter to EPA (7 day report) was provided on 5/11. Incident occurred on the 18<sup>th</sup> October. DPIE was notified on Friday 19<sup>th</sup> October along with other agencies but was not provided with a report until 5 November.</p>	<p>Administrative Non Compliance</p>	<p>Ensure DPIE is provided with a written report within 7 days of the date of the incident.</p>	<p>DPIE will be provided a report within 7 days of any incident that has caused or threatened to cause material harm to the environment.</p>	<p>DPE will be provided a report within 7 days of any incident that has caused or threatened to cause material harm to the environment.</p> <p>There were no incidents meeting this criteria in FY22.</p> <p><b>As required</b></p>



## Environmental Protection Licence 2504

Item No.	Assessment Requirement	Comment	Audit Classification	Response/Action	IMC Response December 2019	Status
O1.1	<p>Licensed activities must be carried out in a competent manner. This includes:</p> <p>(a) The processing, handling, movement and storage of materials and substances used to carry out the activity; and</p> <p>(b) The treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.</p>	<p>A formal warning letter was issued by the EPA in March 2019 for failure to bund a flocculant tank at Appin North. A temporary bund was placed at the tank. The tank has since been decommissioned.</p> <p>The audit team observed potentially inadequate storage of chemicals, oils and waste oil including bunds filled with water and other debris, bunds with insufficient capacity and drains to sumps blocked by mud at the maintenance workshops, laydown areas and waste storage areas at Appin East and West. A bund, sump and oily water management procedure has been developed and it is understood a review of facilities has been conducted in accordance with the procedure. Actions are to be prioritised and implemented on a risk basis and capital availability.</p> <p>Two incidents were reported to the EPA related to issues of waste being inappropriately disposed at the site:</p> <ol style="list-style-type: none"> <li>1. Contents of reagent bund removed and placed at the slurry ponds</li> <li>2. Oil separation pit cleaned out and disposed at Appin North pit top</li> </ol> <p>No further action was taken by the EPA.</p>	Non Compliance	Implement the actions of the review	<p>IMC will continue to review and implement hydrocarbon and chemical facility improvement projects on the basis of risk and funding availability. Bunds will continue to be maintained on an ongoing basis.</p>	<p>IMC will continue to review and implement hydrocarbon and chemical facility improvement projects on the basis of risk and funding availability. Bunds will continue to be maintained on an ongoing basis.</p> <p>A bund audit was undertaken in March 2022. Outcomes from that audit are being progressively implemented.</p> <p>An Official Caution was issued by the EPA in February 2022 in relation to a modification to a bund.</p> <p><b>Ongoing</b></p>
M6.1	<p>For each discharge point or utilisation area specified below, the licensee must monitor:</p> <ol style="list-style-type: none"> <li>a) The volume of liquids discharged to water or applied to the area;</li> <li>b) The mass of solids applied to the area;</li> <li>c) The mass of pollutants emitted to the air;</li> </ol>					



	At the frequency and using the method and units of measure, specified below.													
	<p>Point 4</p> <table border="1"> <thead> <tr> <th>Frequency</th> <th>Unit of measure</th> <th>Sampling method</th> </tr> </thead> <tbody> <tr> <td>Continuous</td> <td>Kilolitres per day</td> <td>In line instrumentation</td> </tr> </tbody> </table>	Frequency	Unit of measure	Sampling method	Continuous	Kilolitres per day	In line instrumentation	<p>Monitoring report indicates manual readings taken from January to December 2017 as flow meters were being replaced. EPA was not notified of the change of sampling method. Illawarra Coal now maintains a Correspondence Register to record all correspondence with regulators and it was sighted that issues with monitoring equipment was now being notified to the EPA.</p>	Administrative Non Compliance	Ensure issues with sampling equipment are notified to the EPA.	EPA will be notified as required where there are any changes to the sampling method as specified in the EPL.	EPA will be notified as required where there are any changes to the sampling method as specified in the EPL.  <b>As required</b>		
Frequency	Unit of measure	Sampling method												
Continuous	Kilolitres per day	In line instrumentation												
	<p>Point 19</p> <table border="1"> <thead> <tr> <th>Frequency</th> <th>Unit of Measure</th> <th>Sampling Method</th> </tr> </thead> <tbody> <tr> <td>Continuous during discharge</td> <td>Kilolitres per day</td> <td>In line instrumentation</td> </tr> </tbody> </table>	Frequency	Unit of Measure	Sampling Method	Continuous during discharge	Kilolitres per day	In line instrumentation	<p>Monitoring report indicates manual readings taken from February to December 2017 as flow meters being replaced. Refer above</p>	Administrative Non Compliance	Ensure issues with sampling equipment are notified to the EPA.	EPA will be notified as required where there are any changes to the sampling method as specified in the EPL.	EPA will be notified as required where there are any changes to the sampling method as specified in the EPL.  <b>As required</b>		
Frequency	Unit of Measure	Sampling Method												
Continuous during discharge	Kilolitres per day	In line instrumentation												
	<p>Point 24</p> <table border="1"> <thead> <tr> <th>Frequency</th> <th>Unit of Measure</th> <th>Unit of Measure</th> <th>Sampling Method</th> </tr> </thead> <tbody> <tr> <td>Continuous during discharge</td> <td>Kilolitres per day</td> <td>KL/month per day</td> <td>Flow meter and continuous logger</td> </tr> </tbody> </table>	Frequency	Unit of Measure	Unit of Measure	Sampling Method	Continuous during discharge	Kilolitres per day	KL/month per day	Flow meter and continuous logger	<p>Monitoring report indicates manual readings taken from January to December 2017 as flow meters being replaced. Refer above</p>	Administrative Non Compliance	Ensure issues with sampling equipment are notified to the EPA.	EPA will be notified as required where there are any changes to the sampling method as specified in the EPL.	EPA will be notified as required where there are any changes to the sampling method as specified in the EPL.  <b>As required</b>
Frequency	Unit of Measure	Unit of Measure	Sampling Method											
Continuous during discharge	Kilolitres per day	KL/month per day	Flow meter and continuous logger											
R2.2	The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.	Refer to condition L1.1 re ferric chloride incident.	Administrative Non Compliance	Ensure notification is undertaken	The EPA will be provided a report	The EPA will be provided a report within 7 days of any incident that has								



	Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.	The incident occurred on 18/10 and the 7 day written notification was provided on 5/11.		as required.	within 7 days of any incident that has caused or threatened to cause material harm to the environment.	caused or threatened to cause material harm to the environment.  <b>As required</b>
U1.1	<p>AIM: The aim of this Environment Improvement Program (EIP) is to improve water quality and aquatic health in the Georges River downstream of licenced discharge point 10 (Brennans creek discharge).</p> <p>WORKS: The licensee must undertake its commitments to works and activities described in the latest controlled version of the document titled "Illawarra Coal, Bulli Seam Operations, Georges River Environmental Improvement Program". The latest version of the document must be displayed on the licensee's website. In addition to the reporting and consultation commitments in document, the licensee must submit a report to the EPA by the due date recommending licence limits for discharge point 10. DUE DATE: 31 December 2018 DUE DATE: 30 June 2019 Note: This EIP follows from Pollution Reduction Programs 19 and 20.</p>	<p>The EIP document is available on the company website. No report has been submitted for 2019. Reports for 2017 and 2018 reviewed. Monitoring of macroinvertebrates and ecotoxicity is continuing. BSO is in discussion with the EPA as to next steps to enable proposed discharge limits at Point 10 to be achieved. It is expected that another water filtration plant will be constructed at Appin North.</p>	Non Compliance	No further action – dependent on outcome of negotiation with EPA.	<p>IMC is continuing to engage with the EPA on the project to improve water quality in the Georges River.</p>	<p>IMC is continuing to engage with the EPA on the project to improve water quality in the Georges River.</p> <p>The EIP has been replaced with the Georges River Aquatic Health Monitoring Program.</p> <p>A temporary WTP has been commissioned at Appin North and a permanent WTP is under construction.</p> <p><b>Ongoing</b></p>





**EPBC Approval 2010/5722**

Item No.	Assessment Requirement	Comment	Audit Classification	Response/Action	IMC Response December 2019	Status
3	<p>The person taking the action must submit a Vegetation Management plan to the Minister for approval. The plan must address the following requirements:</p> <ul style="list-style-type: none"> <li>(a) Make reference to the Biodiversity Offset strategy as outlined in condition 2;</li> <li>(b) Measures to protect the population of <i>Pimelea spicata</i> found in the area proposed for protection through condition 2. These must: <ul style="list-style-type: none"> <li>i. Monitor the <i>Pimelea spicata</i> population to determine the success of management or the need for intervention;</li> <li>ii. Include the establishment of thresholds that if reached would require intervention measures; and</li> <li>iii. Identify what further management measures must be implemented of a threshold is reached</li> </ul> </li> <li>(c) Rehabilitate MZ2, MZ3 and MZ4 (Annexure B) using appropriate native species with input from a suitably qualified CPW expert; and</li> <li>(d) The plan must include key milestones, performance indicators, corrective actions and timeframes for the completion of all actions outlined in the plan for the life of the project.</li> </ul> <p>The approved plan must be implemented. The person taking the action must not clear any CPW until the Minister approves the plan.</p>	<p>Monitoring reports cover the offset area, but there is no evidence of monitoring or maintenance within rehabilitated vegetation within MZ2-4. During field inspection, it appeared that only the noise mitigation bund/wall had been planted with trees. Several areas were observed to be un-related (e.g. MZ 2 and parts of MZ 4) or exhibited rehabilitation failure, as evidenced by the numerous old plastic protective sleeves without plants growing within. Areas of weeds were also observed.</p>	<p>Non Compliance</p>	<p>Survey to be undertaken by a suitably qualified expert of plant density/composition/survival in rehabilitated zones, and corrective measures to be taken where required.</p>	<p>Recommendation noted however IMC has a requirement to maintain an asset protection zone around the Ventilation Shaft 6 fan site.</p> <p>Weed control works will be undertaken as required.</p>	<p>Recommendation noted however IMC has a requirement to maintain an asset protection zone around the Ventilation Shaft 6 fan site.</p> <p>Weed control works will be undertaken as required.</p> <p><b>Ongoing</b></p>



## Appendix 5: Community Complaints Report - FY22

Date	Nature of Complaint	Actions / Follow Up
18/05/2022	Community member contacted the Community Line regarding a speeding truck on Mount Ousley Road. The truck had overtaken a member of public dangerously and was speeding.	The truck contractor reviewed footage and identified that the driver communicated with another driver in a manner that is not aligned with company values. The event progressed as per the Driver Behaviour Policy. The Community Team contacted the member of the community on 19/05/22 and 20/05/22 to inform of actions taken by the contractor.
13/01/2022	Resident contacted the Community Line at about 4.10 pm concerned about activities on Menangle Road associated with the Appin Mine Ventilation and Access Project. Concerned the activities went ahead without consent from the Department of Planning, Industry and Environment and against advice from the Menangle Advisory Panel.	The resident was contacted at about 4.30 pm by return phone call. It was explained the geotechnical activities were approved under a s138 Permit from Wollondilly Shire Council. The Menangle Advisory Panel and near neighbours were informed of the activity at least 7 days prior by email. A good discussion was had, and the issue related more to the expectation of engagement with the Menangle Advisory Panel where it should be made aware during meetings and not by email. South32 took this feedback on board and will endeavour to flag such activities with the Panel at meetings. This would be included as an agenda item for the meeting later in the month. The resident also raised concern that the activity occurred on public property to support a Project that was yet to be
02/09/2021	Resident contacted the community officer directly by phone concerned about the level of dust at his property in Appin. The resident noted he had been away from the property for about one month so regular cleaning had not taken place. The resident provided images of the dust.	The Community Team shared the concern with relevant teams for investigation. Investigation revealed there were some hazard reduction burns in the area in the previous couple of weeks that may have contributed to the material observed in the photos. Data shows that dust from our operations over the last month have not been unusually high. Resident was advised by email on 6 September.



Date	Nature of Complaint	Actions / Follow Up
26/07/2021	Resident contacted the Community Call Line as a water truck was accessing a public hydrant on Equestrian Drive, Picton. Resident spoke with truck driver and requested the water truck fill up from the hydrant at Barkers Lodge or in front of McDonalds but not use the one in Abbotsford Rd, as it lowered their water pressure.	The Community Team were advised by the resident that they had discussed using a different hydrant with the truck driver and requested this be noted as a complaint. The resident did not request a call back.
16/07/2021	Resident contacted a member of the Community Team directly at 4.40 pm requesting information regarding dust which appeared to be in relation to activities at Vent Shaft 6.	The Community Team Member advised the resident that the initial investigation could not determine any cause for the apparent dust, and during inspections no dust was visible from around the Vent Shaft 6 location. The resident was contacted via email and no further response was provided.



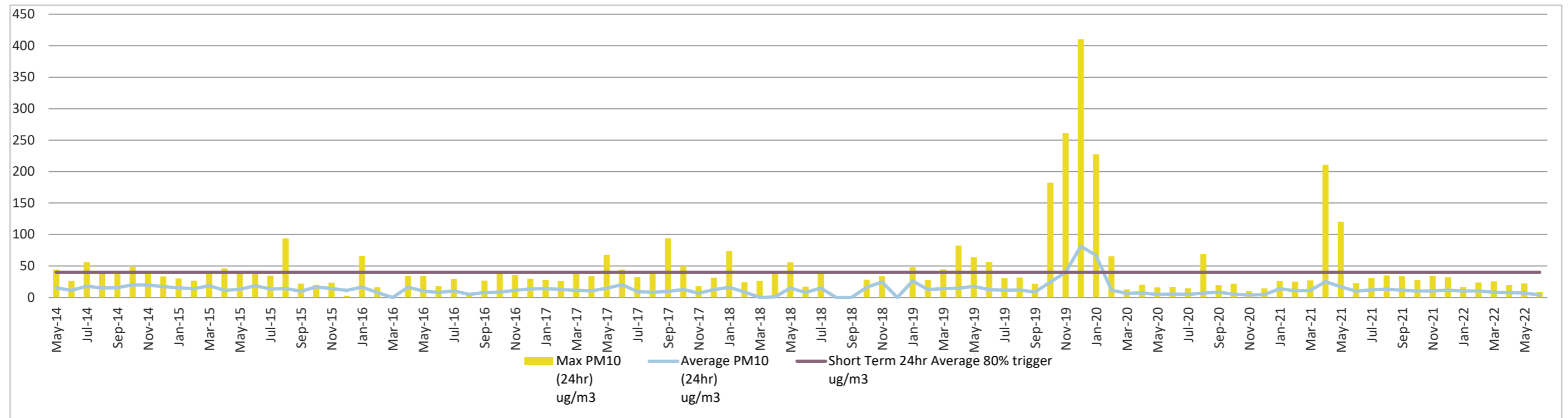
---

## Appendix 6: Appin Mine Long-Term Environmental Monitoring Data

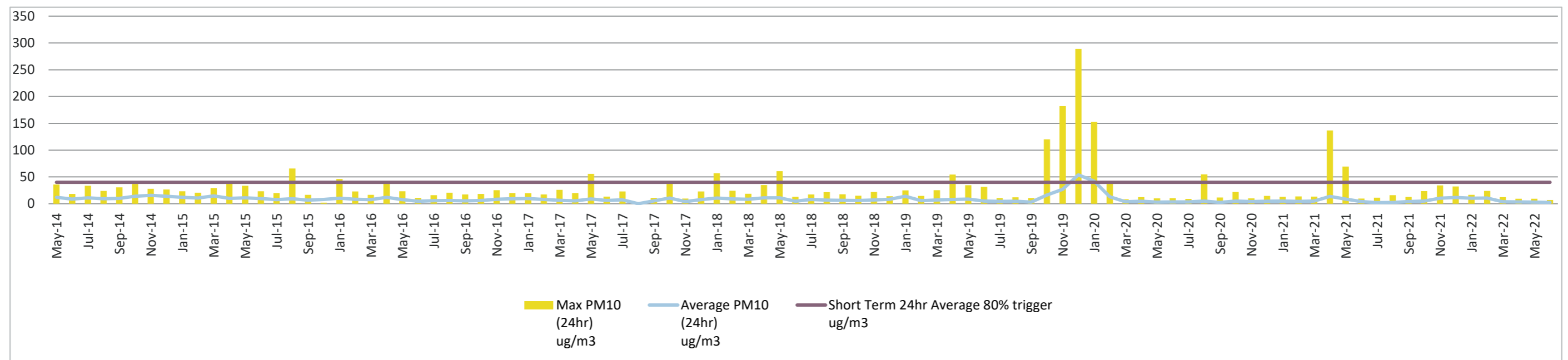
Appendix C – Long-term Monitoring Data

Dust Monitoring

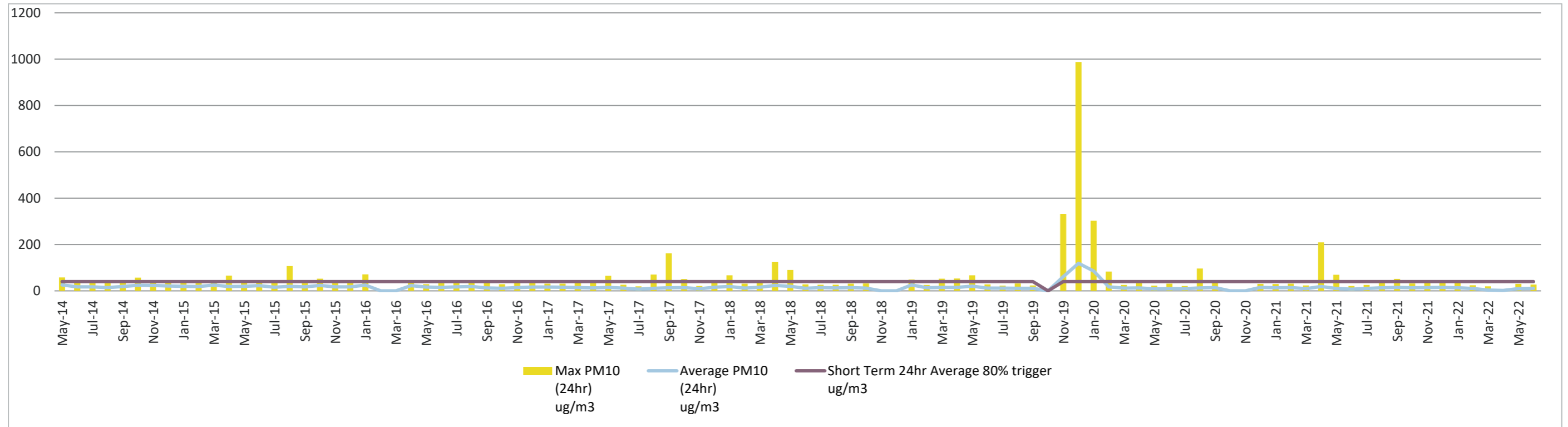
Optical Photometer (DustTrak) – AE-PF1 – 24-hour average (PM<sub>10</sub>)



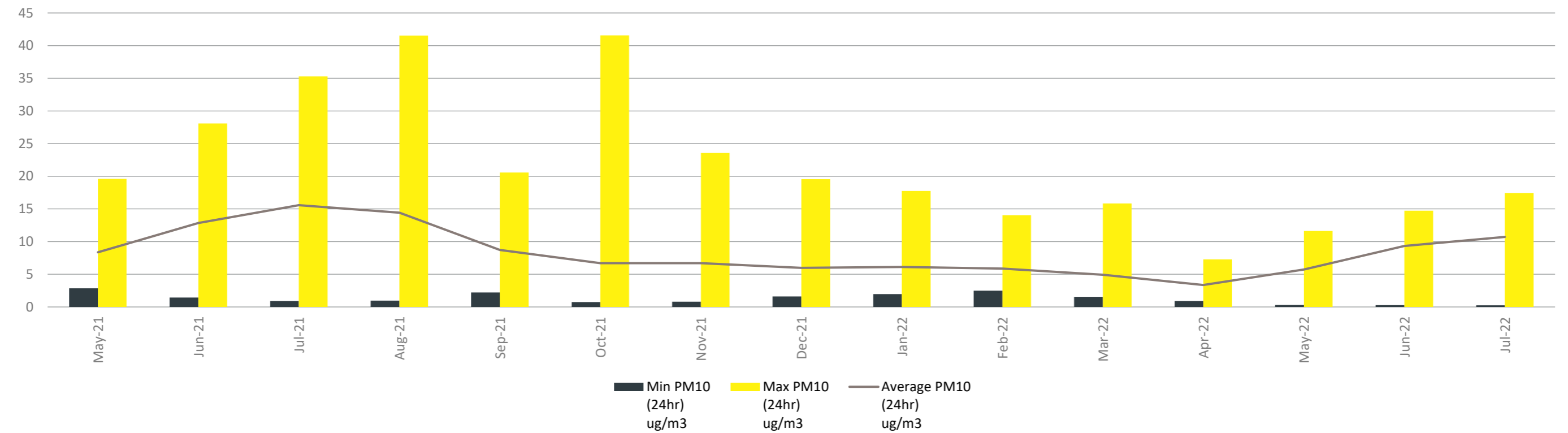
Optical Photometer (DustTrak) – AE-PF3 – 24-hour average (PM<sub>10</sub>)



Optical Photometer (DustTrak) – W-PF1 – 24-hour average (PM<sub>10</sub>)



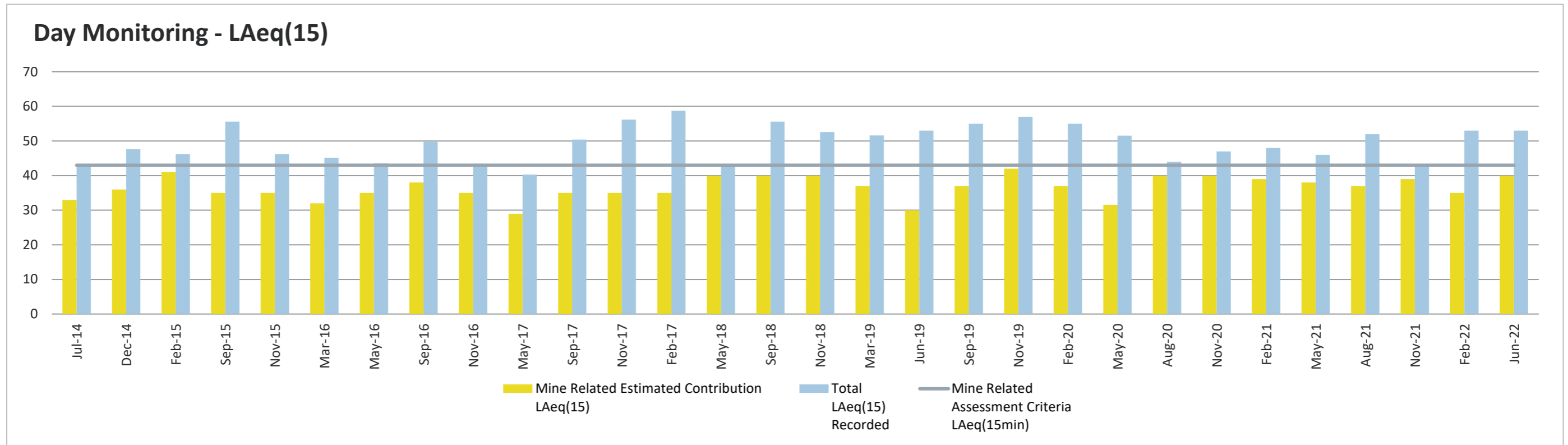
Optical Photometer (DustTrak) – VS6-PF1 – 24-hour average (PM<sub>10</sub>)



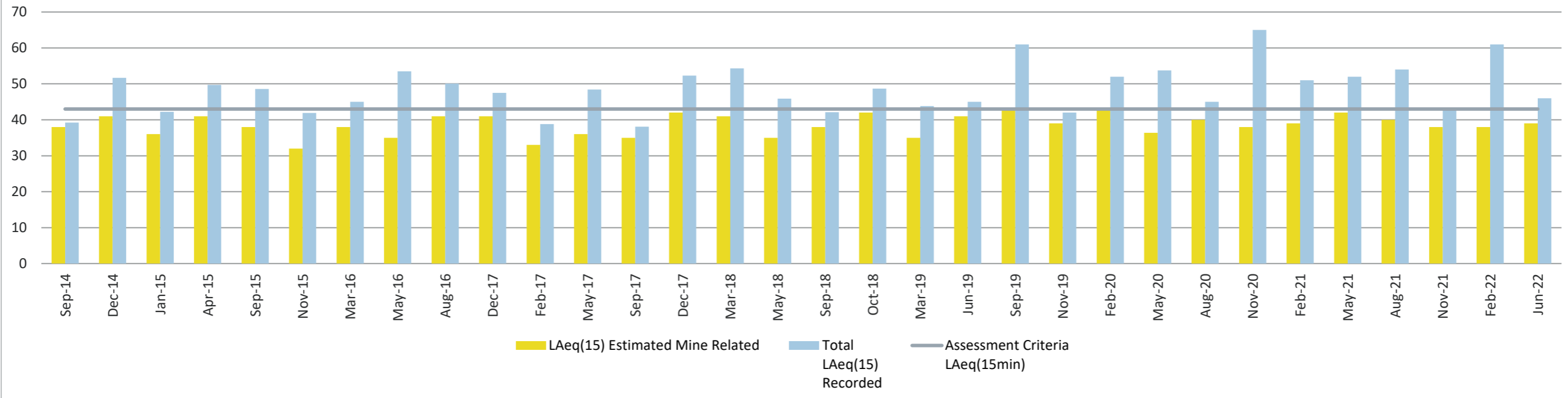
**Noise**

**Appin East**

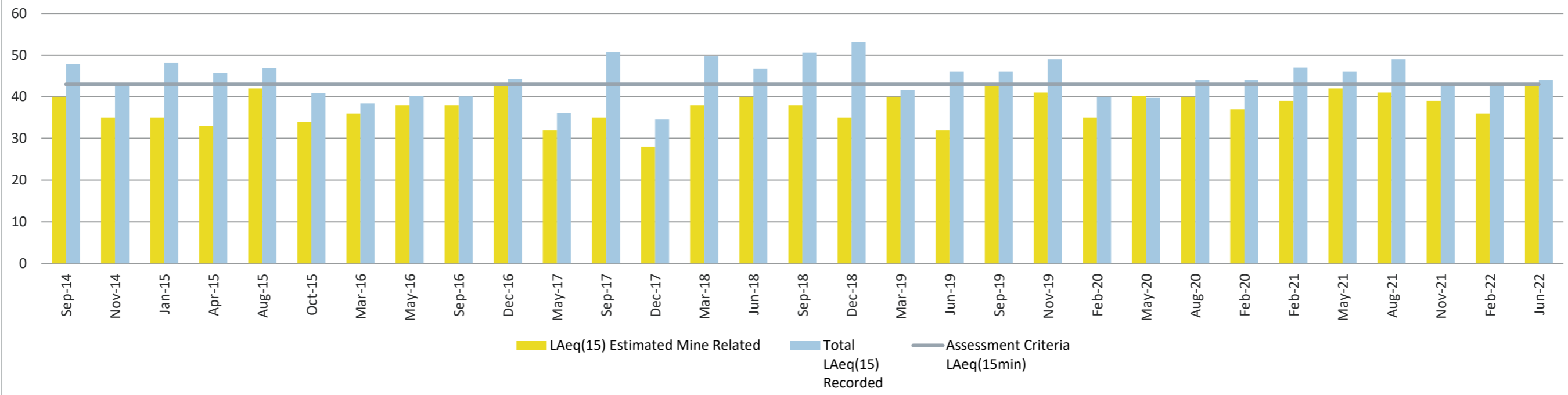
**Noise Monitoring Results – AE-NS4**



### Evening Monitoring - LAeq(15)

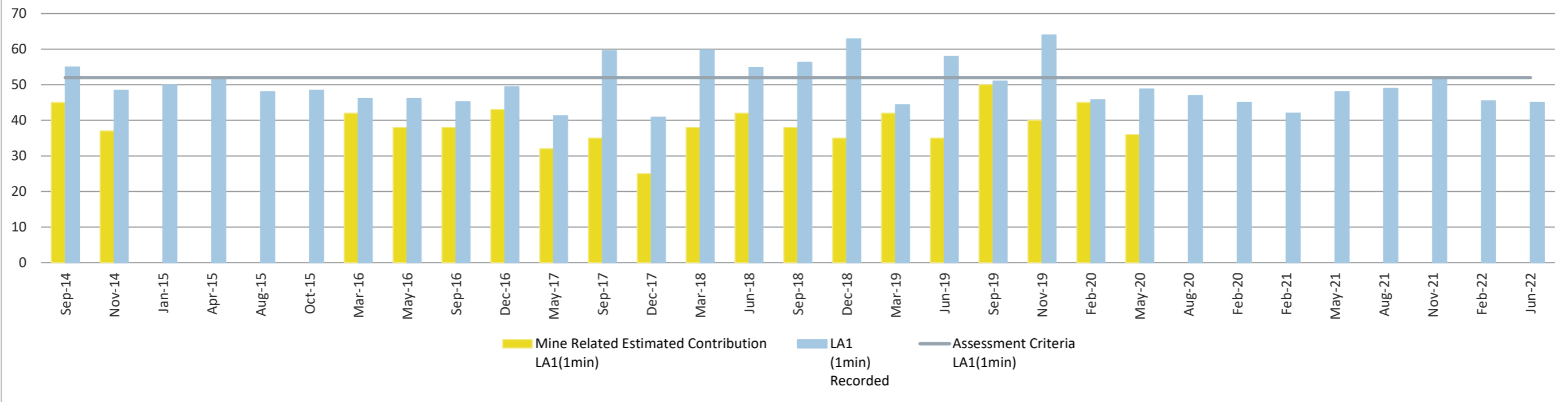


### Night Monitoring - LAeq(15)



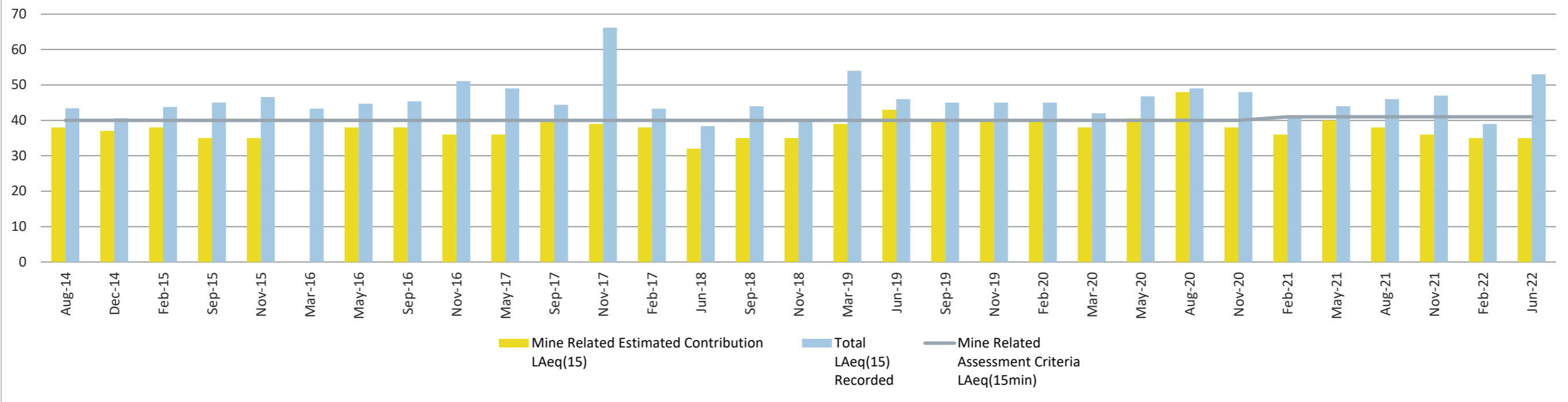


### Night Monitoring - LA1

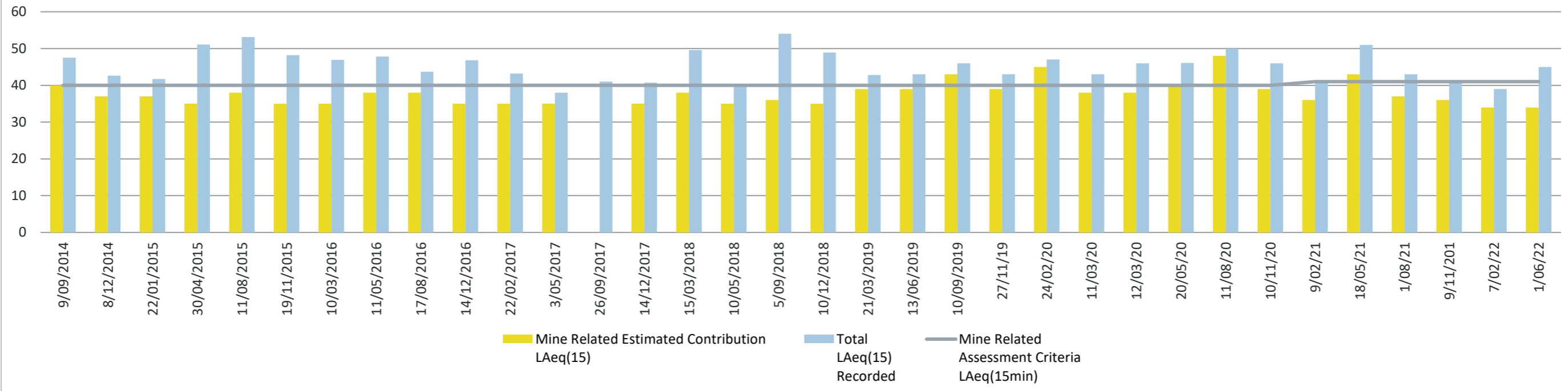


### Noise Monitoring Results – AE-NS5

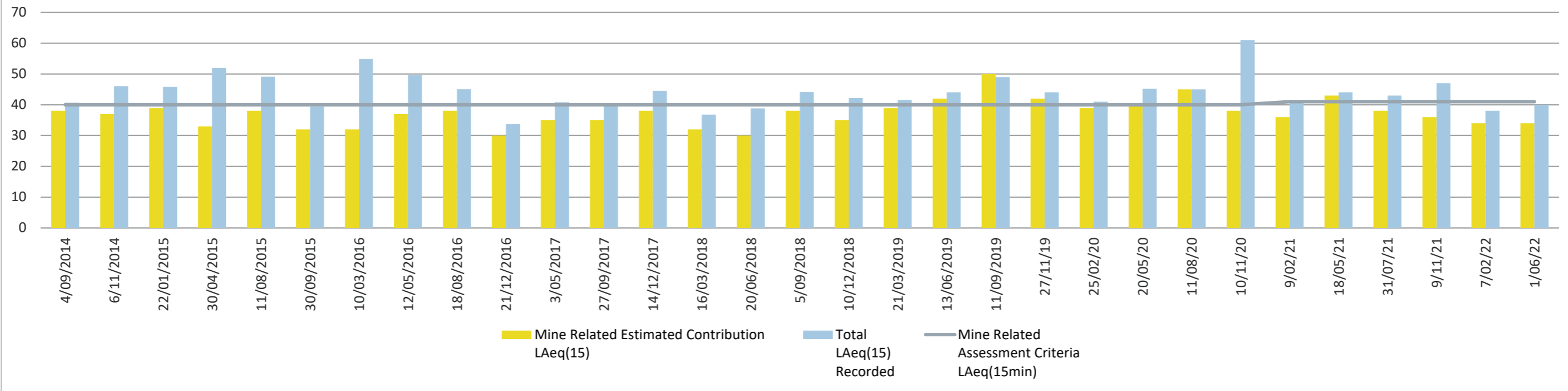
#### Day Monitoring - LAeq(15)

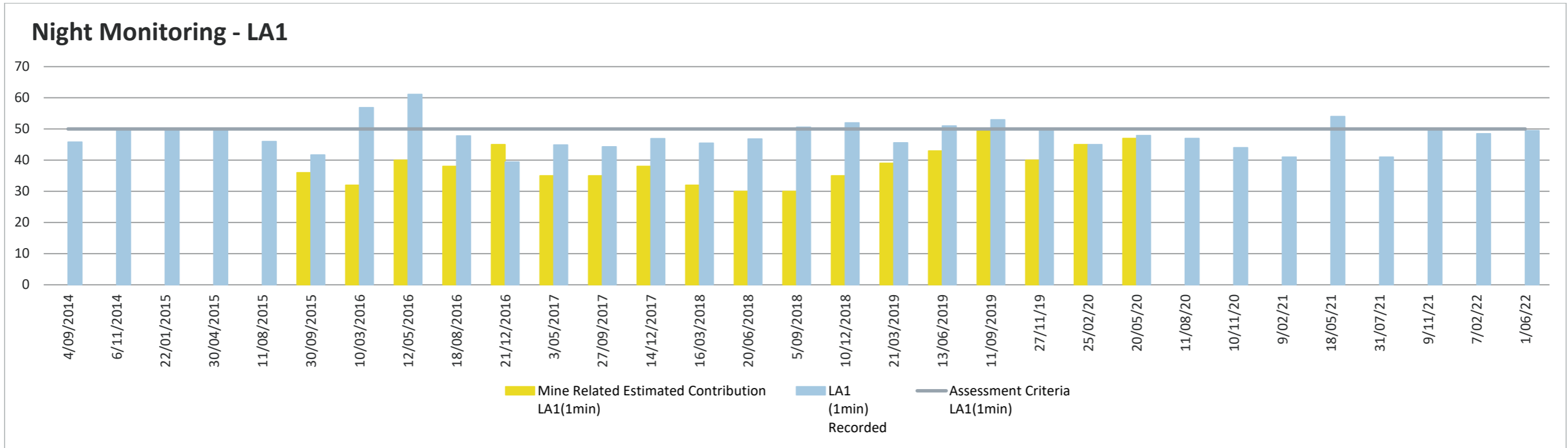


### Evening Monitoring - LAeq(15)



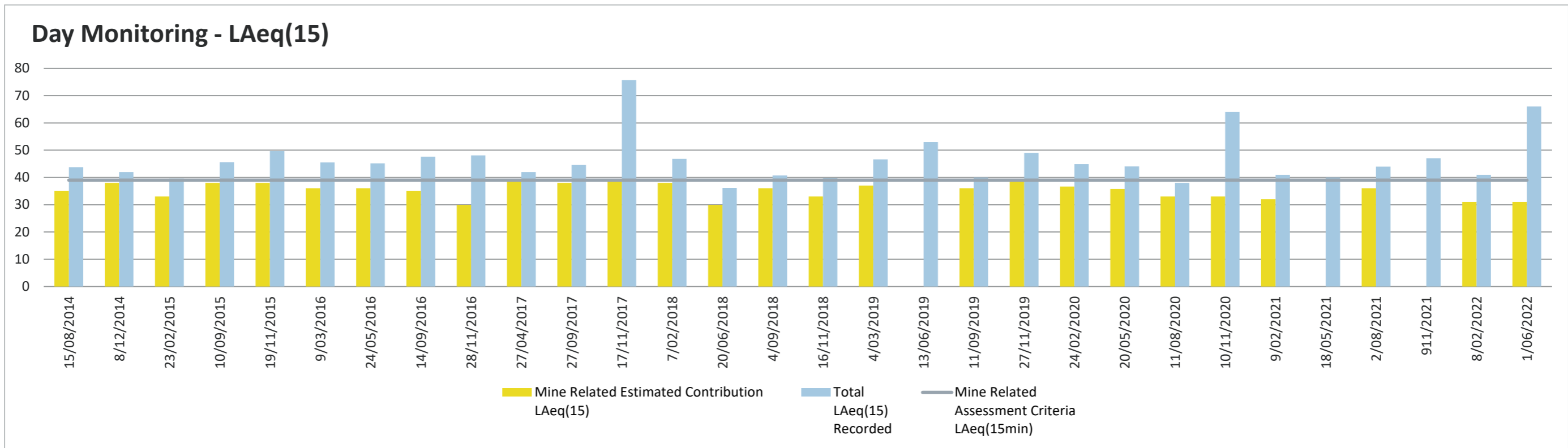
### Night Monitoring - LAeq(15)



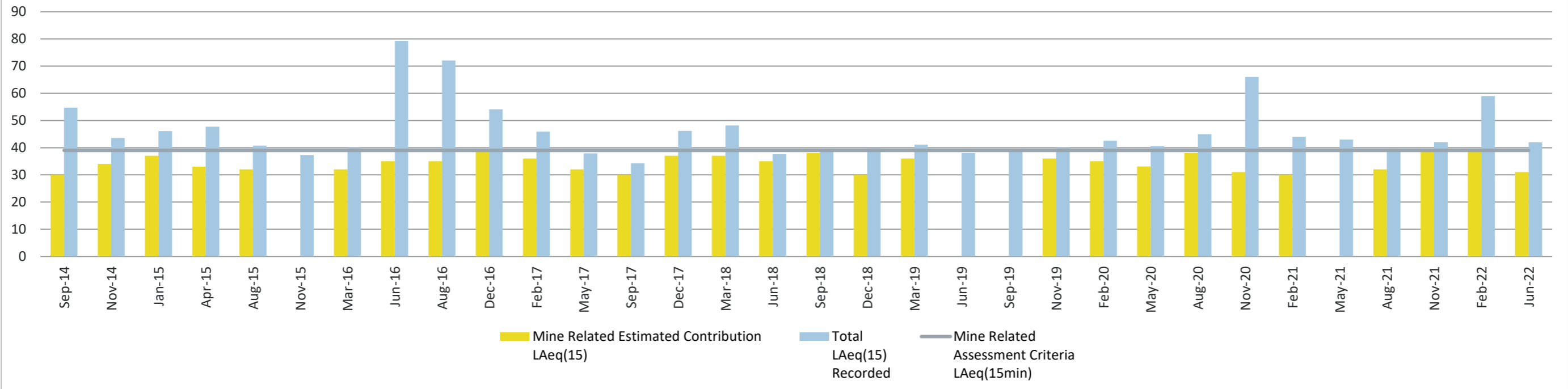


**Appin West**

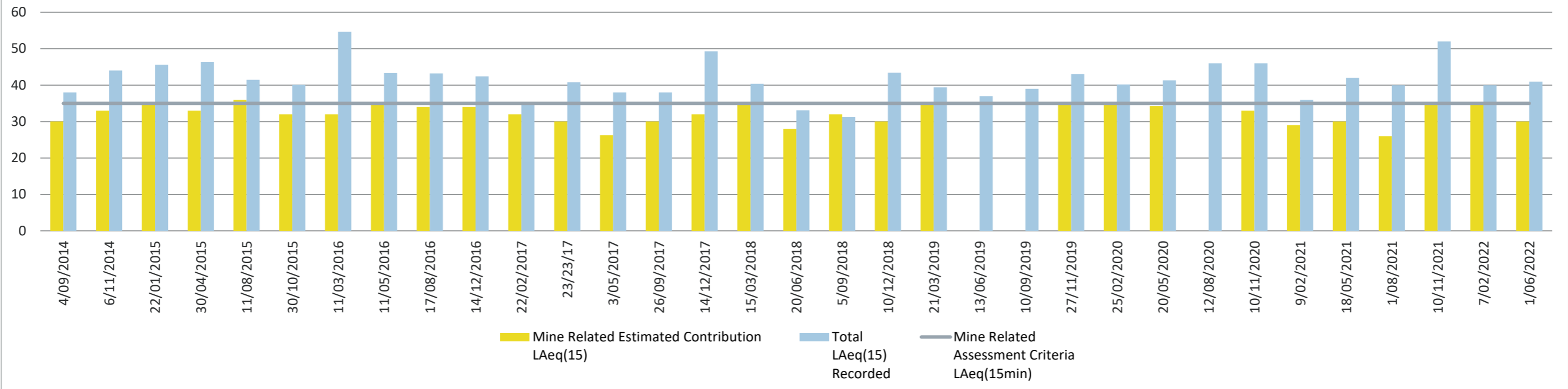
**Noise Monitoring Results – AW-NS4**



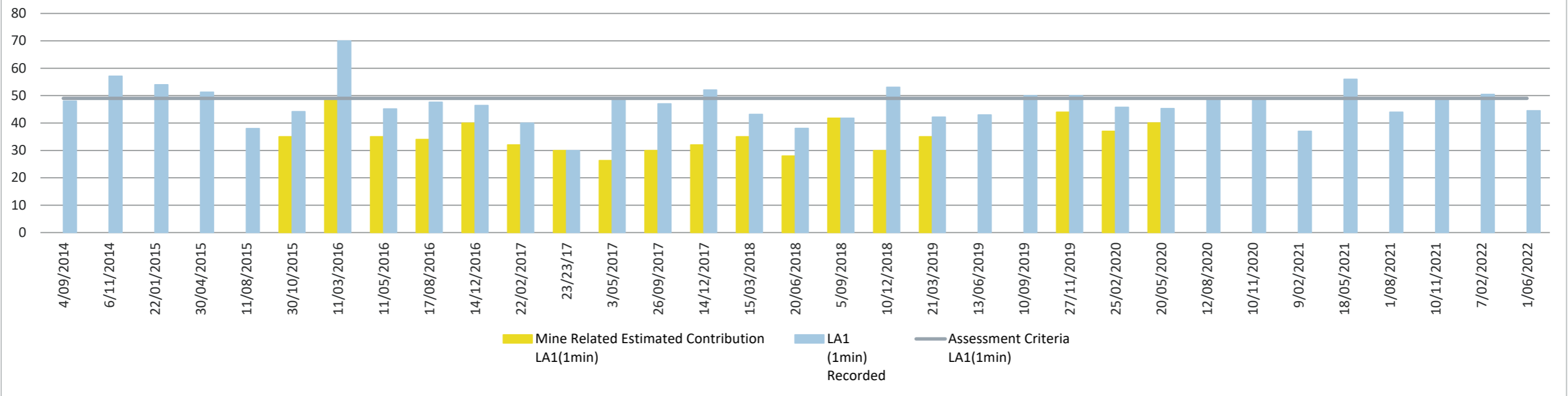
### Evening Monitoring - LAeq(15)



### Night Monitoring - LAeq(15)

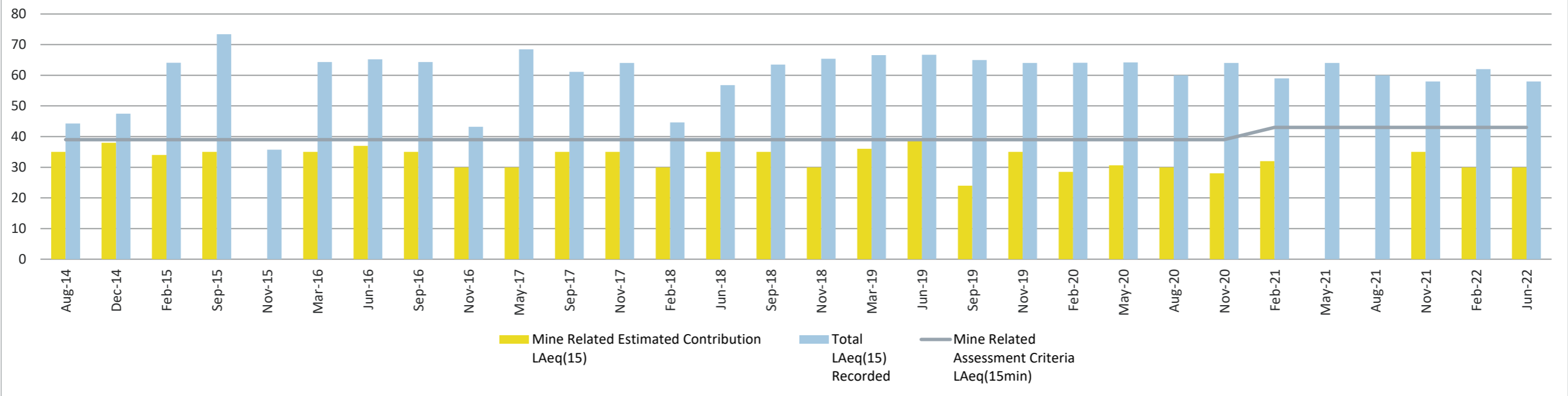


### Night Monitoring - LA1

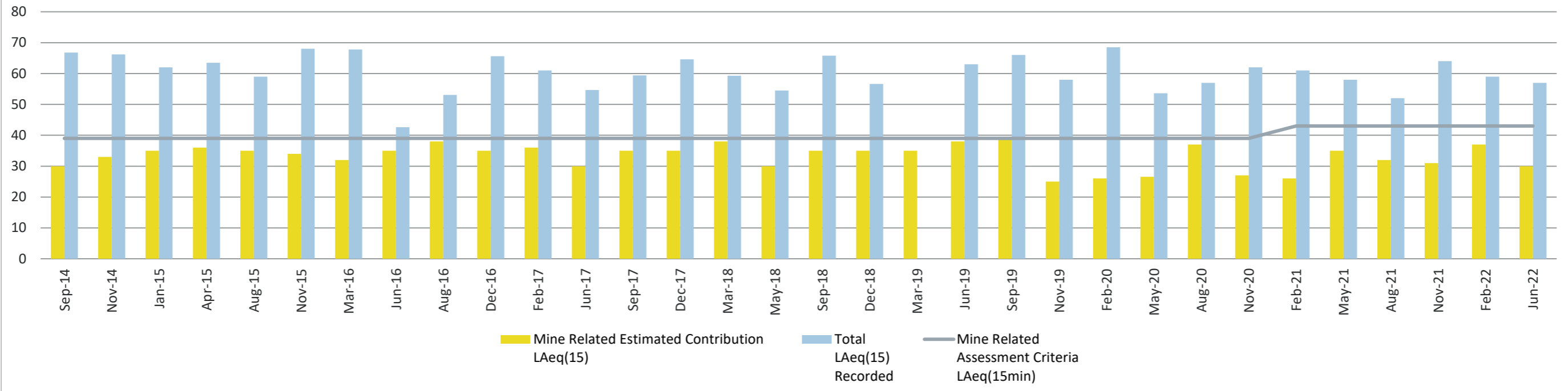


### Noise Monitoring Results – AW-NS5

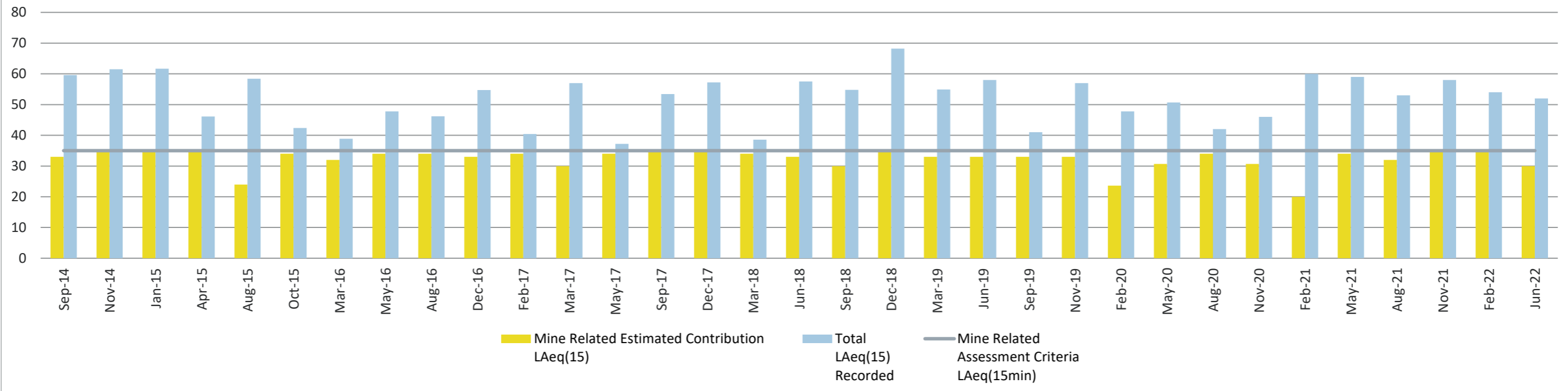
#### Day Monitoring - LAeq(15)



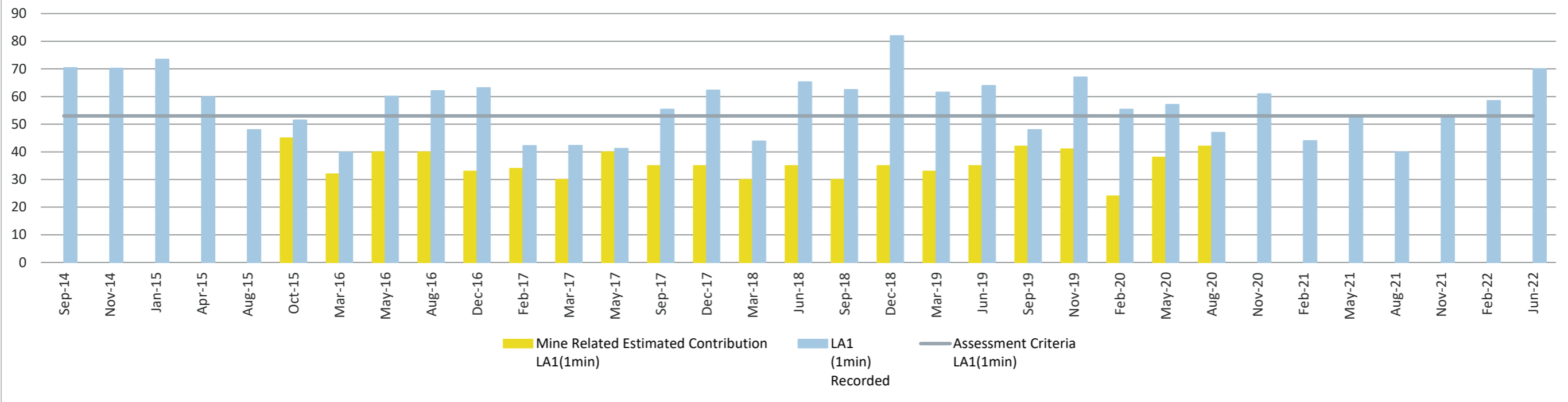
### Evening Monitoring - LAeq(15)



### Night Monitoring - LAeq(15)



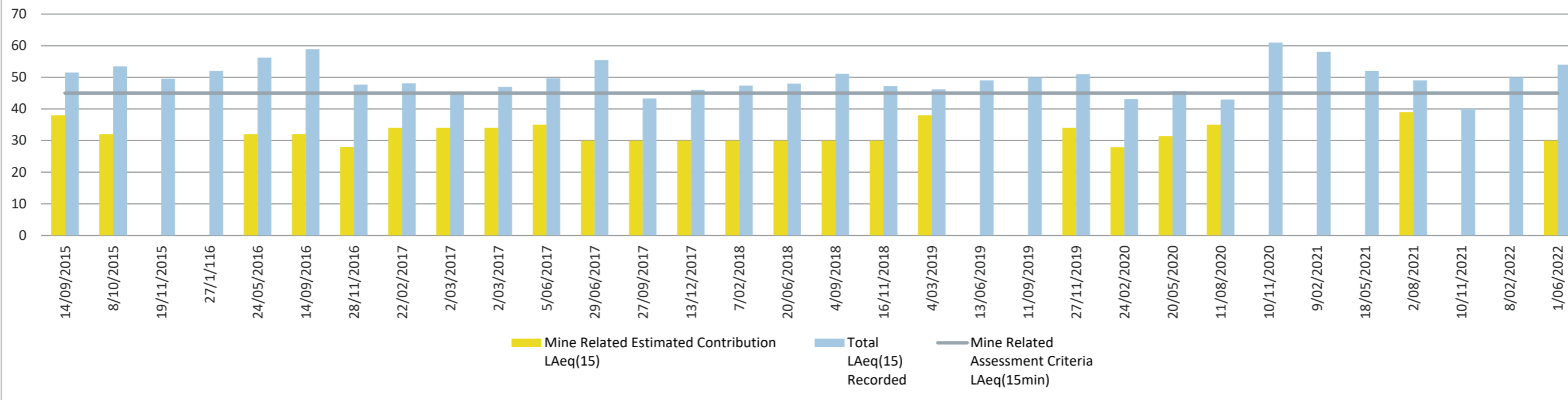
### Night Monitoring - LA1



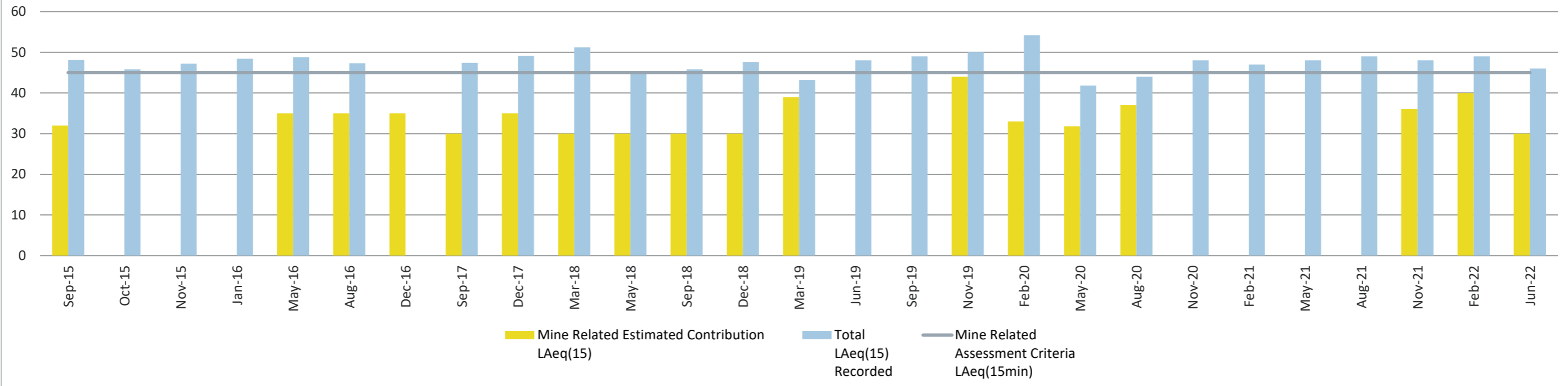
### Ventilation Shaft 6

### Noise Monitoring Results – VS6 Central

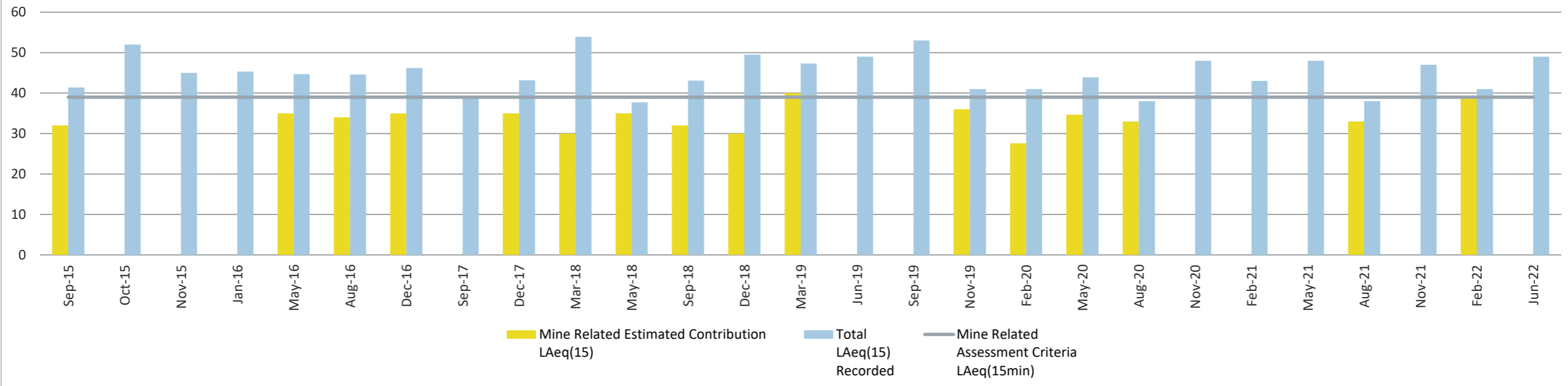
### Day Monitoring - LAeq(15)



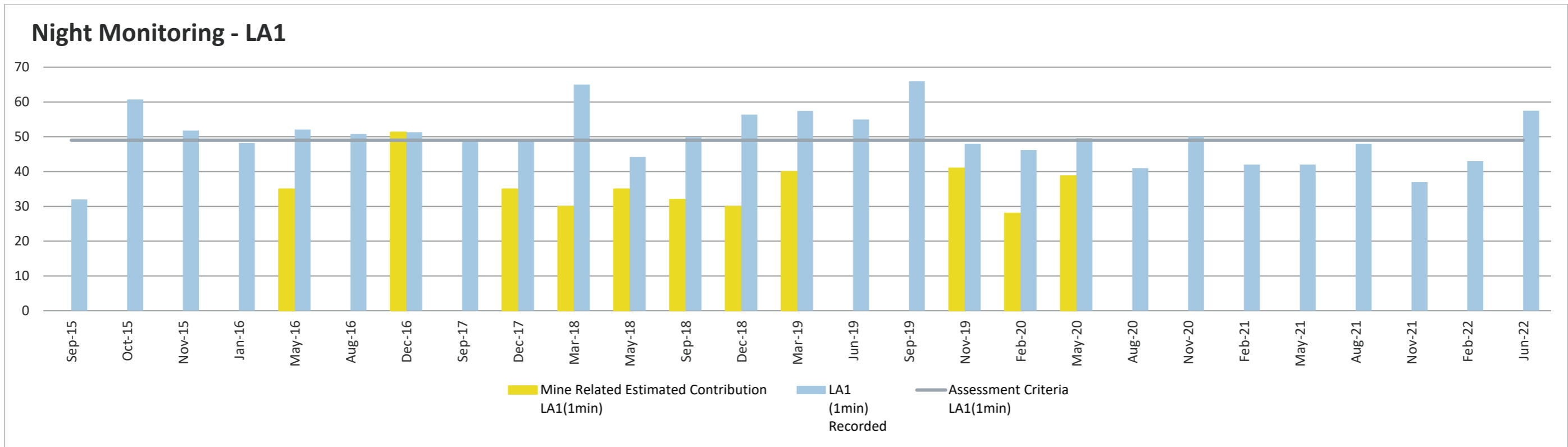
### Evening Monitoring - LAeq(15)



### Night Monitoring - LAeq(15)

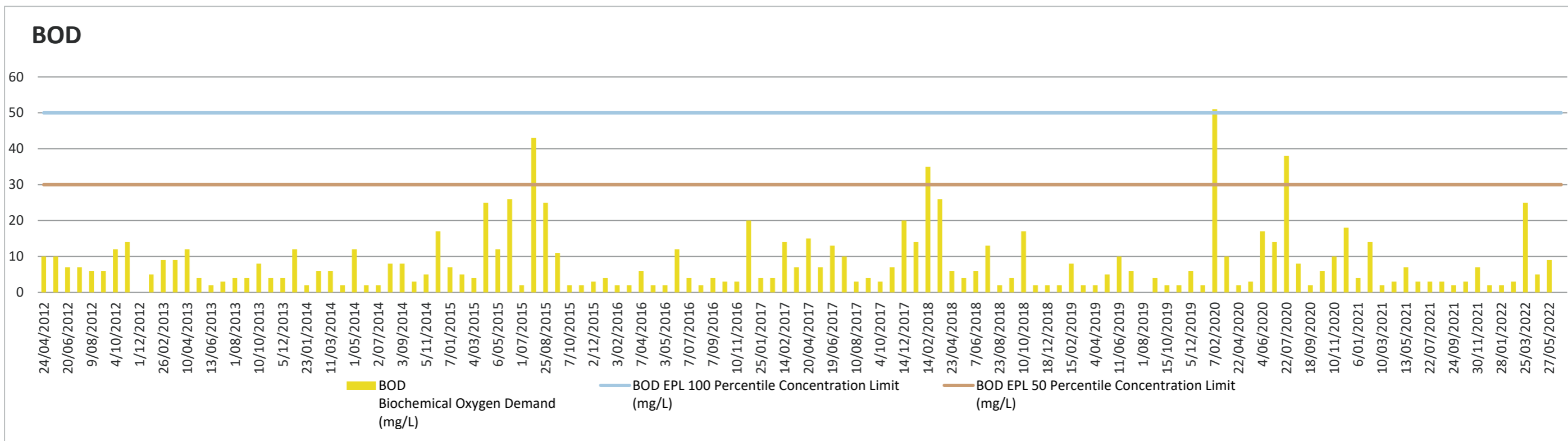


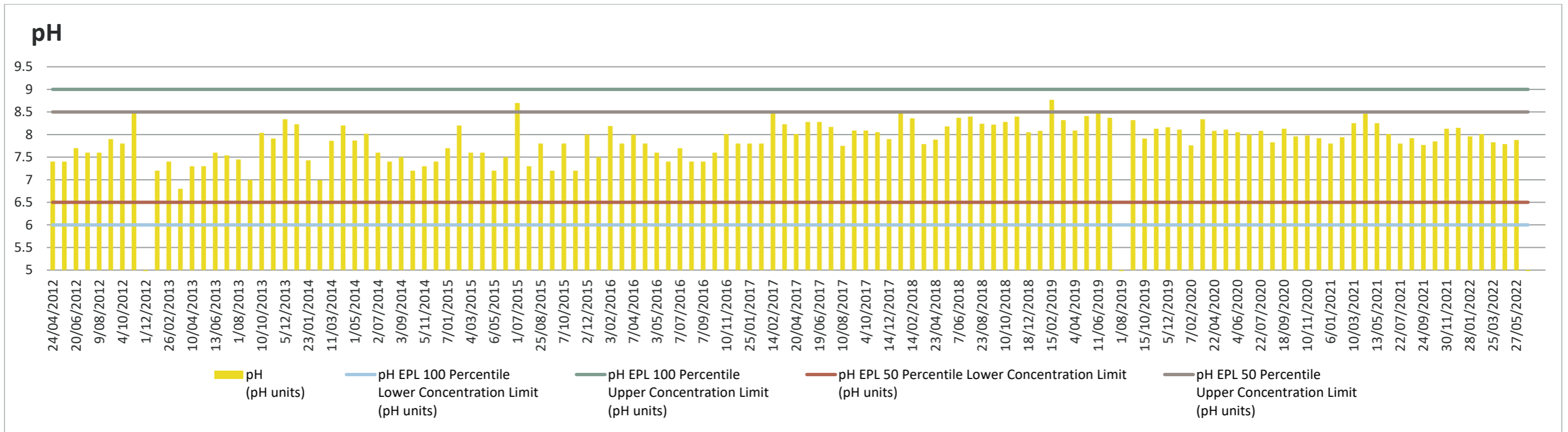




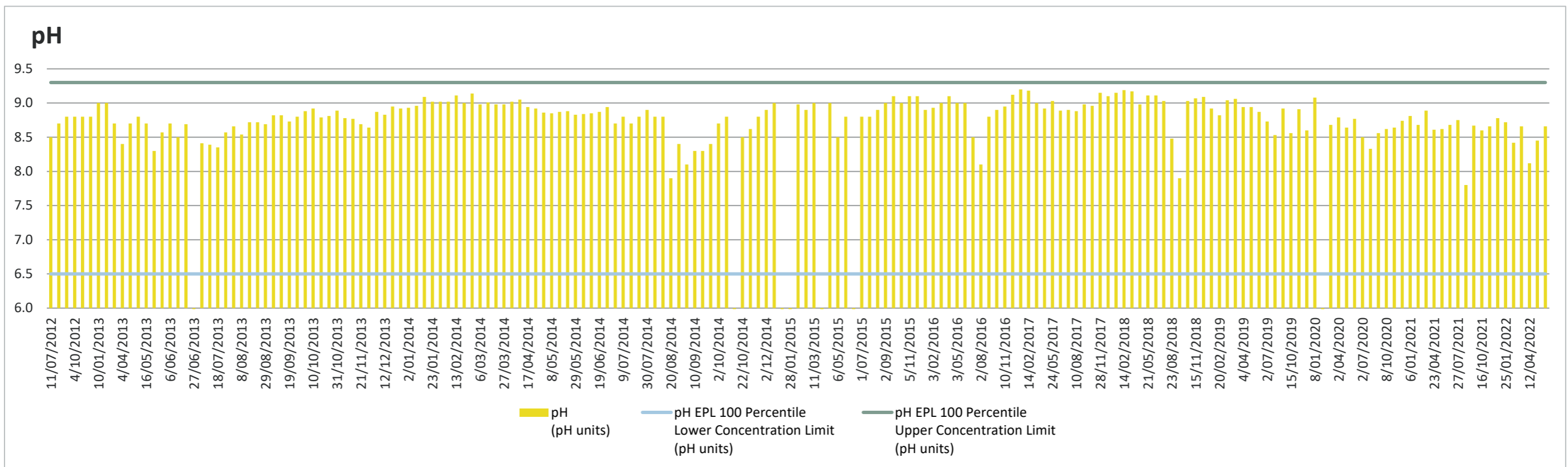
## Water Quality

### Water Quality Monitoring Results – Point 3/4

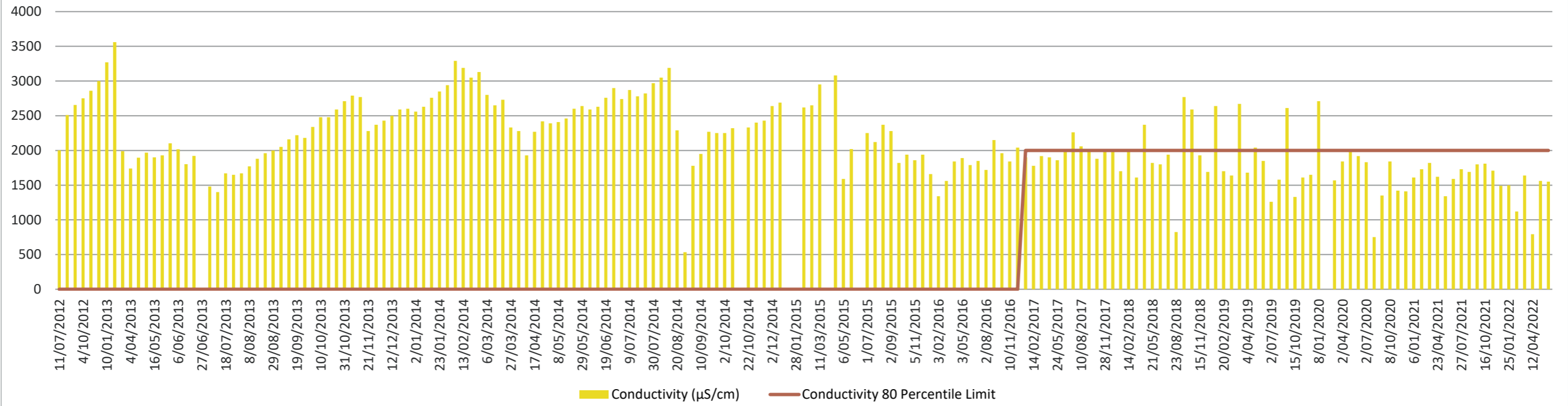




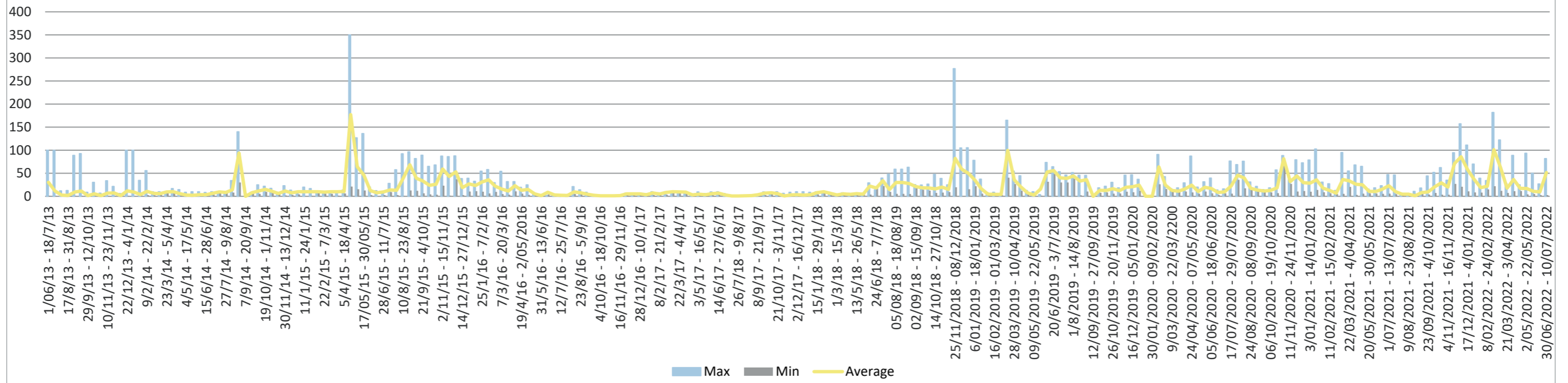
**Water Quality Monitoring Results – Point 10 – Grab Sample**



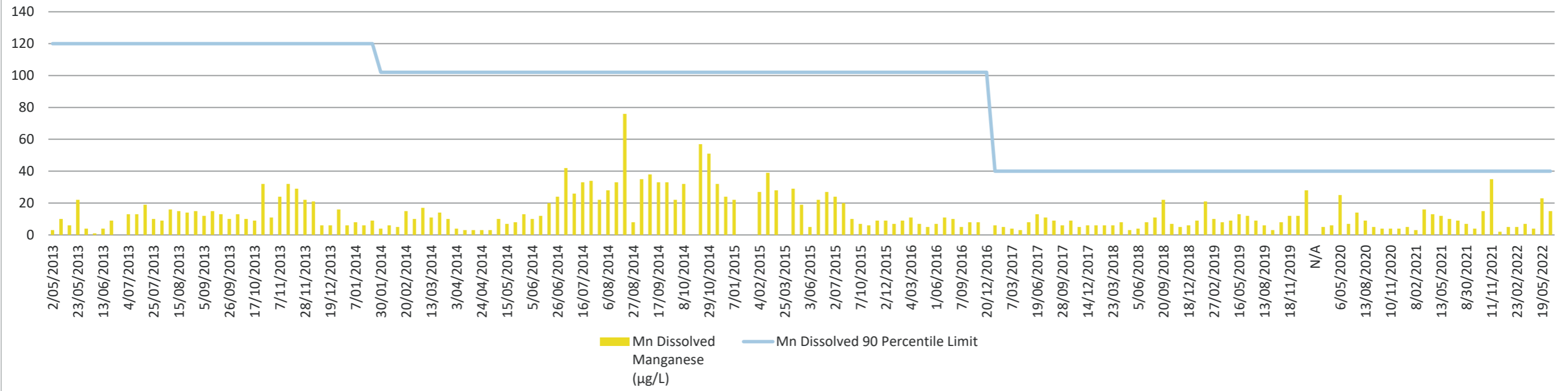
## Conductivity



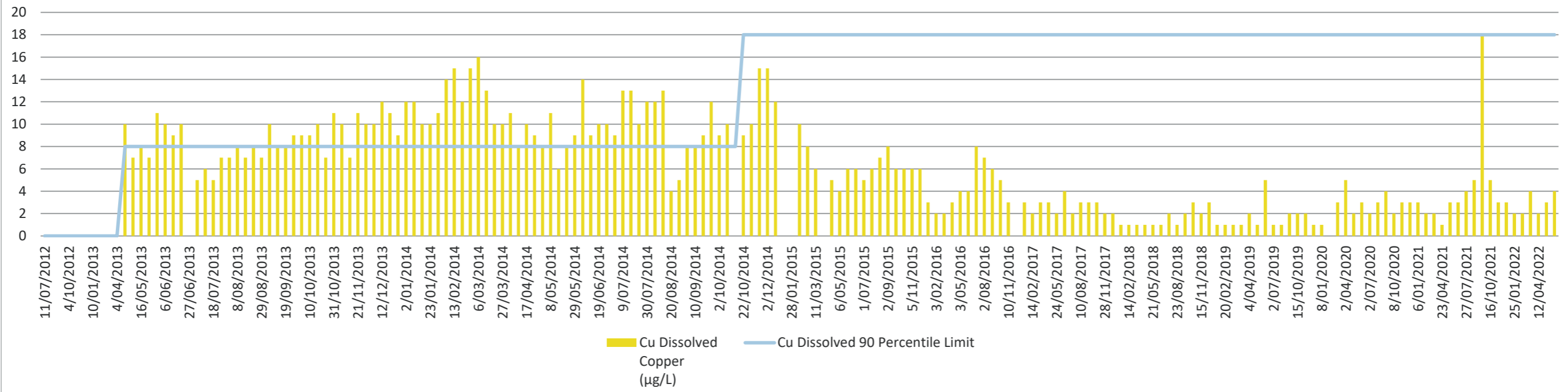
## Turbidity

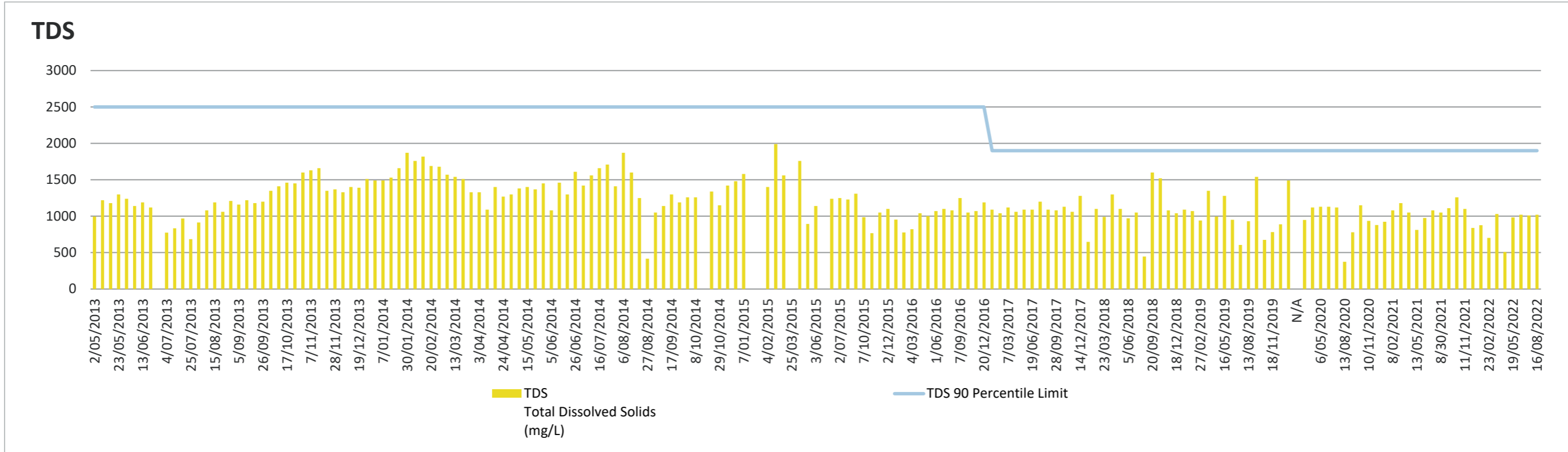
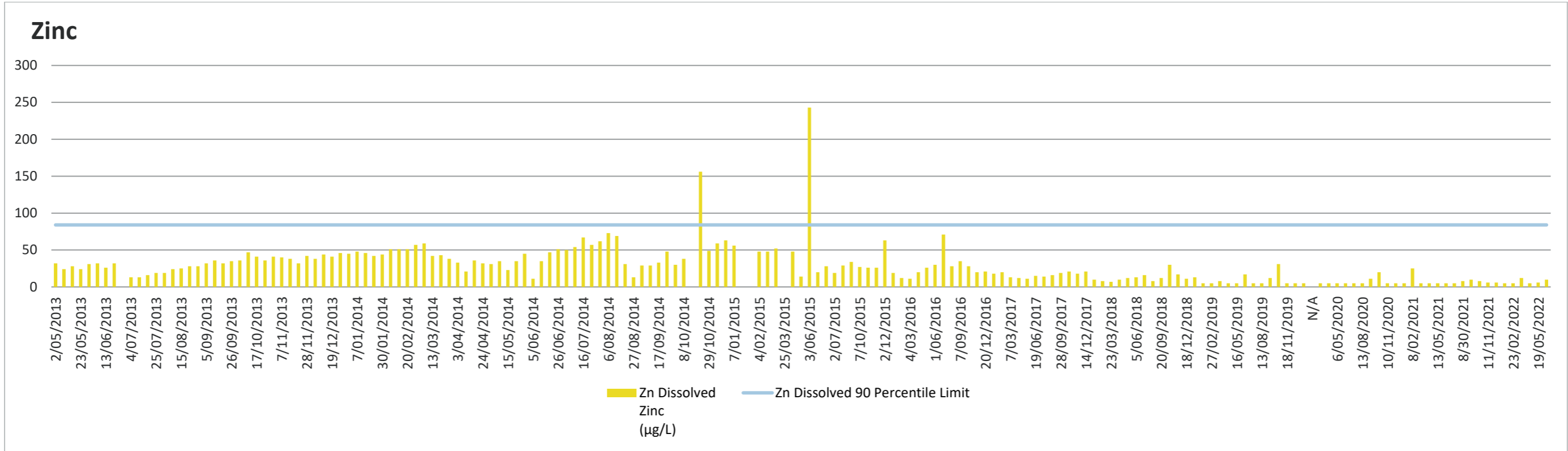


## Manganese

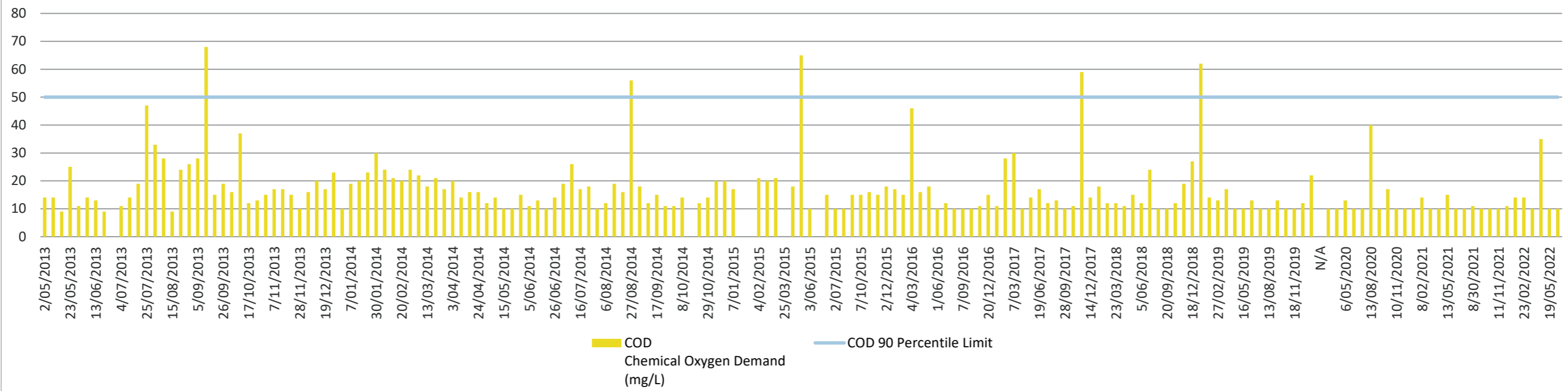


## Copper

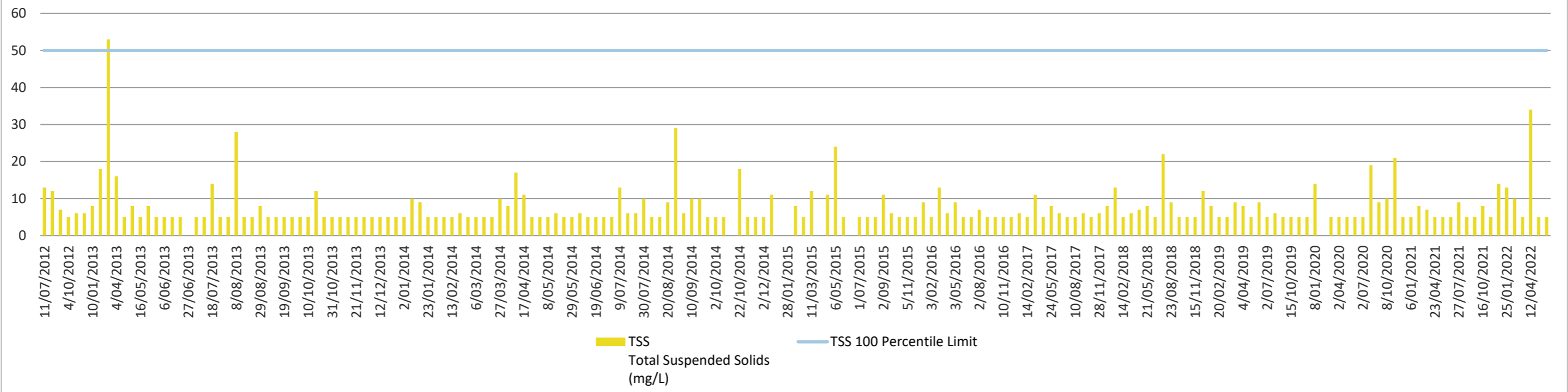


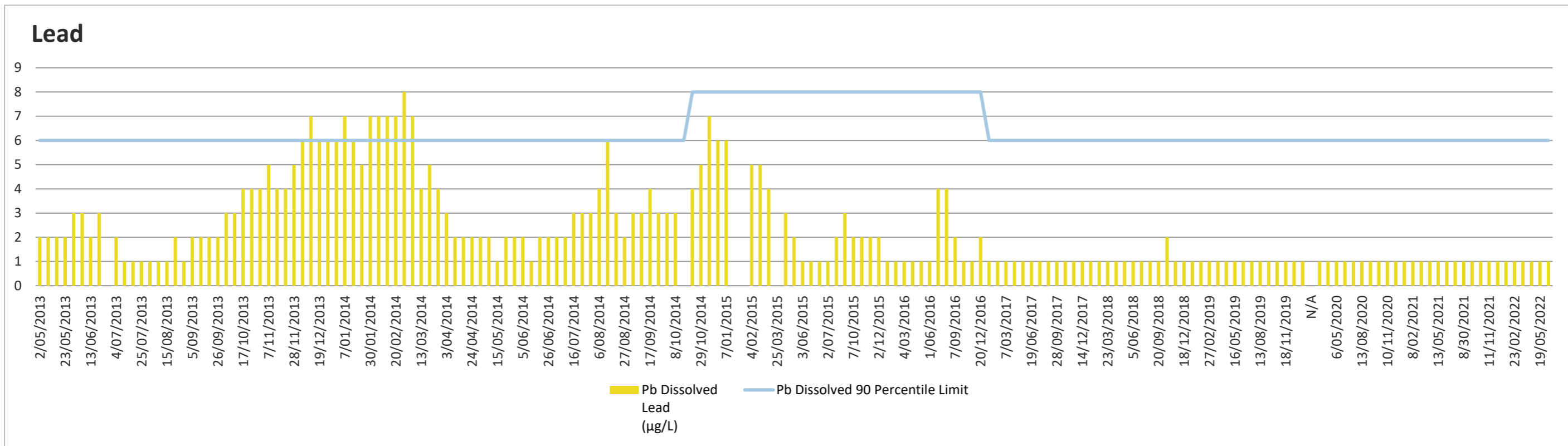
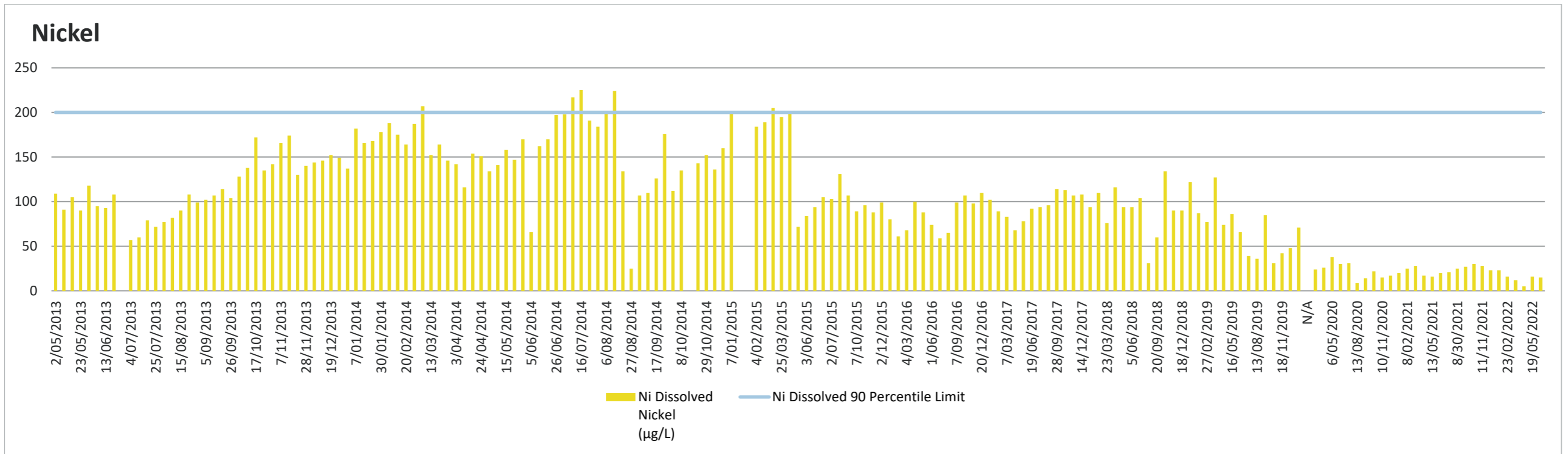


### Chemical Oxygen Demand

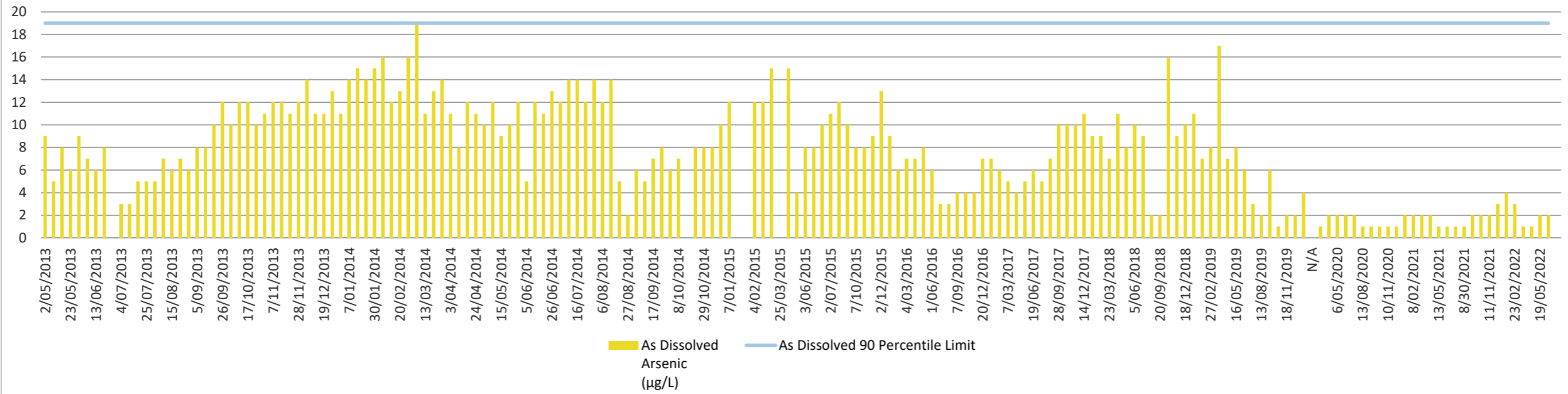


### TSS

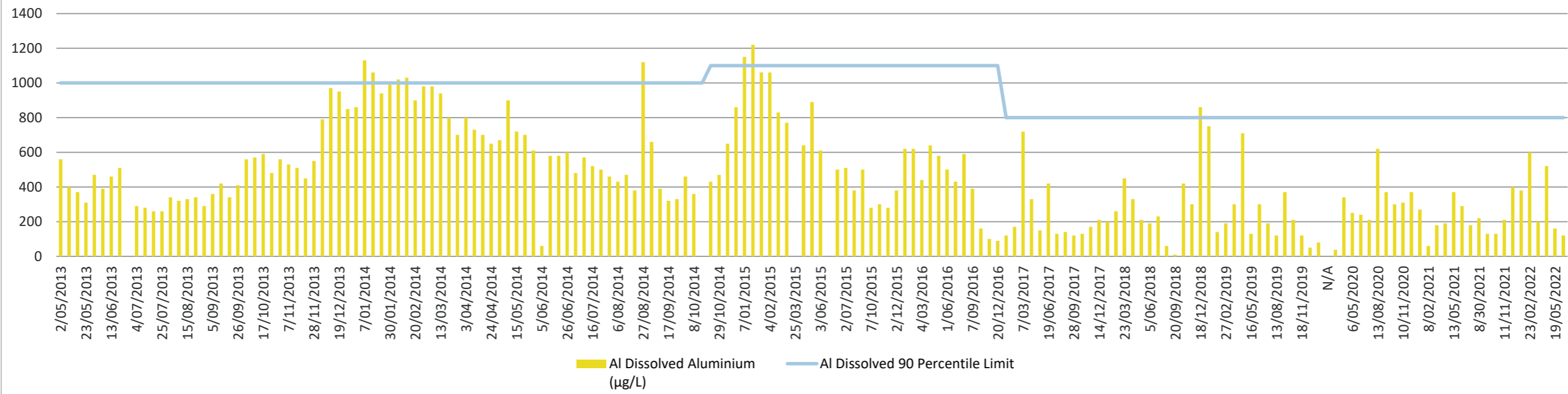




## Arsenic

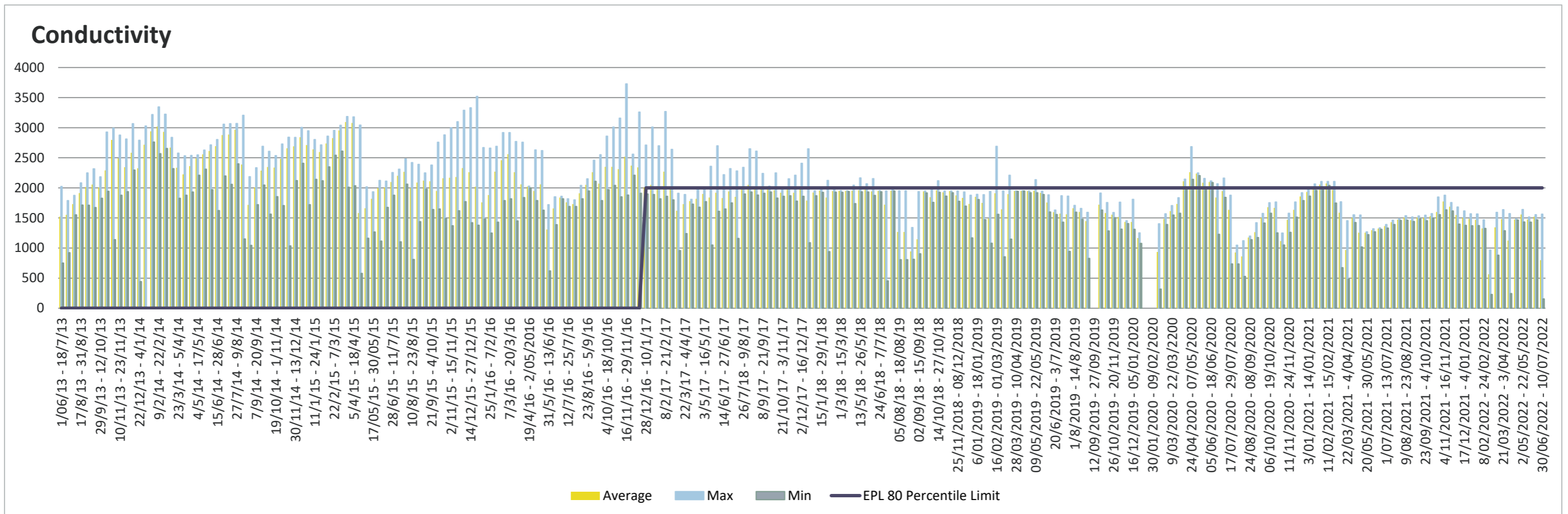
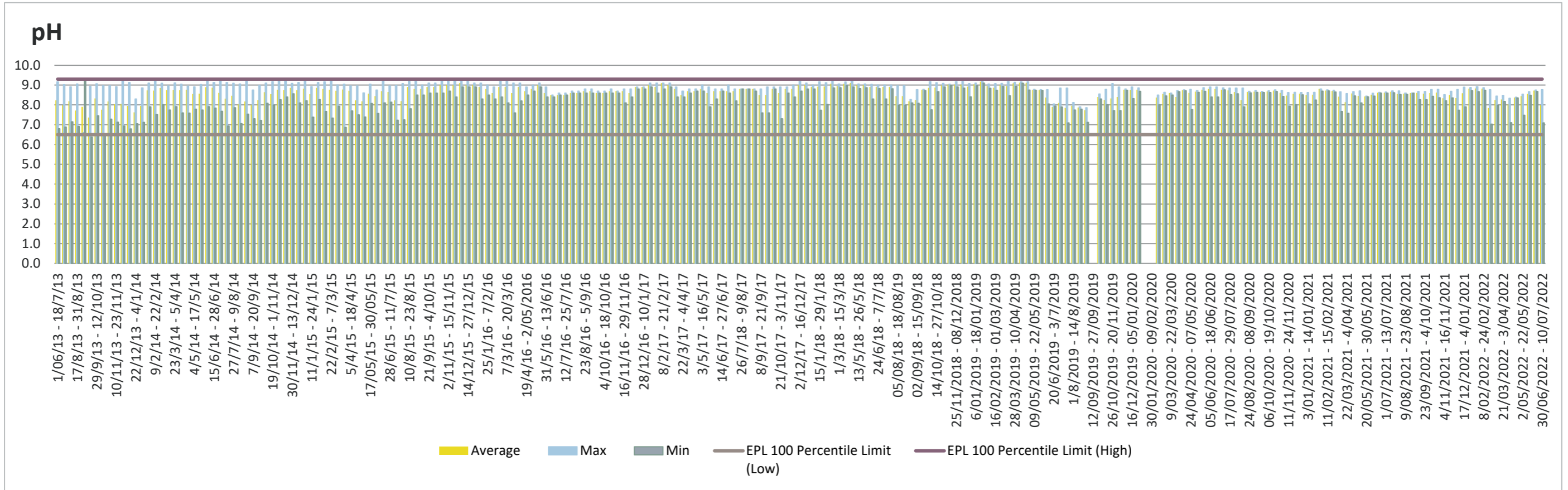


## Aluminium

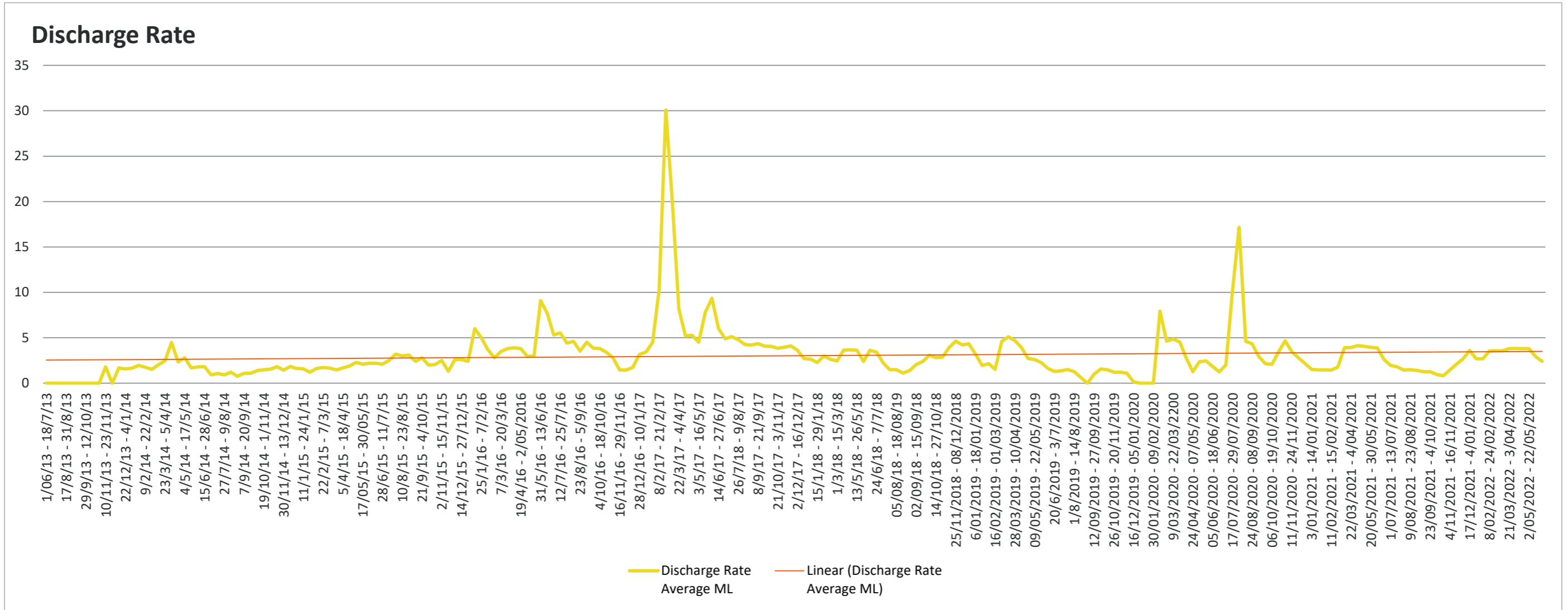




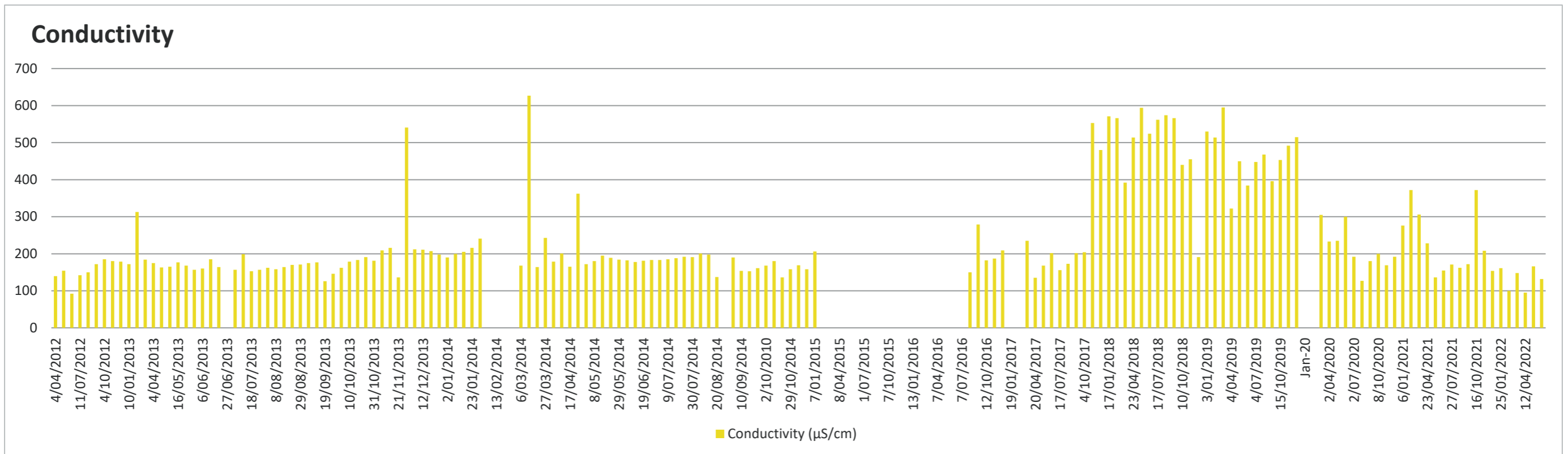
Water Quality Monitoring Results – Point 10 – Continuous Monitoring

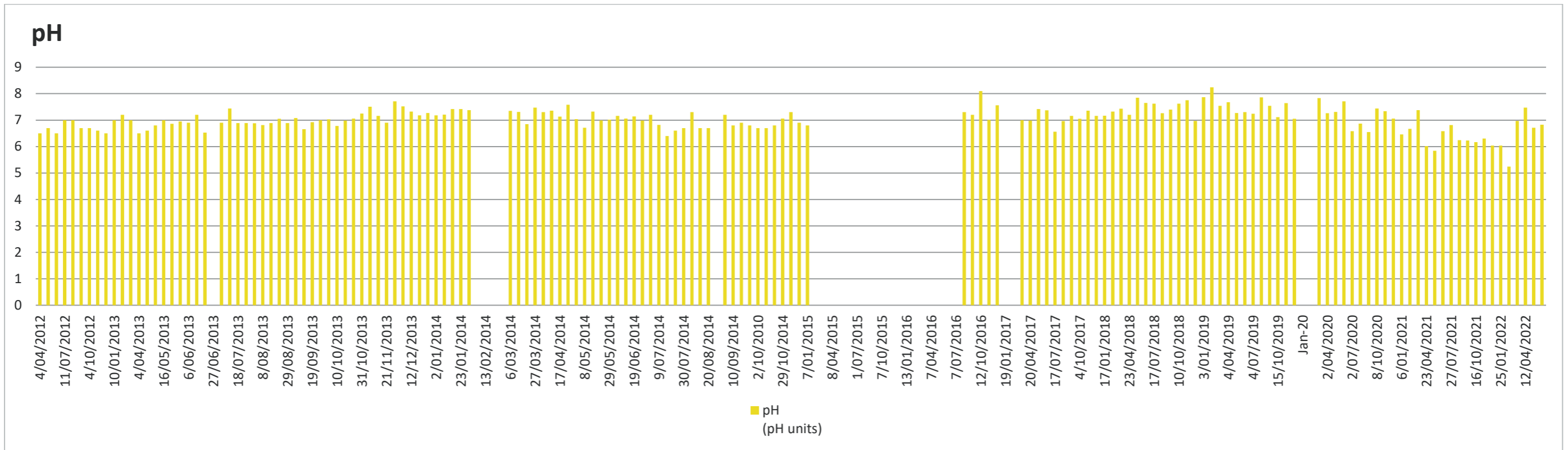


Discharge Rate – Point 10

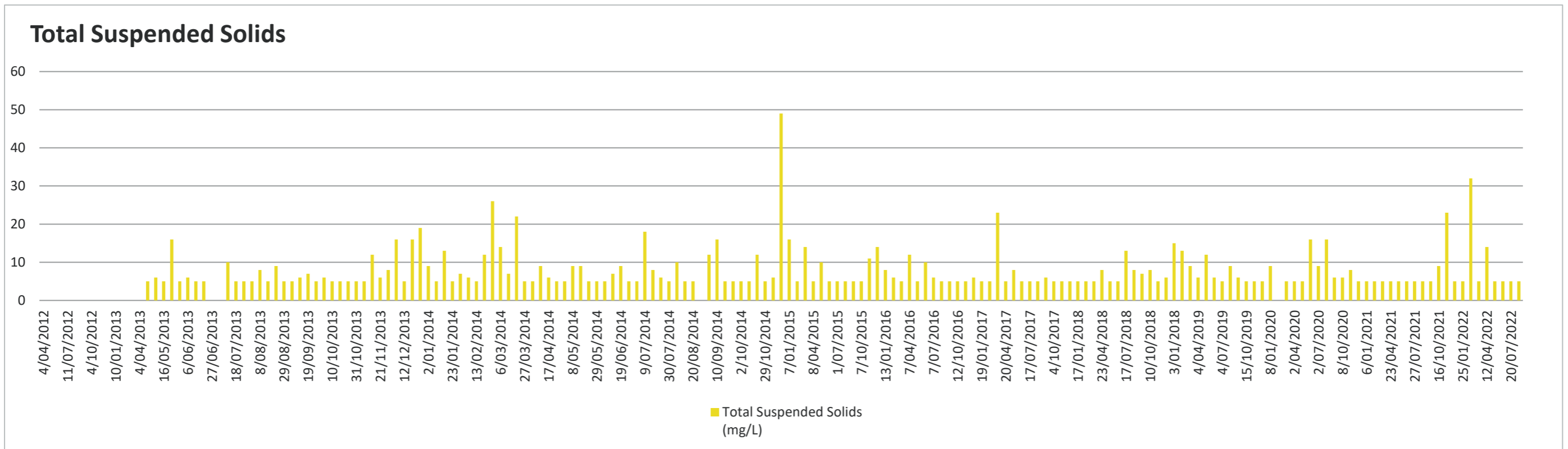


Water Quality Monitoring Results – Point 11 (Grab)

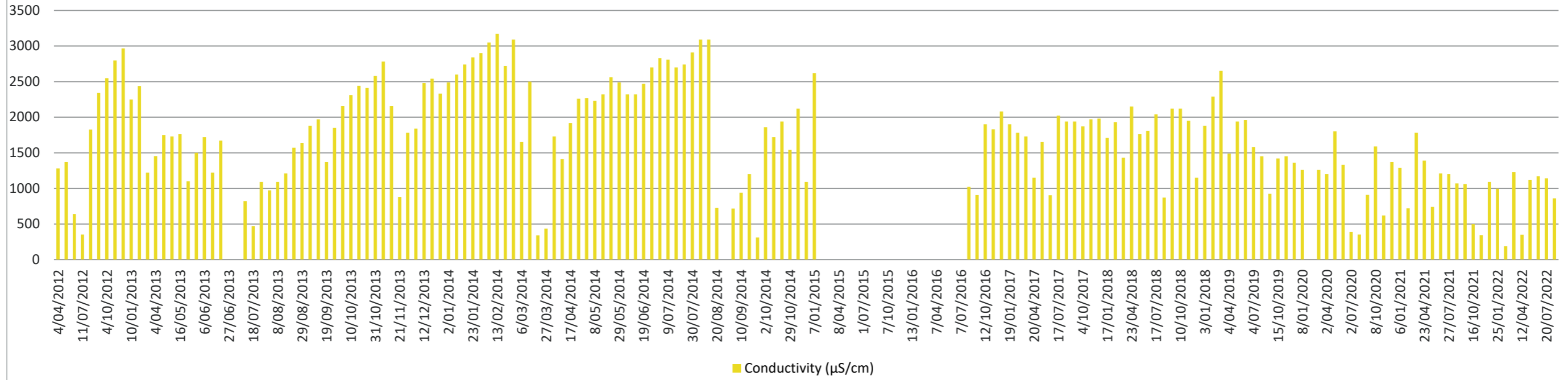




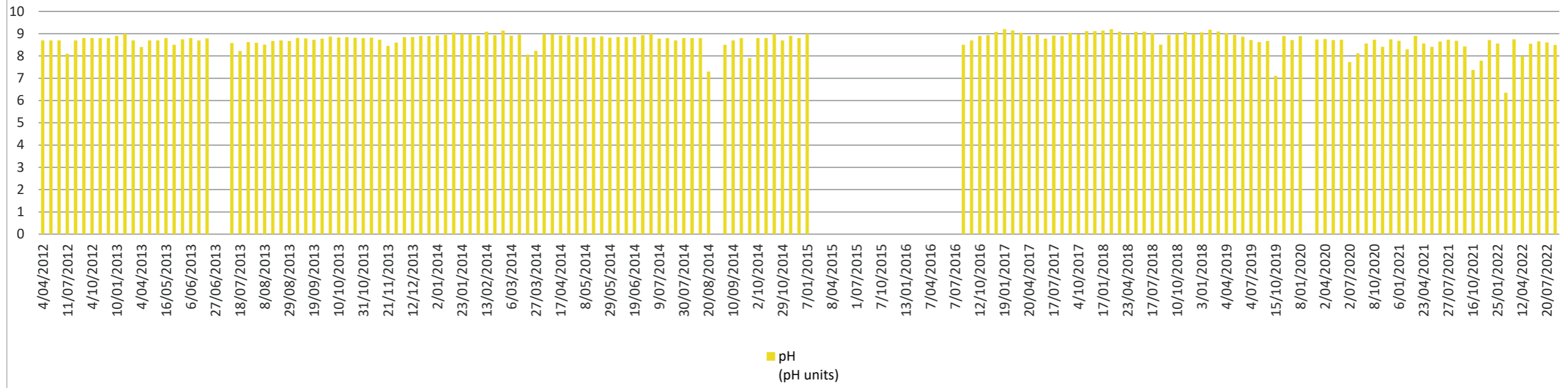
**Water Quality Monitoring Results – Point 12 (Grab)**



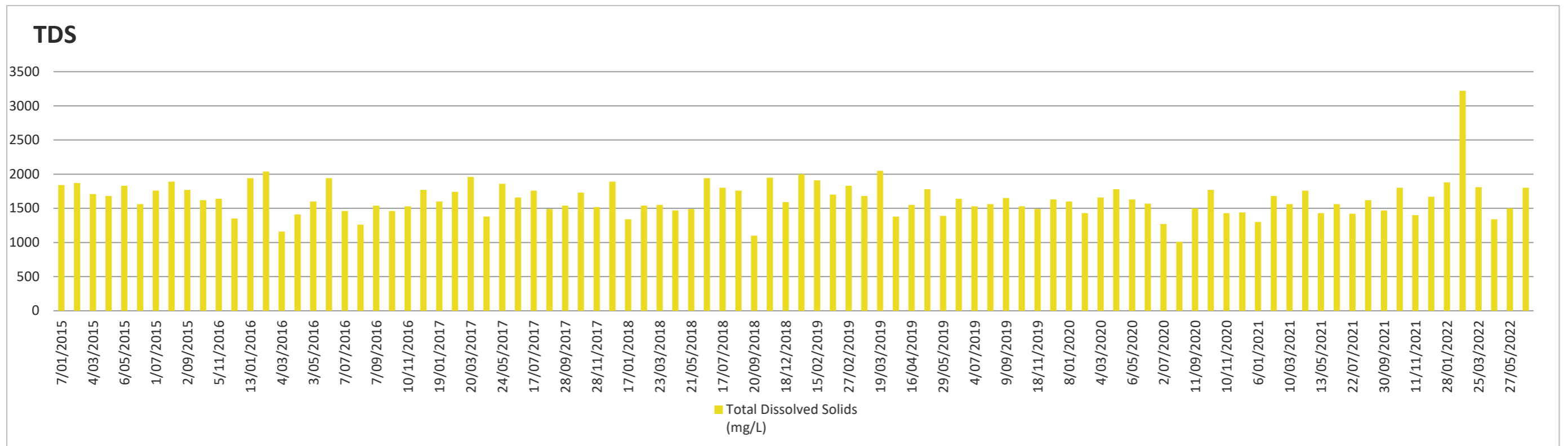
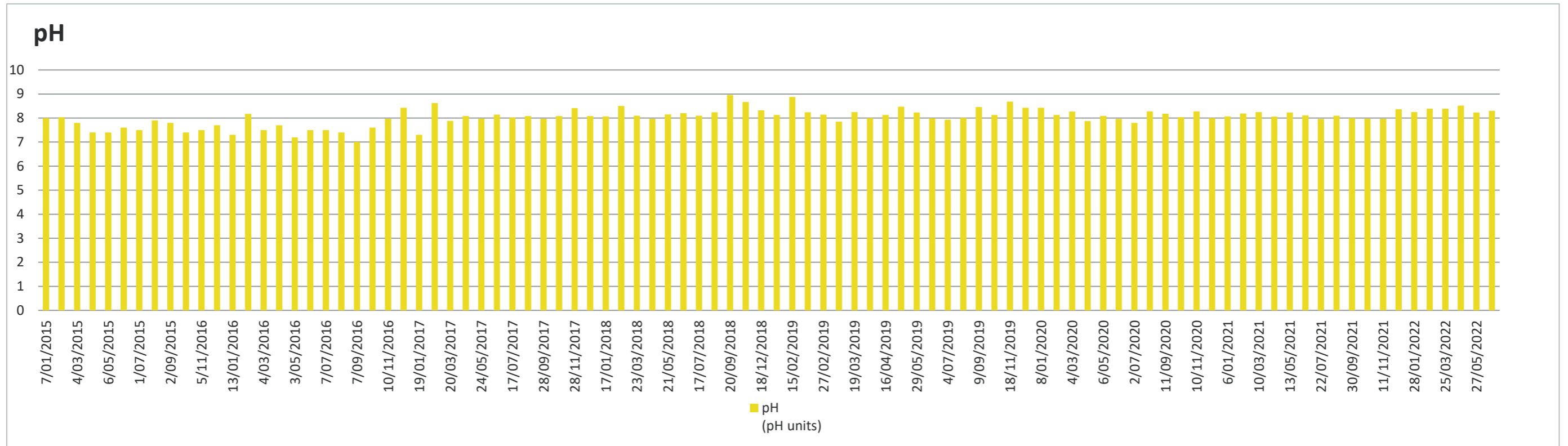
### Conductivity

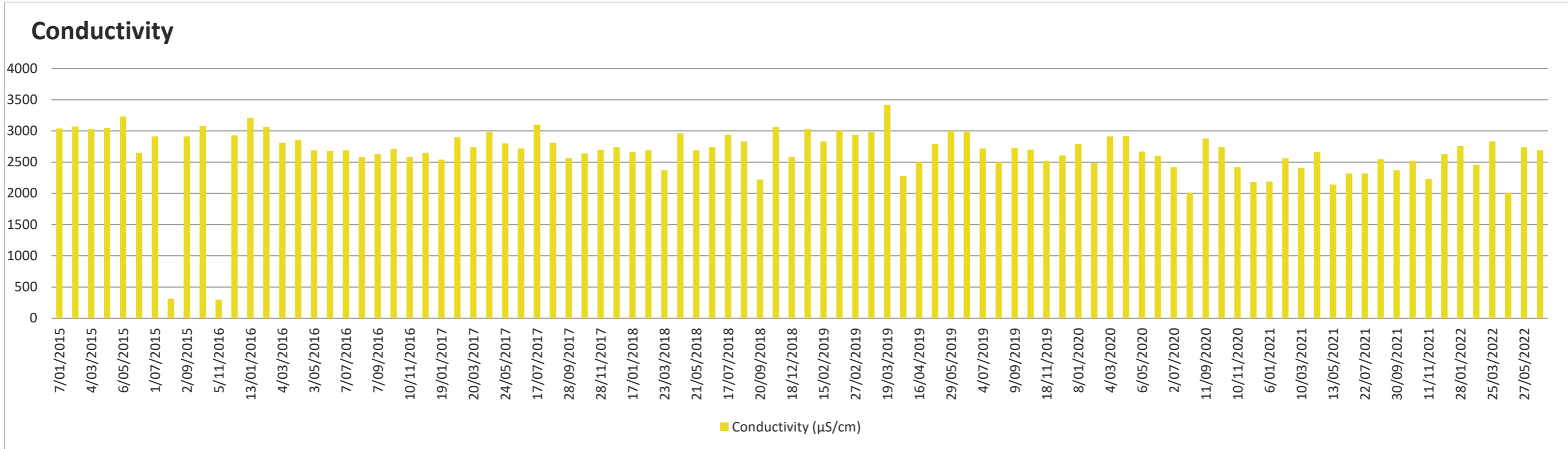


### pH

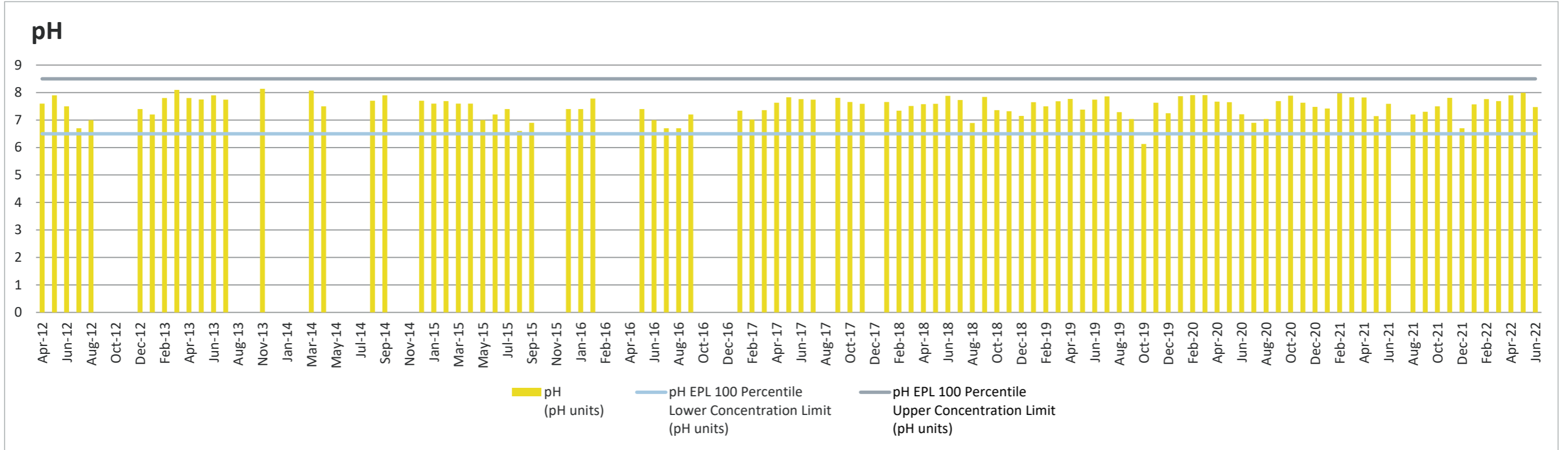


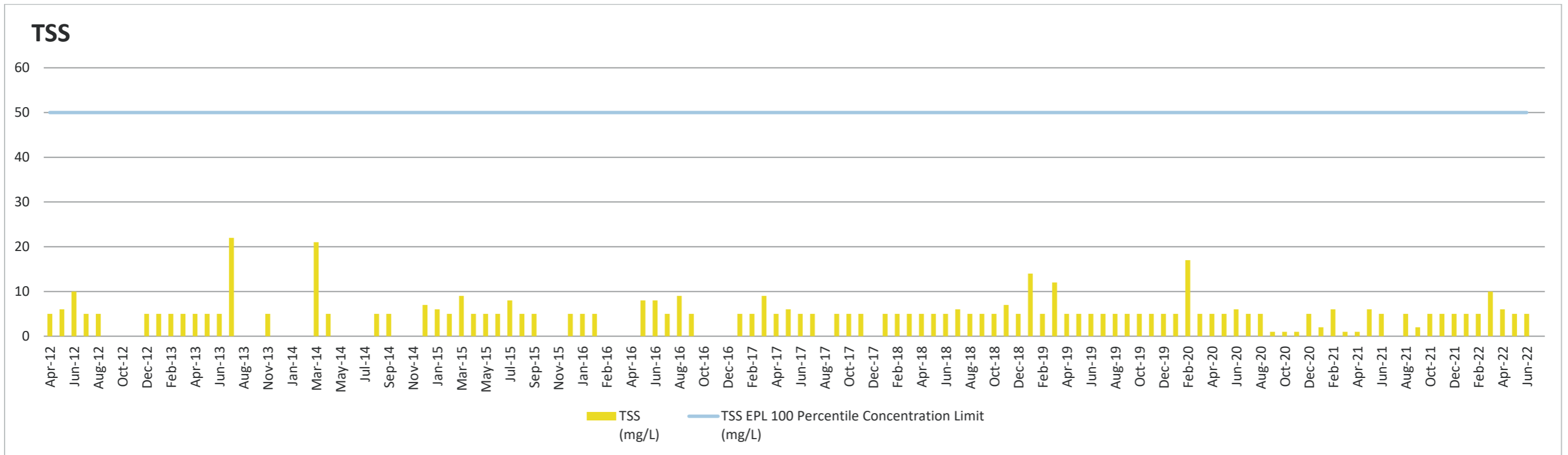
Water Quality Monitoring Results – Point 16



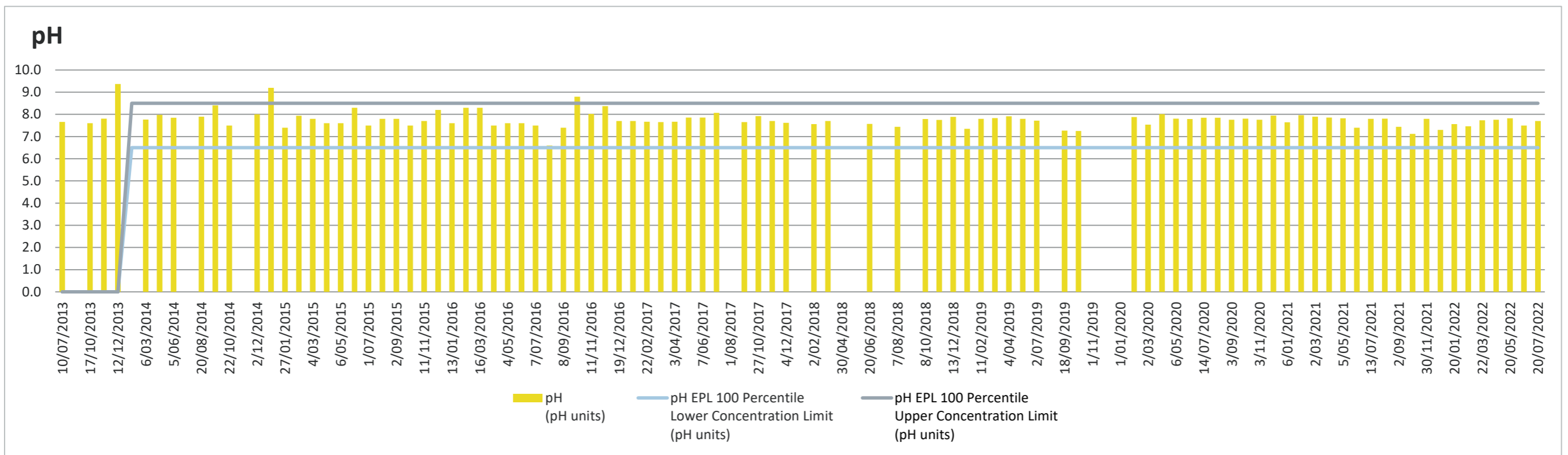


**Water Quality Monitoring Results – Point 19**

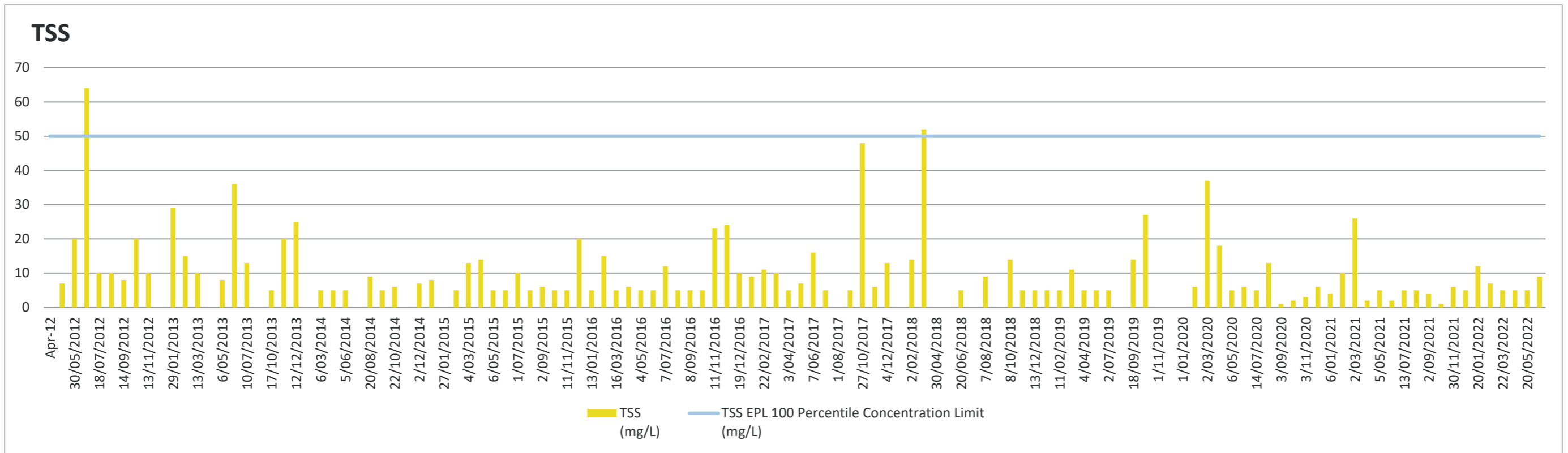




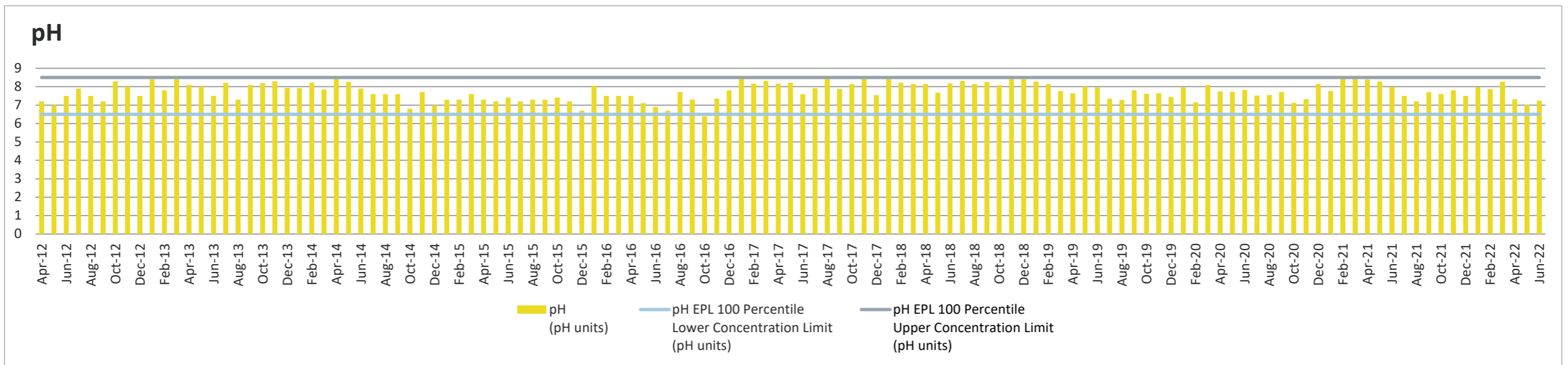
### Water Quality Monitoring Results – Point 23 (Grab)



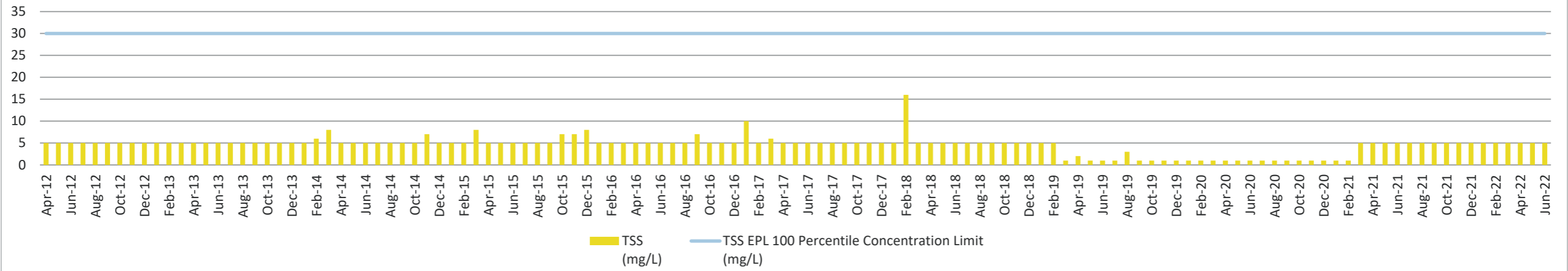




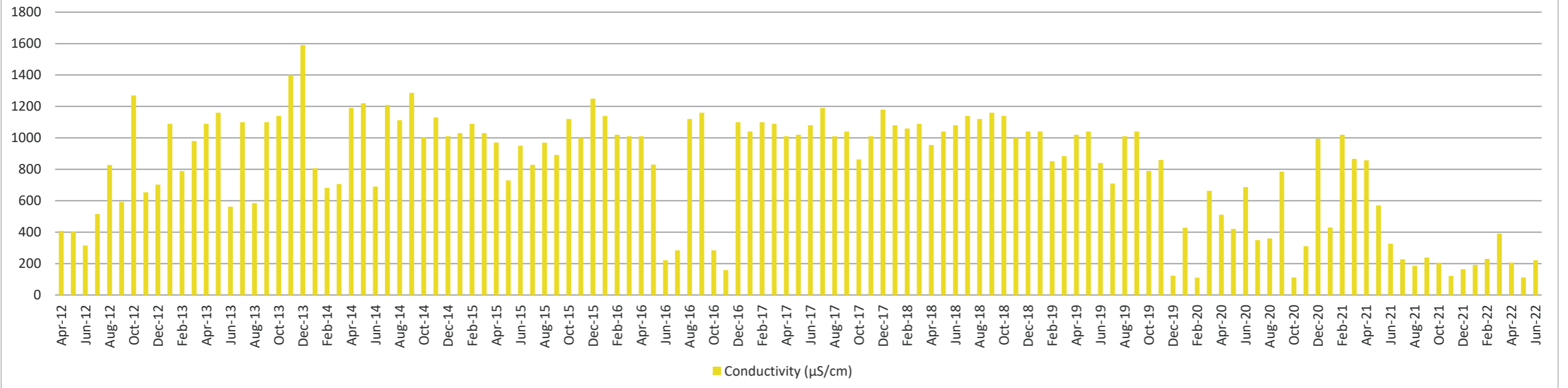
### Water Quality Monitoring Results – Point 24 (Grab)



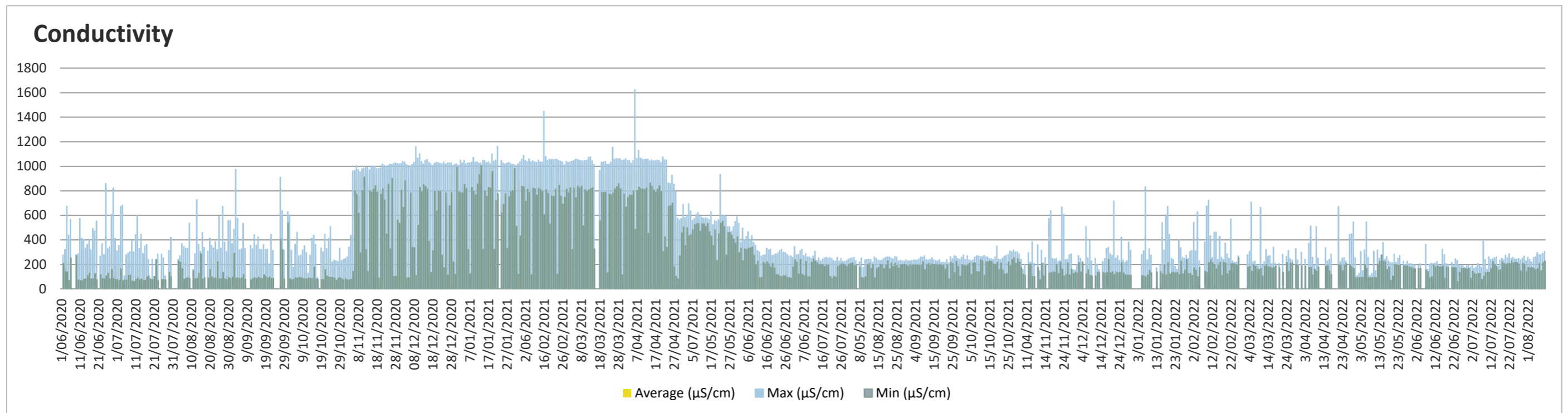
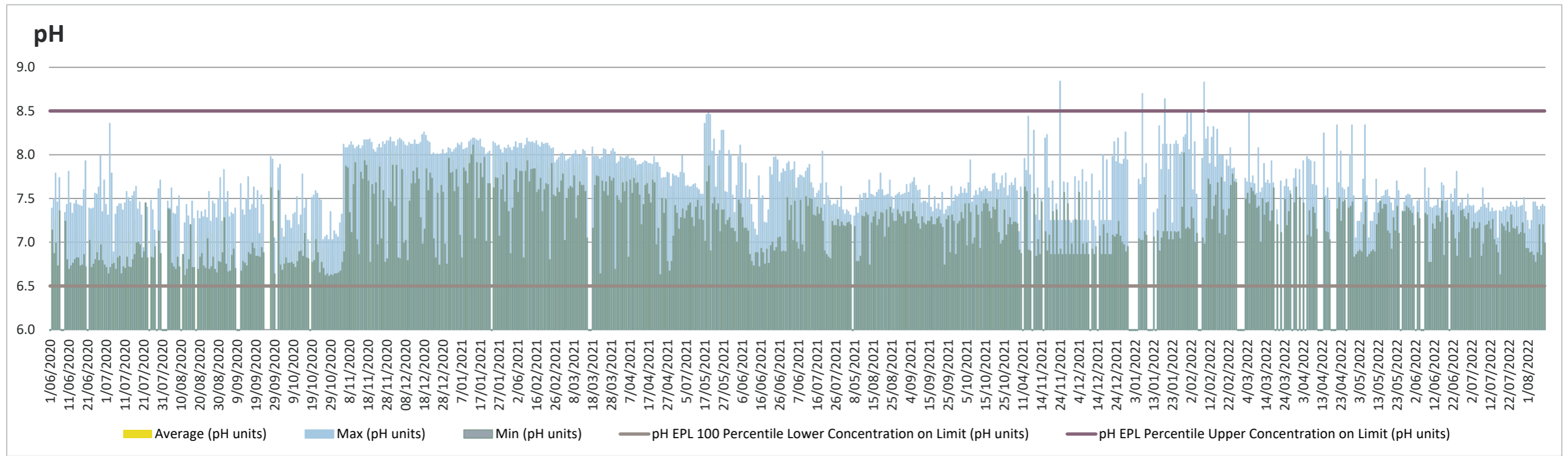
### TSS



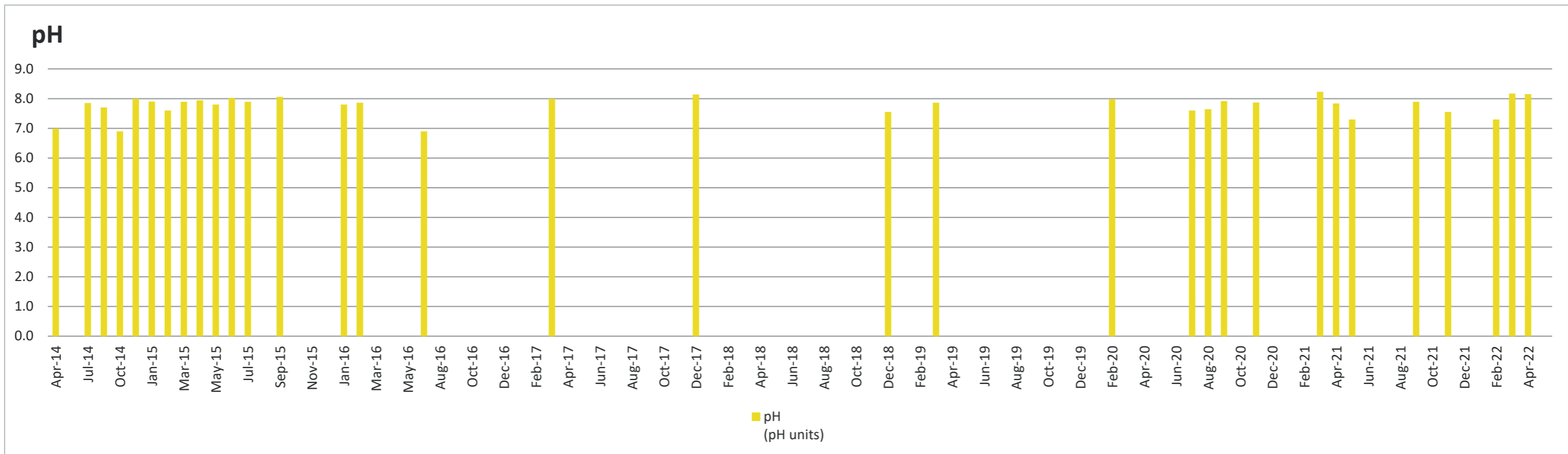
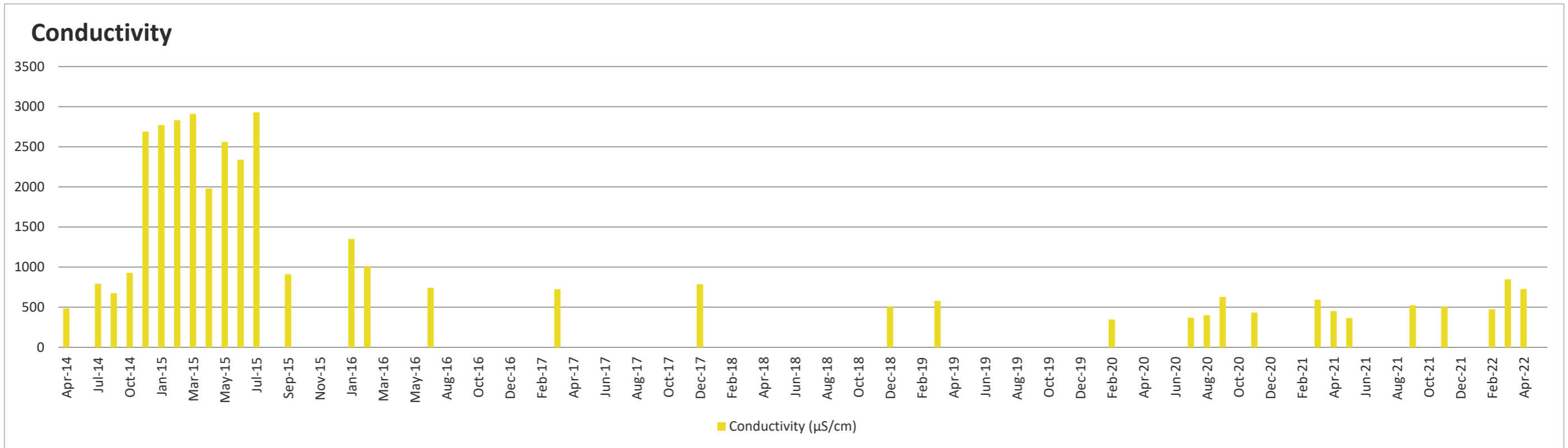
### Conductivity

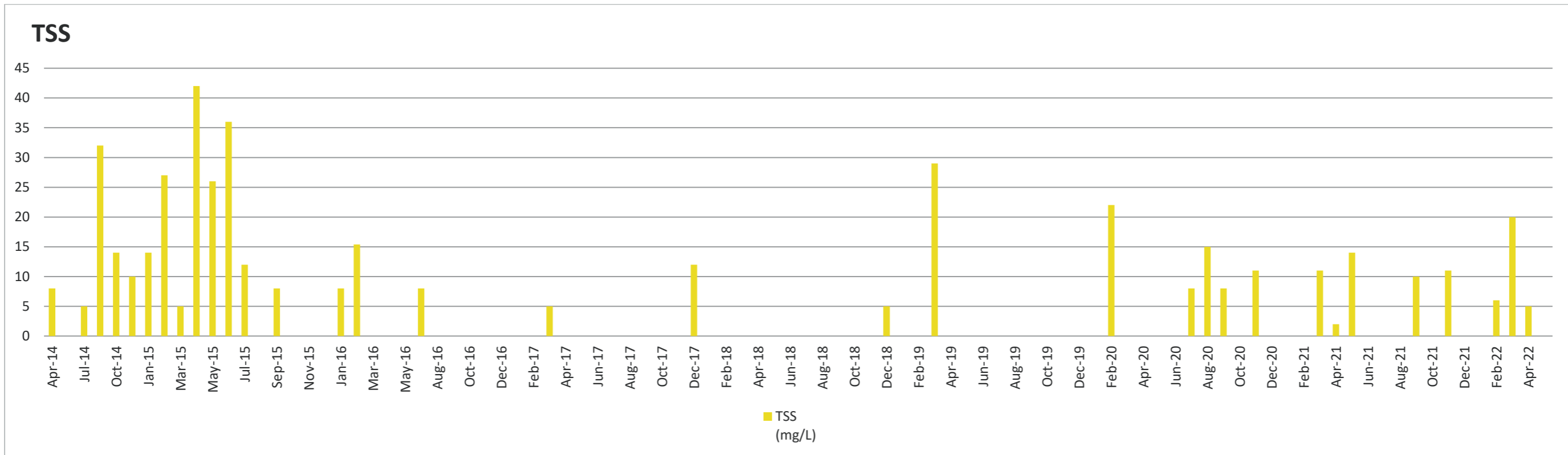


Water Quality Monitoring Results – Point 24 (Continuous)

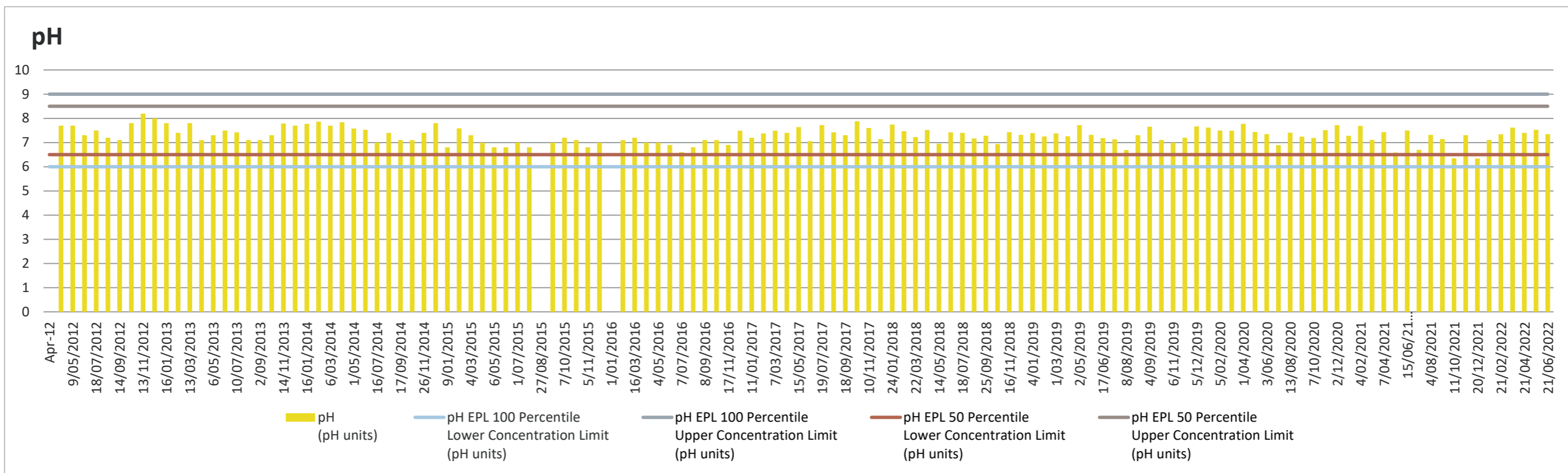


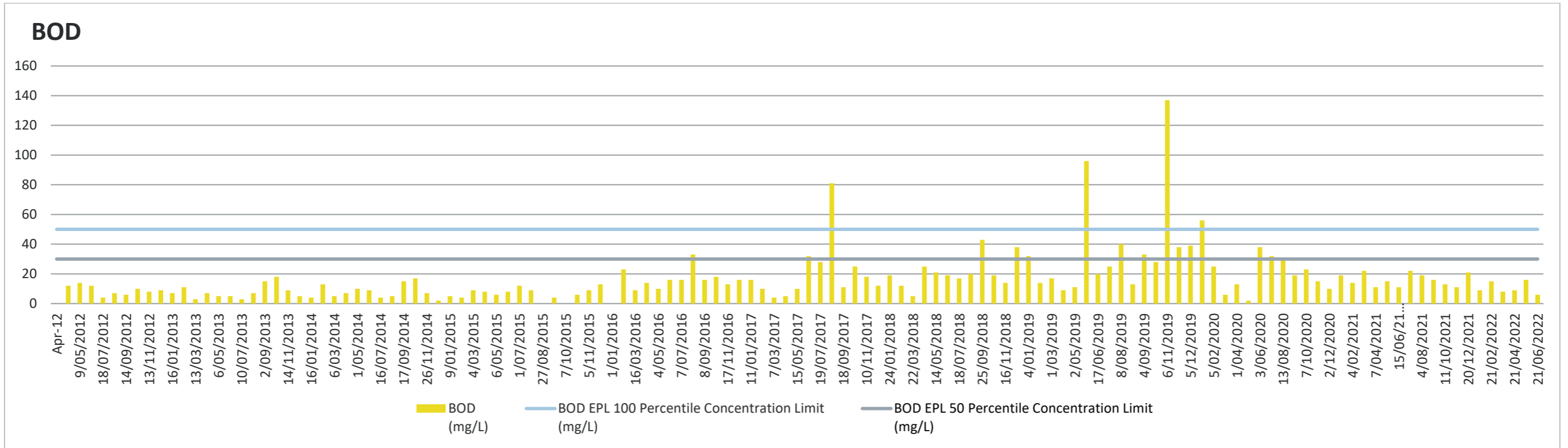
Water Quality Monitoring Results – Point 36 (when discharging)



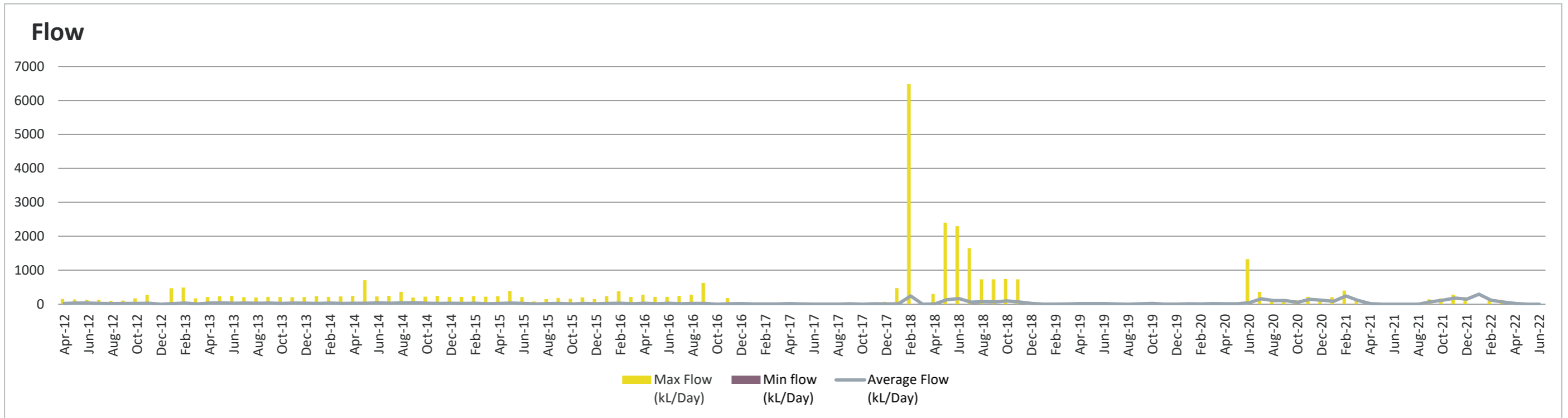


### Water Quality Monitoring Results – Point 38 (Grab)

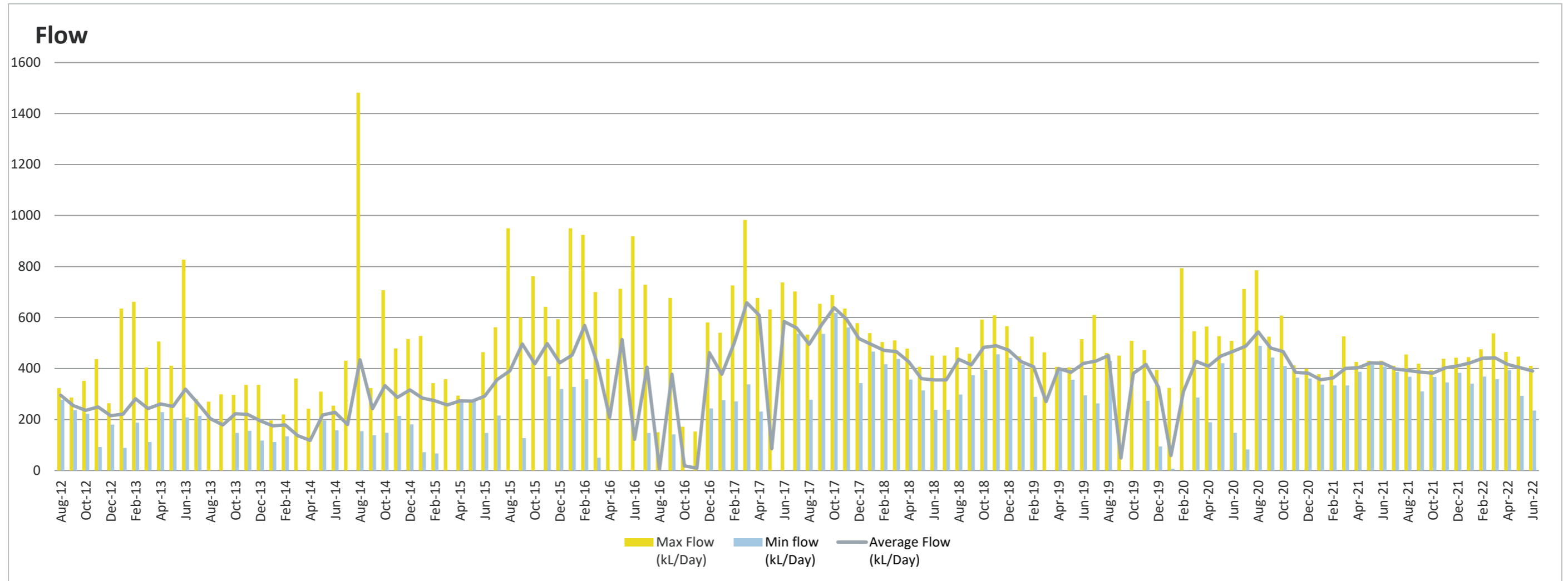




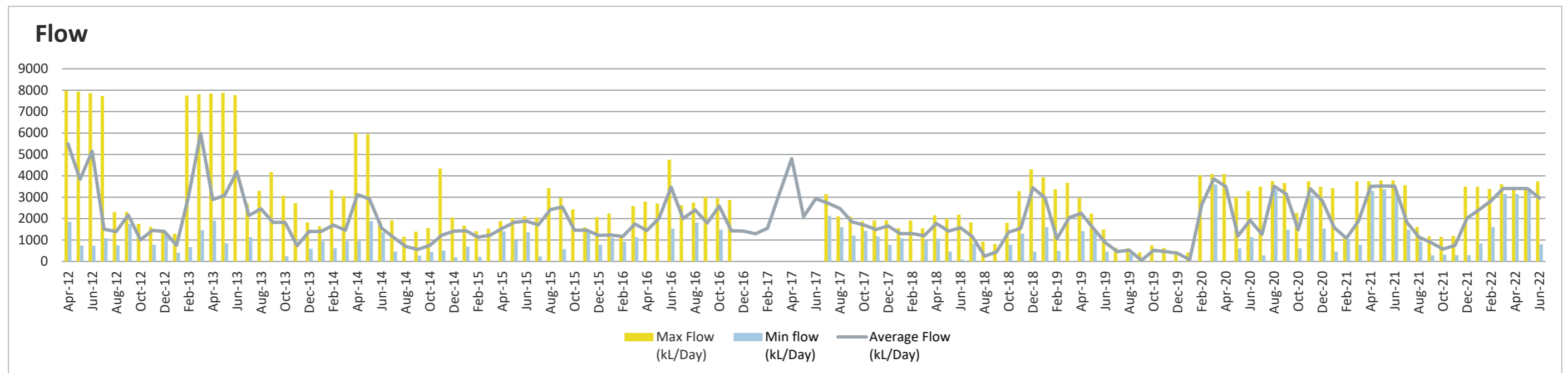
### Volume Monitoring Results – Point 4



**Volume Monitoring Results – Point 10**

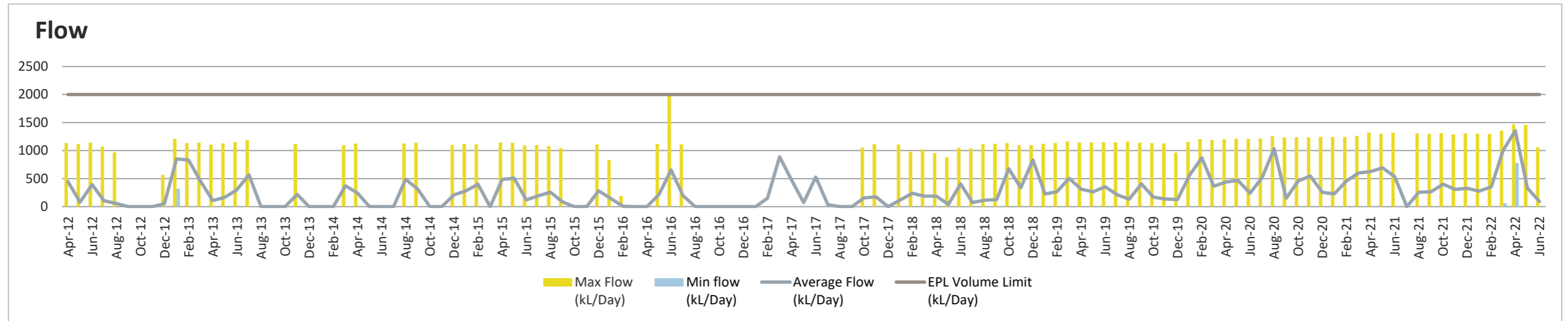


**Volume Monitoring Results – Point 13**



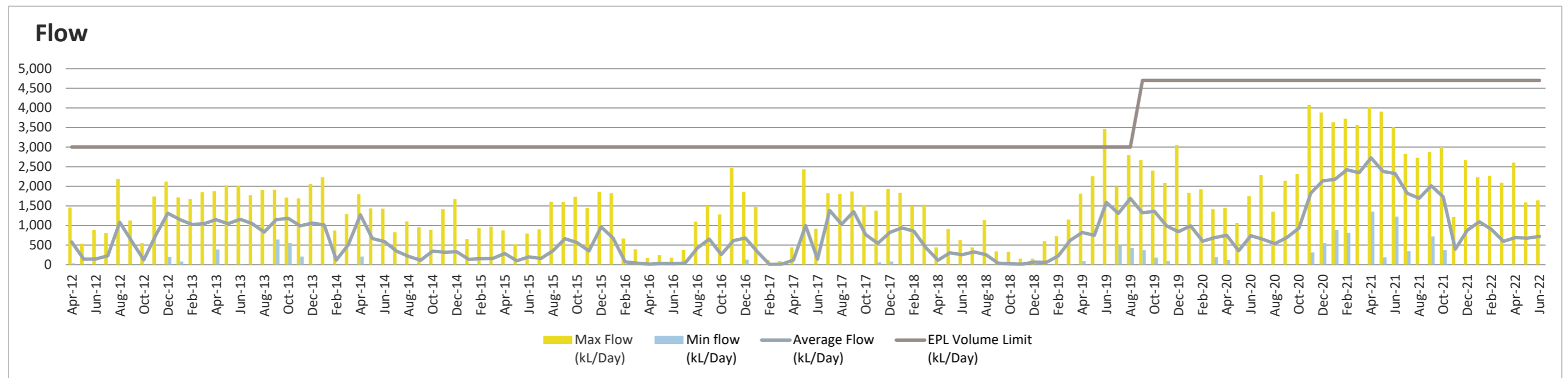
Volume monitoring results – Point 18 not included as no longer utilised.

Volume Monitoring Results – Point 19



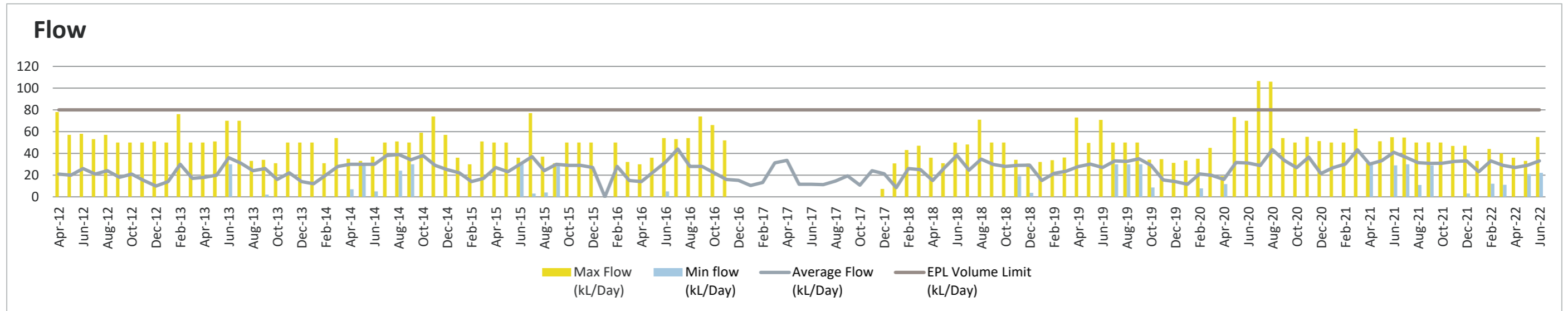
Volume monitoring results – Point 20 not included as no longer utilised.

Volume Monitoring Results – Point 24

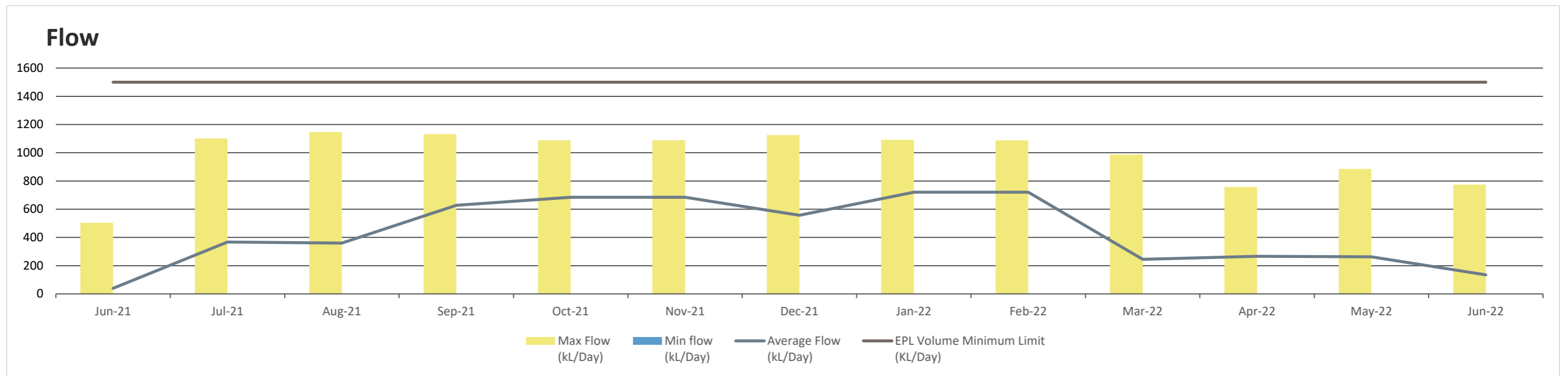




**Volume Monitoring Results – Point 38**



**Volume Monitoring Results – Point 40**





---

**Appendix 7: Annual CWEA Rehabilitation Report**

# MONITORING REPORT - EMPLACEMENT REHABILITATION YEAR 11

Illawarra Metallurgical Coal 2021



# CONTENTS

Contents.....	2
Introduction .....	3
Requirement for Monitoring.....	3
Purpose Of This Report.....	4
Survey Design.....	5
Aim .....	5
Key Performance Criteria .....	5
Methods.....	5
2021 RESULTS AND DISCUSSION .....	9
Biometric Vegetation Assessment.....	9
Photo-Point Monitoring.....	24
Threatened Plant Random Meander .....	24
Fauna .....	24
Completion Criteria.....	28
Conclusion and recommendations .....	33
Plans .....	34
Plan A: CWEA Plot Locations And Rehabilitation Progress .....	35
Plan B: Camera Trap Locations 2021 .....	36
Appendix 1: Photo Point Monitoring.....	37

# INTRODUCTION

## REQUIREMENT FOR MONITORING

### Stage 3 Consent

The development consent for the Stage 3 Emplacement at Appin North Colliery (formerly West Cliff) with the Coal Wash Emplacement Area (CWEA) (the site) required Illawarra Metallurgical Coal (IMC) to implement a formal monitoring program for all past, present and future emplacement rehabilitation activities on the site. The Stage 3 consent was replaced by the Bulli Seam Operations (BSO) Part 3A and EPBC Act approvals in 2011.

### BSO Part 3A and EPBC Act Approvals

IMC received Project Approval for current and proposed operations within the BSO for 30 years from the:

- NSW Department of *Planning* and Environment (DPE) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in December 2011; and
- Department of the Environment (DoE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in May 2012.

Both contain conditions relating to the CWEA operations, as summarised in Table 1.

**Table 1: Condition requirements of the EPBC Act and EP&A Act Part 3A approvals relating to CWEA rehabilitation**

BSO Project Approval Condition 17	EPBC Act Project Approval Clause 6:
<p>The Proponent shall prepare and implement a West Cliff Emplacement Area Management Plan for the project to the satisfaction of the Director-General. This plan must be prepared in consultation with OEH and be submitted to the Director-General for approval by the end of June 2013. This plan must include:</p> <p>a) detailed design plans which include options for reducing, avoiding and/or managing impacts on Aboriginal heritage sites in and adjacent to the south-western fringe of the proposed Stage 4 footprint (including sites: 52-2-2228/3617, 52-2-1373, 52-2-3533/3613 and 52-2-3506</p> <p>(b) management strategies to ensure no impacts to Aboriginal heritage site 52-2-3505 other than negligible impacts, including consideration of potential staged development of the emplacement and/or buffer areas;</p> <p>(c) management strategies for the protection and conservation of <i>Persoonia hirsuta</i>;</p> <p>(d) management strategies for the protection and conservation of the Broad-headed Snake and the Southern Brown Bandicoot;</p> <p>(e) a comprehensive groundwater monitoring program for the Brennan's Creek valley, including the area of the emplacement;</p> <p>(f) provide for progressive rehabilitation of the emplacement area, including through:</p> <ul style="list-style-type: none"> <li>- maximising opportunities for natural regeneration;</li> <li>- maximising retention of suitable habitat species;</li> <li>- appropriate weed and pest control strategies; and</li> </ul>	<p>The person taking the action must provide a Coal Wash Emplacement Staging and Rehabilitation Plan (the Staging Plan) for the stage 4 coal wash emplacement area to the Minister for approval. Clearing of vegetation for stage 4 coal wash area must not occur until the Staging Plan has been approved by the Minister. The Staging Plan must include, but not be limited to:</p> <p>Measures to limit the clearing of native vegetation to no more than 60 hectares;</p> <p>Provision for the progressive staging of coal wash emplacement to ensure at all times a minimum 100 m wide habitat corridor is maintained linking the <i>Persoonia hirsuta</i> core population with habitat adjacent to the Stage 4 coal wash emplacement area;</p> <p>Measures to ensure that, if the corridor is to include land previously used as emplacement areas (either in whole or part), native re-vegetation is established to the extent that it facilitates the movement of pollination vectors for <i>Persoonia hirsuta</i>;</p> <p>Staging of emplacement from east to west;</p> <p>Provision for progressive rehabilitation of the emplacement area, including through:</p> <p>Staged clearing of native vegetation within the stage 4 coal wash emplacement area;</p> <p>Maximising opportunities for natural regeneration, including through salvage, storage and re-use of site top soil and maximising the retention time of suitable habitat species within the stage 4 coal wash emplacement area adjacent to active emplacement areas to assist re-colonisation of native species to rehabilitated areas;</p>

BSO Project Approval Condition 17	EPBC Act Project Approval Clause 6:
<p>- planting only endemic species in habitat mixes appropriate for soil, slope and aspect.</p>	<p>Key performance objectives for site rehabilitation, including indicative timelines, performance measures, management actions and responsibilities and accountabilities;            Planting only endemic species in habitat mixes appropriate for the local surrounding environment, soil, slope and aspect, in accordance with relevant published guidelines; and            Appropriate weed and pest control strategies.            Monitoring and rehabilitation actions including but not limited to, measures to assess the success of management actions, natural regeneration and revegetation. The reporting of monitoring results must be submitted to the department within 30 days of every 12 month anniversary of the implementation date of the Staging Plan; and            Unless otherwise agreed to in writing by the Minister, the Staging Plan must be implemented and remain implemented for a minimum period of 10 years at which point a revised plan taking into account the monitoring referred to above must be submitted to and approved by the Minister.</p>

### CWEA Management Plan

The BSO CWEA Area Management Plan was approved on 16<sup>th</sup> November 2016 by the Department of Planning and Environment (DPE).

The rehabilitation monitoring commitments outlined in this plan are detailed in Table 2.

**Table 2: Monitoring requirements from the Coal Wash Emplacement Area (CWEA) Management Plan**

Type	Who	Frequency	Aspects monitoring	Output
Quarterly Inspection	Site Environmental Representative	Quarterly	Photographic records at pre-determined sites located within the rehabilitated area of the CWEA.	Report (internal) and photographic database.
Annual Inspection	Qualified ecologists or suitably trained site environmental representative	Annual	Quadrat monitoring in rehabilitation and surrounding areas* Fixed photo points throughout the CWEA ** Random meander transects (every three years) in rehabilitated areas*** Fauna Monitoring****	Report (internal). Outcomes from monitoring summarized in the BSO Annual Review Report appended to the BSO Annual Review.

\*Biometric assessments are required annually, starting at 1 year after translocation. Surveys at control sites required once every three years and benchmarks as calculated remain so for the ensuing three-year period.

\*\*Photo point monitoring is required annually and done in conjunction with the above.

\*\*\*Meanders for threatened plants are undertaken every three years.

\*\*\*\*Fauna monitoring using camera traps is required annually, starting 5 years after translocation or as deemed appropriate depending on the maturity of the revegetation.

### PURPOSE OF THIS REPORT

The purpose of this report is to provide the results of the 2021 annual monitoring for the CWEA rehabilitation works.

# SURVEY DESIGN

## AIM

To measure, over time, the success of the rehabilitation of the CWEA, particularly the regeneration of natural vegetation and placement of specific habitat features including rocks and logs.

This will be achieved through monitoring of biometric attributes, fixed photo points and threatened plant meander surveys, as well as measuring the presence/absence of fauna within the various rehabilitation sites of varying age.

## KEY PERFORMANCE CRITERIA

The monitoring program is designed to monitor the success of the following Key Performance Indicators (KPI):

1. Adequate regeneration of translocated communities: Exposed Sandstone Scribbly Gum Woodland (ESSW) and Sandstone Gully Peppermint Forest (SGPF). Regeneration to reflect the composition and structure of the two communities.
  - i. Biometric attributes within local benchmarks
  - ii. No more than 20 percent weed cover in translocated compartments.
2. The degree to which fauna (native) use the rehabilitated CWEA including constructed habitats and nest boxes.

This report will also advise any recommendations to assist implementing actions for the objectives outlined in Table 9.

## METHODS

### Biometric Vegetation Assessment

This assessment utilises the BioBanking Assessment Methodology (OEH 2014). This methodology is used as it is a ready-made vegetation condition assessment, incorporating parameters (known as 'site attributes') that reflect changes in condition over time against benchmarks. Furthermore, the methodology allows for the calculation of local benchmark data, thereby providing a more accurate picture of the condition of the suitable vegetation types locally.

Vegetation plots (50 x 20 metres) were established within each of the monitoring zones and data for the following site attributes was collected:

- Native Plant Species Richness
- Native Overstorey Cover
- Native Midstorey Cover
- Native Groundcover (Grasses)
- Native Groundcover (Shrubs)
- Native Groundcover (Other)
- Exotic Plant Cover
- Total Length of Fallen Logs.

### Control Sites

Six locations were chosen as control sites (Table 3, Plan A). Monitoring the controls sites will:

- Allow measurement of the success of soil translocation within the CWEA through the comparison of a range of site condition attributes with local benchmark conditions;
- Provide long term data regarding the condition of local vegetation types and the targets for rehabilitation; and
- Account for any stochastic variability within the local ecosystems (e.g., bushfire, climate, etc.) and allow for the consideration of such variability in relation to the outcomes on the site.

**Table 3: Control site locations**

Site	Easting	Northing
c253	297696	6212022
c255	297825	6211821
c256	297518	6212778
c257	297518	6212934
c258	297152	6213052
c259	297283	6212899

### Monitoring Sites

Stratification of the monitoring sites within the CWEA occurred according to their treatment histories, age, and the respective areas they occupied in hectares. Accordingly, 11 monitoring sites were chosen across three different treatment types in 2011. This was expanded to 15 plots across four separate treatments in 2014, and 17 plots in 2017 across five treatments (Plan A & Plan B) and 19 plots in 2019. Monitoring sites are listed in Table 4 and shown in Plan A.

**Table 4: Monitoring site locations**

Site	Easting	Northing	CWEA Stage	Area
a1-228	299842	6210193	One	A1
a1-230	299758	6210171		
a1-232	299857	6210092		
a2a-237	299578	6210253	Two	A2a
a2a-239	299649	6210350		
a2a-240	299509	6210386		
a2b-241	299515	6210493		A2b
a2b-242	299322	6210565		
a2b-243	299136	6210510		
a2b-244	299093	6210408		
a2b-245	299388	6210627		
a2c-042	299259	6210803		
a2c-043	299223	6210746		
a2d-001	298798	6210768		A2d
a2d-002	298848	6210678		
a2e-001	299093	6210797		
a2e-002	299018	6210885		
a3a-001	298755	6211092		Three
a3a002	298932	6211007		

### Local Benchmarks

Local benchmark data was collected at six control sites, as detailed above. The BioBanking Local Benchmark Calculator is then used to calculate the benchmark levels and the range of values for each of the collected attributes. The control sites were nominated based on Revised Biometric



Vegetation Types (RBVTs as defined by OEH in the Biometric Vegetation Types Database) as either Red Bloodwood – Scribbly-Gum Heathy Woodland RBVT or Sydney peppermint – Smooth-Barked Apple – Red Bloodwood Shrubby Open Forest RBVT of the Sydney Metropolitan Catchment Management Authority (CMA). It was considered that the CWEA was likely to regenerate to a state that was an artificial combination of both RBVTs and therefore no attempt has been made to stratify the survey on the basis of these types.

Table 5 shows the local benchmark values for each of the biometric attributes using data from the control sites collected in 2015 (and utilised from 2015-2017). Table 6 shows the local benchmark values for each of the biometric attributes using data from the control sites collected in 2020. Data from 2020 was used as the Local Benchmark in this report. The data was entered into the Local Benchmark Calculator. Variation from previous benchmarks may be due to the limitations with survey methods due to a change in personnel conducting the monitoring.

**Table 5: Local benchmarks 2015, 2016, 2017**

Attribute	Benchmarks (2015)	
	Lower	Upper
Native Plant Species	-	>= 42
Native Overstorey Cover	1.9	17.7
Native Midstorey Cover	4.4	16.0
Native Ground Cover (Grasses)	0.0	75
Native Ground Cover (Shrubs)	30.0	72.6
Native Ground Cover (Other)	28.8	66.6
Number of Trees with Hollows*	-	>= 2
Total Length of Fallen Logs	-	>= 34

\* Included here for completeness only. As discussed above, trees with hollows are unlikely to develop within the life of the project.

**Table 6: Local benchmarks 2020**

Attribute	Benchmarks (2020)	
	Lower	Upper
Native Plant Species	-	>= 43
Native Overstorey Cover	6.6	12
Native Midstorey Cover	4.9	11
Native Ground Cover (Grasses)	29	71
Native Ground Cover (Shrubs)	24	49
Native Ground Cover (Other)	1	14
Number of Trees with Hollows*	-	>= 2
Total Length of Fallen Logs	-	>= 49.25

\* Included here for completeness only. As discussed above, trees with hollows are unlikely to develop within the life of the project.

### Photo Point Vegetation Monitoring

Permanent photographic points have been established at each of the biometric vegetation plots.

### Threatened Plant Random Meander

A random meander for threatened plants (Cropper 1993) is conducted throughout the CWEA every three years. This method is the most appropriate for the purposes of the monitoring survey. The meander method was undertaken in 2020, thus it was not undertaken this year. The next meander method is scheduled to be conducted in 2023.

### **Fauna Using Camera Traps**

Camera traps are becoming the preferred survey method over traditional cage traps or hair tubes as they are more efficient, less labour intensive and non-invasive. The method is well documented for monitoring small to medium sized mammals. Some useful resources are Eyre et al. (2018) and Meek et al. (2012).

Camera traps are deployed to the rehabilitating areas, using a passive survey approach (i.e., non-baited). The sites target specific habitat features i.e., logs, log hollows and rock crevasses/overhangs to determine occupation. As a rule, a minimum of one trap is placed per rehabilitation compartment. Refer to Plan B.

Infra-red cameras are used and are placed to aim the lens at the core body zone of the animal. The cameras are placed approximately 20-30 cm above the ground and no more than 2-3m from the feature (Meek *et al.* 2012). The recommended minimum deployment time is 12 nights (Meek et al. 2012).

### **Timing**

Biometric assessments are required annually, starting at one year after translocation. Surveys at control sites are only required once every three years (next due in 2023) and the benchmarks are used for the ensuing three year period (see Table 6 for 2020 benchmarks to be used in this report). Photo point monitoring is required annually and done in conjunction with the above. Meanders for threatened plants are undertaken every three years (next due in 2023).

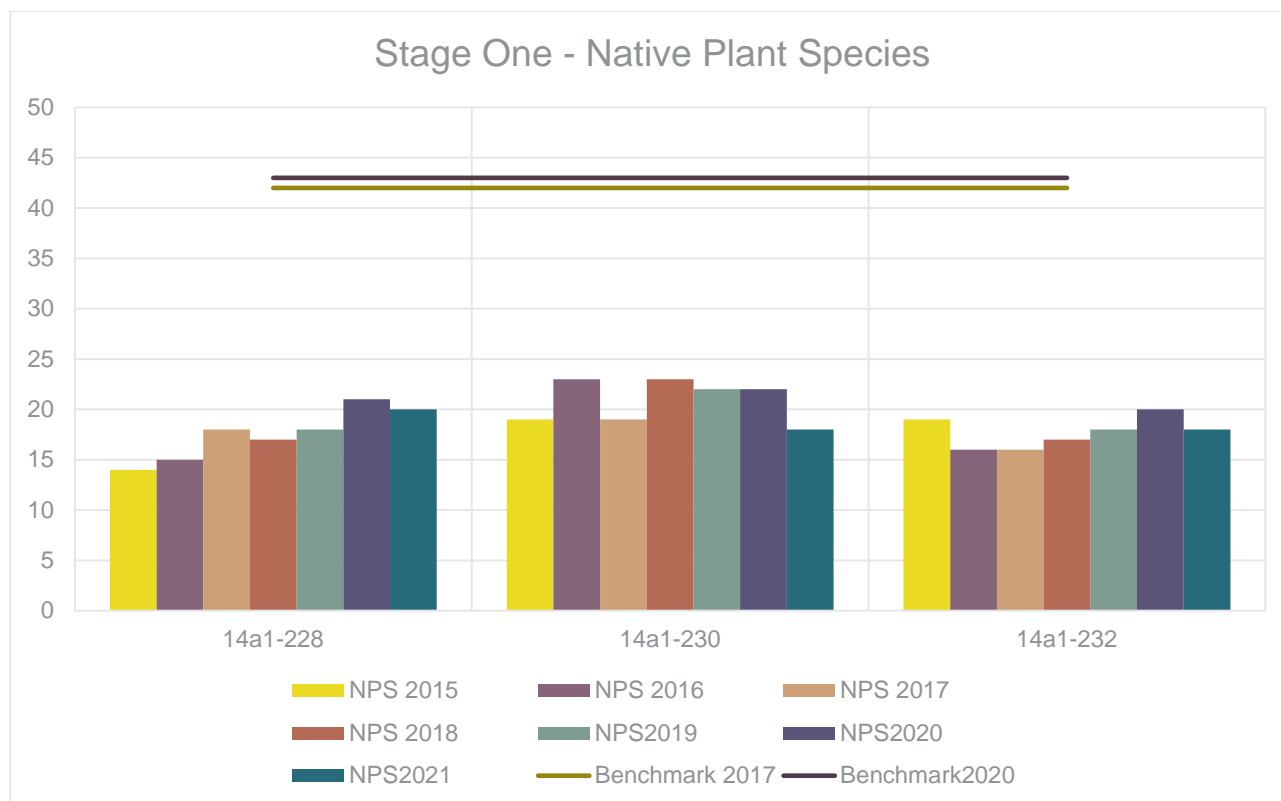
Fauna monitoring using camera traps is required annually, starting five years after translocation or as deemed appropriate, depending on the maturity of the revegetation. Criteria can be measured most easily in spring by noting flowering, seed production, seedling growth and establishment.

# 2021 RESULTS AND DISCUSSION

## BIOMETRIC VEGETATION ASSESSMENT

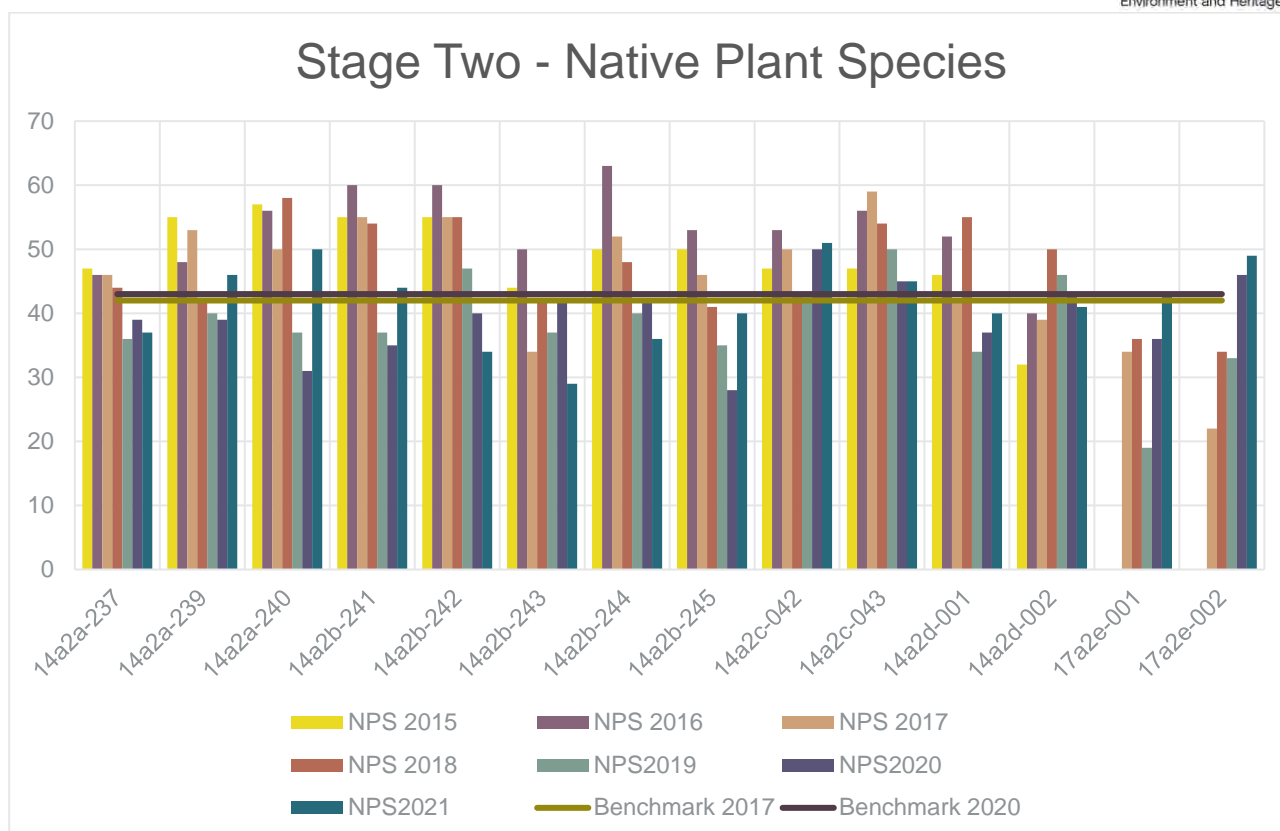
### Native Plant Species Richness

The 2020 local benchmark for Native Plant Species Richness is  $\geq 43$  species per plot (previously in 2017  $\geq 42$ ).



**Figure 1: Number of native plant species - Stage One**

The plots in Stage One had low species richness in comparison to benchmark; however, this is consistent with the results of previous years (2015 to 2020) (Figure 1). This may be due to the differing nature of the methodology used in comparison to Stage Two, i.e., Stage One has shallower topsoil and was planted with tube stock (predominantly Acacia and Eucalypts).



**Figure 2: Number of native plant species - Stage Two (Area 2a, 2b, 2c, 2d, 2e)**

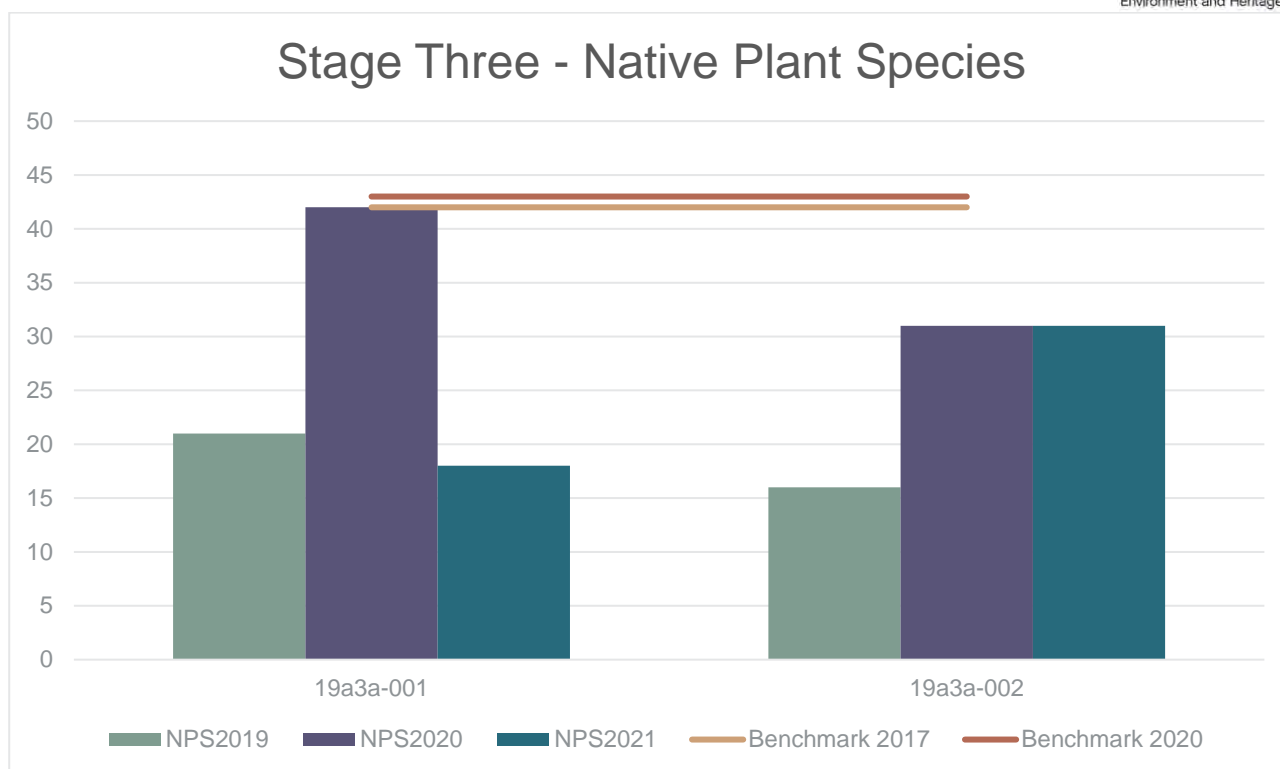
The plots in Area 2a had an average of 44 species per plots in 2021, slightly higher than the average of 36 (2020) and 37 (2019) species per plot of previous years monitoring. Rehabilitation in this area commenced in 2007 and as expected species richness has reached benchmark (43) over time.

The plots in Area 2b had an average of 36 species per plot which is slightly lower than the average with the 2020 data (average of 37) year and 2019 (average of 39). The average has just fallen below benchmark but is expected to approach benchmark (43) over time.

The native plant species richness of Areas 2c (last seven years) is above benchmark levels (of 43), with the average for Area 2c (48) slightly higher than 2020 data (47.5) and 2019 data (46). The average for Area 2d (40.5), is slightly higher than 2020 data (40) and 2019 data (40) and approaching benchmark (43).

Area 2e (treated in 2017) received results just above benchmark (average of 46), this is a large increase from 2020 data (average of 41) and 2019 data (average of 26). It is expected to continue to increase with time and as the treatments establish further.

The high native species richness present in Stage Two may reflect the immaturity of the translocation areas, in that it shows that no particular species has had time to establish dominance and out-compete other species. It is expected that these sites in Stage Two will see fluctuation in species diversity over time and approach benchmark levels as certain species thrive and out compete others for resources and space.



**Figure 3: Number of native plant species - Stage Three (Area 3a)**

The newly treated Area 3a was below benchmark for Native species richness (average of 24.5), a decrease from the 2020 data (average of 33.5). It is expected that species richness will increase further at these locations as the treatments establish.

### Native Overstorey Cover

The 2020 local benchmark for Native Overstorey Cover is 6.6 – 12.0 percent foliage cover (previously 1.9 – 17.7 percent foliage cover).

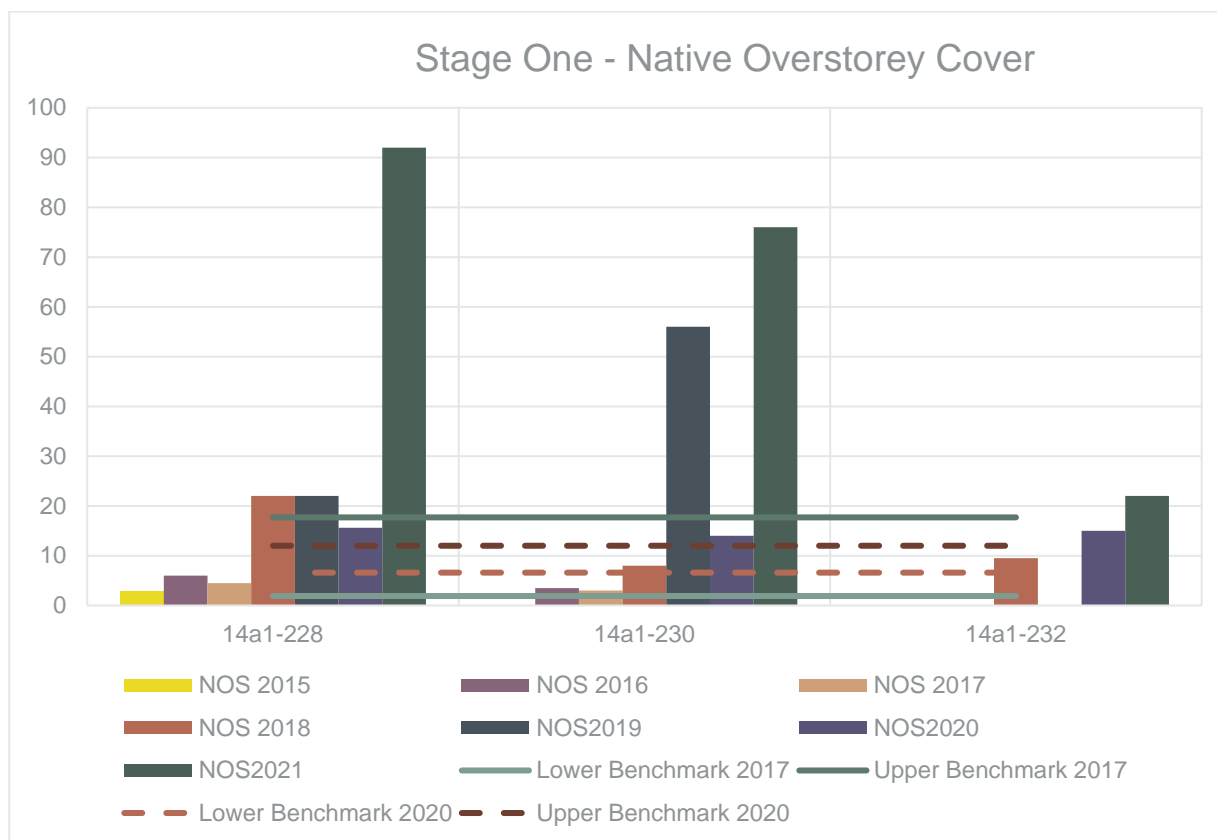
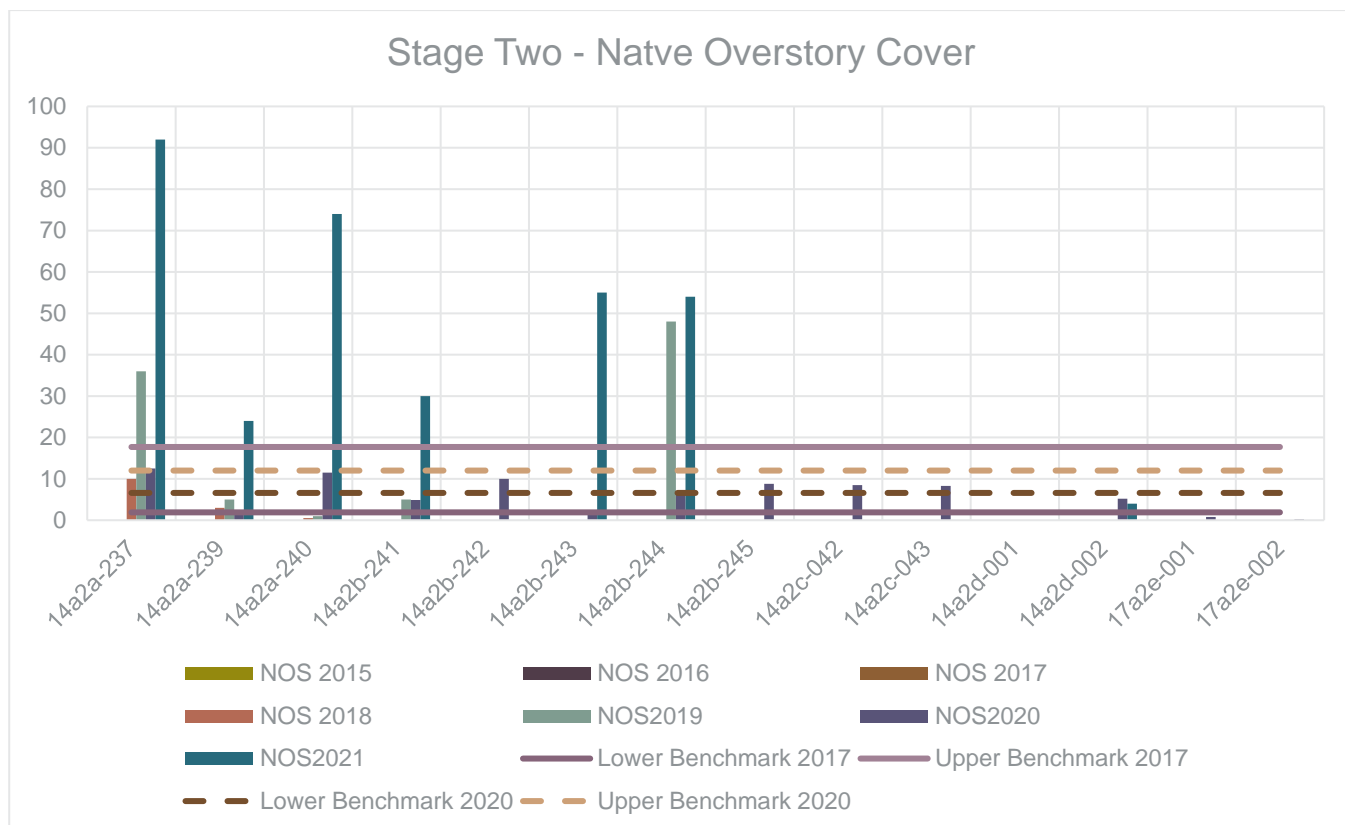


Figure 4: Native overstorey cover - Stage One



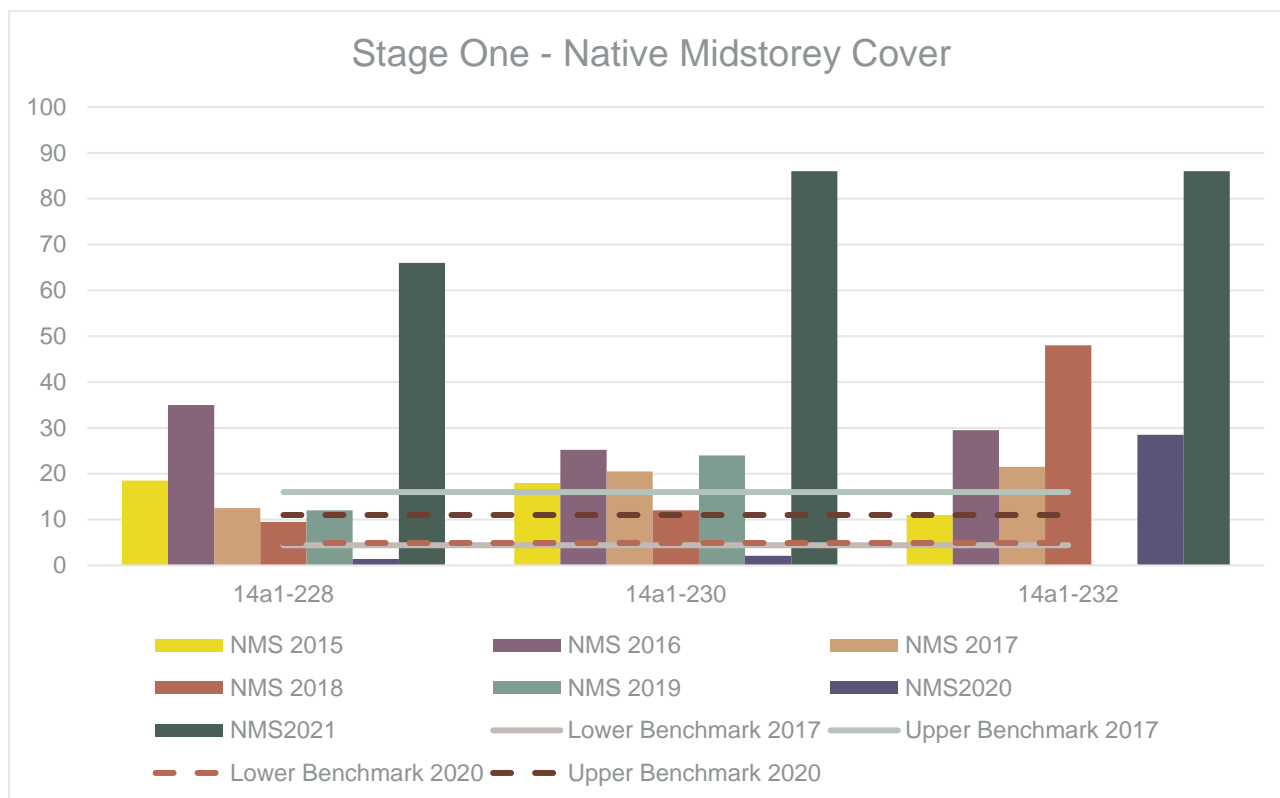
**Figure 5: Native overstorey cover - Stage Two (Area 2a, 2b, 2c, 2d and 2e)**

Native overstorey was recorded in all three plots in Stage One. Of the 14 plots in Stage Two native overstorey was recorded in seven plots (14a2a-237, 14a2a-239, 14a2a-240, 14a2b-241, 14a2b-243, 14a2b-244 and 14a2d-002) (Figure 4 and Figure 5). The overstorey cover change (increase) in Stage One and in the seven plots in Stage Two, compared with previous years, may in part be due to transect placement. Despite all efforts to maintain a consistent bearing for the monitoring transect, even a slight change in angle can result in differing results. Additionally, the large difference in data collected in 2021 may be due to observer bias. It is clear, however, that the canopy in Stage One and a portion of Stage Two is developing within benchmark values. The areas subject to rehabilitation in Areas 2c, 2d and 2e are still somewhat immature and have only recorded a smaller amount of native overstorey cover. With all dominant overstorey species being recorded within the monitoring plots, native overstorey cover is likely to increase over time. As the translocation areas establish and mature it is expected that native overstorey cover will increase and approach benchmark levels.

Stage Three is still too immature to record any native overstorey cover and sites are not yet in the benchmark range for native overstorey cover. As the translocation areas establish and mature it is expected that native overstorey cover will increase and approach benchmark levels.

**Native Midstorey Cover**

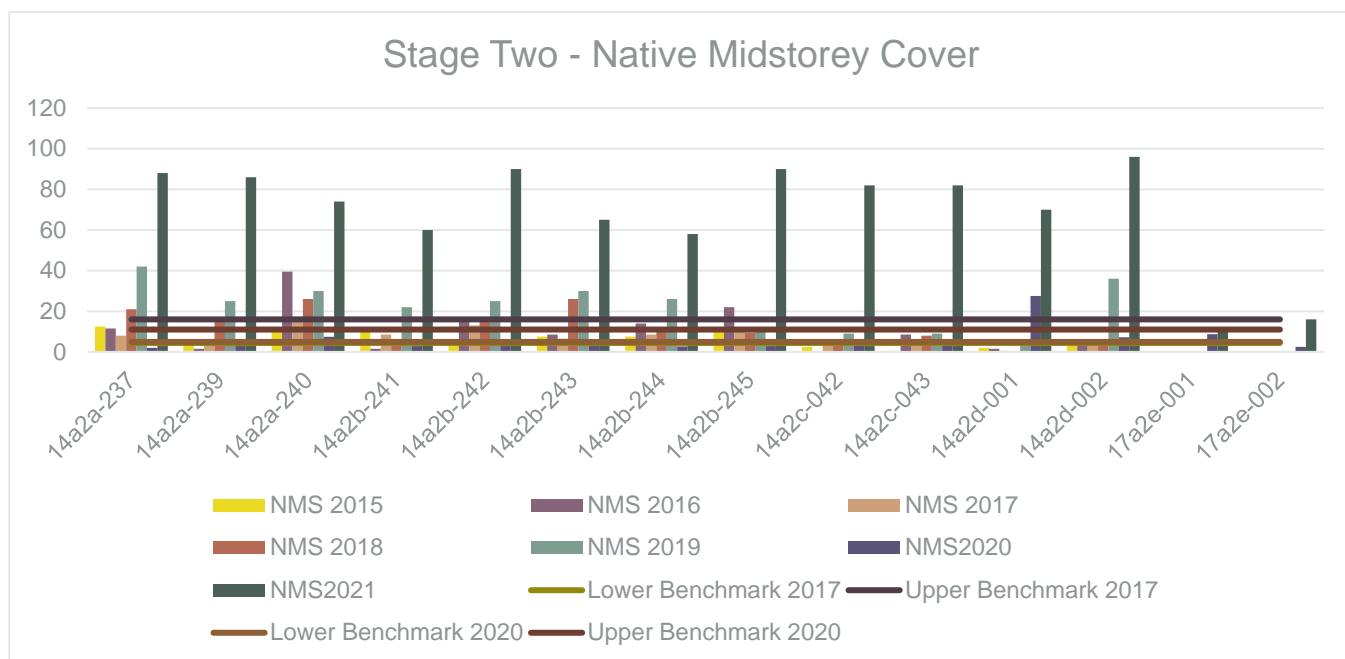
The 2020 local benchmark for Native Midstorey Cover is 4.9 – 11.0 percent foliage cover (previously 4.4 – 16.0 percent foliage cover).



**Figure 6: Native Midstorey Cover - Stage One**

Every plot in Stage One demonstrated above benchmark values for native midstorey cover (Figure 6). This dramatic increase in midstorey cover, compared with previous years, may be the result of

a combination of factors, including a higher level of rainfall in 2021, accidental variation in the transect placement and/or observer bias.



**Figure 7: Native Midstorey Cover - Stage Two (Area 2a, 2b, 2c, 2d and 2e)**

Every plot in Stage Two demonstrated above benchmark values for native midstorey cover except for 17a2e-001 and 17a2e-002 (Figure 7). This dramatic increase in midstorey cover, compared with previous years, may be the result of a combination of factors, including a higher level of rainfall in 2021, accidental variation in the transect placement and/or observer bias.

Stage Three is still too immature to record any native midstorey cover and sites are not yet in the benchmark range for native midstorey cover. As the translocation areas establish and mature it is expected that native midstorey cover will increase and approach benchmark levels.

**Native Ground Cover (Shrubs)**

The 2020 local benchmark for Native Groundcover (Shrubs), i.e., woody plants < 1 metre: 24.0 – 49.0 percent (previously 30.0 – 72.6 percent).



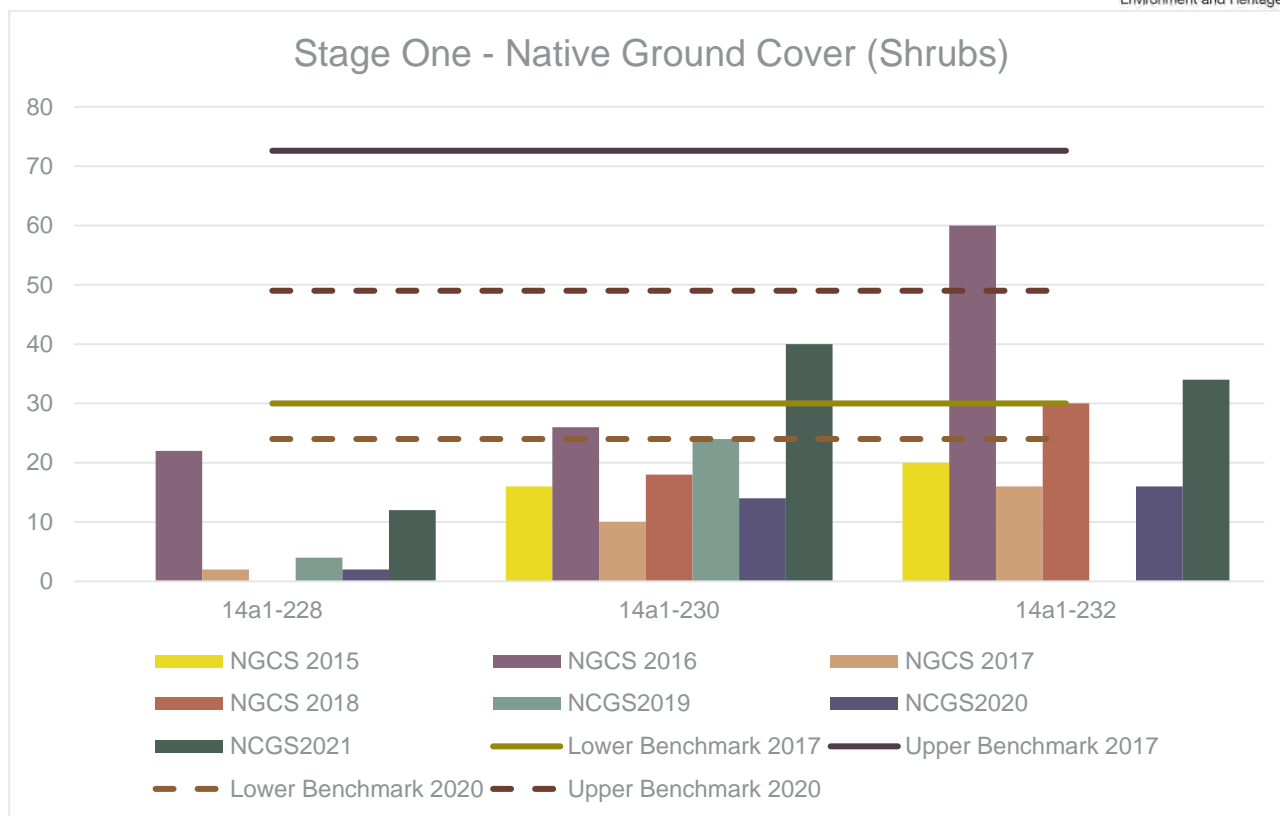


Figure 8: Native ground cover - Shrubs - Stage One

Stage One plots 14a1-230 and 14a1-232 are within benchmark, and plot 14a1-228 has moved closer to the benchmark compared to previous years (Figure 8). With management and time plot 14a1-228 is expected to reach benchmark.

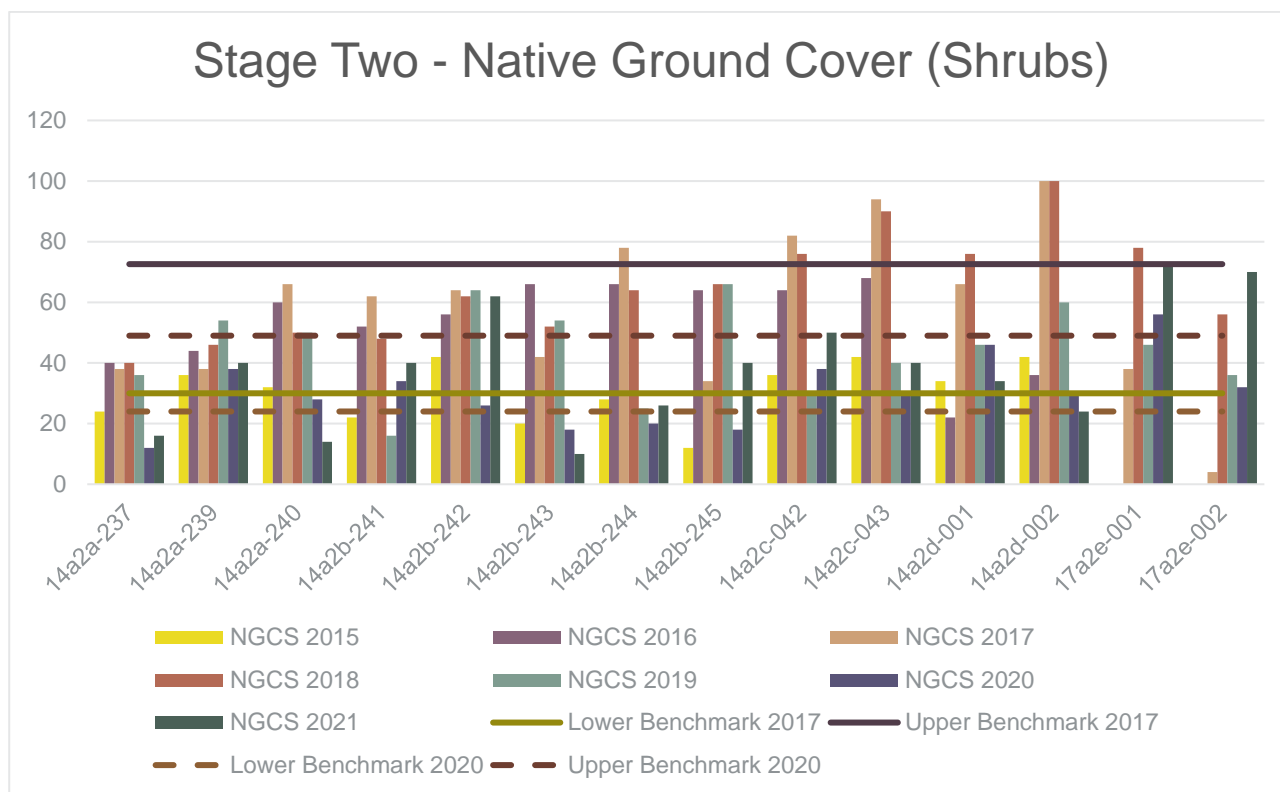
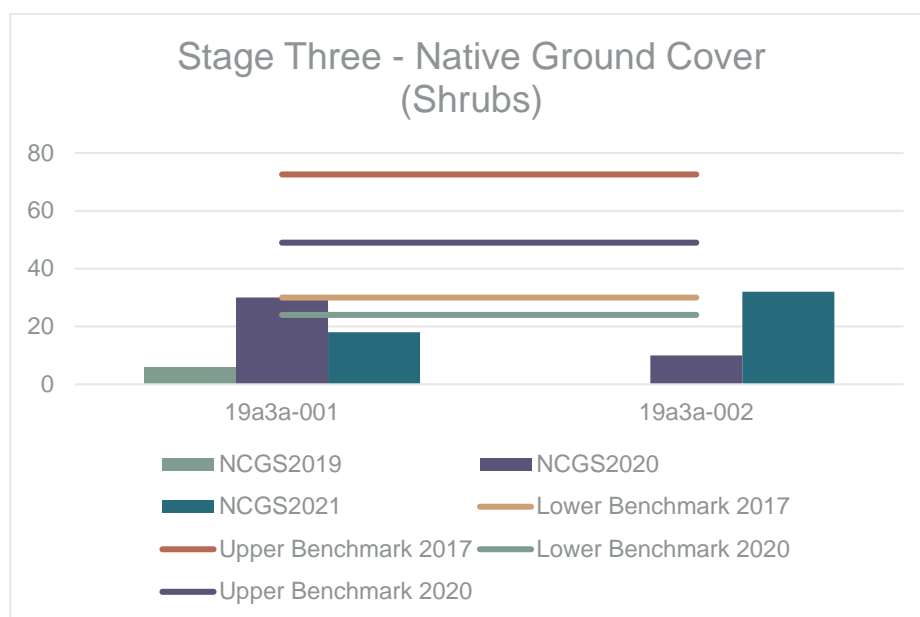


Figure 9: Native ground cover - Shrubs - Stage Two (Area 2a, 2b, 2c, 2d and 2e)

For Stage Two, most plots are within (or just below) the benchmark range for the attribute (Figure 9).



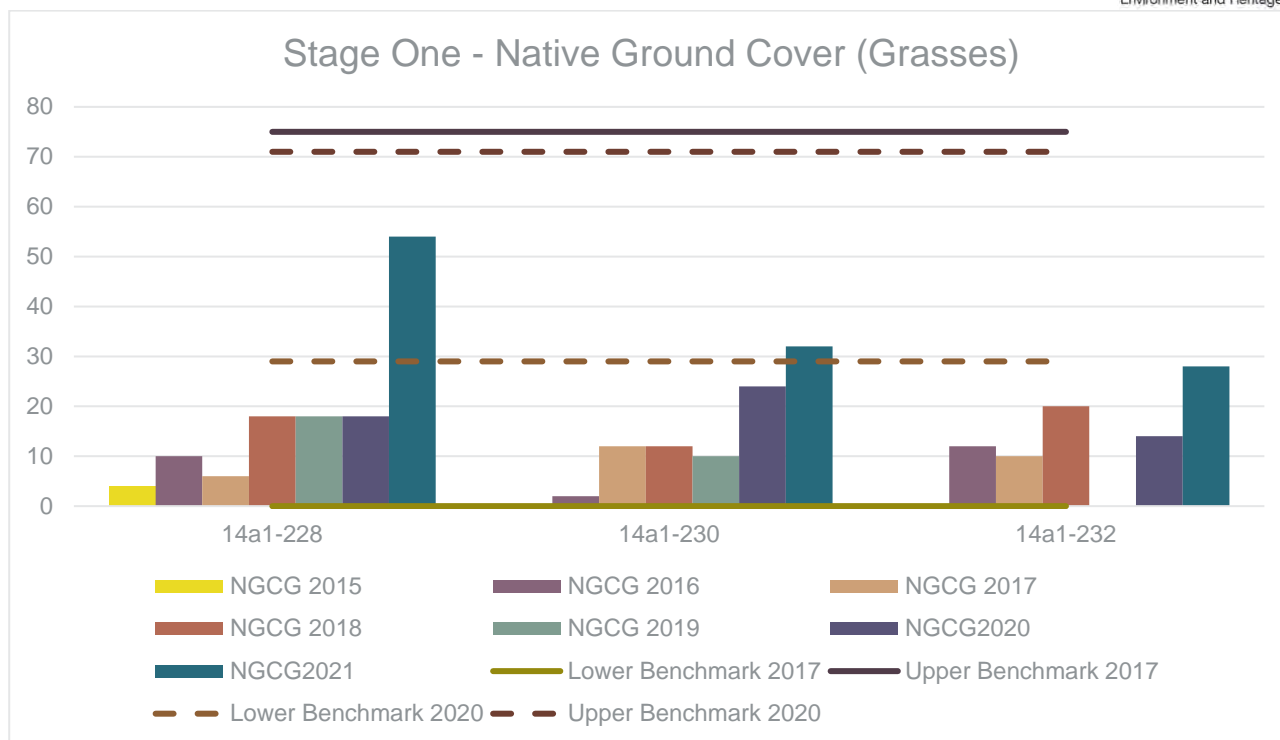
**Figure 10: Native ground cover - Shrubs - Stage Three (Area 3a)**

Stage Three plots are within or just below benchmark range for the attribute (Figure 10). The low ground cover may be because the species have had sufficient time to establish within this Stage, due to recent rehabilitation. Ground cover in the newly treated areas is expected to increase with time.

#### **Native Ground Cover (Grasses)**

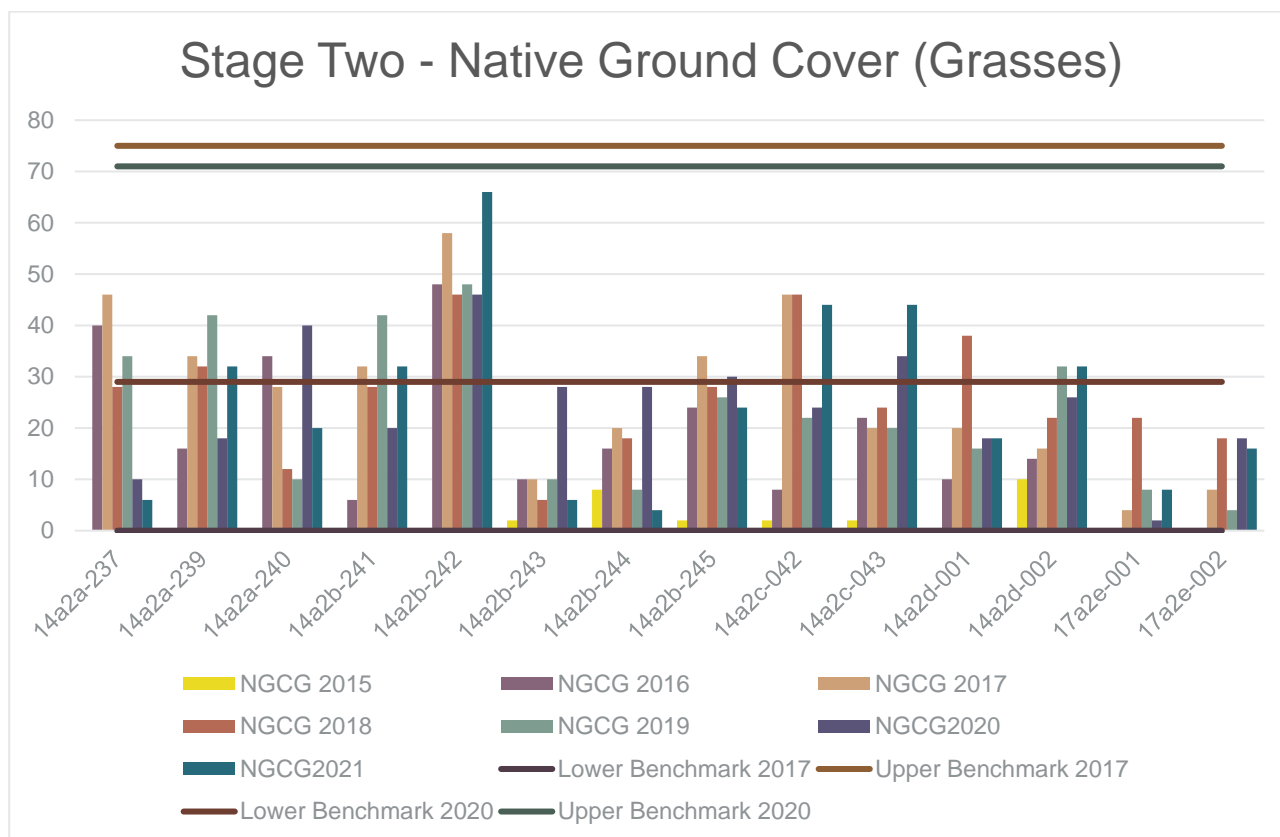
The 2020 local benchmark for Native Groundcover (Grasses) is 29.0 - 71.0 (previously 0.0 – 75.0 percent).

Grass cover is naturally low in the control sites, as is typical of Sydney Coastal Dry Sclerophyll Forests, hence the broad benchmark range for the attribute. This is entirely reasonable given that the translocated soils are from Sydney Coastal Dry Sclerophyll Forests, which are naturally higher in cover for herbs and forbs than grasses. Grass cover also requires an open environment and since most of the treatments have resulted in a relatively dense midstorey and shrub layer, native grass is difficult to establish. Percent cover of native grasses is not necessarily indicative of ecosystem health in Sydney Coastal Dry Sclerophyll Forests and the attribute is within benchmark in all treatment areas. In saying this, increases in native grass cover are shown in some of the areas.



**Figure 11: Native ground cover - Grasses - Stage One**

All plots in Stage One are within or just below benchmark for this attribute.



**Figure 12: Native ground cover - Grasses - Stage Two (Areas 2a, 2b, 2c, 2d and 2e)**

Six out of the 14 plots in Stage Two are within benchmark (Figure 12). As the overstorey and midstorey canopy cover increases, the understorey species tend to reduce and stabilise as the vegetation matures.

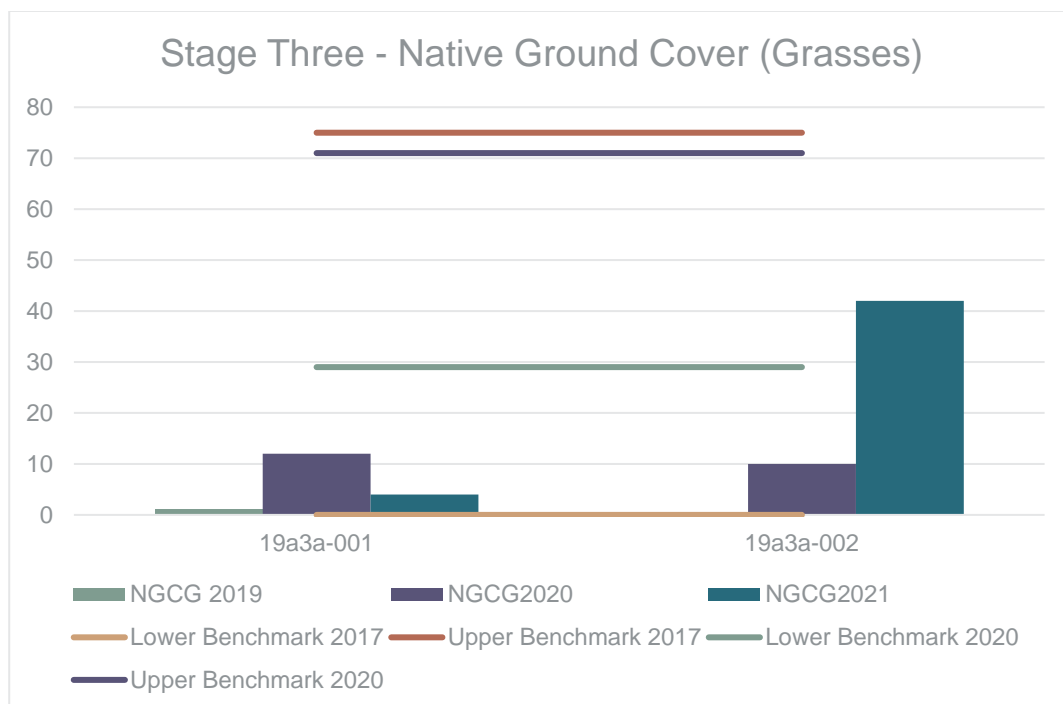


Figure 13: Native ground cover – Grasses - Stage Three (Area 3a)

Plot 10a3a-002 is within benchmark, however plot 19a3a-001 is below benchmark (Figure 13). As the rehabilitation progresses there will be fluctuations of understorey and midstorey species competing for light and resources as the vegetation matures. Groundcover variation is to be expected in coming years.

#### Native Ground Cover (Other)

The 2020 local benchmark for Native Ground Cover (Other), i.e., herbs and forbs other than grasses is 1-14 (previously, 28.8 – 66.6 percent).

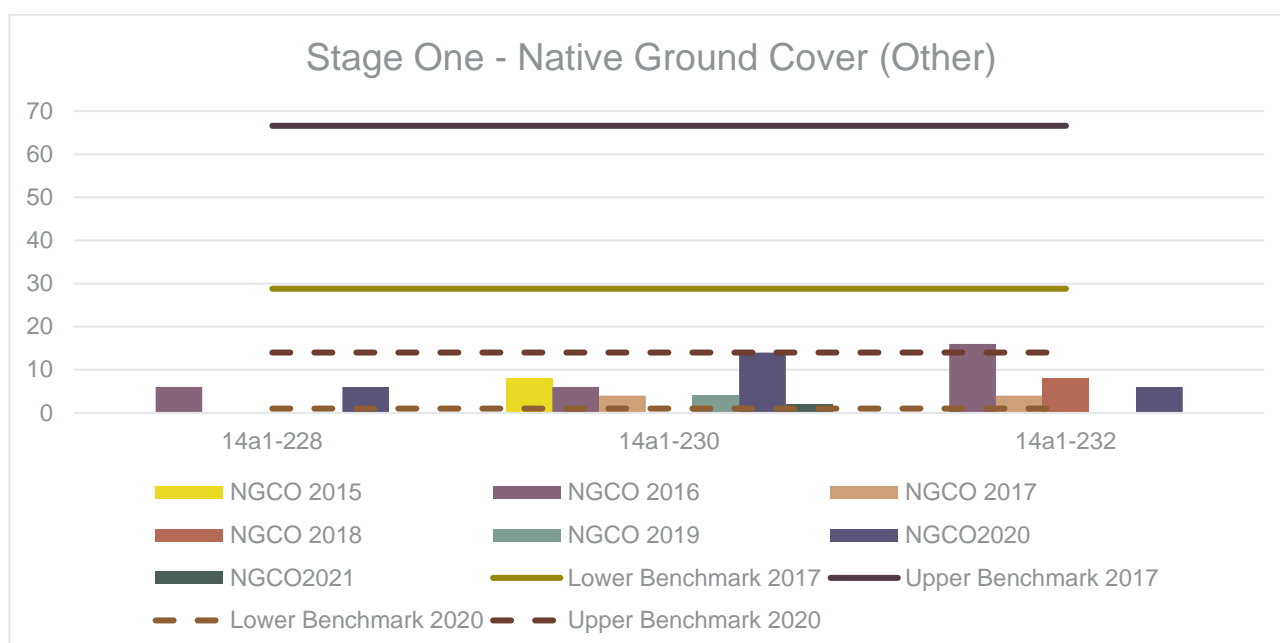


Figure 14: Native ground cover - Other - Stage One

Stage One continues to experience low percentage Native Ground Cover (Other), with this growth form only being recorded in plot 14a1-230 during the 2021 survey (Figure 6). Along with low native grass cover, this may be symptomatic of the density of the shrub and midstorey layers and a result of the rehabilitation treatment of this zone (planted tube stock of predominantly Acacia and Eucalypts).

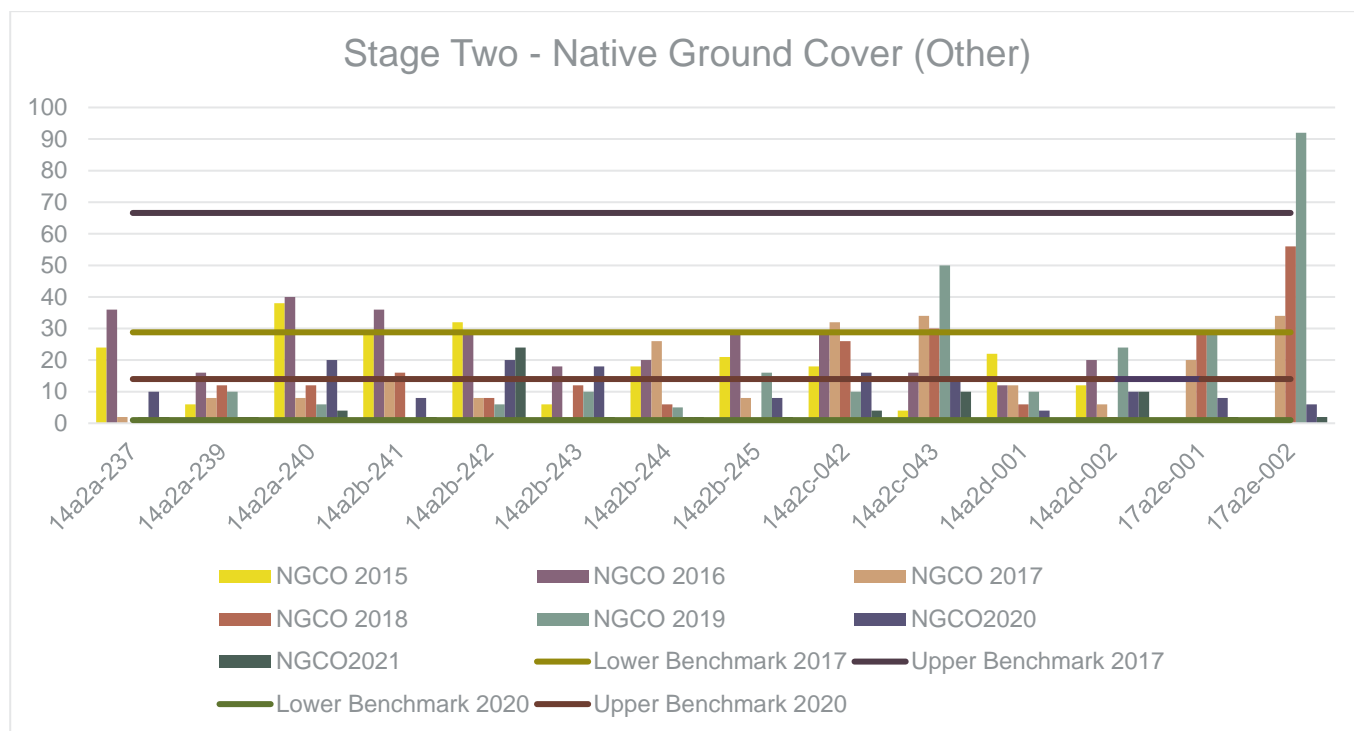
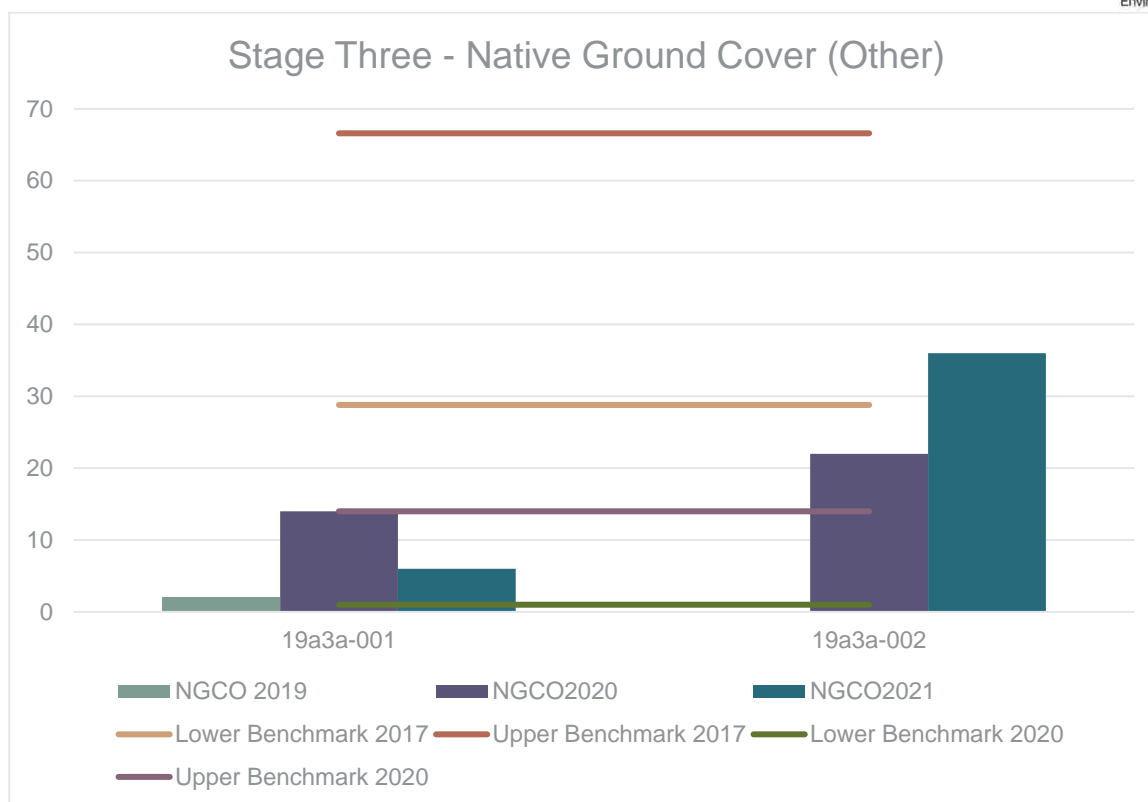


Figure 15: Native ground cover - Other - Stage Two (Areas 2a, 2b, 2c, 2d and 2e)

Stage Two plots (except plot 14a2d-001 which was zero) are within benchmark for Native Groundcover (Other). There appears to be a general reduction in cover compared to previous years (2015-2019), this is most likely due to the upper stratum maturing.



**Figure 16: Native ground cover —Other - Stage Three**

Stage Three has shown an increase in Native Groundcover (Other) within or exceeding the 2020 benchmark. This will fluctuate over time as the plants establish across the Stage.

#### Exotic Plant Cover

There is no local benchmark for exotic plant cover. Whilst it is assumed that there would be 0 – 5% exotic plant cover within the control plots, a target of <20% has been established in the KPIs for all rehabilitation areas.

The dominant weeds recorded include *Eragrostis curvula* (African lovegrass), *Andropogon virginicus* (Whisky Grass), *Conyza bonariensis* (Fleabane), and *Hypochaeris radicata*. *Pennisetum clandestinum* (Kikuyu), and *Cynodon dactylon* (Common Couch) are exotic perennial grasses that have also dominated localised patches within the CWEA and require management.

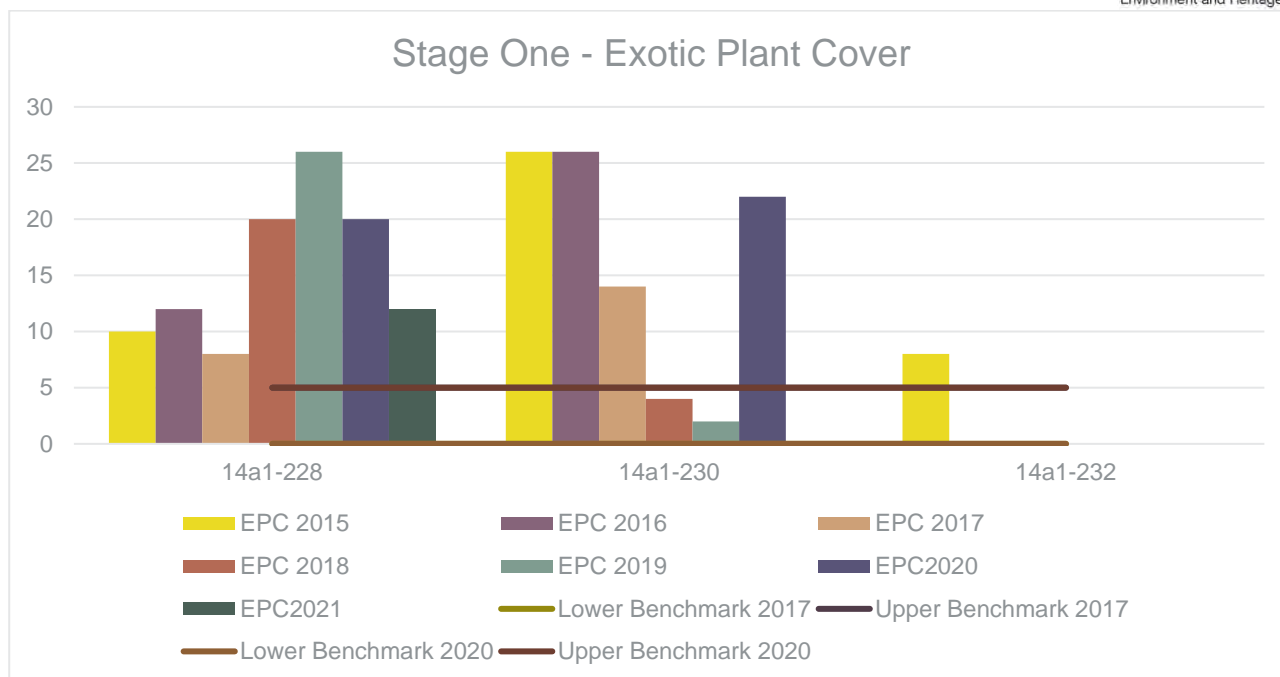


Figure 17: Exotic Plant Cover - Stage One

Out of the three plots in Stage One, only one was above 5% exotic plant cover in 2021 (Figure 17) and none are above 20%. It is recommended that weed management occur in this area, mainly to control exotic grasses.

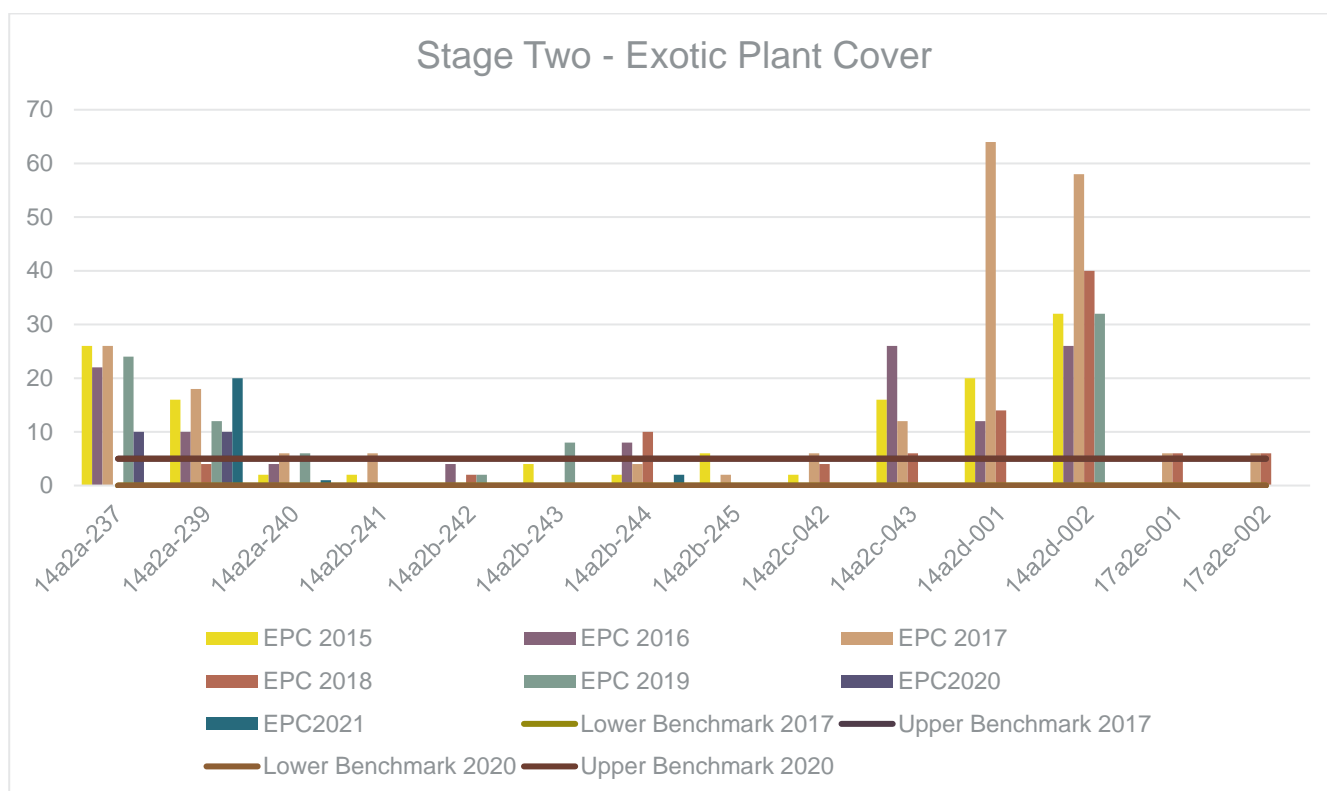
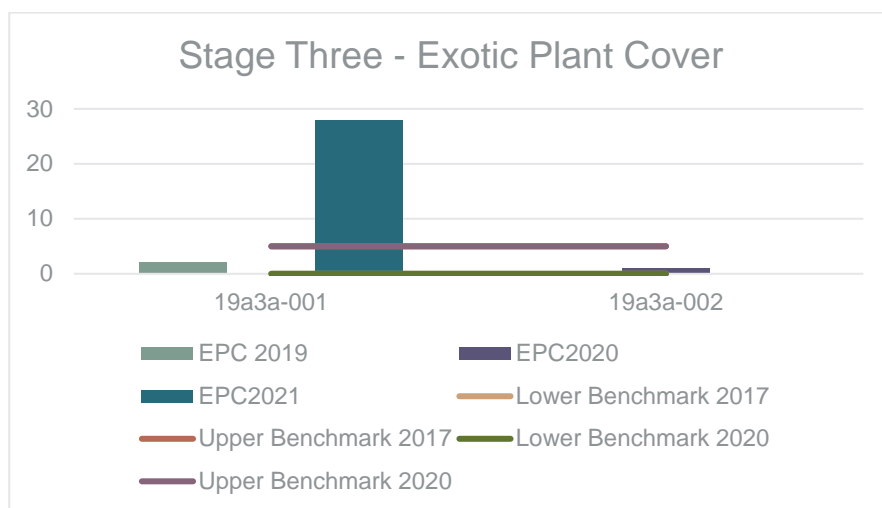


Figure 18: Exotic Plant Cover - Stage Two (Areas 2a, 2b, 2c, 2d and 2e)

Within Stage Two, only plot 14a2a-239 had 20% exotic plant cover. The rest of the plots in Stage Two ranged between 0-2% exotic plant cover (Figure 18).



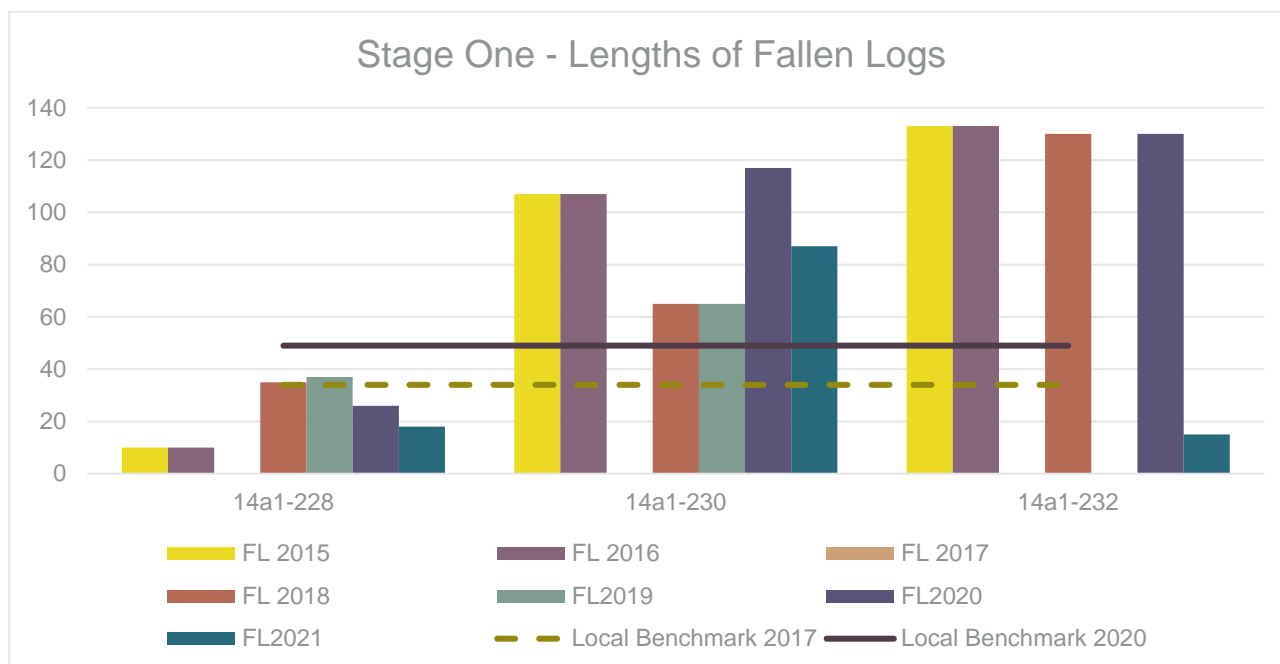
**Figure 19: Exotic Plant Cover - Stage Three (Area 3a)**

Plot 19a3a-001 had a dramatic increase in exotic plant cover from 0% in 2020 to 28% in 2021. This may be due to the high level of rainfall seen in 2021. Exotic plant cover in 19a3a-002 is below the target (5%) (Figure 19).



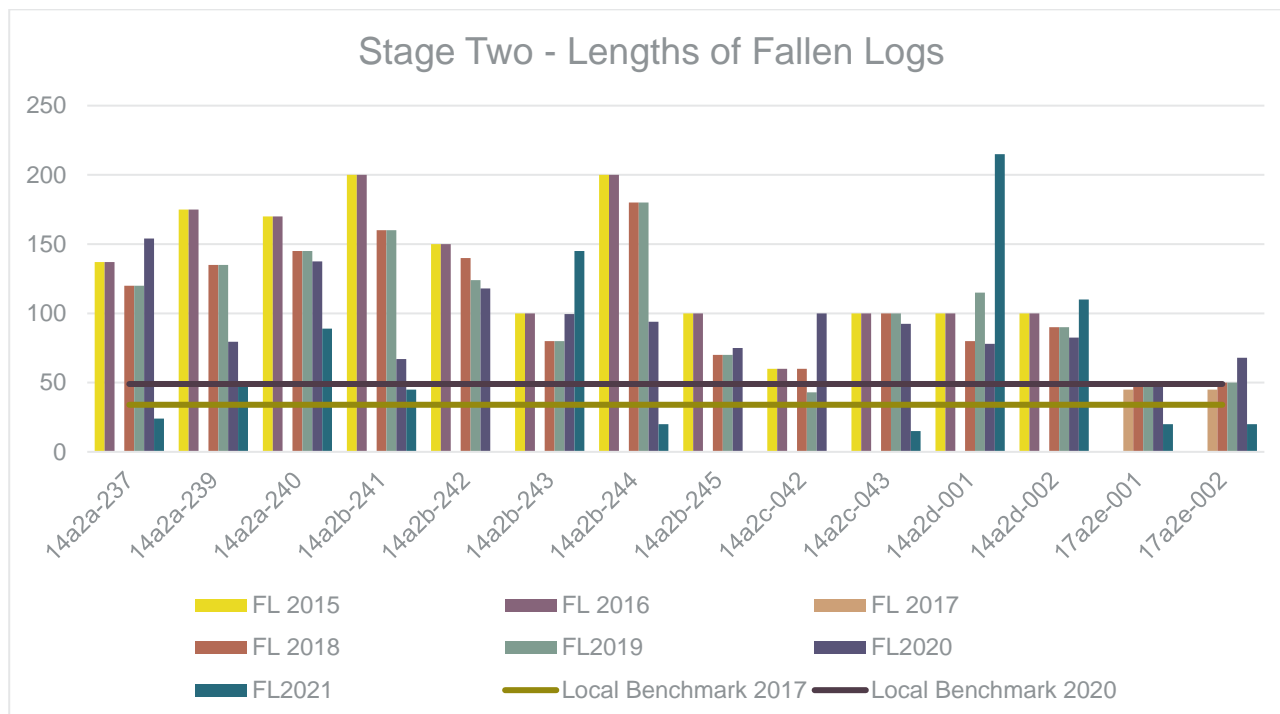
### Length of Fallen logs

The 2020 local benchmark for Length of Fallen Logs is  $\geq 49$  (previously,  $\geq 34$  metres within the 20 x 50 metre plot).



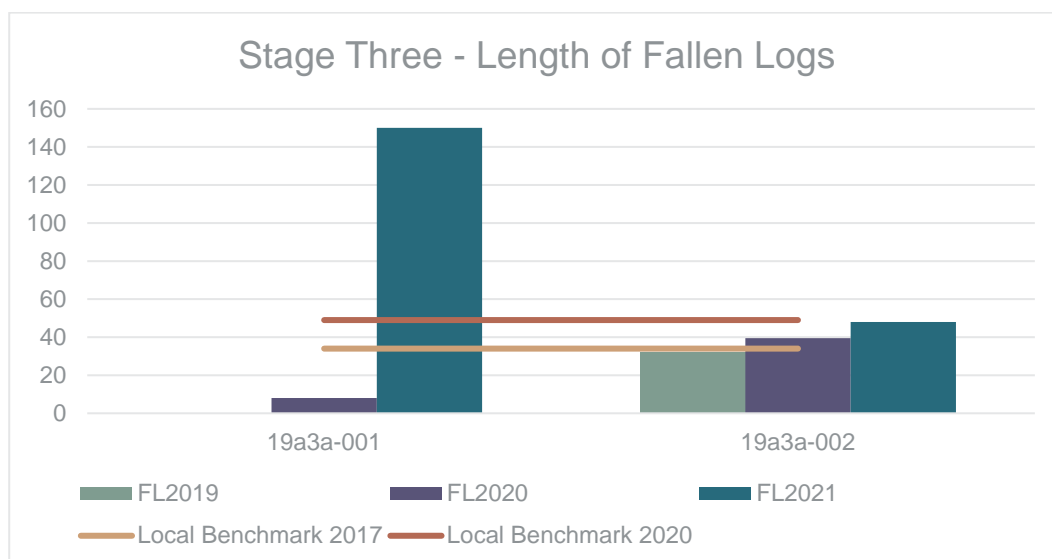
**Figure 20: Length of fallen logs - Stage One**

Stage One has two plots below the benchmark for length of fallen logs, with the third plot above benchmark (Figure 20). Although it fluctuates over time, this is potentially due to the slight change in transect bearing.



**Figure 21: Length of fallen logs - Stage Two**

Four plots in Stage Two are above benchmark (Figure 21), and ten plots are below benchmark. Although it fluctuates over time, this is potentially due to the slight change in transect bearing.



**Figure 22: Length of fallen logs - Stage Three**

One plot in Stage Three is significantly over benchmark whereas the other plot is just below benchmark (Figure 22). This data may fluctuate over time, and is potentially due to the slight change in transect bearing. The newly rehabilitated areas have an opportunity to add additional logs if required to help stabilise soil and allow fauna habitat to form.

## PHOTO-POINT MONITORING

Photo-point monitoring, illustrating the changes in vegetation cover at each of the monitoring sites is provided in Appendix 1 (Plate 1 to 19). In general, all treatment areas have a good cover of native vegetation as a response to soil translocation.

## THREATENED PLANT RANDOM MEANDER

Threatened plant meanders are undertaken every 3 years. The last meander was completed in Summer 2020 (10 December 2020). *Pultenaea aristata* (1 individual) was detected within the CWEA during the 2020 surveys. *Pultenaea aristata* is listed as vulnerable under the NSW *Biodiversity Conservation Act 2016* (BC Act) and EPBC Act. *Pultenaea aristata* has continued to successfully re-establish within the CWEA (refer to previous monitoring reports). The next threatened plant meander is scheduled for 2023.

Threatened plant occurrences within the CWEA will be regularly monitored by an IMC environmental representative who is familiar with the flora species of the area.

During the *Persoonia hirsuta* survey, six additional *P. hirsuta* were found just outside the Stage 4 emplacement area, along with four *Acacia bynoeana*. These have been reported in the burn survey report.

## FAUNA

Camera traps were deployed across ten sites in 2021 across all of the rehabilitation areas (33 days camera hours) from 16 November 2021 – 18 December 2021. Cameras were placed in general habitat of the rehabilitation areas, all of which were attached low to the ground against a tree (Table 7).

**Table 7: Camera Trap Locations**

Site Name	Latitude	Longitude
Site 1	-34.2258	150.819817
Site 2	-34.227533	150.81815
Site 3	-34.223917	150.81575
Site 4	-34.22845	150.82475
Site 5*	-34.22405	150.8192
Site 7	-34.226967	150.82105
Site 8	-34.23029749	150.8259626
Site 10	-34.2258	150.819817

See Plan B for camera trap locations.

The survey detected 21 different native species; seven of which were mammals, 12 birds and two reptiles. The results are summarised in Table 8. Rosenberg's Goanna (*Varanus rosenbergi*) listed as Vulnerable under the BC Act, was recorded 26 times at Site 4.

\* No data was collected by the camera at Site 5.

**Table 8: Fauna records from the camera trap survey**

Scientific Name	Common Name	Exotic	BC Status	EPBC status	Sites						Total	
					1	2	3	4	7	8		10
<i>Antechinus stuartii</i>	Brown Antechinus	-	-	-		4			3		1	<b>8</b>
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	-	-	-		4	4	4				<b>12</b>
<i>Eopsaltria australis</i>	Eastern Yellow Robin	-	-	-			2					<b>2</b>
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	-	-	-							25	<b>25</b>
<i>Malurus cyaneus</i>	Superb Fairy-wren	-	-	-				4				<b>4</b>
<i>Malurus lamberti</i>	Variiegated Fairy-wren	-	-	-				17				<b>17</b>
<i>Origma solitaria</i>	Rockwarbler	-	-	-			2					<b>2</b>
<i>Oryctolagus cuniculus</i>	Rabbit	Yes	-	-			22					<b>22</b>
<i>Pachycephala rufiventris</i>	Rufous Whistler	-	-	-						5		<b>5</b>
<i>Phaps chalcoptera</i>	Common Bronzewing	-	-	-	3							<b>3</b>
<i>Platycercus elegans</i>	Crimson Rosella	-	-	-		4						<b>4</b>
<i>Pomatostomus superciliosus</i>	White-browed Babbler	-	-	-	2							<b>2</b>
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum	-	-	-							6	<b>6</b>
<i>Pseudonaja textilis</i>	Eastern Brown Snake	-	-	-				8				<b>8</b>
<i>Psophodes olivaceus</i>	Eastern Whipbird	-	-	-			5	6	19			<b>30</b>
<i>Rattus fuscipes</i>	Bush Rat	-	-	-		4	24		24			<b>52</b>
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	-	-				4				<b>4</b>
<i>Sericornis frontalis</i>	White-browed Scrubwren	-	-	-	1			10		5		<b>16</b>
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	-	-	-	5	3	95	4			4	<b>111</b>
<i>Thylogale</i> sp.	Unidentified Pademelon	-	-	-	6							<b>6</b>
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	-	V	-				26				<b>26</b>
<i>Vulpes vulpes</i>	European Fox	Yes	-	-	3	3					31	<b>37</b>
<i>Wallabia bicolor</i>	Swamp Wallaby	-	-	-	170	86	302	19			52	<b>629</b>
<b>Total</b>					<b>190</b>	<b>108</b>	<b>456</b>	<b>102</b>	<b>46</b>	<b>10</b>	<b>119</b>	<b>1031</b>

 <p>0003 ■ 055F 12C 01/12/2021 22:26:42</p>	 <p>0010 ■ 056F 13C 27/11/2021 13:45</p>	 <p>0003 ■ 061F 16C 29/11/2021 18:51</p>	 <p>0003 ■ 064F 17C 27/11/2021 13:45</p>
<p>Bush rat</p>	<p>Fox</p>	<p>Swamp Wallaby with pouch young</p>	<p>Echidna</p>
 <p>0001 ■ 049F 09C 05/12/2021 20:42</p>	 <p>0007 ■ 061F 16C 28/01/2015 15:35</p>	 <p>0004 ■ 093F 33C 03/12/2021 12:29:06</p>	 <p>0004 ■ 062F 16C 16/11/2021 17:38:32</p>
<p>Pademelon</p>	<p>Eastern Whipbird</p>	<p>Rosenberg's Goanna</p>	<p>Brown Snake</p>

## COMPLETEION CRITERIA

Table 9 details the completion criteria for the Coal Wash Emplacement Area (CWEA) for all three stages of the West Cliff Washery site, provided by IMC personnel (South32 2020). The completion criteria relate to land stability and establishing plant growth mediums, by having no exposed coal wash and fauna habitat replaced over the site (logs and rocks).

**Table 9: Coal Wash Emplacement Area (CWEA) completion criteria as per the Mining Operations Plan (MOP) (South32 2020)**

Domains	Rehabilitation Phase	Domain Objective	Indicator	Completion Criteria	Justification/Sources	Complete (IMC comments)	Complete (Niche comments)
Domain 11: CWEA	Landform Establishment	Landform established to be consistent with the surrounding environment or post-mining land use.	Final landform design.	Site reprofiled as per final landform design (where applicable). Note Stages One and Two emplacements were reprofiled to the standard of the day.	Section 5.1 – Landform construction - Mine Rehabilitation Leading Practice Sustainable Development Program for the Mining Industry (2016).	Emplacement Stage One and Two are completed. Stage Three is being rehabilitated progressively.	Landform established and stabilising with no active, gully or tunnel erosion across Stage One and Stage Two. Stage Three is still in early stages of rehabilitation and requires logs to be spread across sections of the hill to slow water down and reduce erosion.
Domain 11: CWEA (Stage Two and Three emplacements only)			Compaction testing (for CWEA stages Two & Three only).	>95% compaction achieved as evidenced by compaction test reports. Note Stages One and Two emplacements were constructed to the standard of the day.	Coal Wash Emplacement Area Management Plan (CWEAMP) – Section 8.3. -Emplacement Compaction.		
Domain 11: CWEA (all emplacement stages)			Combustion testing (CWEA only).	Coal wash ignition testing results within acceptable range (using the Coal Washery Rejects Order 2014 as a guide unless otherwise determined by the regulatory authority).	Coal Washery Rejects Order 2014.		
Domain 11: CWEA	Growth Medium Development.	Establish plant growth medium.	CWEA Capping.	No coal wash is left exposed (Stage One emplacement).	Wollondilly Shire Council Development Consent (1975).	Emplacement Stage One and Two are completed. Stage Three is being rehabilitated progressively.	Plant growth in Stage Three is progressively establishing over time. This will be monitored and growth should increase over time as the plants establish in the soil.
Domain 11: CWEA			Topsoil/capping depth.	Bare or stripped areas topsoiled/capped – Depth will be governed by factors such as	For CWEA, CWEAMP – Section 6 - Vegetation and Fauna Management.		

Domains	Rehabilitation Phase	Domain Objective	Indicator	Completion Criteria	Justification/Sources	Complete (IMC comments)	Complete (Niche comments)
				desired vegetation, quantity and quality of the surface and subsoil available and the nature of underlying material. Generally, >50 mm depth required for seed germination. Combined topsoil and capping depth min requirement for the CWEA is 0.5 m (Stages Two and Three).		Two are completed. Stage Three is being rehabilitated progressively.	Stage One and Two had established plant growth with many shrubs and tree species starting to shade the areas, logs and rocks are creating habitat and leaf litter cover will return nutrients into the soil.
Domain 11: CWEA (Stage Two and Three)	Ecosystem Establishment	Stable landform capable of supporting and sustaining vegetation growth (subject to post-closure land use considerations).	Translocated habitat (rocks and logs).	Rocks and logs spread across the surface of the rehabilitating emplacement in accordance with the CWEAMP. Broad-headed Snake habitat incorporated into Stage Three and Four rehabilitation areas.	CWEAMP – Section 6 - Vegetation and Fauna Management.	Landform established, and site preparation works are largely completed within Stages One and Two; however, some minor areas require further habitat placement, planting and weeding (for example, Stage Two lookout point).	Stage One, Two and Three have had habitat features installed, such as logs and rocks.
			Site preparation and seeding/planting with appropriate species.	Area ripped (if required) and seeded/planted using the appropriate method.	Section 5.3 (Establishment of a Plant Growth Medium) - Mine Rehabilitation Leading Practice Sustainable Development Program for the Mining Industry (2016).		All 3 Stages had seeded/ planted species consistent with the surrounding vegetation.
Domain 11: CWEA			Plant establishment and growth.	50% combined vegetative cover achieved and sustained for a period of two years.	Target was determined based on past experience and taking into consideration: 1. Observational evidence from the CWEA rehabilitation program.		Stage One had a healthy vegetation cover; species diversity is low although consistent species with surrounding vegetation. Stage Two had good vegetation

Domains	Rehabilitation Phase	Domain Objective	Indicator	Completion Criteria	Justification/Sources	Complete (IMC comments)	Complete (Niche comments)
					2. Vegetation types and climate of the area. 3. Local Benchmarks as determined in the CWEA rehabilitation monitoring program.		cover and high species diversity. Stage Three had a reasonable diversity, and a more natural structure is likely to further develop over time.
			Weed cover.	Regular weed control undertaken.	Project Approval Condition 17 (f). NSW Biosecurity Act 2015.		All Stages have had a variety of challenges with exotic species. More time required for natural structure to develop and outcompete weed species, especially in Stage Three. It is recommended that weed management is conducted across all Stages to keep exotic species under control.
Domain 11: CWEA	Ecosystem development.	Ecosystem is self-sustaining.	Succession.	Rehabilitation report indicates plants in rehabilitated areas show evidence of seed setting and seed germination.	CWEAMP Section 8.1.1.1 – Key Performance Criteria. Also applies to other domains due to similar vegetation community.	Rehabilitation works in some sections of Emplacement Stage One and Two are complete. Stage One was rehabilitated to the standard of the day.	In 2021 many of the shrub and canopy species appear to be flowering and setting seed in Stage One and Two, although Stage Three individuals are likely too young to establish



Domains	Rehabilitation Phase	Domain Objective	Indicator	Completion Criteria	Justification/Sources	Complete (IMC comments)	Complete (Niche comments)
			Weed cover.	Weed cover is no greater than 20% (at the time of relinquishment) as determined by relevant survey method.	<p>Target is defined in Table 5 of the CWEAMP and Section 8.1.1.1 – Key Performance Criteria.</p> <p>Also applies to other domains due to similar vegetation community.</p>		<p>reproductive aspects.</p> <p>In all Stages weed cover averaged less than less than 20% across the plots, although there are patches dominated by weeds, which are being sprayed annually to control by a subcontractor, arranged by IMC directly.</p>
Domain 11: CWEA			Bushfire resilience.	Rehabilitation can withstand a bushfire. Germination is observed and evidence of recovery after a test burn (subject to approval under the Rural Fires Act 1997).	Following a site inspection with the Resources Regulator, this area was determined as being an area prone to wildfire.		N/A
Domain 11: CWEA (Stages One and Two)			Floristic structure, species composition.	Trajectory analysis indicates selected biometric indicators (species richness and vegetation cover) are on track to achieve like that of pre-determined reference benchmarks. For example, a statistical test indicates biometric indicators show a year on year improvement and on-track to achieve (or exceed) the reference benchmarks.	<p>CWEAMP – Section 6.3 -Emplacement Rehabilitation which outlines the monitoring program and benchmarks.</p> <p>Also applies to other domains due to similar vegetation community.</p>		At this stage visual comparisons to benchmarks have been applied. This report combines the previous 2017 benchmark results with the 2020 newly calculated benchmarks to show changes over time with regards to the control sites and how this compares to plot data from the

Domains	Rehabilitation Phase	Domain Objective	Indicator	Completion Criteria	Justification/Sources	Complete (IMC comments)	Complete (Niche comments)
							three Stages within the CWEA.
All domains	Relinquished lands.	Stakeholders satisfied.	Regulator and/or landholder satisfied.	Formal Regulator and/or landholder sign-off.		Nil.	N/A

## CONCLUSION AND RECOMMENDATIONS

This report provides a description of the methodologies used and the outcomes achieved from the eleventh season of monitoring the rehabilitation success in Stages One, Two and Three of the CWEA. For the most part, the rehabilitation areas were within or above the local benchmarks for most of the biometric attributes.

Weed incursion remains the key threat to the rehabilitation of the CWEA. African Love grass was observed as one of the dominant weeds throughout the monitoring program. It is likely to spread and out-complete native plants if not treated. Weed management is recommended mainly within Stage One and Stage Three and will continue to be a major focus for rehabilitation. Trained bush regenerators with chemical application tickets would be most appropriate to carefully apply chemicals to the African Love grass, or manually remove where closer to susceptible species.

Previously, two threatened plant species, *Pultenaea aristata* and *Persoonia hirsuta*, were detected in 2016, 2017 and 2018 with neither detected within the CWEA during the 2021 monitoring. This may be due to the drought conditions of 2019-2020, with flora slow to respond to changes in weather conditions (recent increase in rainfall). As mentioned above, six *P. hirsuta* and four *A. bynoeana* were observed just outside the CWEA of Stage 4.

Despite all efforts to maintain a consistent bearing for the monitoring transect, even a slight change in angle can result in differing results in floristics and potentially a constraint on the detection of threatened species efforts within plots. The *Persoonia hirsuta* individuals are considered a significant observation, contributing to the understanding of the species' capacity for regeneration within the rehabilitation areas and will continue to be considered during future monitoring.

The habitat features within the rehabilitation are being occupied by native mammals. As the rehabilitation matures, it is expected that native fauna abundance will increase further.

# PLANS





Drawn by: Philip Rofe. Last updated: 12/14/2020 3:37:51 PM File: T:\Spatial\Working\ae021 - WestCliff\_Monitoring\Maps\Other Maps\6342\_Figure1\_Plots.mxd



Drawn by: Phillip Rofe. Last updated: 3/1/2022 12:50:24 PM. File: T:\spatial\projects\6800\6876\_illawarra\Coal\_BA\_NSW\Map\report\Monitoring\_Report\6876\_Plan\_B\_CameraTraps\_20210228.mxd

## APPENDIX 1: PHOTO POINT MONITORING



Plate 1: Site A1\_228 (left 2010, middle 2020, right 2021)



Plate 2: Site A1\_230 (left 2010, middle 2020, right 2021)



Plate 3: Site A1-232 (left 2010, middle 2020, right 2021)



Plate 4: A2a\_237 (left 2010, middle 2020, right 2021)





Plate 5: Site A2a\_239 (left 2010, middle 2020, right 2021)



Plate 6: Site A2a\_240 (left 2010, middle 2020, right 2021)



Plate 7: Site A2b\_244 (left 2010, middle 2020, right 2021)



Plate 8: Site A2b\_241 (left 2010, middle 2020, right 2021)



Plate 9: Site A2b\_242 (left 2010, middle 2020, right 2021)



Plate 10: Site A2b\_243 (left 2010, middle 2020, right 2021)



Plate 11: Site A2b\_245 (left 2010, middle 2020, right 2021)



Plate 12: Site A2c-042 (left 2012, middle 2020, right 2021)



Plate 13: A2c-043 (left 2012, middle 2020, right 2021)



Plate 14: A2d-001 (left 2015, middle 2020, right 2021)

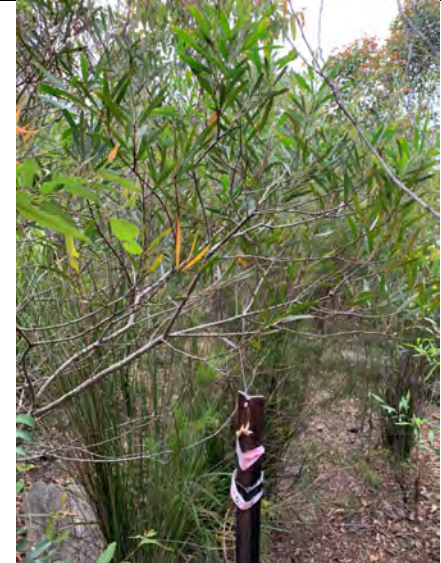


Plate 15: A2d-002 (left 2015, middle 2020, right 2021)



Plate 16: 17a2e-001 (left 2017, middle 2020, right 2021)



Plate 17: 17a2e-002 (left 2017, middle 2020, right 2021)



Plate 18: 19a3a-001 (left 2019, middle 2020, right 2021)



Plate 19:19a3a-002 (left 2019, middle 2020, right 2021)



## References

Cropper, S.C. (1993) Management of Endangered Plants. CSIRO Publications Victoria.

Eyre TJ, Ferguson DJ, Hourigan CL, Smith GC, Mathieson MT, Kelly, AL, Venz MF, Hogan, LD & Rowland, J. 2018. Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland. Department of Environment and Science, Queensland Government, Brisbane.

Meek, P., Ballard, G. and Fleming, P. (2012). An introduction to camera trapping for wildlife surveys in Australia.

OEH (2014). BioBanking Assessment Methodology 2014.

<https://www.environment.nsw.gov.au/resources/biobanking/140661BBAM.pdf>


South32 (2020) South32 Illawarra Metallurgical Coal Mining Operations Plan,

<https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents>, Accessed December 2020.



---

**Appendix 8: Annual *Persoonia hirsuta* Condition Monitoring Report**



# ANNUAL *PERSOONIA HIRSUTA* CONDITION MONITORING REPORT

Illawarra Metallurgical Coal, 2021 Survey



## CONTENTS

Contents.....	2
Overview .....	3
Review of previous Surveys .....	3
Current Survey (Spring 2021).....	5
References.....	9
Appendix A: Rating system used to determine the condition of <i>P. hirsuta</i> individuals .....	10
Appendix B: <i>Persoonia hirsuta</i> Records from 2021 .....	11
Appendix C: <i>Persoonia Hirsuta</i> Research Strategy and Status.....	19

## OVERVIEW

Illawarra Metallurgical Coal (IMC) conducted its ninth round of annual condition monitoring of the *Persoonia hirsuta* population at Appin North (formerly West Cliff). The monitoring was undertaken in accordance with the approved *P. hirsuta* Offset Management Plan, which complies with EPBC Approval 2010/5350 Condition 2. The monitoring was completed by one Niche Environment and Heritage (Niche) ecologist and one IMC representative over one day in December 2021, during the peak flowering period for the species.

## REVIEW OF PREVIOUS SURVEYS

### FloraSearch 2009

A study by FloraSearch (2009) was conducted to quantify the distribution of *P. hirsuta* prior to construction of the Stage 3 Coal Wash Emplacement and indicated a local high density of the species on the broad ridgetop to the north-east of Brennans Creek and low-density occurrences on the ridgetops to the north and south of the core population. Beyond these the concentrations were widely scattered isolated individual plants.

At least 88 plants of *P. hirsuta*, or approximately 66% of the total population, were identified by FloraSearch (2009) within the core population. Of the core patch, approximately 20 plants have been lost to the Stage 3 emplacement development and at least seven are within the footprint of Stage 4 emplacement.

### Niche 2012 (Baseline Study)

Niche undertook a field survey of the core *P. hirsuta* population in November 2012 to establish a baseline population estimate and distribution of *P. hirsuta* for the Offset Management Plan. Two representatives from IMC were also present and assisted with the surveys.

A total of 44 individuals were recorded within the core population area. A single individual was recorded approximately 14 metres to the north of the core population area and it was assumed that it would be impacted by the Stage 4 emplacement. Height and age class were also recorded.

A further nine individuals were recorded within the Appin North lease area in areas where the species had been previously recorded, seven along Brennans Creek Road to the north and three along the south-west boundary with the Appin Road easement.

The core population was in good condition. The core area had a good level of inherent resilience (capacity to regenerate), a high level of native plant species richness, a low level of exotic plant cover and all structural layers were intact (canopy, mid-storey, shrubs and ground-cover).

The previous southern extension of the core population had been impacted by the construction of an approved haul road, which resulted in an indirect impact through edge effects. However, whilst the increased light levels and altered drainage had locally altered the native vegetation in a narrow, localised strip along this edge, the condition of this vegetation was still good with a low level of exotic cover. Some exotic perennial grasses, such as *Eragrostis curvula* (African lovegrass) and *Chloris gayana* (Rhodes grass) occurred occasionally along the road and track edges within the mine site and exclusion of these exotics from the core *P. hirsuta* population was considered a high priority.

It was estimated that the core *Persoonia* area had not experienced a fire event for up to 24 years. This was evident in the senescing (dead or dying) *Banksia ericifolia*, the low cover of annual herbs, grasses and obligate seeding short-lived shrubs. The fire history map for the study area (Wollondilly Bush Fire Risk Management Plan 2007) supported this observation, with the last reported fire event mapped around 1989.

### Spring 2013

The 2013 survey was undertaken by IMC. The total Offset population (Core population) in 2013 was 38 plants. Discounting five new plants that were identified during this survey, the Offset area had experienced an overall population decline of 11 plants since baseline (2012). It was

concluded that the majority of the *P. hirsuta* plants in the Offset were reaching the end of their natural lifecycle; there appeared to be no recruitment occurring at the time which was likely a natural occurrence as no evidence suggested otherwise.

#### **Spring 2014**

The 2014 survey was undertaken by IMC. The total Offset population in 2014 was 36 plants. Discounting eight new plants that had been identified in the Offset since baseline (2012), the Offset area had experienced an overall population decline of 16 plants. Again, there were no visible impacts from dust or apparent disease, and it was concluded that the mortality was due to the plants reaching the end of their natural lifecycle.

Three immature plants were identified (estimated age between 1 and 2.5 years). All were situated on a cleared easement. Recruitment within the population was limited to previously disturbed areas.

One mature plant was discovered within the Stage Two Emplacement rehabilitation.

#### **Spring 2015**

The total count of live plants in the Offset in spring 2015 was 29. Discounting nine new plants that had been identified in the Offset since baseline (2012), the Offset area had experienced an overall population decline of 24 plants. Although the vegetation remained in good condition, the *P. hirsuta* population in the Offset continued to decline because of the plants reaching senescence and the absence of a germination cue. Any recent recruitment of *P. hirsuta* (three immature plants in 2014) had been limited to previously disturbed areas (in this case a powerline easement). Other known (healthier) populations at Couridjah and Yanderra, NSW, had a more recent fire history than Appin North (D. Gregory pers.obs.).

#### **Spring 2016**

The total count of live plants within the Offset in 2016 was 11.

Discounting nine new plants that had been identified in the Offset since baseline (2012), the Offset area had experienced an overall population decline of 42 plants:

- 16 of these were burned as part of the approved conservation burn trial in April 2016; and
- 26 are likely due to age related causes.

No new plants were identified in the Offset during 2016.

There appeared to be no recruitment occurring during 2016.

#### **Spring 2017**

The total count of live plants within the Offset in 2017 was 10:

- One new plant was identified in the Offset during 2017.
- All 10 plants were identified post-baseline. Discounting the 10 plants that had been identified in the Offset since baseline (2012), the offset has declined by 44 plants.
  - 28 plants have died likely due to age related causes (since the baseline in 2012);
  - 16 plants were burned as part of the approved conservation burn trial in April 2016; and
  - A seedling was identified within the powerline corridor on Dam Road, indicating recruitment is occurring but limited to previously disturbed areas.

#### **Spring 2018**

The total count of live plants within the Offset in 2018 was 10:

- 28 plants have died likely due to age related causes (since the baseline in 2012);
- 16 plants were burned as part of the approved conservation burn trial in April 2016; and
- No new plants were identified in the Offset during 2018.

### Spring 2019

The total count of live plants within the Offset in 2019 was 138 (10 from previous years and 128 planted in 2019):

- One plant had died likely due to age related causes or lack of rainfall;
- One new plant (SH004) was identified in the Offset during 2019, within the demarcated fencing near CF001;
- 128 plants were translocated from the Mount Annan Botanic Gardens and placed adjacent to the offset area.
- Two plants had died in the translocated offset area in 2019, likely due to stresses when initially planted, leaving 126 living plants.

### Spring 2020

The total count of live plants within the Offset in 2020 was 38 (nine from previous years and 28 translocated plants):

- Two plants had died likely due to age related causes or lack of rainfall.
- One new plant (SH006) was identified in the Offset during the burn survey 2020.
- 98 of the translocated plants have died, many of which were juvenile plants in the translocated area that were more susceptible to harsh conditions likely due to extreme hot and dry weather in early 2020.

## CURRENT SURVEY (SPRING 2021)

### Aim

To inspect all *P. hirsuta* plants to determine:

1. Survivorship and recruitment:
  - a. Condition;
  - b. Reproductive activity and age to maturity; and
  - c. Any imminent threat or risk to the plants health (e.g. apparent disease, excessive dust deposition).

### Methods

All *P. hirsuta* plants were inspected to record the following attributes:

- Height;
- Age class;
- Condition; and
- Comments on any imminent threat or risk to the plants health (e.g. apparent disease, excessive dust deposition).

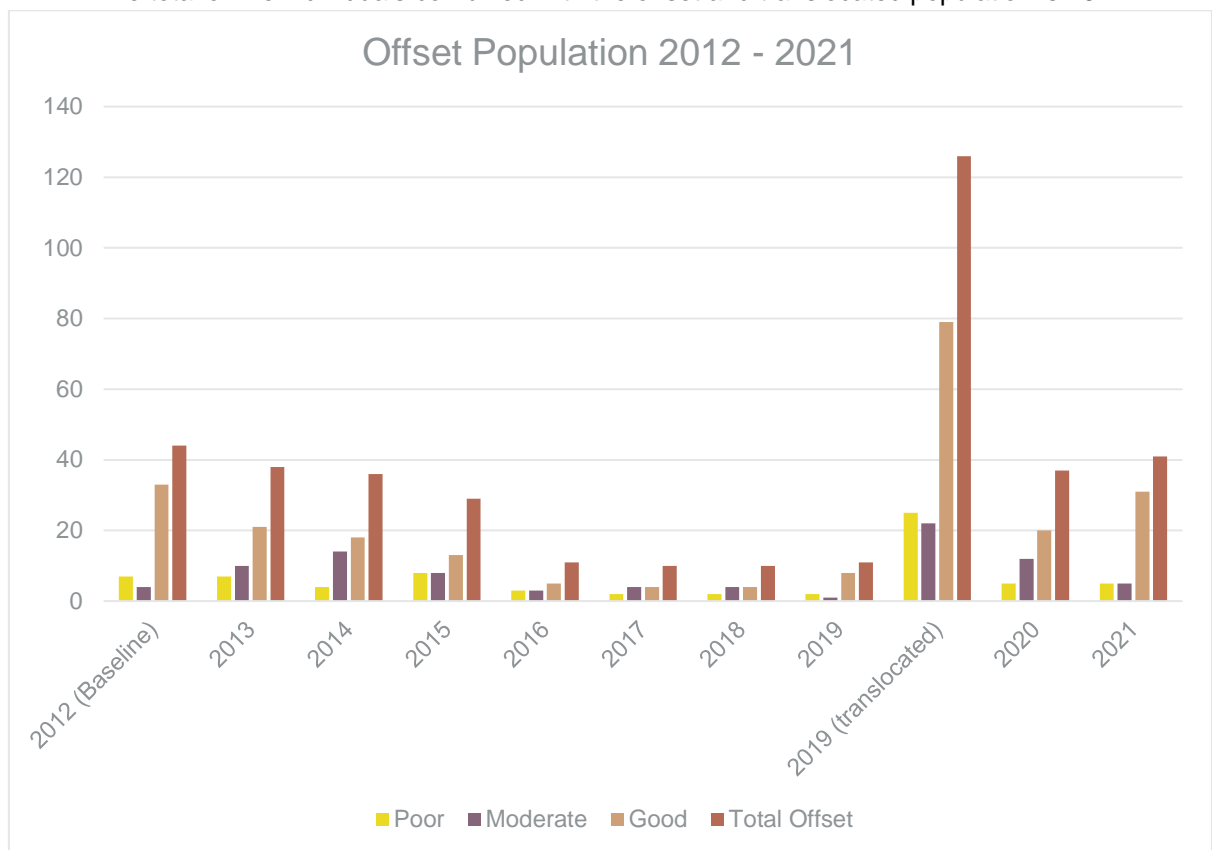
Height was measured using a tape measure, measuring from the ground surface to the highest point on the plant, without physically moving any part of the plant. Condition was defined using a combination of factors, including the percent cover of leaves, colour of leaves and the presence or absence of fruit or flowers, rating condition from 0 to 6, or from very poor condition to excellent condition (Appendix A).

Any new individuals were recorded with a Garmin GPS. The plants were also flagged with fluorescent, biodegradable flagging tape.

## Results

### Offset and Translocation Population:

- The total count of live plants within the Offset in 2021 (not including translocated) was eleven (CM002, CF001, CM011, DG011, NS006, NS021, NS022, NS025, SH004, SH006 and PB0007).
- The remaining 28 translocated plants recorded in 2020 were recorded again in the 2021 survey (PB002, PB005, PB007, PB008, PB022, PB025, PB030, PB038, PB039, PB045, PB046, PB047, PB052, PB053, PB054, PB060, PB062, PB064, PB070, PB075, PB076, PB077, PB088, PB090, PB093, PB103, PB113 and PB124).
- Seven new plants were recorded during the 2021 surveys (PB0001, PB0002, PB0003, PB0004, PB0005, PB0006 and PB0007). PB0007 was found in the Offset area.
- A total of 90 plants were translocated in 2021 (PB128-PB217) (Figure 1). One plant has died since translocation, likely due to stresses when initially planted, leaving 89 living plants.
- The total of live individuals combined with the offset and translocated population is 134.



**Figure 1: Comparison of *Personia hirsuta* condition and population within the Offset across years**

### Appin North Other Areas

- An additional 18 live individuals are being monitored within the surrounding Appin North lease (see Figure 3). Of these, ten individuals (DG003, DG004, DG006, DG007, DG013, DG015, NS033, NS034, PM001 and SG001) were not visited during the 2021 survey (as seen in Figure 2).

### Total Site Count

- The total count for confirmed live *P. hirsuta* plants at Appin North in summer 2021 was 142, including plants that have been identified post-baseline (2012) and the additional 117 plants (2019 & 2021) translocated that are still alive (Figure 2). Excluding the 2021 translocated



plants, there has been a decrease of 3 plants in 2021, all three are from within the non-impacted area along Dam Road.

The results are tabulated in Appendix B.

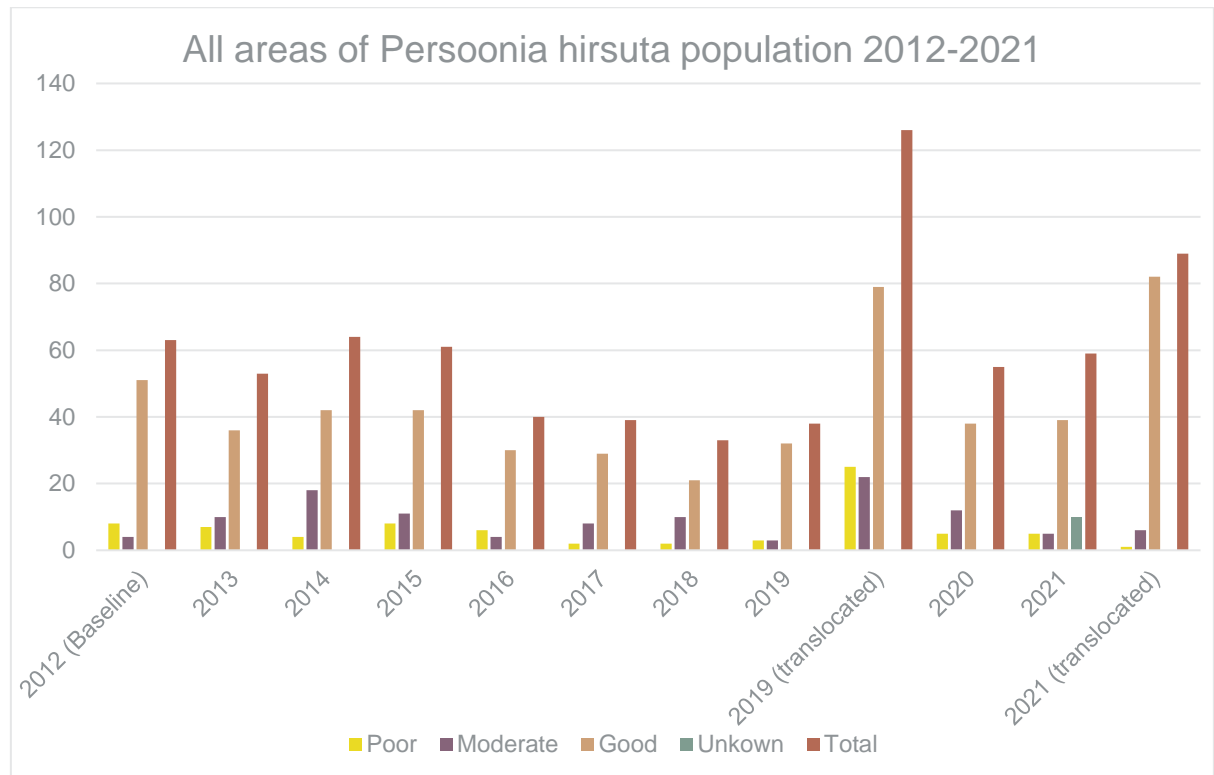


Figure 2: Comparison of condition and population of all *Persoonia hirsuta* plants across years

### Discussion

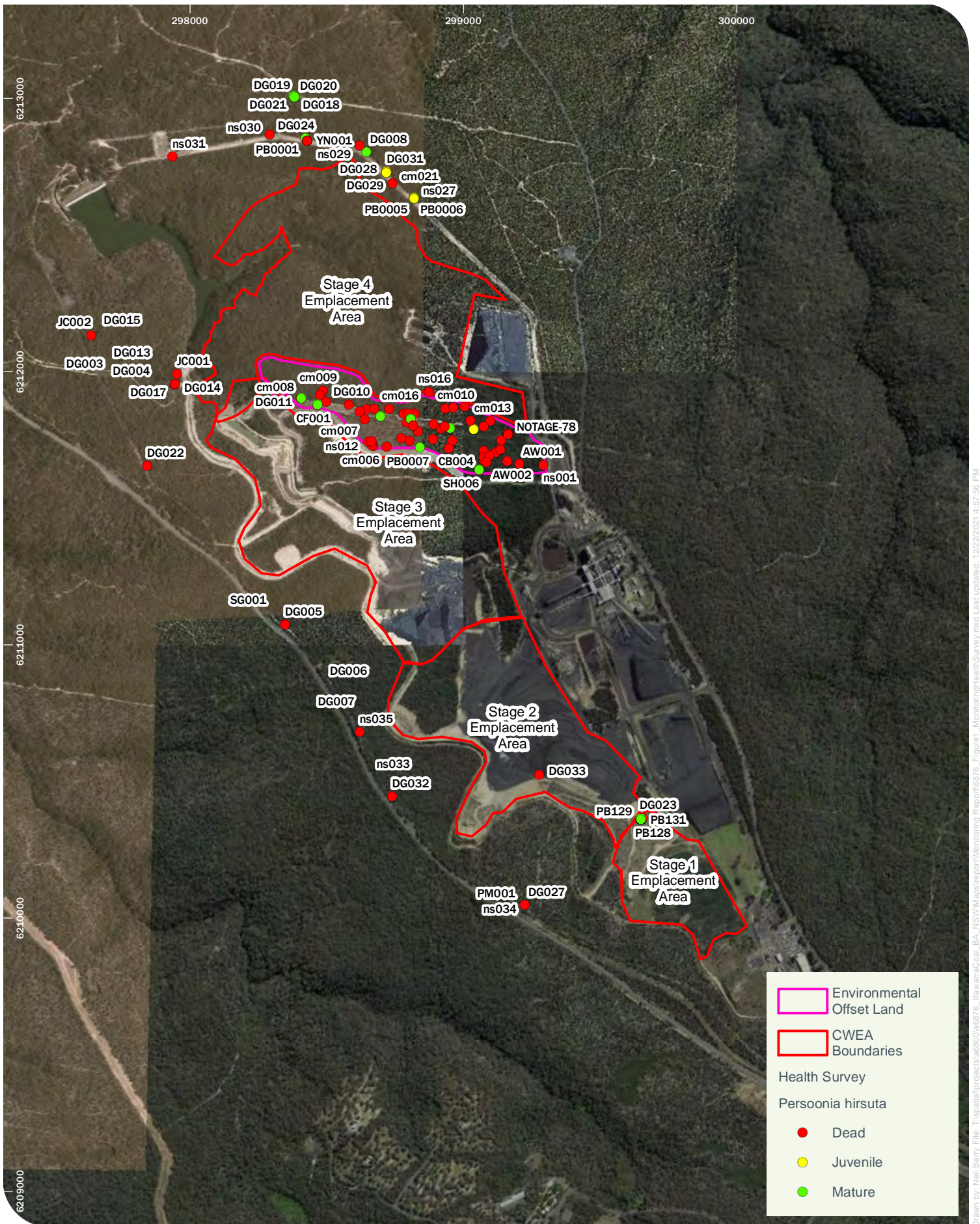
- The overall health of the core population of *P. hirsuta* is good as the plants are producing flowers and fruits in most cases. Flowering and fruiting is more prevalent in plants that are located within dense bush rather than those beneath powerlines or on the roadside.
- The vegetation in the Offset and surrounding Appin North site remains in good condition. The conservation burn area is regenerating well. IMC is monitoring the site for emergent seedlings. Two new *P. hirsuta* within the burn trial area have been observed to date (SH006 and PB0007).
- As per previous years, recruitment is limited to previously disturbed areas (beneath powerlines) or close to a skeleton of a previously known record.
- It is recommended to continue to water the translocated plants within the offset area as they mature to enable growth and have a greater chance of survival.

### Ongoing Research and Conservation Management

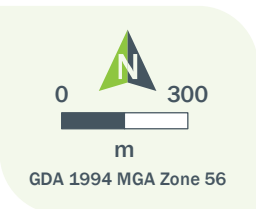
In accordance with EPBC 2010/5350 Condition 3, IMC is undertaking targeted research on *Persoonia hirsuta* including:

- Habitat and demography;
- Population genetics;
- Seed biology, germination and recruitment and propagation, and
- Pollination.

Refer to Appendix C – *Persoonia* Research Status and Strategy for more detail.



Drawn by: Neil Berry File: T:\spatial\projects\6876\_1\NSW\Map\reports\Monitoring Report\6876\_Figure1\_MonitoringHealthSurvey.mxd Last updated: 12/22/2021 4:57:56 PM



**MONITORING REPORT 2021 - Persoonia hirsuta health survey**  
Plot locations

Niche PM: Sian Griffiths  
Niche Proj. #: 6876  
Client: IMC

**Figure 3**

## REFERENCES

Alison Haynes Honours Thesis (2015). Conservation genetics of the rare and endangered plant, *Persoonia hirsuta* (Proteaceae). University of Wollongong, NSW.

BHPBIC *Persoonia hirsuta* Offset Management Plan

FloraSearch (2009). Illawarra Coal - Bulli Seam Operations Project - Terrestrial Flora Assessment. Illawarra Coal and BHP Billiton, eds. Bulli Seam Operations - Appendix E - Terrestrial Flora Assessment. EPBC Referral 2010/5350. Orange, NSW: FloraSearch.

Stephanie Wilmott Honours Thesis (2013). The Demography and Habitat Characteristics of *Persoonia hirsuta*. University of Wollongong, NSW.

**APPENDIX A: RATING SYSTEM USED TO DETERMINE THE CONDITION OF *P. HIRSUTA* INDIVIDUALS**

<b>Rating</b>	<b>Condition</b>	<b>Determinants</b>
0	Very Poor	0-15% cover of leaves 100% of leaves dull or browning No fruits or flowers
1	Poor	15-30% cover of leaves >75% of leaves dull or browning No fruits or flowers
2	Fairly Poor	30-45% cover of leaves >50% of leaves dull or browning No fruit or flowers
3	Moderate	45-60% cover of leaves 50% of leaves dull or browning Some fruits or flowers
4	Good	60-75% cover of leaves <50% leaves dull or browning Presence of fruits or flowers
5	Very good	75-90% cover of leaves <25% of leaves dull or browning Presences of fruits or flowers
6	Excellent	90-100% cover of leaves 0% leaves dull or browning Presence of fruits or flowers

**APPENDIX B: *PERSOONIA HIRSUTA* RECORDS FROM 2021**

Area	Nursery #	Label	Height (mm)	Width (mm)	Age Class	Condition	E	N
Emplacement Rehab	-	DG023	-	-	Dead	Dead	299655	6210366
Emplacement Rehab	-	DG033	-	-	Dead	Dead	299277	6210523
Non core non impacted	-	DG005	-	-	Dead	Dead	298346	6211073
Non core non impacted	-	DG014	-	-	Dead	Dead	297943	6211952
Non core non impacted	-	DG017	-	-	Dead	Dead	297944	6211953
Non core non impacted	-	DG022	-	-	Dead	Dead	297842	6211654
Non core non impacted	-	DG024	-	-	Dead	Dead	298422	6212851
Non core non impacted	-	DG027	-	-	Dead	Dead	299223	6210048
Non core non impacted	-	DG028	-	-	Dead	Dead	298718	6212731
Non core non impacted	-	DG029	-	-	Dead	Dead	298721	6212729
Non core non impacted	-	DG031	-	-	Dead	Dead	298719	6212730
Non core non impacted	-	DG032	-	-	Dead	Dead	298738	6210444
Non core non impacted	-	JC001	-	-	Dead	Dead	297951	6211989
Non core non impacted	-	JC002	-	-	Dead	Dead	297637	6212132
Non core non impacted	-	ns031	-	-	Dead	Dead	297935	6212786
Non core non impacted	-	ns027	-	-	Dead	Dead	298819	6212634
Non core non impacted	-	ns028	-	-	Dead	Dead	298718	6212726
Non core non impacted	-	ns029	-	-	Dead	Dead	298619	6212825
Non core non impacted	-	ns030	-	-	Dead	Dead	298290	6212866
Non core non impacted	-	SH003	-	-	Dead	Dead	298427	6212845
Non core non impacted	-	ns035	-	-	Dead	Dead	298619	6210678
Non core non impacted	-	YN001	-	-	Dead	Dead	298427	6212845
Non core non impacted	-	YN002	-	-	Dead	Dead	298427	6212845
Non core non impacted	-	cm021	-	-	Dead	Dead	298740	6212688
Non core non impacted	-	SH001	215	298	Juvenile	Excellent	298819	6212634
Non core non impacted	-	SH002	110	340	Juvenile	Excellent	298717	6212727
Non core non impacted	-	DG003	Unknown	Unknown	Unknown	Unknown	297701	6212019
Non core non impacted	-	DG004	Unknown	Unknown	Unknown	Unknown	297704	6212032
Non core non impacted	-	DG006	Unknown	Unknown	Unknown	Unknown	298511	6210872
Non core non impacted	-	DG007	Unknown	Unknown	Unknown	Unknown	298568	6210760
Non core non impacted	-	DG008	712	620	Mature	Very good	298644	6212804
Non core non impacted	-	DG013	Unknown	Unknown	Unknown	Unknown	297712	6212037
Non core non impacted	-	DG015	Unknown	Unknown	Unknown	Unknown	297684	6212156
Non core non impacted	-	DG018	680	1600	Mature	Very good	298381	6213005
Non core non impacted	-	DG019	389	1320	Mature	Very good	298379	6213004
Non core non impacted	-	DG020	590	1160	Mature	Very good	298377	6213006
Non core non impacted	-	DG021	320	950	Mature	Good	298382	6213005
Non core non impacted	-	ER001/DG012	645	1540	Mature	Excellent	298717	6212727
Non core non impacted	-	ns033	Unknown	Unknown	Unknown	Unknown	298682	6210531
Non core non impacted	-	ns034	Unknown	Unknown	Unknown	Unknown	299213	6210048
Non core non impacted	-	PM001	Unknown	Unknown	Unknown	Unknown	299196	6210059
Non core non impacted	-	SG001	Unknown	Unknown	Unknown	Unknown	298278	6211131
Non core non impacted	-	PB0001	275	130	Mature	Very Good	298421 .73	6212851 .73
Non core non impacted	-	PB0002	60	30	Juvenile	Very Good	298717 .60	6212728 .32

Area	Nursery #	Label	Height (mm)	Width (mm)	Age Class	Condition	E	N
Non core non impacted	-	PB0003	60	30	Juvenile	Very Good	298718 .66	6212726 .80
Non core non impacted	-	PB0004	70	30	Juvenile	Very Good	298717 .90	6212726 .78
Non core non impacted	-	PB0005	470	280	Mature	Very Good	298818 .73	6212634 .01
Non core non impacted	-	PB0006	185	30	Mature	Very Good	298818 .50	6212632 .77
Offset	-	AH001	-	-	Dead	Dead	299074	6211709
Offset	-	AW001	-	-	Dead	Dead	299204	6211662
Offset	-	AW002	-	-	Dead	Dead	299159	6211671
Offset	-	CB004	-	-	Dead	Dead	299074	6211676
Offset	-	cm001	-	-	Dead	Dead	299119	6211704
Offset	-	cm003	-	-	Dead	Dead	298933	6211799
Offset	-	cm004	-	-	Dead	Dead	298889	6211807
Offset	-	cm005	-	-	Dead	Dead	298833	6211781
Offset	-	cm006	-	-	Dead	Dead	298669	6211727
Offset	-	cm007	-	-	Dead	Dead	298638	6211825
Offset	-	cm009	-	-	Dead	Dead	298485	6211930
Offset	-	cm010	-	-	Dead	Dead	298933	6211865
Offset	-	cm012	-	-	Dead	Dead	299003	6211871
Offset	-	cm013	-	-	Dead	Dead	299025	6211820
Offset	-	cm014	-	-	Dead	Dead	299098	6211818
Offset	-	cm015	-	-	Dead	Dead	298781	6211844
Offset	-	cm016	-	-	Dead	Dead	298728	6211863
Offset	-	cm017	-	-	Dead	Dead	299138	6211748
Offset	-	cm018	-	-	Dead	Dead	298719	6211724
Offset	-	cm019	-	-	Dead	Dead	298792	6211812
Offset	-	cm020	-	-	Dead	Dead	298918	6211790
Offset	-	DG001	-	-	Dead	Dead	299089	6211685
Offset	-	DG002	-	-	Dead	Dead	298802	6211746
Offset	-	DG009	-	-	Dead	Dead	298646	6211861
Offset	-	DG025	-	-	Dead	Dead	298475	6211914
Offset	-	ns001	-	-	Dead	Dead	299291	6211655
Offset	-	ns002	-	-	Dead	Dead	299134	6211714
Offset	-	ns003	-	-	Dead	Dead	299073	6211686
Offset	-	ns004	-	-	Dead	Dead	299095	6211692
Offset	-	ns005	-	-	Dead	Dead	299083	6211666
Offset	-	ns007	-	-	Dead	Dead	298960	6211747
Offset	-	ns008	-	-	Dead	Dead	298946	6211718
Offset	-	ns009	-	-	Dead	Dead	298888	6211752
Offset	-	ns010	-	-	Dead	Dead	298772	6211754
Offset	-	ns011	-	-	Dead	Dead	298663	6211731
Offset	-	ns012	-	-	Dead	Dead	298651	6211741
Offset	-	ns013	-	-	Dead	Dead	298664	6211744
Offset	-	ns015	-	-	Dead	Dead	298579	6211877
Offset	-	ns017	-	-	Dead	Dead	299074	6211798
Offset	-	ns018	-	-	Dead	Dead	298820	6211843
Offset	-	ns020	-	-	Dead	Dead	298673	6211861
Offset	-	ns024	-	-	Dead	Dead	298815	6211801
Offset	-	ns026	-	-	Dead	Dead	298931	6211797
Offset	-	ns014	-	-	Dead	Dead	298619	6211853

Area	Nursery #	Label	Height (mm)	Width (mm)	Age Class	Condition	E	N
Offset	-	cm008	-	-	Dead	Dead	298405	6211903
Offset	-	DG010	-	-	Dead	Dead	298498	6211889
Offset	-	ns019	-	-	Dead	Dead	298798	6211844
Offset	-	cm002	200	90	Juvenile	Poor	299037	6211788
Offset	-	CF001	600	1400	Mature	Excellent	298466	6211878
Offset	-	cm011	dead	dead	mature	dead	298963	6211868
Offset	-	DG011	650	820	Mature	Excellent	298406	6211903
Offset	-	ns006	dead	dead	Mature	dead	298950	6211791
Offset	-	ns021	dead	Dead	Mature	dead	298806	6211827
Offset	-	ns022	dead	dead	Mature	dead	298807	6211825
Offset	-	ns025	600	1500	Mature	Poor	298695	6211834
Offset	-	SH004	680	500	Mature	Excellent	298466	6211878
Offset Burn Area	-	SH006	345	273	Mature	Good	-	-
Offset burn area	-	PB0007	565	950	Mature	Very Good	298841 .12	6211720 .90
Stage 4	-	ns016	-	-	Dead	Dead	298873	6211924
Translocated	-	NOTAGE-78	-	-	Dead	Dead	299162	6211770
Translocated	-	P2017-1049/1-23	-	-	Dead	Dead	299162	6211770
Translocated	3	PB001	-	-	Dead	Dead	299162	6211770
Translocated	31	PB003	-	-	Dead	Dead	299162	6211770
Translocated	106	PB004	-	-	Dead	Dead	299162	6211770
Translocated	48	PB006	-	-	Dead	Dead	299162	6211770
Translocated	63	PB009	-	-	Dead	Dead	299162	6211770
Translocated	35	PB010	-	-	Dead	Dead	299162	6211770
Translocated	28	PB011	-	-	Dead	Dead	299162	6211770
Translocated	36	PB012	-	-	Dead	Dead	299162	6211770
Translocated	33	PB013	-	-	Dead	Dead	299162	6211770
Translocated	27	PB014	-	-	Dead	Dead	299162	6211770
Translocated	75	PB015	-	-	Dead	Dead	299162	6211770
Translocated	2	PB016	-	-	Dead	Dead	299162	6211770
Translocated	10	PB017	-	-	Dead	Dead	299162	6211770
Translocated	1	PB018	-	-	Dead	Dead	299162	6211770
Translocated	102	PB019	-	-	Dead	Dead	299162	6211770
Translocated	23	PB020	-	-	Dead	Dead	299162	6211770
Translocated	50	PB021	-	-	Dead	Dead	299162	6211770
Translocated	64	PB023	-	-	Dead	Dead	299162	6211770
Translocated	62	PB024	-	-	Dead	Dead	299162	6211770
Translocated	61	PB026	-	-	Dead	Dead	299162	6211770
Translocated	14	PB027	-	-	Dead	Dead	299162	6211770
Translocated	45	PB028	-	-	Dead	Dead	299162	6211770
Translocated	32	PB029	-	-	Dead	Dead	299162	6211770
Translocated	63	PB031	-	-	Dead	Dead	299162	6211770
Translocated	74	PB032	-	-	Dead	Dead	299162	6211770
Translocated	4	PB033	-	-	Dead	Dead	299162	6211770
Translocated	76	PB034	-	-	Dead	Dead	299162	6211770
Translocated	30	PB035	-	-	Dead	Dead	299162	6211770
Translocated	29	PB036	-	-	Dead	Dead	299162	6211770
Translocated	35	PB037	-	-	Dead	Dead	299162	6211770
Translocated	26	PB040	-	-	Dead	Dead	299162	6211770

Area	Nursery #	Label	Height (mm)	Width (mm)	Age Class	Condition	E	N
Translocated	58	PB041	-	-	Dead	Dead	299162	6211770
Translocated	30	PB042	-	-	Dead	Dead	299162	6211770
Translocated	40	PB043	-	-	Dead	Dead	299162	6211770
Translocated	44	PB044	-	-	Dead	Dead	299162	6211770
Translocated	5	PB048	-	-	Dead	Dead	299162	6211770
Translocated	65	PB049	-	-	Dead	Dead	299162	6211770
Translocated	7	PB050	-	-	Dead	Dead	299162	6211770
Translocated	24	PB051	-	-	Dead	Dead	299162	6211770
Translocated	56	PB055	-	-	Dead	Dead	299162	6211770
Translocated	57	PB056	-	-	Dead	Dead	299162	6211770
Translocated	3	PB057	-	-	Dead	Dead	299162	6211770
Translocated	60	PB058	-	-	Dead	Dead	299162	6211770
Translocated	39	PB059	-	-	Dead	Dead	299162	6211770
Translocated	22	PB061	-	-	Dead	Dead	299162	6211770
Translocated	6	PB063	-	-	Dead	Dead	299162	6211770
Translocated	9	PB065	-	-	Dead	Dead	299162	6211770
Translocated	11	PB066	-	-	Dead	Dead	299162	6211770
Translocated	115	PB067	-	-	Dead	Dead	299162	6211770
Translocated	121	PB068	-	-	Dead	Dead	299162	6211770
Translocated	48	PB069	-	-	Dead	Dead	299162	6211770
Translocated	51	PB071	-	-	Dead	Dead	299162	6211770
Translocated	59	PB072	-	-	Dead	Dead	299162	6211770
Translocated	24	PB073	-	-	Dead	Dead	299162	6211770
Translocated	38	PB074	-	-	Dead	Dead	299162	6211770
Translocated	71	PB079	-	-	Dead	Dead	299162	6211770
Translocated	20	PB080	-	-	Dead	Dead	299162	6211770
Translocated	14	PB081	-	-	Dead	Dead	299162	6211770
Translocated	85	PB082	-	-	Dead	Dead	299162	6211770
Translocated	25	PB083	-	-	Dead	Dead	299162	6211770
Translocated	118	PB084	-	-	Dead	Dead	299162	6211770
Translocated	38	PB085	-	-	Dead	Dead	299162	6211770
Translocated	43	PB086	-	-	Dead	Dead	299162	6211770
Translocated	102	PB087	-	-	Dead	Dead	299162	6211770
Translocated	52	PB089	-	-	Dead	Dead	299162	6211770
Translocated	29	PB091	-	-	Dead	Dead	299162	6211770
Translocated	49	PB092	-	-	Dead	Dead	299162	6211770
Translocated	26	PB094	-	-	Dead	Dead	299162	6211770
Translocated	111	PB095	-	-	Dead	Dead	299162	6211770
Translocated	103	PB096	-	-	Dead	Dead	299162	6211770
Translocated	15	PB097	-	-	Dead	Dead	299162	6211770
Translocated	114	PB098	-	-	Dead	Dead	299162	6211770
Translocated	112	PB099	-	-	Dead	Dead	299162	6211770
Translocated	18	PB100	-	-	Dead	Dead	299162	6211770
Translocated	41	PB101	-	-	Dead	Dead	299162	6211770
Translocated	31	PB102	-	-	Dead	Dead	299162	6211770
Translocated	33	PB104	-	-	Dead	Dead	299162	6211770
Translocated	7	PB105	-	-	Dead	Dead	299162	6211770
Translocated	54	PB106	-	-	Dead	Dead	299162	6211770
Translocated	36	PB107	-	-	Dead	Dead	299162	6211770



Area	Nursery #	Label	Height (mm)	Width (mm)	Age Class	Condition	E	N
Translocated	27	PB108	-	-	Dead	Dead	299162	6211770
Translocated	119	PB109	-	-	Dead	Dead	299162	6211770
Translocated	117	PB110	-	-	Dead	Dead	299162	6211770
Translocated	64	PB111	-	-	Dead	Dead	299162	6211770
Translocated	16	PB112	-	-	Dead	Dead	299162	6211770
Translocated	13	PB114	-	-	Dead	Dead	299162	6211770
Translocated	21	PB115	-	-	Dead	Dead	299162	6211770
Translocated	8	PB116	-	-	Dead	Dead	299162	6211770
Translocated	37	PB117	-	-	Dead	Dead	299162	6211770
Translocated	46	PB118	-	-	Dead	Dead	299162	6211770
Translocated	53	PB119	-	-	Dead	Dead	299162	6211770
Translocated	42	PB120	-	-	Dead	Dead	299162	6211770
Translocated	47	PB121	-	-	Dead	Dead	299162	6211770
Translocated	9	PB122	-	-	Dead	Dead	299162	6211770
Translocated	6	PB123	-	-	Dead	Dead	299162	6211770
Translocated	19	PB125	-	-	Dead	Dead	299162	6211770
Translocated	107	PB126	-	-	Dead	Dead	299162	6211770
Translocated	12	PB127	-	-	Dead	Dead	299162	6211770
Translocated	-	PB141	-	-	Dead	Dead	299648.79	6210360.937
Translocated (2019)	55	PB002	315	110	Juvenile	Good	299162	6211770
Translocated (2019)	34	PB005	370	110	Juvenile	Good	299162	6211770
Translocated (2019)	11	PB007	240	180	Juvenile	Good	299162	6211770
Translocated (2019)	12	PB008	615	200	Juvenile	Moderate	299162	6211770
Translocated (2019)	20	PB022	270	130	Juvenile	Very Good	299162	6211770
Translocated (2019)	1	PB025	560	240	Juvenile	Very Good	299162	6211770
Translocated (2019)	87	PB030	340	210	Juvenile	Moderate	299162	6211770
Translocated (2019)	44	PB038	150	140	Juvenile	Good	299162	6211770
Translocated (2019)	2	PB039	360	170	Juvenile	Moderate	299162	6211770
Translocated (2019)	105	PB045	240	90	Juvenile	Very Good	299162	6211770
Translocated (2019)	18	PB046	360	160	Juvenile	Good	299162	6211770
Translocated (2019)	52	PB047	160	50	Juvenile	Very Good	299162	6211770
Translocated (2019)	41	PB052	210	150	Juvenile	Very Good	299162	6211770
Translocated (2019)	16	PB053	510	160	Juvenile	Good	299162	6211770
Translocated (2019)	50	PB054	310	160	Juvenile	Good	299162	6211770
Translocated (2019)	40	PB060	250	100	Juvenile	Fairly Poor	299162	6211770
Translocated (2019)	42	PB062	310	120	Juvenile	Good	299162	6211770
Translocated (2019)	61	PB064	390	240	Juvenile	Good	299162	6211770
Translocated (2019)	32	PB070	240	90	Juvenile	Fairly Poor	299162	6211770
Translocated (2019)	4	PB075	110	90	Juvenile	Good	299162	6211770
Translocated (2019)	21	PB076	270	120	Juvenile	Very Good	299162	6211770
Translocated (2019)	108	PB077	230	120	Juvenile	Moderate	299162	6211770
Translocated (2019)	34	PB088	410	200	Juvenile	Moderate	299162	6211770
Translocated (2019)	55	PB090	260	100	Juvenile	Very Good	299162	6211770
Translocated (2019)	17	PB093	110	100	Juvenile	Very Good	299162	6211770
Translocated (2019)	13	PB103	270	100	Juvenile	Fairly Poor	299162	6211770
Translocated (2019)	82	PB113	130	50	Juvenile	Very Good	299162	6211770
Translocated (2019)	5	PB124	430	140	Juvenile	Very Good	299162	6211770
Translocated (2021)	-	PB128	410	560	Mature	Very good	299648.79	6210360.937

Area	Nursery #	Label	Height (mm)	Width (mm)	Age Class	Condition	E	N
Translocated (2021)	-	PB129	360	600	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB130	610	530	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB131	1020	580	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB132	250	500	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB133	490	450	Mature	Moderate	299648.79	6210360.937
Translocated (2021)	-	PB134	640	310	Mature	Moderate	299648.79	6210360.937
Translocated (2021)	-	PB135	240	420	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB136	510	480	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB137	590	550	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB138	560	450	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB139	480	490	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB140	100	160	Juvenile	Good	299648.79	6210360.937
Translocated (2021)	-	PB141	90	90	Dead	Dead	299648.79	6210360.937
Translocated (2021)	-	PB142	620	490	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB143	340	660	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB144	350	550	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB145	1020	570	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB146	610	530	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB147	620	550	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB148	870	520	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB149	350	530	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB150	440	490	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB151	660	520	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB152	990	470	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB153	720	640	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB154	490	530	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB155	680	600	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB156	590	390	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB157	300	470	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB158	1030	470	Mature	Moderate	299648.79	6210360.937
Translocated (2021)	-	PB159	560	550	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB160	500	560	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB161	550	320	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB162	570	500	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB163	650	460	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB164	400	500	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB165	470	510	Mature	Moderate	299648.79	6210360.937
Translocated (2021)	-	PB166	720	600	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB167	430	450	Mature	Very good	299648.79	6210360.937

Area	Nursery #	Label	Height (mm)	Width (mm)	Age Class	Condition	E	N
Translocated (2021)	-	PB168	890	550	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB169	880	480	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB170	520	370	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB171	310	430	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB172	590	650	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB173	770	270	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB174	850	470	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB175	720	520	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB176	630	600	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB177	230	480	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB178	1080	490	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB179	620	500	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB180	590	450	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB181	510	530	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB182	530	380	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB183	600	450	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB184	650	390	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB185	610	380	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB186	1050	510	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB187	710	550	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB188	1010	400	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB189	290	500	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB190	620	420	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB191	330	540	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB192	650	850	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB193	260	470	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB194	720	560	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB195	470	530	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB196	340	600	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB197	100	80	Juvenile	Fairly poor	299648.79	6210360.937
Translocated (2021)	-	PB198	160	250	Juvenile	Moderate	299648.79	6210360.937
Translocated (2021)	-	PB199	800	470	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB200	870	590	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB201	210	180	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB202	390	470	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB203	370	490	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB204	580	490	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB205	730	570	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB206	120	150	Juvenile	Very good	299648.79	6210360.937

Area	Nursery #	Label	Height (mm)	Width (mm)	Age Class	Condition	E	N
Translocated (2021)	-	PB207	520	300	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB208	620	860	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB209	210	430	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB210	340	520	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB211	770	530	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB212	350	600	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB213	600	450	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB214	250	500	Mature	Very good	299648.79	6210360.937
Translocated (2021)	-	PB215	910	760	Mature	Moderate	299648.79	6210360.937
Translocated (2021)	-	PB216	650	520	Mature	Good	299648.79	6210360.937
Translocated (2021)	-	PB217	420	530	Mature	Very good	299648.79	6210360.937

## APPENDIX C: PERSOONIA HIRSUTA RESEARCH STRATEGY AND STATUS

### EPBC Approval (2010/5350) Condition 3 – South32 Illawarra Metallurgical Coal Persoonia Research Status Update and Strategy

Prepared by: David Gregory – IC Land and Biodiversity Specialist

Review Date: 22<sup>nd</sup> June 2018

Condition Requirement	Status
3. The person taking action must engage a suitably qualified expert to undertake and make publicly available targeted research to inform conservation knowledge of <i>Persoonia hirsuta</i> . The research must:	<p>The ‘targeted research’ is being undertaken by both the University of Wollongong (UOW) and Royal Botanic Gardens and Domain Trust. The following research has been completed by UOW to date:</p> <ol style="list-style-type: none"><li>1. Honours project #1 titled The Demography and Habitat Characteristics of the Endangered <i>Persoonia hirsuta</i> (submitted 2013)</li><li>2. Honours project #2 titled Conservation genetics of the rare and endangered plant, <i>Persoonia hirsuta</i> (Proteaceae) (submitted 2015)</li><li>3. Honours Project #3 (Continuation of #2) titled Can the seed bank act as a reservoir of genetic diversity? A Conservation genetic study of <i>Persoonia hirsuta</i></li></ol> <p>UOW will publish the outcomes from this work. We expect the final paper/s to be available mid-late 2018. The following research is underway with the Royal Botanic Gardens and Domain Trust:</p> <ol style="list-style-type: none"><li>1. Trial propagation using cuttings collected from the West Cliff and other populations. The aim is to develop a population of stock plants at the nursery which will be used to collect seed for germination trials and translocation. This project is ongoing, progress has been slow due to the overall success rate for this species being very low.</li><li>2. ACARP 24013 (2017). <i>Managing and conserving native plant species in the mining environment - seed germination biology and alternative ex situ storage of Persoonia germplasm for restoration</i>. This work is a collaborative project between IMC, Centennial Coal and Royal Botanic Gardens and Domain Trust and is funded by the Australian Coal Association Research Program (ACARP). The research had two main aims:<ol style="list-style-type: none"><li>a. To optimise propagation of <i>Persoonia</i>, through seed and vegetative material, with a focus on several species relevant to current mining leases in South-Eastern Australia. The objectives within this aim include:<ol style="list-style-type: none"><li>i. - Optimising the collection of seed and vegetative material</li><li>ii. - Understanding dormancy preventing high rates of seed germination for multiple species and optimising germination conditions to establish cultivation protocols</li><li>iii. - Trialling various approaches to vegetative propagation.</li></ol></li><li>b. To determine the most appropriate ex situ conservation options for successful reintroduction of these species as part of restoration programs. The following objectives were addressed:<ol style="list-style-type: none"><li>i. Determination of the long-term suitability of seedbanking for <i>Persoonia</i></li><li>ii. Identification of optimal conditions for the successful propagation and healthy growth and survival of <i>Persoonias</i> in the nursery</li><li>iii. Establishment of a protocol for storage of germplasm as seed (seedbanking) and plantlets (tissue culture) to maximise survivorship.</li></ol></li></ol></li></ol>

Condition Requirement	Status
	<p>The above project (Phase 1) commenced February 2015 and completed in March 2017. This project was granted further funding in 2016 and extended for two years (Phase 2) (to conclude late 2019) to include high interest native plants in mine site restoration programs and Propagation, translocation and re-introduction of plants for the establishment of offset populations. Mt Annan RBG are currently undergoing seed collections, germination and pollinator observations. To date, the project has resulted in successful germination of <i>P. hirsuta</i> seed in the nursery plants grown from seed in the nursery have been translocated back to the mine site. Phase 1 has resulted in several published research articles.</p> <p>3. PhD (Collaboration with Royal Botanic Gardens and Western Sydney University) titled <i>Addressing Drivers of Dieback in an Endangered Tree Species, Persoonia hirsuta (Hairy Geebung)</i>. The aim of this project is to assess environmental factors that may be linked to dieback, particularly those related to beneficial and detrimental microbes and to plant nutrition. These factors will be assessed in field and glasshouse experiments and using state-of-the-art laboratory techniques. This project will commence mid-2018 and run for the next 3 years.</p>
<p>a. Document current understanding of <i>Persoonia hirsuta</i> ecology and genetics;</p>	<p>UOW honours project #1 - Thesis titled <i>The demography and Habitat Characteristics of the Endangered Persoonia hirsuta</i> by Stephanie Wilmott. Project was completed in October 2013. The study investigated the following:</p> <ul style="list-style-type: none"> <li>• Current distribution and abundance</li> <li>• Soil stored seed bank – to determine if seed is dispersed or retained directly under the plant; and</li> <li>• Habitat requirements – Indicator species, soil particle size/composition and elevation</li> </ul> <p>Current understanding of genetics was summarised in the Conservation Genetics Projects (UOW project #2 &amp; #3) which is summarised in Condition (5) below. UOW will publish the outcomes of these works in a paper late 2018.</p>
<p>b. Outline previously documented management and conservation actions;</p>	<p>This will be outlined in the final report when published.</p>
<p>c. Investigate:</p> <p>i. Pollination biology</p>	<p>Royal Botanic Gardens have commenced pollinator observations on <i>P. hirsuta</i>. This work will form part of the ACARP research mentioned above.</p>
<p>ii. Requirements of its pollinators</p>	<p>As above.</p>
<p>iii. Soil seed bank dynamics and the role of various disturbances (including fire) in germination and recruitment;</p>	<p>Soil seed bank was investigated as part of project #1 as mentioned above. This study found that all of the sites where <i>P. hirsuta</i> populations were present were found to have high levels of disturbance. The type of disturbance and the level of disturbance <i>P. hirsuta</i> can tolerate, and perhaps benefit from, was not tested experimentally. The RBG ACARP project will attempt to develop a robust and informative experimental framework for examining germination cues for <i>Persoonia</i> species seed, including temperature, chemical, physical and temporal treatments. Soil stored seed was also a topic of investigation in the UOW project #3.</p> <p>UOW was engaged by IMC to investigate post-fire seedling emergence patterns at a site consisting of approximately 8000 m<sup>2</sup> of dry sclerophyll forest at Yanderra, on the edge of the Southern Highlands, NSW. The site was burned in a wildfire in late October 2013. This study was the first to record the spatial and</p>

Condition Requirement	Status
	<p>temporal pattern of post-fire seedling emergence in <i>P. hirsuta</i> and found that of 16 burned skeletons, the seed banks immediately below 10 of them produced a flush of seedlings mostly seven months after the fire (Alison Haynes Thesis 2015). The results were published in the UOW project #2 (Conservation Genetics).</p> <p>IMC conducted an ecological burn within the West Cliff <i>Persoonia</i> Offset in April 2016. The aim of the burn was to promote germination of <i>P. hirsuta</i> and increase the density of the species within the area. IMC prepared a Burn Plan and designed a post-fire monitoring program and is currently monitoring for seedlings.</p>
<p>iv. Phenology and seasonal growth of <i>Persoonia hirsuta</i></p>	<p>IMC is conducting annual population and condition surveys at West Cliff. These surveys examine the growth, health and survival of the plants growing within the Offset area at West Cliff. An annual report is provided to Department of Agriculture, Water and the Environment each year in accordance with EPBC 2010/5350 Condition (h).</p>
<p>v. Population genetic structure, levels of genetic diversity, minimum viable population size and management actions</p>	<p>UOW honours project #2 - titled <i>Conservation Genetics of the Rare and Endangered Persoonia hirsuta (Proteaceae)</i>. Project was completed July 2015 and investigated the following:</p> <ul style="list-style-type: none"> <li>• Developing and optimising a set of species-specific microsatellite primers suitable for fine scale population genetic analysis in this study, and in later studies of paternity analyses.</li> <li>• Using microsatellite data from adult plants to estimate patterns of allelic and genotypic diversity, fine and coarse scale genetic differentiation and mating systems; and</li> <li>• Investigating the species' demographic response to fire by taking advantage of a wildfire in October 2013 that burned one of the adult stands, providing the opportunity to document spatial and temporal patterns of seedling emergence and growth.</li> </ul> <p>Further research in this area continued under Honours project # 3 – Completed Nov 16.</p> <p>There were five major aims of this project:</p> <ul style="list-style-type: none"> <li>• Extract and amplify DNA of a reliable and workable quality from <i>Persoonia hirsuta</i> seed material using PCR.</li> <li>• Select and optimise markers based on quality, repeatability and variability.</li> <li>• Use material from each of two populations to genotype seed from canopy and soil stored seed bank to: <ul style="list-style-type: none"> <li>○ Verify that seed genotypes were reflective of the embryo, whilst not containing maternal DNA</li> <li>○ Compile a representative sample of the seed bank</li> </ul> </li> <li>• Infer patterns of mating using paternity analyses, estimation of pollen dispersal distances and variation in male reproductive success across time. Calculate single and multilocus outcrossing rates.</li> <li>• Compare levels and partitioning of genetic diversity within the adult and seed bank populations.</li> </ul>
<p>vi. Impact of dieback disease and control techniques on <i>Persoonia hirsuta</i> and its habitat; and</p>	<p>PhD (Collaboration with Royal Botanic Gardens and Western Sydney University) titled <i>Addressing Drivers of Dieback in an Endangered Tree Species, Persoonia hirsuta (Hairy Geebung)</i>.</p> <p>The aim of this project is to assess environmental factors that may be linked to dieback, particularly those related to beneficial and detrimental microbes and to plant nutrition. These factors will be assessed in field and glasshouse experiments and using state-of-the-art laboratory techniques. This project will commence mid-2018 and run for the next 3 years.</p>

Condition Requirement	Status
vii. Impact of fire on <i>Persoonia hirsuta</i> and its habitat	As mentioned above, <i>UOW Conservation Genetics...</i> (Project #2) thesis Investigated the species' demographic response to fire by taking advantage of a wildfire in October 2013 that burned one of the adult stands, providing the opportunity to document spatial and temporal patterns of seedling emergence and growth. IMC has conducted an ecological burn within the Offset in 2016 and is monitoring to measure the plants' response to fire at West Cliff.

Key Milestones	Target Completion Date	Status
1. Demography and Habitat Project Completed	Nov 2013	Completed Nov 2013
2. Conservation Genetics Project Completed	June 2015	Honours Thesis completed June 15, UOW currently publishing this work.
3. Mating Systems Project Complete	Oct 2016	Completed Oct 2016
4. Annual population monitoring Completed	Dec 13, 14, 15, 16 & 17	Dec 13, 14, 15, 16 & 17 completed
5. Mt Annan Propagation Trials using cuttings completed	Trial 1 WC cuttings collected by – June 2014 Trial 2 (Couridjah) cuttings collected by – Dec 2014 Trial 3 WC cuttings collected by – March 2015 Trial 4 – WC cuttings collected by end of 2016 Trial 5 – WC and Yanderra April 2018	Trial 1 completed with no success Trial 2 ongoing, no long-term success Trial 3 underway, 16 cuttings successful to begin with, but mortality high – No plants have since survived. Trial 4 Mortality high, few plants remaining in nursery and progress very slow. Trial 5 – Cuttings have been potted but no root establishment yet.
6. Conduct Ecological burn – West Cliff Offset	Autumn 2016 (depending on findings from ACARP and 2015 population census).	Burn completed in Apr 2016. Commenced post-fire monitoring program. One <i>P. hirsuta</i> seedling recorded in 2020 (confirmed to be still present and healthy in 2021) and one mature plant recorded in the burn area in 2021.
7. Royal Botanic Gardens ACARP Project Report Completed	May 2017 (Part 1). Oct 2019 (Part 2)	Project commenced February 2015 – Ongoing. Has been extended into a second project –further funding for another two years.
8. PhD Project (RBG & UWS)	March 2021	Not yet commenced
9. Submit Final Project Report	June 2021	Original deadline was May 2017 – Request submitted to extend by another two years - Granted. Additional request submitted to extend till 2021 to allow for PhD project and additional work being undertaken by RBG.

END OF REPORT





---

**Appendix 9: Appin West BioBank Site Annual Report - 2021/2022**



**Landcare Australia**

**Annual Report for the  
NSW Biodiversity Conservation Trust  
2021-2022**

**Appin West BioBanking Site (ID: 215)**

## Contents

1. BioBanking Annual Reporting Table.....	3
2. Photo Points.....	8
3. Results of the inspections required .....	21
4. Site visits – October 2021, February 2022, June 2022, July 2022 and August 2022 (Annual Inspection by Landcare Australia).....	22
4.1. Weeds .....	22
4.2. Fire .....	23
4.3. Pest Animals.....	24

## 1. BioBanking Annual Reporting Table

BioBank Site Annual Report					
Location Details					
BioBanking Agreement ID: 215		Name of landowner - Endeavour Coal Pty Ltd. All conservation land management works undertaken by Landcare Australia on behalf of Endeavour Coal Pty Ltd.			
Reporting date: 19 August 2022		Property address: 140 Douglas Park Drive, Douglas Park, 2569			
Management actions	Required completion time and frequency	Action completed (Yes/No)	Actual completion date/s	Description of actions undertaken (including reference to management zones), any variations and the reasons for variation.	Visual observations and other comments (including reasons for non-completion)
1. Management of grazing for conservation	Ongoing	Yes	<p>Site visits for this reporting period, include:</p> <p>Site visit dates are as follows.                      20 Oct 2021                      16 Feb 2022                      17 Jun 2022                      13 Jul 2022                      04 Aug 2022 - annual inspection</p>	<p>No stock observed in all management zones on each site visit. There has been minor damage to the top strand of the boundary fence with the neighbour to the south from falling branches during high wind. A contractor has been sourced to make repairs in Aug/Sept 2022.</p> <p>Grazing by stock animals has ceased on the property to the south since the change in ownership and there has been no known incursion into the site since the previous reporting period.</p>	No other observed evidence of grazing, trampling or other traces of stock animals.
2. Weed control	Ongoing – (minimum 4 times per year)	Yes	<p>Site visits for this reporting period, include:</p> <p>Site visit dates are as follows.                      20 Oct 2021                      16 Feb 2022                      17 Jun 2022                      13 Jul 2022                      04 Aug 2022</p>	<p>Weed control at MZ1, MZ2, MZ3 and Transmission Line (TL) easement and edges of MZ6 and MZ7 adjoining easement on each site visit using herbicide spot spraying, with a quick spray™ unit (in the TL) and hand-pulling of weed species listed in BioBanking Agreement (BBA) 215. <i>Pls note: There is currently limited access to MZ3 due to the ongoing above average rainfall. Without vehicle access there is limited capacity to spray this area with a quick spray unit and all weed control must be done by walking to the site with 15-20kg knapsacks.</i></p>	<p>Ongoing herbicide treatment required in MZ1, MZ2, MZ3 and the transmission line easement for Blue Periwinkle, Paterson’s Curse, Bridal Creeper, African Lovegrass, Stinking Roger, Spear Thistle, Fleabane, Paddy’s Lucerne and other woody species such as Small Leaved Privet.</p> <p>As per the BBA - Areas previously disturbed require ongoing control for at least the following</p>

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

				<p>Maintenance sweeps for key weed threats through MZ6 and MZ7. No access permitted to MZ4 and MZ5 due to the high cliffs and gorges, however no weeds observed in adjoining management zones during maintenance sweeps.</p> <p>Herbicides have been used on the BioBanking site during site visits to undertake management actions (i.e. weed control) in each respective management zone as listed in the BBA. A list of herbicides used at each visit is available (if required).</p> <p>Slashing in the TL was planned for July 2022 however this has been deferred until August/September 2022 subject to more favourable weather conditions.</p>	<p>10 years, after which time these zones are to be reassessed for the need for further control.</p>
<b>3. Management of fire for conservation</b>	Ongoing	Yes	Quarterly site visits	<p>No evidence of recent fire activity during the site visits (BBA suggests last burn/wildfire was in 2004).</p> <p>No ecological burns are planned in any zone until at least 2026, and then the site will be reconsidered for future ecological burns in a mosaic pattern across the site.</p>	<p>Heavy senescence of <i>Acacia spp.</i> (predominantly <i>A. decurrens</i>) in MZ1, MZ2 and MZ7.</p> <p>Fuel loads vary in all Management Zones but are at least 15-25 tonnes per hectare or greater (in areas) across the site.</p> <p>However, with the current high moisture levels within the vegetation and the soils the site does not pose a significant fire risk (as at 4 August 2022).</p>
<b>4. Management of human disturbance</b>	Ongoing	Yes	Quarterly site visits	<p>Signage and fencing as per the BBA are in good working order.</p> <p>There has been minor damage to the top strand of the boundary fence with the neighbour to the south from falling branches</p>	<p>Access for management purposes includes South32 and Landcare Australia (land management contractor) staff.</p> <p>There is no ability for stock or unauthorized motor vehicles to access the site with the current exclusion fencing in place.</p>

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

				<p>during high wind. A contractor has been sourced to make repairs in Aug/Sept 2022.</p> <p>No waste has been observed on the site during the site visits this year.</p>	<p>Routine inspections conducted at each site visit to ensure fencing is secure and that there have been no incursions. Any incursions and associated impacts would be reported to South32 and the BCT as per BBA.</p>
<b>5. Retention of native vegetation</b>	Ongoing	Yes	Quarterly site visits	<p>There was no other evidence of vegetation being killed, destroyed or poisoned onsite during this reporting period.</p>	<p>No evidence or observation of recent ringbarking or tree felling onsite.</p>
<b>6. Planting or seeding - maintenance</b>	Ongoing	Yes	Quarterly site visits	<p>As per the Section 6.6 of the BBA, a planting program was implemented as a “local planting day” on 22/05/18 for the species listed in the planting schedule.</p> <p>Survivability of the canopy species planted since the drought has declined. Forty-five seedlings planted (of the 250 originally planted) have survived as of 4 August 2022. This is likely attributed to the drought experienced in the first 18 months after planting. The seedlings continue to be significantly grazed by native and non-native herbivores on the site (see Section 10, below).</p>	<p>Soil moisture levels declined significantly during the drought (2018 – 2020). Supplementary watering was provided to the seedlings as per the scope of works for maintenance.</p> <p>The grazing can be reduced on the remaining seedlings via the installation of wire mesh guards. Landcare Australia will liaise with South32 to confirm funding availability to install 800mm tall mesh guards.</p> <p>Any remaining green corflute guards from the seedlings that did not survive have been stockpiled on the site until such time there is vehicle access to MZ3.</p>
<b>7. Retention of dead timber</b>	Ongoing	Yes	Quarterly site visits	<p>No timber has been introduced or removed from the site since the commencement of the BBA.</p>	<p>Observations made during maintenance sweeps for all zones during annual and quarterly sites visits.</p>
<b>8. Erosion control</b>	Ongoing	Yes	Quarterly site visits	<p>No areas identified across the site that currently require any supplementary erosion control or stabilisation.</p>	<p>Observations made during maintenance sweeps for all zones during annual and quarterly sites visits.</p>
<b>9. Retention of rocks</b>	Ongoing	Yes	Quarterly site visits	<p>No rock removal has occurred on the site since the commencement of the BBA.</p>	<p>Site monitored for rock removal at either quarterly or annual site visits to the respective management zones.</p>

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

<b>10. Control of feral and overabundant native herbivores</b>	Ongoing	Yes	Quarterly site visits	Negligible feral or overabundant native herbivory in all areas except MZ3. Grazing in MZ3 is likely by wallabies, kangaroos and goats (no goat scats observed onsite to date).	In accordance with the BBA annual inspection required for species traces. Opportunistic observations made during weed control and maintenance sweeps for all zones during either the annual and/or quarterly site visits.
<b>11. Vertebrate pest management</b>	Ongoing	Yes	Quarterly site visits.  Canid pest ejectors containing 1080 capsules were activated from 6 June to 15 July 2022. The following site visits were used to assess the bait and replace as needed.  15 June 2022, 23 June 2022, 29 June 2022, 12 July 2022, 14 July 2022	Fox scats were observed within in the TL and MZ1 and MZ2 in the previous reporting period.  No goat scats have been observed during any site visits.  However, there is potential for goats to access the site (and graze in MZ3) as goats have been sighted in the same gorge at another site serviced by Landcare Australia in Douglas Park, NSW.	Following liaison with Greater Sydney Region Local Land Services the site is currently included in the regional Spring and Autumn fox baiting program due to the presence of fox scats and observations at the site.  The pest management plan is due for review as per Annexe C of the BBA. Initial discussions between EC and LA were held in 2021 and discussions will continue to FY23 and will be developed by December 2023.
<b>12. Nutrient control</b>	Ongoing	Yes	Quarterly site visits	Nil	No fertilizers have been used on the site since the commencement of the BBA.
<b>13. Control of exotic fish species</b>	N/A	N/A	N/A	N/A	No action required under the BBA.
<b>14. Maintenance or reintroduction of natural flow regimes</b>	Ongoing	Yes	Ongoing	No artificial structures installed to impede the natural flow regimes on the site.	Natural flow regimes are maintained on the site in accordance with the BBA.
<b>Incident or event that has adverse effect on biodiversity values on biobank site</b>					
<b>Incident or event including adverse impacts (e.g. natural events)</b>			<b>Action taken and proposed recommended actions</b>		

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

Nil	N/A
Nil	N/A
<b>Records submitted with this report</b>	
<input checked="" type="checkbox"/> Photographs taken at the photo points set in the BioBanking agreement – see attached	
<input checked="" type="checkbox"/> Results of the inspections required to be conducted in item 1.3 of annexure D to the BioBanking agreement – see attached	
<input checked="" type="checkbox"/> Results of any monitoring, inspections, surveys required in Annexures C and D to the BioBanking agreement – see attached	

<b>Signature and certification</b>	
I hereby declare that the information supplied in this report is accurate and complies with the reporting requirements under item 2 of the Annexure D to the BioBanking agreement Note: If the land that forms the biobank site is owned by multiple persons, each landowner must sign this annual report	
Signed: 	Signed: 
Date: 5 August 2022	Date: 8 August 2022















## 2. Photo Points

Location of Photopoints					
Projected Coordinate System: GDA 94, MGA – Zone 56					
Photopoint Ref.	Easting	Northing	Feature	Direction of Photo	Comment (Date)
PP1	289949	6210260	Planted and regenerating native pasture.	NSEW	1 Star Picket in clearing, flagged.
PP2	289844	6210546	Shale Sandstone Transition Forest (EEC).	NSEW	1 Star Picket in clearing, 20m from original site. Flagged.
PP3	290152	621692	Acacia thicket in subtle drainage line from adjoining property's dam outfall.	NSEW	1 Star Picket in clearing, flagged.
PP4	290223	6210758	Centre of old Bore site, in regeneration area, at end of access track.	NSEW	1 Star Picket in clearing, flagged.
PP5	290390	6210874	Centre of main access track to western block, in centre of powerline alignment.	NSEW	New Photopoint established ~15m from original GPS location, which will not interfere with slashing regime (see Feature column) (2/3/18).
PP6	290321	6211031	Powerpole (ID869210) marker, viewing weed management (and future revegetation) in slashed grass area.	NSEW	New Photopoint established approximately 15m from original GPS location, using Powerpole (ID 869210) in centre of easement/slashed area (2/3/18).
PP7	290420	6211172	Garden plant escapee/weed management, east of boundary fence maintenance track.	NSEW	New Photopoint established approximately 20m from original GPS location. New Site is next to patch of succulents (Removed 24-25/10/17), approximately 10m from property boundary with adjacent house block, due east from carport (25/10/17). 1 Star Picket in clearing, flagged (2/3/18).
PP8	290631	6211462	Regeneration of track. Marker within vegetation, south-east of track bend.	NSEW	Original photopoint not found. New Photopoint established and flagged (2/3/18).
PP9	290788	6211293	Regeneration of formerly cleared area.	NSEW	New photopoint established approximately 15m from original GPS location. Used forked Eucalypt in NW corner of clearing / turning circle (25/10/17). New photopoint established and flagged in clearing (2/3/18).

*Pls note images from 2018 were taken by previous staff or contractors and some of these photopoints (in some cases) are not showing the correct bearing i.e. north, east, south or west and these have been identified in the following table. We were unable to take photo points for 2021 due to Covid 19 restrictions.*

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP#	Direc tion	February 2018	February 2019	July 2020	August 2022
PP1	N	 <p>Image facing NW not N</p>			
PP1	E	 <p>Image facing NE not E</p>			
PP1	S				

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP1	W	 <p>Image facing SW not W</p>			
PP2	N	 <p>Image facing NW not N</p>			
PP2	E	 <p>Image facing NE not N</p>			

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP2	S	 <p>Image facing SE not S</p>			
PP2	W	 <p>Image facing SW not W</p>			
PP3	N				

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP3	E				
		Image facing SE not E	Image facing SE not E		
PP3	S				
PP3	W				




BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP4	N				
		Image facing NW not N			
PP4	E				
PP4	S				

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP4	W					
		Image facing SW not W				
PP5	N					
PP5	E					

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP5	S				
PP5	W				
PP6	N				



BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP6	E				
PP6	S				
PP6	W				

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP7	N				
PP7	E				
PP7	S				

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP7	W				
PP8	N				
PP8	E				

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP8	S				
PP8	W				
PP9	N				

BioBanking Agreement 215 - Annual Report (2021 – 2022), Photo Points, Inspections, Monitoring and Reporting

PP9	E				
PP9	S				
PP9	W				

### 3. Results of the inspections required - as per item 1.3 of Annexure D to the BioBanking Agreement

1. *Percentage of ground cover present on the biobank site for the purpose of item 1.1 of Section 1 of Annexure C (reporting - 12 monthly) – No stock incursion has allowed groundcover to be maintained and/or increase in density across the site over the previous 5 years due to the installation of the exclusion fencing (refer to photopoints for further detail) heavy rainfall in the region in 2021 and 2022 has significantly increased growth of existing groundcover (and weed species due the weed bank in the soils within the disturbed areas of the site).*
2. *Number of stock and date/s when the stock have entered the management zones of the biobank site (reporting - 6 monthly) – No further evidence of stock on the site since the previous reporting period (inspected 16 February and 4 August 2022).*
3. *Physical condition of fencing and gates to ensure they are maintained to the standard listed in Annexure D section 1.3 of the BBA:*
  - a. Currently maintained to the standard to exclude stock from the site and inspected annually:
    - As of 4 August 2022 the site fencing was maintained. Refer to the note above in Section 1 of the annual reporting table which indicates some damage to the existing fencing however this has not rendered the fencing in-operable to prevent stock grazing.
  - b. Currently maintained to a standard to control human disturbance and inspected annually:
    - As of 4 August 2022 the site fencing was maintained. Refer to the note above in Section 4 of the annual reporting table which indicates there is some damage to the existing fencing but is still capable of preventing human disturbance on the site.
  - c. Currently maintained at a standard to control feral or overabundant herbivores and/or vertebrate pests and inspected annually (inspected 4 August 2022) - feral and/or native herbivores have been observed onsite during quarterly site visits. Whilst the existing fencing is adequate to ensure stock exclusion, the fencing will not prevent non-native and native herbivores from accessing the site.
4. *Records of any human disturbance on the biobank site – (reporting 6 monthly) – No human disturbance observed (inspected 16 February and 4 August 2022).*
5. *Evidence of erosion – (reporting 6 monthly) - There are no identified areas across all Management Zones as currently requiring any supplementary erosion control or stabilisation (inspected 16 February and 4 August 2022).*
6. *Evidence of Waste – (reporting 6 monthly) – No evidence of any new waste was observed during the site visits (inspected 16 February and 4 August 2022).*

#### 4. Site visits – October 2021, February 2022, June 2022, July 2022 and August 2022 (Annual Inspection by Landcare Australia)

##### 4.1. Weeds

<b>Template for reporting of monitoring activities</b>		
<b>Management Zone</b>	<b>Date</b>	<b>Observations and assessment of monitoring</b>
<b>MZ1</b>	20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	Treatment of exotic weeds and grasses with herbicide spot spraying and hand pulling of weeds.
<b>MZ2</b>	20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	Undertaken in conjunction with weed control works at MZ1. Treatment of exotic weeds and grasses with herbicide spot spraying and hand-pulling of weeds.
<b>Transmission line (TL) and associated cleared area</b>	20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	Undertaken in conjunction with weed control works at MZ1 and MZ2. Treatment of exotic weeds (Particularly Paterson’s Curse and Stinking Roger) and grasses with herbicide (using quick spray™ unit), spot spraying and hand-pulling of weeds.
<b>MZ3</b>	20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	Undertaken in conjunction with weed control works at MZ1 and MZ2. Treatment of exotic weeds (particularly Paterson’s curse) and exotic grasses with herbicide spot spraying and hand-pulling of weeds inside tree guards.
<b>MZ4</b>	20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	Management zone not visited: no access due to high-risk cliffs. No weeds observed in adjacent management zones.
<b>MZ5</b>	20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	Management zone not visited: no access due to high-risk cliffs. No weeds observed in adjacent management zones.
<b>MZ6</b>	20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	Undertaken in conjunction with weed control works in MZ7. Maintenance sweep targeting key weed threats, concentrating along existing tracks.
<b>MZ7</b>	20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	Undertaken in conjunction with weed control works at MZ6. Maintenance sweep targeting key weed threats, concentrating along existing tracks.

Diary template for weed control management			
Date	Management Zone	Description and type of activity undertaken or observation made	Minor variations (details and reasons)
20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	<b>1, 2, 3 and TL easement</b>	Weed control, herbicide spot spraying, quick spray unit and hand pulling of: <ul style="list-style-type: none"> <li>- Blue Periwinkle (<i>Vinca major</i>);</li> <li>- Paterson’s Curse (<i>Echium plantagineum</i>);</li> <li>- African Lovegrass (<i>Eragrostis curvula</i>);</li> <li>- Spear Thistle (<i>Cirsium vulgare</i>);</li> <li>- Bridal Creeper (<i>Asparagus asparagoides</i>);</li> <li>- Small-leaved Privet (<i>Ligustrum sinense</i>); and</li> <li>- Stinking Roger (<i>Tagetes minuta</i>)</li> </ul>	Ongoing treatment in MZ1, MZ2 and transmission line (TL) to treat Paterson’s curse, African Lovegrass, Spear Thistle, Bridal Creeper and Stinking Roger.  The TL was planned to be slashed in July 2022 to improve efficiency of weed treatment in this zone, however this has been postponed until there are more favourable weather conditions. The site has been waterlogged from high rainfall events in the region as of 4 August 2022.
20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	<b>MZ 6 and 7</b>	Quarterly maintenance weed sweeps ongoing. Occasional spot spraying of African Lovegrass in these zones.	Ongoing observation in these Zones.
20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	<b>MZ 1, 2, 3, TL, 6, 7</b>	Site walk to observe any pests or evidence of presence via scats. Evidence of Foxes observed at the site (scats).	The site was assessed as suitable for inclusion in the regional fox baiting program in Spring and Autumn. The site was baited using Canid Pest Ejectors in Autumn 2022 with no baits triggered.

## 4.2. Fire

Template for reporting of monitoring activities		
Management Zone	Date	Observations and assessment of monitoring
<b>MZ 1, 2, 3, TL, 6, 7</b>	20 Oct 2022 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	No evidence of recent fire activity during site visit (Management report suggests last burn was in 2004).  <i>Acacia</i> spp. in MZ 2 and MZ 7 continue to exhibit senescence. Fuel loads approx. 25 tonnes per hectare on average.



<b>Diary template for fire management activities</b>			
<b>Date</b>	<b>Management Zone</b>	<b>Description and type of activity undertaken or observation made</b>	<b>Minor variations (details and reasons)</b>
20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	MZ 1, 2, 3, TL, 6, 7	No fire management activities undertaken except for opportunistic observation during weeding activities and annual inspection on 4 August 2022.	N/A

### 4.3. Pest Animals

<b>1. Template for reporting of monitoring activities</b>		
<b>Management Zone</b>	<b>Date</b>	<b>Current level of impact on vegetation</b> This column must record impacts as Negligible, Minimal, Moderate or High.
<b>MZ 1, 2, 3, TL, 6, 7</b>	20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	Minimal grazing by native herbivores in all zones except MZ3.  Heavy grazing of seedlings planted in MZ3. All seedling with growth above the corflute guards have been impacted by native or non-native herbivores (macropods and possibly feral goats).

<b>Diary template for feral and overabundant herbivore management</b>			
<b>Date</b>	<b>Management Zone</b>	<b>Description and type of activity undertaken</b> This column must include details of the feral and overabundant herbivores targeted, control techniques, and numbers controlled.	<b>Minor variations (details and reasons)</b>
15 Jun 2022 23 Jun 2022 29 Jun 2022 12 July 2022 14 July 2022	<b>MZ 2 and TL</b>	Greater Sydney Region Local Land Services regional fox baiting program conducted by Landcare Australia on site in Autumn 2022.	N/A
20 Oct 2021 16 Feb 2022 17 Jun 2022 13 Jul 2022 04 Aug 2022	<b>All</b>	Opportunistic observations were undertaken during weeding activities and the annual inspection.	N/A



---

**Appendix 10: Nepean River BioBank Site Annual Report - 2021/2022**



**Landcare Australia**

**Annual Report for the  
Biodiversity Conservation Trust  
2021-2022**

**Nepean BioBanking Site (ID: 382)**

## Contents

1. BioBanking Annual Reporting Table.....	3
2. Photo Points.....	10
3. Results of the inspections required by the BioBanking Agreement .....	17
4. Landcare Australia Site Visits Sep 2021, Jan, June, July and Aug 2022.....	18
4.1. Weeds .....	18
4.2. Fire .....	19
4.3. Native herbivores.....	19
4.4. Vertebrate (feral) pests.....	20

## 1. BioBanking Annual Reporting Table

BioBank Site Annual Report					
Location Details					
BioBanking agreement ID: 382		Name of landowner – Endeavour Coal Pty Ltd. All conservation land management works undertaken by Landcare Australia on behalf of Endeavour Coal Pty Ltd.			
Reporting date: 19 August 2022		Property address: 1025 and 1235 Menangle Rd, Douglas Park, NSW Australia.			
Management actions	Required completion time and frequency	Action completed (Yes/No)	Actual completion date/s	Description of actions undertaken (including reference to management zones), any variations and the reasons for variation.	Visual observations and other comments (including reasons for non-completion)
1. Management of grazing for conservation	Ongoing	Yes	Recorded at the following site visits including:  8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	Reported on 27 June that domestic stock had entered the site via the adjoining property on the eastern boundary in late June 2022.  South32 and Landcare Australia staff inspected site on 29 June 2022 following the report but could not find any evidence of stock onsite. The advice from the neighbour was that stock had been retrieved from the site shortly after they noticed they were missing.  Except for the above incident no stock have been observed in all management zones during sites visits since the last reporting period.	Landcare Australia is currently seeking a quote for replacement of the existing eastern boundary fence line with a stock proof fence in collaboration with the adjoining landowner.
2. Weed control	Ongoing – (4 times per year)	Yes	Quarterly site visits, including  8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022	Weed control within MZ1 and MZ2 continues with spot spraying using herbicide and hand-pulling of species listed in BioBanking Agreement (BBA) 382. A list of herbicides used at each visit is available (if required).  Maintenance sweeps for key weed threats through MZ3 and the accessible parts of MZ4 are undertaken during site visits. No access	Additional herbicide treatment will still be required in MZ1 and MZ2. The above average rainfall in the previous 24 months continues to provide opportunities for increased densities of weed species in disturbed areas of the site including: African lovegrass, Stinking Roger, various Thistle, Fleabane, Blackberry, Prickly Pear and woody species such as African Boxthorn.

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

BioBank Site Annual Report					
Location Details					
BioBanking agreement ID: 382		Name of landowner – Endeavour Coal Pty Ltd. All conservation land management works undertaken by Landcare Australia on behalf of Endeavour Coal Pty Ltd.			
Reporting date: 19 August 2022		Property address: 1025 and 1235 Menangle Rd, Douglas Park, NSW Australia.			
Management actions	Required completion time and frequency	Action completed (Yes/No)	Actual completion date/s	Description of actions undertaken (including reference to management zones), any variations and the reasons for variation.	Visual observations and other comments (including reasons for non-completion)
			05 Aug 2022	<p>permitted to MZ5 due to the high cliffs and gorges. However, no significant weed issues observed within these undisturbed areas of the site.</p> <p>Previous slashing of the eastern planting area within MZ1 and MZ2 continues to provide good opportunities for native species such as Kangaroo Grass to outcompete non-natives species which previously dominated this area.</p> <p>Further slashing of the eastern plantings within MZ1 a MZ2 was planned for July 2022 however, this has been deferred until at least Sep/Oct 2022 subject to more favourable weather conditions and repairs to the crossing (see Section 8 below).</p>	<p>As per the BBA, areas previously disturbed require ongoing control for at least the following 10 years, after which time these zones are to be reassessed for the need for further weed control.</p> <p><i>Pls note: The current weather conditions continue to prevent Landcare Australia from undertaking regular quarterly site visits as reflected in the dates of the site visits in the previous 12 months (see quarterly site visits column).</i></p>
3. Management of fire for conservation	Ongoing	Yes	Quarterly site visits.	<p>No evidence of recent fire activity during site visits (BBA suggests no burn as far back as 1962).</p> <p>No ecological burns are planned in any zone until at least 2024 and then the site will be reconsidered for future ecological burns in a mosaic pattern across the site.</p>	<p>Fuel loads vary in all management zones but are at least 15-25 tonnes per hectare or greater (in areas) across the site.</p> <p>However, with the current high moisture levels within the vegetation and the soils the site does not pose a significant fire risk (as of 5 August 2022).</p>

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

<b>BioBank Site Annual Report</b>					
<b>Location Details</b>					
<b>BioBanking agreement ID: 382</b>		Name of landowner – Endeavour Coal Pty Ltd. All conservation land management works undertaken by Landcare Australia on behalf of Endeavour Coal Pty Ltd.			
<b>Reporting date: 19 August 2022</b>		Property address: 1025 and 1235 Menangle Rd, Douglas Park, NSW Australia.			
<b>Management actions</b>	<b>Required completion time and frequency</b>	<b>Action completed (Yes/No)</b>	<b>Actual completion date/s</b>	<b>Description of actions undertaken</b> (including reference to management zones), any variations and the reasons for variation.	<b>Visual observations and other comments</b> (including reasons for non-completion)
<b>4. Management of human disturbance</b>	Ongoing	Yes	Quarterly site visits.	<p>Signage and fencing as per the BBA are in good working order.</p> <p>There has been no observations or evidence of incursions onto the site from the neighbouring properties (excluding the stock incursion outlined Section 1 above)</p> <p>No waste has been observed on the site during site visits this year.</p>	<p>Access for management purposes includes South32 and Landcare Australia (land management contractor) staff.</p> <p>As outlined in Section 1 (above) the stock exclusion fencing on the eastern boundary is significantly aged and beyond economical repair. Landcare Australia is currently seeking a quote for replacement.</p> <p>Unauthorised motor vehicles have no capacity to access the site with the current exclusion fencing and gates in place.</p>
<b>5. Retention of native vegetation</b>	Ongoing	Yes	Quarterly site visits.	There was no evidence of vegetation being killed, destroyed or poisoned onsite during this reporting period.	No evidence or observation of recent ringbarking or tree felling onsite.
<b>6. Planting or seeding</b>	May/June 2020	Yes	N/A	<p>Success rate in survivability of the canopy and shrub layer species planted in June 2020 in MZ1 and MZ2 is approx. 90%. However, due to the heavy browsing by goats the seedlings are unable to grow beyond the height of the tree guards (450mm), refer to Section 10 below.</p> <p>Currently there is approx. 50% success rate in survivability in the western section of MZ1</p>	Observations made during maintenance sweeps for all accessible zones during quarterly sites visits.

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

BioBank Site Annual Report					
Location Details					
BioBanking agreement ID: 382		Name of landowner – Endeavour Coal Pty Ltd. All conservation land management works undertaken by Landcare Australia on behalf of Endeavour Coal Pty Ltd.			
Reporting date: 19 August 2022		Property address: 1025 and 1235 Menangle Rd, Douglas Park, NSW Australia.			
Management actions	Required completion time and frequency	Action completed (Yes/No)	Actual completion date/s	Description of actions undertaken (including reference to management zones), any variations and the reasons for variation.	Visual observations and other comments (including reasons for non-completion)
				(planted in Autumn 2019) following from the drought conditions in the summer of 2019. Landcare Australia have observed the feral goats also using this area for browsing and are impacting the ability of these plants to gain any substantial height.	
7. Retention of dead timber	Ongoing	Yes	Quarterly site visits.	There is no evidence that timber has been introduced or removed from the site in this reporting period	Observations made during maintenance sweeps for all accessible zones during quarterly sites visits.
8. Erosion control	Ongoing	Yes	Quarterly site visits.	The water crossing used to access the eastern planting zones in MZ1 and MZ2 has been damaged due to recent flooding (March 2022). Landcare Australia has advised South32 that there is no vehicle access as a result. South32 are currently arranging for additional inert ballast material to be reinstated to allow ongoing access to the planting area by vehicle.	Observations made during maintenance sweeps for all zones during quarterly sites visits.
9. Retention of rocks	Ongoing	Yes	Quarterly site visits.	No rock removal has occurred on the site since the commencement of the BBA.	Observations made during maintenance sweeps for all zones during quarterly sites visits.
10. Control of feral and overabundant native herbivores	Ongoing	Yes	Quarterly site visits.	In accordance with the BBA annual inspection required for species traces. Opportunistic observations made during weed control and maintenance sweeps for accessible zones during either the annual and/or quarterly site visits.	Feral goats continue to activate trail cameras on numerous occasions during the fox baiting programs.  These goats continue to have a significant impact on the seedlings planted in western and eastern sections of the site as observed by Landcare Australia staff.





BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

<b>BioBank Site Annual Report</b>					
<b>Location Details</b>					
<b>BioBanking agreement ID: 382</b>		Name of landowner – Endeavour Coal Pty Ltd. All conservation land management works undertaken by Landcare Australia on behalf of Endeavour Coal Pty Ltd.			
<b>Reporting date: 19 August 2022</b>		Property address: 1025 and 1235 Menangle Rd, Douglas Park, NSW Australia.			
<b>Management actions</b>	<b>Required completion time and frequency</b>	<b>Action completed (Yes/No)</b>	<b>Actual completion date/s</b>	<b>Description of actions undertaken</b> (including reference to management zones), any variations and the reasons for variation.	<b>Visual observations and other comments</b> (including reasons for non-completion)
			completed in Winter 2022.	record any movements around each bait station.	
<b>12. Nutrient control</b>	Ongoing	Yes	Quarterly site visits.	N/A	No fertilizers (except for diluted seasoil for the seedlings) have been used on the site since the commencement of the BBA.
<b>13. Control of exotic fish species</b>	N/A	N/A	N/A	N/A	No action required under the BBA.
<b>14. Maintenance or reintroduction of natural flow regimes</b>	Ongoing	Yes	Ongoing.	N/A	Natural flow regimes are maintained on the site in accordance with the BBA.
<b>Incident or event that has adverse effect on biodiversity values on biobank site</b>					
<b>Incident or event including adverse impacts (e.g. natural events)</b>			<b>Action taken and proposed recommended actions</b>		
Stock access to the site in June 2022			Site inspected by Landcare Australia and South32 on 29 June 2022. No evidence of stock onsite the neighbour advised that stock had removed from site. A quote for replacement of the eastern boundary fence line is currently being sought to prevent further stock incursions.		
Damage to existing water crossing in March 2022 floods.			South32 currently developing a proposal to upgrade the previous crossing for access to the planting site in the eastern section of MZ1 and MZ2.		
<b>Records submitted with this report</b>					
<input checked="" type="checkbox"/> Photographs taken at the photo points set in the BioBanking agreement – see attached					
<input checked="" type="checkbox"/> Results of the inspections required to be conducted in item 1.3 of annexure D to the BioBanking agreement – see attached					
<input checked="" type="checkbox"/> Results of any monitoring, inspections, surveys required in Annexures C and D to the BioBanking agreement – see attached					

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting







Signature and certification	
I hereby declare that the information supplied in this report is accurate and complies with the reporting requirements under item 2 of the Annexure D to the BioBanking agreement Note: If the land that forms the biobank site is owned by multiple persons, each landowner must sign this annual report	
Signed: 	Signed: 
Date: 12 August 2022	Date: 19 August 2022

## 2. Photo Points

Location of Photopoints					
Projected Coordinate System: GDA 94, MGA – Zone 56					
Photopoint Ref.	Easting	Northing	Feature	Direction of Photo	Comment (Date)
PP1	285862	6215244	Weed control and boundary fence	NE/NW	1 Star Picket, flagged
PP2	284670	6214464	Weed control and boundary fence	SE/NW	1 Star Picket, flagged
PP3	284753	6214555	Revegetation CPW Zone 1	N/S	1 Star Picket, flagged
PP5	284810	6214720	Revegetation CPW Zone 1	E/W	1 Star Picket, flagged
PP6	284930	6214751	Cumberland Plain Woodland Zone 2	N/S	1 Star Picket, flagged
PP7	285161	6214854	Grey Myrtle Dry Rainforest edge	SE	New Photopoint established (setup in 2019) approximately 30m east of original GPS location to improve accessibility. 1 Star Picket, flagged
PP9	285412	6215024	Cumberland Plain Woodland Zone 2	NE/NW	1 Star Picket, flagged
PP10	286216	6215177	Riparian Scrub edge	E/W	New Photopoint established (setup in 2019) approximately 100m north of the original GPS location to improve accessibility. 1 Star Picket, flagged
PP11	286265	6215312	Shale Sandstone	E/W	1 Star Picket, flagged

*Note that Landcare Australia were unable to take photo points for 2021 due to Covid 19 restrictions and the BCT were notified of this at the time.*

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

PP#	Direction	March 2019	August 2020	July 2022
PP1	NE			
PP1	NW			

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

PP2	SE			
PP2	NW			
PP3	N			

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

PP3	S			
PP5	E			
PP5	W			

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

PP6	N			
PP6	S			
PP7	SE			



BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

PP9	NE			
PP9	NW			
PP10	SE			

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

PP1 0	NW			
PP1 1	E			
PP1 1	W			

### 3. Results of the inspections required by the BioBanking Agreement

1. *Percentage of ground cover present on the biobank site for the purpose of item 1.1 of Section 1 of Annexure C* (reporting - 12 monthly). Minimal stock incursion (approx. 1-2 days in late June 2022) has allowed groundcover to be maintained and/or increase in density across the site over the previous 4 years due to the installation of the exclusion fencing (refer to photopoints for further detail). Heavy rainfall in the region in 2021 and 2022 has increased growth of existing groundcover (and weed species due to the weed seed bank within the disturbed areas of the site).
2. *Number of stock and date/s when the stock have entered the management zones of the biobank site* (reporting - 6 monthly) – Inspected 21 January and 29 June 2022. Minor stock incursion reported on 27 June 2022. However, no stock observed onsite by Landcare Australia or South32 staff following the site inspection on 29 June 2022.
3. *Physical condition of fencing and gates to ensure they are maintained to the standard listed in Annexure D section 1.3 of the BBA:*
  - a. *Currently maintained to the standard to exclude stock from the site on the eastern, western and northern boundaries* (inspected 29 June 2022). – No on eastern boundary
    - As of 27 June a report had been received that stock from the adjoining property on the eastern boundary had accessed the site. A site inspection on 29 June by both Landcare Australia and South32 revealed no stock incursion. Refer to the notes in Section 1 of the annual reporting table which indicates that the adjoining landowner retrieved the stock from the site. A quote for replacement of this stock exclusion fence line on the eastern boundary is currently being sought from Landcare Australia.
  - b. *Currently maintained to a standard to control human disturbance on the eastern, western and northern boundaries* (inspected 29 June 2022).
    - As of 29 June 2022 the site fencing was maintained to a standard to control human disturbance.
  - c. *Currently maintained to a standard to control feral or overabundant herbivores and/or vertebrate pests* (inspected 29 June 2022).
    - Feral and/or native herbivores have been observed onsite during all quarterly site visits. The boundary fences installed will not prevent native and non-native herbivores from accessing and grazing the planting areas in MZ1 and MZ2 on the site.
4. *Records of any human disturbance on the biobank site* – (reporting 6 monthly) – Nil human disturbance observed at the site (inspected 21 January and 15 July 2022).
5. *Evidence of erosion* – (reporting 6 monthly) – There are no areas identified across management zones as currently requiring any supplementary erosion control or stabilisation (inspected in 21 January and 29 June 2022)
  - As of 29 June 2022 Landcare Australia advised South32 of the damage to the existing water crossing in the eastern section of the site. South32 is currently exploring options to reinstate the crossing so that vehicle access can be provided to the eastern plantings in MZ1 and MZ2.
6. *Evidence of Waste* – (reporting 6 monthly) – No evidence of waste was observed during the site visits (inspected 21 January and 29 June 2022).

## 4. Landcare Australia Quarterly Site Visits September 2021, January, June, July and August 2022

### 4.1. Weeds

Template for reporting of monitoring activities		
Management Zone	Date	Observations and assessment of monitoring
MZ1	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	Treatment of exotic weeds and grasses spot spraying with herbicide or hand hand-pulling of weeds.
MZ2	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	Treatment of exotic weeds and grasses spot spraying with herbicide, or hand-pulling of weeds.
MZ3	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	Maintenance sweep targeting key weed threats.
MZ4	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	Maintenance sweep targeting key weed threats in accessible sections of this zone.
MZ5	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	No activity conducted – no access to the gorge, visual observation made from safe locations within MZ4.

Diary template for weed control management			
Date	Management Zone	Description and type of activity undertaken or observation made	Minor variations (details and reasons)
8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	1, 2, 3, 4	Weed control, herbicide (spot spraying) and hand pulling of: <ul style="list-style-type: none"> <li>• <i>Opuntia stricta</i>, Prickly Pear</li> <li>• <i>Lycium ferocissimum</i>, African Boxthorn</li> <li>• <i>Rubus fruticosus</i>, Blackberry</li> <li>• <i>Verbena rigida</i>, Purpletop</li> <li>• <i>Conyza bonariensis</i>, Fleabane</li> </ul>	Will need to revisit MZ1 and MZ2 to continue treating the key threat weed species listed. Continue weed sweeps in MZ3 and MZ4.  The BBA does not list presence of Prickly Pear

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

		<ul style="list-style-type: none"> <li>• <i>Tagetes minuta</i>, Stinking Roger</li> <li>• <i>Asparagus asparagoides</i>, Bridal creeper</li> <li>• <i>Cirsium vulgare</i>, Spear Thistle</li> <li>• <i>Eragrostis curvula</i>, African Lovegrass</li> </ul>	<p>onsite, it is assumed that these were not identified during the initial assessment. Along with African Boxthorn it is one of the more prevalent invasive weed species identifiable on the site and will require significant follow-up for emergents.</p>
--	--	---	---

4.2. Fire

Template for reporting of monitoring activities		
Management Zone	Date	Observations and assessment of monitoring
1, 2, 3, 4, 5	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	No evidence of recent fire activity during site visit (Management report suggests no burns reported on the property since 1962).

Diary template for fire management activities			
Date	Management Zone	Description and type of activity undertaken	Minor variations (details and reasons)
8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	All	No specific fire management activities undertaken except for opportunistic observation during weeding, watering, planting, fox baiting and goat control activities.	N/A

4.3. Native herbivores

Template for reporting of monitoring activities			
Management Zone	Date	Current level of impact on vegetation This column must record impacts as Negligible, Minimal, Moderate or High	Observations and assessment of monitoring
All	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	No specific native herbivore management work undertaken except for opportunistic observation during weeding, watering, planting fox baiting and goat control activities.	Trail cameras set up for fox baiting revealed several common native mammal and bird species regularly traverse the site.

Diary template for overabundant herbivore management			
Date	Management Zone	Description and type of activity undertaken This column must include details of the	Minor variations (details and reasons)

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

		overabundant herbivores targeted, control techniques, and numbers controlled.	
8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	All	No specific native herbivore management work undertaken except for opportunistic observation during weeding, watering, planting, fox baiting and goat control activities.	Native species observed include: Common Wombat and Eastern Grey Kangaroo.

4.4. Vertebrate (feral) pests

Template for reporting of monitoring activities			
Management Zone	Date	Current level of impact on vegetation or threatened fauna species This column must record impacts as Negligible, Minimal, Moderate or High	Observations and assessment of monitoring
<b>MZ1</b>	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	Feral Goats have been observed on all occasions during site visits in a herd of approx. 15-30 animals within MZ1, MZ2, MZ3 and MZ4. Currently undertaking a control program with the assistance of Greater Sydney Local Land Service.  Trail cameras installed in Winter 2022 during the Greater Sydney Local Land Services fox baiting program revealed foxes traversing the site and activating two ejectors.  No threatened native fauna has been observed within the site to date by Landcare Australia. Common native fauna species observed may be impacted by the presence of foxes.	Feral species observed onsite include feral goats and foxes.
<b>MZ2</b>	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	As above	As above
<b>MZ3</b>	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	As above	As above
<b>MZ4/MZ5</b>	8 Sep 2021 21 Jan 2022 29 Jun 2022 15 Jul 2022 29 Jul 2022 05 Aug 2022	As above	As above

BioBanking Agreement 382 - Annual Report (2021-2022), Photo Points, Inspections, Monitoring and Reporting

<b>Diary template for vertebrate pest management</b>			
<b>Date</b>	<b>Management Zone</b>	<b>Description and type of activity undertaken</b> This column must include details of the vertebrate pests targeted, control techniques applied and numbers controlled.	<b>Minor variations</b> (details and reasons)
Days visited for goat trapping: 25 Jan 2022 14 Jan 2022 06 May 2022 30 Jun 2022	MZ2	Due to the increase in the feral goat populations within the site, goat pens were setup in MZ2 and trapping has commenced. The pens were installed in Jan 2022 by Landcare Australia and Greater Sydney Local Land Services.	Three goats were caught in the pens in June 2022 and were taken off site for processing.
Days visited for fox baiting: 15 Jun 2022 23 Jun 2022 29 Jun 2022 12 July 2022 14 July 2022	MZ3	Greater Sydney Region Local Land Services regional fox baiting program conducted by Landcare Australia on site in Winter 2022.	Foxes have activated two Canid Pest Ejectors during the Winter 2022 fox baiting program.



---

**Appendix 11: Cataract River BioBank Site Passive Management Annual Report - 2022**





**Landcare Australia**

**Biodiversity Stewardship Agreement ID number: BA 345  
for sites established under the NSW Threatened Species  
Conservation Act, 1995**

**Annual Report – March 2022 for Passive Management**

**Cataract River Biobanking Stewardship Site BA 345**

---

## Annual report summary of passive management actions

BSA Site Reporting and Monitoring				
Audit details				
Reporting year of BSA site: 2022 Site visit: 1/2/2022 (Annual) BCT Contact: Pollyanna Barlow - Specialist Environment Phone: 0401 808 711      Email: <a href="mailto:pollyanna.barlow@south32.net">pollyanna.barlow@south32.net</a>  Prepared by Anna Charlton Shick from Landcare Australia on behalf of South32 Illawarra Metallurgical Coal			Biodiversity Stewardship agreement ID: BA 345 Name of landowner/site contact: South32 Illawarra Metallurgical Coal. All conservation land management works undertaken by Landcare Australia behalf of South32 Illawarra Metallurgical Coal. South32 Illawarra Metallurgical Coal Address: Port Kembla Coal Terminal, Port Kembla Road, Inner Harbour, Port Kembla, NSW 2505  All conservation land management works undertaken by Landcare Australia on behalf of South32 Illawarra Metallurgical Coal	
Management actions				
Annual reporting undertaken by landowner of the site (as per landowner's annual report)				
Management action	Item reference number	Required completion and frequency	Action completed (Yes/No)	Dates of inspection and description of actions undertaken
<b>1. Management of grazing for conservation</b>	1.1 Stock must not be permitted to graze in any area of the BSA site.	Ongoing from commencement date	<b>Yes</b>	No stock further stock have been observed since the installation of the site's boundary exclusion fencing. During the passive monitoring site visit on 1 Feb 2022 there was no evidence of recent stock incursion via grazing or horse manure.  Grazing by stock animals appears to have significantly reduced on the adjoining site to the west.
	1.2 If stock is observed, the landowner must take measures to remove the stock immediately.	Ongoing from commencement date	<b>Yes</b>	No further action required as per item 1.1 (above)

Management action	Item reference number	Required completion and frequency	Action completed (Yes/No)	Dates of inspection and description of actions undertaken
2. Weed control	2.1 N/A until active management	NA	NA	Weed control will commence when requirement for active management is initiated. Weeds were observed along the western edge of the site (on the fence-line) whereas across the majority of the site resilient native vegetation is dominant.
3. Management of fire for conservation	3.1 N/A until active management	NA	NA	Fire management of the site will be in accordance with the BSA and only commence once the requirement for active management is initiated.
	3.2 The landowner must light no additional fires on the property except that which has been outlined as part of the fire management plan.	Ongoing from commencement date	Yes	Fire management of the site will be in accordance with the BSA and only commence once the requirement for active management is initiated.
4. Management of human disturbance	4.1 Human activities that adversely affect biodiversity values must not be carried out except as permitted under the agreement.	Ongoing from commencement date	Yes	Signage has been installed to the Douglas Park Drive entrance to the site.  A part of MZ3 was identified by Landcare Australia as having asbestos containing material (ACM) in August 2019.  The landowner developed a plan (in consultation with BCT) to remove all visible ACM and confirmation from an occupational hygienist was provided in April 2020 that all visible ACM had been removed.
	4.3 The landowner must not store or dispose of any waste on the BSA site.	Ongoing from commencement date	Yes	No waste has been stored, or disposed of, on the BSA site in the previous 12 months. There is some evidence of orphaned waste on the site, mainly being a few beer bottles and some water storage containers which appear to have been onsite for some years. These orphaned items will be removed by South32 personnel during the next site visit.
5. Retention of regrowth and remnant native vegetation	5.1 Native vegetation must not be cut down or removed.	Ongoing from commencement date	Yes	No native vegetation has been removed or poisoned onsite to date.
	5.2 Native vegetation must not be burnt except in accordance with fire management plan.	Ongoing from commencement date	Yes	No wildfire or hazard reduction burning has occurred on the site since the commencement date.

Management action	Item reference number	Required completion and frequency	Action completed (Yes/No)	Dates of inspection and description of actions undertaken
6. Replanting or supplementary planting where natural regeneration will not be sufficient	6.1 N/A until active management	As required	Yes	Replanting on the disturbed site containing ACM was completed in June 2020 and seedlings were observed to have a high success rate at the annual inspection in Feb 2022.
	6.2 Seeds and plants used for planting must be from locally collected provenances unless there are reasons to do otherwise.	As required	Yes	As advised in previous annual report seeds were sourced locally in Western and South Western Sydney.
7. Retention of dead timber	7.1 Dead timber (whether standing or fallen and including branches and leaf litter) must not be removed from or within the BSA site.	Ongoing from commencement date	Yes	No dead timber (standing or fallen) has been removed and no additional timber has been introduced to the site since commencement of the BSA.
8. Erosion control	8.1 N/A until active management	NA	NA	No areas identified across the site which currently require any supplementary erosion control or stabilisation.
9. Retention of rocks	9.1 The landowner must not remove, or cause or permit to be removed, rocks from or within the BSA site.	Ongoing from commencement date	Yes	No rock removal has occurred on the site since the commencement of the BSA.
10. Control of feral and overabundant native herbivores	10.1 N/A until active management	NA	NA	No feral species or overabundance of native herbivores observed and minimal native herbivory could be identified during site visits.
11. Vertebrate pest management – foxes	11.1 N/A until active management	NA	NA	Annual baiting of foxes and wild dogs using buried 1080 baits to be laid in conjunction with local programs once active management commences.

Management action	Item reference number	Required completion and frequency	Action completed (Yes/No)	Dates of inspection and description of actions undertaken
<b>12. Nutrient control</b>	N/A until active management	<b>NA</b>	<b>NA</b>	No fertilizers will be used on the site when active management commences.
<b>14. Maintenance or reintroduction of natural flow regimes</b>	14.3 Artificial structures such as dams or levee banks that impede the natural flow regimes on the BSA site must not be constructed unless approved in writing for the purpose of restoring natural flows.	Ongoing from commencement date	<b>Yes</b>	Natural flow regimes are maintained on the site in accordance with the BSA.

### Details of incidents or events that have had an adverse effect on biodiversity values on biobank site

Description of incident or event (e.g. natural events)	Action taken and/or proposed recommended actions
Nil	Nil
<b>Any other comments or observations regarding the biobank site</b>	
<p><b>Please include photos of the site visit along with comments/observations.</b></p> <p>Landcare Australia identified and installed 6 photo point locations during a site visit on 13 Aug 2019. Each photo point from the previous report is shown with the UTM's. (Note: photo points 1 and 3 were moved in 2019 slightly so as not to be within the zone containing ACM). The six photo points were revisited on 1 Feb 2022 as shown below.</p>	<p>Since the previous reporting period there has been a noticeable visual increase in vegetation across the entire site. This is likely attributed to previous drought conditions and the lack of effective exclusion fencing to the site and subsequent fencing of the site and more regular rainfall.</p> <p>The images taken on 1 Feb 2022 show a significant increase in the native vegetation understory within the site. The increased weed growth mainly located along the boundary (adjoining the exclusion fencing) is attributed to the increase in rainfall across the site and previous disturbance at the edge of the resilient native vegetation.</p>



**Photo point 1**















**Photo point 5**





Photo point 6



<b>Signature and declaration</b>		
<p>I hereby declare that the information supplied in this report is accurate and complies with the reporting requirements under clause 2 of the Annexure D to the biodiversity stewardship agreement.</p> <p>Note: If the land that forms the biobank site is owned by multiple persons, each landowner must sign this annual report.</p>		
<p>Signed</p> 	<p>Signed</p> 	
<p>Date 1/03/2022</p>	<p>Date</p>	<p>3/03/2022</p>



---

**Appendix 12: Ventilation Shaft No. 6 Offset Annual Monitoring Report - 2021/2022**

## Appin Ventilation Shaft Site No. 6 Offset Area

Offset Site Monitoring Report 2021

Prepared for South32 Illawarra Metallurgical Coal | 17 December 2021



## Document control

Project number	Client	Project manager	LGA
6876	South32 Illawarra Metallurgical Coal	Sian Griffiths	Wollondilly Shire Council

Version	Author	Review	Status	Date
D1	Sophia Dunn and Isabel Lyons	Sian Griffiths	Draft	2 December 2021
D2	Sophia Dunn and Isabel Lyons		Draft	15 December 2021
R1		-	Final	

© Niche Environment and Heritage Pty Ltd (ACN 137 111 721) 2018

Copyright protects this publication. All rights reserved. Except for purposes permitted by the Australian Copyright Act 1968, reproduction, adaptation, electronic storage, transmission and communication to the public by any means is prohibited without our prior written permission. Any third party material, including images, contained in this publication remains the property of the specified copyright owner unless otherwise indicated, and is used subject to their licensing conditions.

### Disclaimer

While Niche Environment and Heritage Pty Ltd uses care and diligence in the preparation of this report, it is not responsible or liable for any mistakes, misprints, omissions or typographical errors. None of Niche Environment and Heritage Pty Ltd, nor its editors or authors are responsible for the results of any actions taken on the basis of information in this publication. Niche Environment and Heritage Pty Ltd and its editors and authors expressly disclaim all and any liability and responsibility to any person or organisation in respect of, or as a consequence of, anything done or omitted to be done by any person or organisation in reliance, whether wholly or partially, upon the whole or part of any of the contents of this publication, including any photographs, statements or descriptions. No representation is made as to the suitability of this publication for any particular purpose. The views expressed in this publication are not necessarily endorsed by this publication, its editors or authors, or the owners or management of Niche Environment and Heritage Pty Ltd.

### Enquiries should be addressed to:

Sydney Head Office  
Niche Environment and Heritage  
02 9630 5658  
info@niche-eh.com  
PO Box 2443 North Paramatta  
NSW 1750 Australia

## Executive summary

---

As part of the project approval (MP 10\_0079) and Commonwealth *Environmental Protection Biodiversity Conservation Act 1999* approval (2010/5722) for the Appin Ventilation Shaft Site No.6, South32 Illawarra Metallurgical Coal (IMC) is required to implement a formal monitoring program of the management actions that were approved for the associated offset area at the Mountbatten Stud property at Douglas Park, NSW. This report is the tenth annual report for the monitoring program, conducted by Niche Environment and Heritage (Niche) in December 2021.

The aim of the monitoring program is to demonstrate the success of management actions through the collection of empirical data, mapping and photographic records for the offset site. The monitoring methodology employs fixed floristic plots to collect vegetation condition data, population estimates of the threatened plant species *Pimelea spicata* (conducted every five years), strategic photo-point monitoring and vegetation distribution mapping.

The 2021 monitoring results in relation to the floristic composition, structure and function, indicate that, on average, the bushland on the offset area is outside of benchmark attribute values for the Cumberland Plain Woodland but is slowly showing trends towards benchmark values. An increase in exotic species may be due to the wetter conditions within 2020 and 2021 or the bush regeneration works occurring in areas not within plots.

An assessment of the change in size and distribution of the threatened plant population of *Pimelea spicata* (Spiked rice-flower) was undertaken during the 2021/22 surveys, as it has been five years since the last monitoring census in 2016/17. The local population within MZ5 in 2021 is estimated at 25,974 individuals. This is an increase from an estimated population of 9,702 individuals in 2017. This increase in population demonstrates that site management to date has been beneficial to the species.

Recommendations in relation to the on-going management of the site include continued treatment of African Olive and African Boxthorn, seasonal spraying of Blackberry, continued treatment of exotic vines and exotic perennial grasses.

## Glossary and list of abbreviations

Term or abbreviation	Definition
BAM	Biodiversity Assessment Methodology
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
CEEC	Critically Endangered Ecological Community
DPIE	NSW Department of Planning, Industry and Environment, formerly NSW Department of Planning and Environment (DPE)
EEC	Endangered Ecological Community
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
Ha	Hectare/s
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environmental Plan
Locality	The Work Zone and surrounds, nominally a 10 km radius from the Work Zone.
MNES	Matters of National Environmental Significance (from the Commonwealth Environment Protection and Biodiversity Conservation Act 1999).
M	Metre/s
m <sup>2</sup>	Metres square
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
OEH	Office of Environment and Heritage (formerly DECCW, DECC, DEC)
Study area	Means the Work Zone and surrounding land where surveys were conducted.
PCT	Plant Community Type
TEC	Threatened Ecological Community



## Table of Contents

<b>Executive summary</b> .....	<b>i</b>
<b>Glossary and list of abbreviations</b> .....	<b>ii</b>
<b>Table of Contents</b> .....	<b>iii</b>
<b>1. Introduction</b> .....	<b>1</b>
1.1 Background .....	1
1.2 Purpose and objectives .....	1
<b>2. Management Actions</b> .....	<b>3</b>
2.1 Management actions undertaken .....	3
2.2 Management actions compared to BMP .....	3
<b>3. Methodology</b> .....	<b>5</b>
3.1 Key performance criteria .....	5
3.2 Monitoring methodology .....	5
3.3 Survey stratification .....	6
3.4 Data analysis and interpretation .....	7
3.5 Limitations .....	7
<b>4. Results</b> .....	<b>8</b>
4.1 Flora recorded .....	8
4.2 Assessment of site attribute data .....	9
4.3 Bell Minors .....	17
4.4 <i>Pimelea spicata</i> .....	17
4.5 Photo-points .....	18
4.6 Vegetation distribution monitoring .....	19
<b>5. Recommendations</b> .....	<b>20</b>
5.1 Fencing and stock management .....	20
5.2 Bush regeneration .....	20
5.3 Monitoring of native vegetation and <i>Pimelea spicata</i> .....	21
<b>6. Conclusions</b> .....	<b>22</b>
<b>References</b> .....	<b>23</b>
<b>Figures</b> .....	<b>24</b>
<b>Appendix A– Management actions, performance criteria, corrective actions and timeframes</b> .....	<b>28</b>
<b>Appendix B. Plant species list (2021)</b> .....	<b>31</b>
<b>Appendix C. BAM and BBAM plot (raw data)</b> .....	<b>35</b>

Woodland .....	35
Blackthorn thicket .....	38
Pasture.....	39

**Appendix D. Biodiversity Assessment Method: measuring vegetation integrity attributes (DPIE 2020) ... 41**

**Appendix E. Photo point monitoring..... 43**

**List of Figures**

Figure 1. Study Area .....	25
Figure 2: Monitoring locations .....	26
Figure 3: Vegetation extent.....	27

**List of Plates**

Plate 1. Woodland during 2020 at monitoring plot MZ5-003.....	9
Plate 2. Blackthorn thicket in plot MZ5-004 in 2020.....	14
Plate 3. Plot (MZ5-005) within pasture land during 2020 .....	16

**List of Tables**

Table 1: Conditions of approval requiring a monitoring program .....	1
Table 2: Proposed and current management actions in the BMP .....	3
Table 3: Location of monitoring sites.....	7
Table 4: Flora recorded over monitoring years.....	8
Table 5: Native flora recorded from 2012-2021.....	12
Table 7: <i>Pimelea spicata</i> census .....	18
Table 8. Woody native vegetation changes per monitoring year .....	19
Table 9. Comparison of woodland plots to PCT benchmarks (2017-2021).....	35
Table 10. Comparison of woodland plots to BVT benchmarks (2012-2016).....	37
Table 12. Comparison of blackthorn thicket plots to BVT benchmarks (2012-2016) .....	39
Table 13. Comparison of pasture plots to PCT benchmarks (2017-2021).....	39
Table 14. Comparison of the pasture plots to BVT benchmarks (2012-2016) .....	40
Table 15: Derived grassland and area of woodland from MZ6_009 (photo point 5).....	43
Table 16: Derived grassland from photo point 4.....	44

Table 17: Area of erosion, Photo point 7 ..... 45

Table 18: MZ6\_006. Note the obvious cover differences between the years. Woody weed control required in 2022. .... 46

Table 19: MZ6\_007. Note the ground cover since 2012. Woody weed control required in 2022..... 47

Table 20: Regenerating woodland from MZ5\_002. Note the increase in the regeneration of *Bursaria spinosa* within the woodland understorey..... 48

Table 21: Derived grassland from M5\_005. .... 49

**List of Graphs**

Graph 1: Comparison of key attributes for woodland plots in MZ5 (HN529/PCT850) (Note only High Threat Weeds (HTW) measured in 2017-2021, as per BAM methodology) ..... 10

Graph 2: Comparison of key attributes for woodland plots in MZ6 (HN529/PCT850) ..... 11

# 1. Introduction

## 1.1 Background

The Appin Ventilation Shaft Site No. 6 project approval requires South32 Illawarra Metallurgical Coal (IMC) to secure, manage and monitor an 8.7 hectare offset (offset area) of Cumberland Plain Woodland (CPW) such that an improve or maintain outcome would be achieved for threatened biodiversity.

The offset area is known as MZ5 and is located to the north of the Appin Ventilation Shaft Site No. 6 on the property known as Mountbatten Stud at Douglas Park NSW (Figure 1). An initial assessment of the proposed offset area was conducted by Niche in December 2010 to assess the suitability of the site to be used as an offset for the unavoidable impacts associated with Appin Ventilation Shaft Site No. 6. Niche determined that the site was indeed CPW and, under management, would improve to benchmark condition over time. The initial inspection of MZ5 also resulted in the discovery of a population of the threatened plant, *Pimelea spicata*, adding significant conservation value to the offset area.

In accepting the offset proposal, the Department of Planning and Environment (DPE) and Department of Environment and Energy (DoEE) provided a number of approval conditions relating to the reservation, management and monitoring of management actions within MZ5. One of the conditions required IMC to implement a formal monitoring program for both the management of the native vegetation on the offset area and the extent and health of the *Pimelea spicata* population.

Conditions 2(c) (v – vii) of the NSW project approval (MP10\_0079) and condition 3(d) of the EPBC Act Approval (2010/5722) are the conditions that require a monitoring and performance evaluation program to be implemented (Table 1).

**Table 1: Conditions of approval requiring a monitoring program**

Approval	Condition of Approval
NSW approval	2(c)(v) – A program to monitor the effectiveness of these measures, and progress against the performance and completion criteria.
	2(c)(vi) – A description of the potential risks to re-vegetation, and a description of the contingency measures that would be implemented to mitigate these risks.
	2(c)(viii) – Details of who would be responsible for monitoring, reviewing and implementing the plan.
Commonwealth approval	3(d) The plan must include key milestones, performance indicators, corrective actions and timeframes for the completion of all actions outlined in the plan for the life of the project.

## 1.2 Purpose and objectives

The aim of the monitoring program is to demonstrate the success of the management actions through the collection of empirical data, mapping and establishment of a photographic record for the offset area. The specific objectives of this report are:

1. To describe and evaluate the re-vegetation and bush regeneration works undertaken to date against the key performance criteria as detailed in the Biodiversity Management Plan (BMP) for the offset area (South32 Illawarra Coal 2017)
2. To outline any problems encountered during works and how these were managed
3. To recommend alterations or additions to management actions as required
4. To provide an analysis of vegetation monitoring results, including
  - Comparison of data from Monitoring plots to benchmark condition levels for CPW

- Visual comparative analysis of photo point monitoring locations
- Vegetation and condition mapping at a scale deemed appropriate to inform management decisions.

Mapping will include:

1. Location of vegetation monitoring plots
2. Photo point monitoring locations
3. Baseline mapping of native vegetation and condition within MZ5.

The 2021 monitoring report includes the details regarding the latest results of the *Pimelea spicata* population census.

## 2. Management Actions

### 2.1 Management actions undertaken

Since 2011, management actions have been conducted at both the offset area (MZ5) and the voluntary management area (MZ6) to enhance and maintain native biodiversity. Stock has been excluded from MZ5 and MZ6 by the installation of a fence around the site boundary, which was installed in 2011.

Toolijooa Bushland Restoration Pty Ltd (Toolijooa) conducted the bushland restoration works at both MZ5 and MZ6 between 2011 and 2016. Bush regeneration works have been undertaken by Landcare Australia since 2019. In 2021 quarterly maintenance has been undertaken at the site as suggested by Landcare Australia in their 2020 report.

Weeds treated across the site since 2011 include:

- Herbaceous species: *Bidens pilosa* Cobbler's Peg, *Brassica* sp., *Cirsium vulgare* Spear Thistle, *Conyza* sp. Fleabane, *Echium plantagineum* Paterson's Curse, *Ehrharta erecta* Panic Veldt Grass, *Modiola caroliniana* *Modiola*, *Onopordum acanthium* Scotch Thistle, *Paspalum dilatatum* Paspalum, *Pennisetum clandestinum* Kikuyu, *Plantago lanceolata* Ribwort Plantain, *Senecio madagascariensis* Fireweed, *Solanum nigrum* Blackberry Nightshade, *Sonchus oleraceus* Common sowthistle, *Verbena bonariensis* Purpletop, *Xanthium* sp Noogoora Burr;
- Woody weeds: *Lycium ferocissimum* African Boxthorn, *Olea europaea* subsp. *cuspidata* African olive) and
- Vines (*Araujia sericifera* Moth Vine, *Delairea odorata* Cape Ivy and *Rubus* sp. Blackberry).

### 2.2 Management actions compared to BMP

The current management actions have addressed the recommended actions proposed in the BMP (South32 Illawarra Coal 2017) for MZ5 and MZ6. These have been compared in Table 2. It should be noted that the management actions are on-going.

**Table 2: Proposed and current management actions in the BMP**

Action	Description	Performance Target (Milestones)	Completion Status
<i>Pimelea spicata</i> Monitoring program	<ul style="list-style-type: none"> <li>▪ Design a program to determine the success of management or the need for intervention.</li> <li>▪ Annual population counts within permanent plots.</li> <li>▪ 5 yearly population census.</li> <li>▪ Condition of individual plants from mixed cohorts.</li> <li>▪ Condition of habitat.</li> <li>▪ Annual inspections of fencing to ensure maintenance and up-keep.</li> <li>▪ Regular site visits the potential presence of stock and/or feral herbivores that have breached fencing to ensure that such impact is eliminated by fencing and that trapped stock or feral herbivores are freed.</li> <li>▪ Monitoring against stochastic events.</li> </ul>	Sustainable <i>Pimelea spicata</i> population with population numbers staying level with or exceeding current numbers.	Census proposed to occur every five years. Previous census undertaken in early 2017 and reported on in the 2016 monitoring report. Details regarding the <i>Pimelea spicata</i> population are provided in the 2021 monitoring report. This report provides general observations for the species and presence within plots.

Action	Description	Performance Target (Milestones)	Completion Status
MZ5 Fencing	<ul style="list-style-type: none"> <li>The first action within the offset area will be to exclude stock. Existing four-strand post-and-wire fence will be utilised and additional fencing installed where required. No barbed-wire will be used and the bottom strand will have a clearance of 400mm above the ground to allow the movement of native fauna. Stock will be herded out of the area prior to fencing taking place.</li> </ul>	Four-strand post-and-wire fence installed, no strands barbed and 400 mm separation from ground to lowest strand.	Fence installed, barbed wire as top wire. On-going monitoring.
Bush Regeneration in MZ5	<ul style="list-style-type: none"> <li>Primary, secondary and maintenance weed management within MZ5 will target the treatment of Blackberry, African Olive, Lantana, African boxthorn, privet, Cape ivy and a variety of exotic perennial grasses such as African Lovegrass, Rhodes Grass, Kikuyu and Couch.</li> <li>All weed management works will be supervised by a suitably qualified bush regenerator. A team of four bush regenerators will be engaged for five days for the primary weeding and then a team of two for one day every four months thereafter for secondary and maintenance weed management as required.</li> </ul>	Engagement of suitably qualified bush regeneration contractor to implement primary, secondary and maintenance weed management program. Annual vegetation condition assessment Improvement in condition of offset bushland to within, or as near as possible to, benchmark condition levels.	Currently being conducted. On-going. Section 4 of this report regarding vegetation condition to benchmarks.
MZ6 Fencing	<ul style="list-style-type: none"> <li>The first action within the native vegetation area will be to exclude stock. Existing four-strand post-and-wire fence will be utilised and additional fencing installed where required. No barbed-wire will be used and the bottom strand will have a clearance of 400mm above the ground to allow the movement of native fauna. Stock will be herded out of the area prior to fencing taking place.</li> </ul>	Four-strand post-and-wire fence installed, no strands barbed and 400 mm separation from ground to lowest strand.	Fence erected. On-going monitoring.
Bush Regeneration in MZ6	<ul style="list-style-type: none"> <li>Weed management within MZ6 will target the treatment of Blackberry, African Olive, lantana, African Boxthorn, privet, Cape ivy and a variety of exotic perennial grasses such as African lovegrass, Rhodes grass, Kikuyu and couch.</li> <li>All weed management works will be supervised by a suitably qualified bush regenerator.</li> </ul>	Engagement of suitably qualified bush regeneration contractor to implement weed management program. Improvement in condition of offset bushland to within, or as near as possible to, benchmark condition levels.	Currently being conducted. On-going. Section 4 of this report regarding vegetation condition to benchmarks.

## 3. Methodology

---

### 3.1 Key performance criteria

The priority management actions, performance criteria and timeframes for the works in MZ5, as described in the BMP, are provided in Appendix A. The key elements include:

- Engagement of suitably qualified bush regeneration contractor to implement a primary, secondary and maintenance weed management program.
- Annual vegetation condition assessment.
- Improvement in condition of offset bushland to within, or as near as possible to, benchmark condition levels.
- Sustainable *Pimelea spicata* population with population numbers staying level with or exceeding current numbers.

Utilising these elements, Niche developed the monitoring methodology described in Section 3.2.

### 3.2 Monitoring methodology

The monitoring methodology will follow that outlined in the BMP.

Fixed plot vegetation monitoring for 2021 was conducted on 11 November and 1 December 2021 by one Niche employee (Yogesh Nair - Ecologist) and two sub-contractors from Gerba.

#### 3.2.1 Fixed plot vegetation monitoring

The plot monitoring incorporated the following (Figure 2):

1. Five fixed BAM (Biodiversity Assessment Method) plots within MZ5, monitored annually.
2. Five fixed BAM plots within MZ6, monitored annually.
3. Comparison of site collected attribute data with the benchmarks for the PCT 850 Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain (CPW) from the PCTs Benchmarks Database. The BAM site attributes and their methods of measurement are provided in Appendix D.

Historically, the fixed plot vegetation monitoring has used the BioBanking Plot methodology. However, in 2017 a new industry standard was developed in association with the *Biodiversity Conservation Act 2016* (BC Act). Biodiversity Assessment Method (BAM) Plots have replaced BioBanking Plots as the standard method of collecting attribute data. As such, BAM plots were utilised in the 2017 and 2018 monitoring instead of BioBanking Plots in order to collect data consistent with updated methodologies, PCTs and benchmarks.

#### 3.2.2 *Pimelea spicata* population census

Monitoring of the *Pimelea spicata* population takes place annually as part of the fixed plot vegetation monitoring, with counts of *P. spicata* stems occurring within the BAM Plots. *P. spicata* occurs within BAM plots MZ5\_001, MZ5\_003, MZ5\_004. These plots coincide to some extent with the monitoring plots used to count *P. spicata* during the population census, as detailed below. Annual observations within the BAM plots can monitor the extent of the population throughout zone MZ5 within areas monitored by Niche. General observations of the population outside of the plots are also undertaken annually to observe any obvious declines in population health.

A population census of the *P. spicata* population in the study area occurs once every five years to estimate the population size and determine the health of the population. With monitoring of the presence of the



species undertaken annually, it is determined that a full population census undertaken every five years is adequate. If the species was determined not to be present in plots where it is known to previously occur during the annual monitoring, this would trigger a full population census regardless of its scheduled timeframe.

The original census of the *P. spicata* population was undertaken in October 2012 and a second census was undertaken in February 2017. The most recent *P. spicata* census has occurred in this round of monitoring (2021/2022). The monitoring of the *Pimelea spicata* population within MZ5 followed the methods used in the original surveys in 2012. The methods involved counting every *Pimelea spicata* plant within five permanent 10 x 10 metre plots (Figure 3) and then extrapolating an average across the known extent of the population. The plots were set up as permanent sites in 2012, the first year of monitoring.

### 3.2.3 Photo-point monitoring

The photo-point monitoring was planned as follows:

1. Five fixed photo-points were sited within MZ5, coincident with the BAM plots.
2. Five fixed photo-points were sited within MZ6, coincident with the BAM plots.
3. An additional five photo-points were located within 200 metres of the external boundary of MZ5 to enable a visual assessment of the health of the vegetation in that area. Opportunistically favourable locations for photo-points were also recorded.

The photo-point locations are those shown in Figure 2.

### 3.2.4 Vegetation distribution monitoring

1. The boundary of the native vegetation within MZ5 and MZ6 will be mapped annually using a hand held GPS and interpretation of the available aerial imagery.
2. The mapped vegetation boundary will be compared each year, with the expectation that the extent of native vegetation within the offset area will increase with management.

## 3.3 Survey stratification

Stratification of the monitoring sites within the offset area was determined on-site whilst conducting the first round of monitoring surveys in spring 2012. Stratification was based on condition such that an accurate comparison of the improvement in that condition could be gained over time. Three broad condition categories existed on the site:

1. Woodland (Section 4.2.1)
2. Blackthorn (*Bursaria spinosa*) thicket (Section 4.2.2)
3. Pasture (Section 4.2.3).

Five BAM plots were conducted in each of MZ5 and MZ6 (ten in total) and distributed over the three condition types as shown in Table 3 and Figure 2.

**Table 3: Location of monitoring sites**

Management Zone	Area (ha)	Monitoring Site	Easting	Northing	Condition Class
MZ5	8.7	MZ5-001	290285	6216759	Woodland
		MZ5-002	290360	6216591	Woodland
		MZ5-003	290365	6216665	Woodland
		MZ5-004	290195	6216725	Blackthorn thicket
		MZ5-005	290017	6216883	Pasture
MZ6	12.43	MZ6-006	289842	6216418	Woodland
		MZ6-007	289990	6216474	Woodland
		MZ6-008	289852	6216665	Woodland
		MZ6-009	289925	6216342	Pasture
		MZ6-010	289974	6216678	Blackthorn thicket

\* Easting and Northing provided in GDA94, MGA Zone 56.

### 3.4 Data analysis and interpretation

A series of key attributes were identified for assessing the current condition of the vegetation and habitats in MZ5 and MZ6, the restoration pathways and progress towards attaining the conservation objectives. These attributes relate to species richness and percent cover of native plants in vegetation layers, as well as fauna habitat features and canopy regeneration. This monitoring report presents the 2021 monitoring data according to these key attributes.

Basic statistical analyses have been conducted incorporating temporal variation (i.e., changes over time) in vegetation condition to assess the magnitude and direction of change in vegetation communities. Statistical analysis conducted involved temporal comparisons of means and standard errors (variability in data between quadrats) between the average survey data from 2012 to 2021. Key attributes which would be most informative for management input were selected for comparison, such as native species diversity, percent cover of exotics and native canopy cover. Calculations of mean and standard error were not conducted where less than three plots were undertaken within a plant community type as this is not enough data to provide meaningful or statistically robust analysis. Therefore, analysis was limited to the woodland plots in MZ5 and MZ6.

Benchmark values based on the Plant Community Type (PCT) accessed from the Vegetation Information System (VIS) database were used to provide an indication of the condition of the vegetation in a broader context. It should be noted that these benchmark values are not site specific and therefore are not intended to represent a target for measuring restoration success. Comparison of site values with benchmark values is intended to provide a broader context for interpreting the restoration pathway and the trajectory of change as management measures are implemented (direction of change).

### 3.5 Limitations

Some plant species are cryptic and can only be detected when flowering at certain times of the year. For example some orchids flower within certain seasons and cannot be detected at other times of the year.

The density of blackthorn at plots MZ5-004 and MZ6-010 prevented the placement of the 50 metre transect tape. An estimate of the BAM composition, structure and function attributes were therefore used for the plot. Different staff to previous monitoring events were used and this may introduce observer bias in the results. Analysis of results should be undertaken with these limitations in mind.

## 4. Results

### 4.1 Flora recorded

A total of 103 species were recorded across ten floristic plots within the study area during the 2021 monitoring event (Appendix B). The number of species recorded varies slightly with each monitoring event, the observed differences are likely attributed to seasonal variation. The species diversity in 2021 is significantly higher than 2020 and may be due to the large rainfall events that occurred throughout 2020 and 2021. Species diversity will be monitored in the next monitoring event to determine if increasing diversity is a continuing trend (Spring 2022).

During the current monitoring, 41 species were exotic which accounts for 39.8 percent of species recorded. This is an increase in percent of exotic species recorded when compared to last years' records and may also be due to the large rainfall events that have occurred since 2020 (Table 4).

**Table 4: Flora recorded over monitoring years**

Year of survey	Total number species recorded	Number of exotic species recorded	Percentage exotic species recorded
2021	103	41	39.8%
2020	44	15	20%
2019	74	14	19%
2018	82	30	37%
2017	81	23	28%
2016	83	38	46%
2015	96	43	45%
2014	96	53	55%
2013	85		
2012	90		

## 4.2 Assessment of site attribute data

### 4.2.1 Woodland

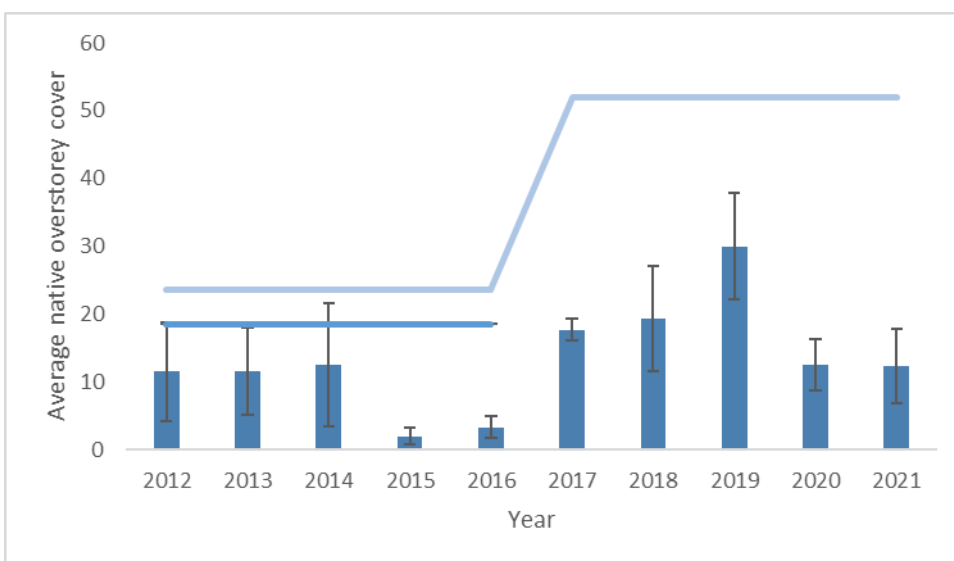
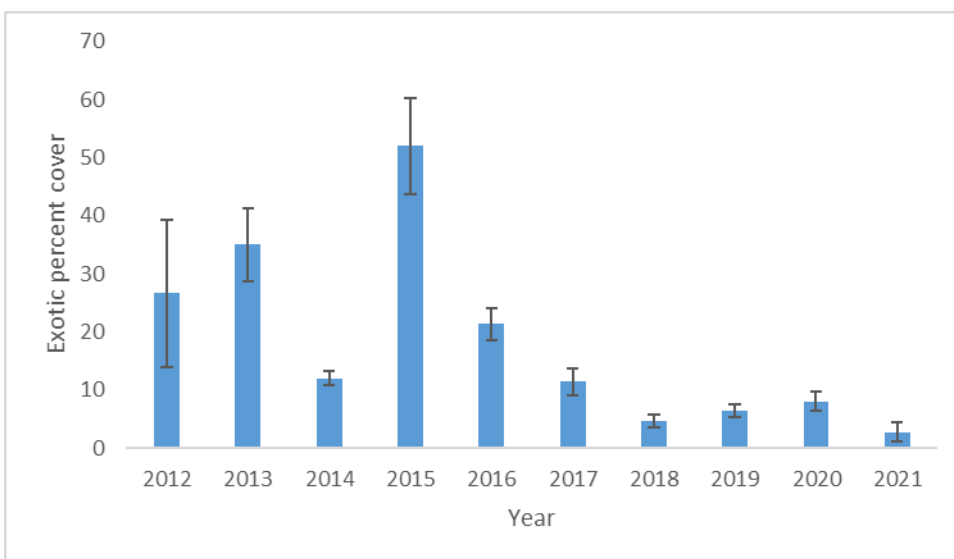
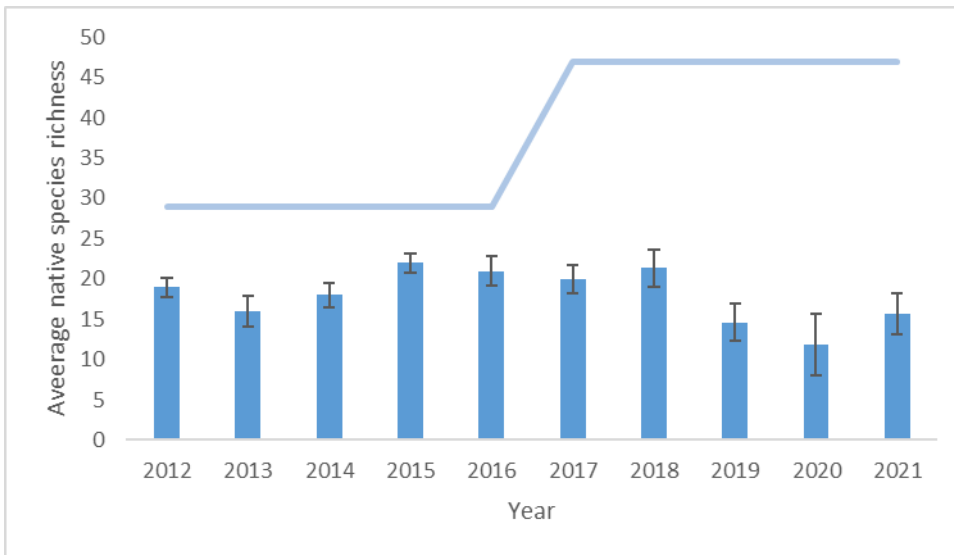


Plate 1. Woodland during 2021 at monitoring plot MZ5-003

#### 4.2.1.1 Plot data

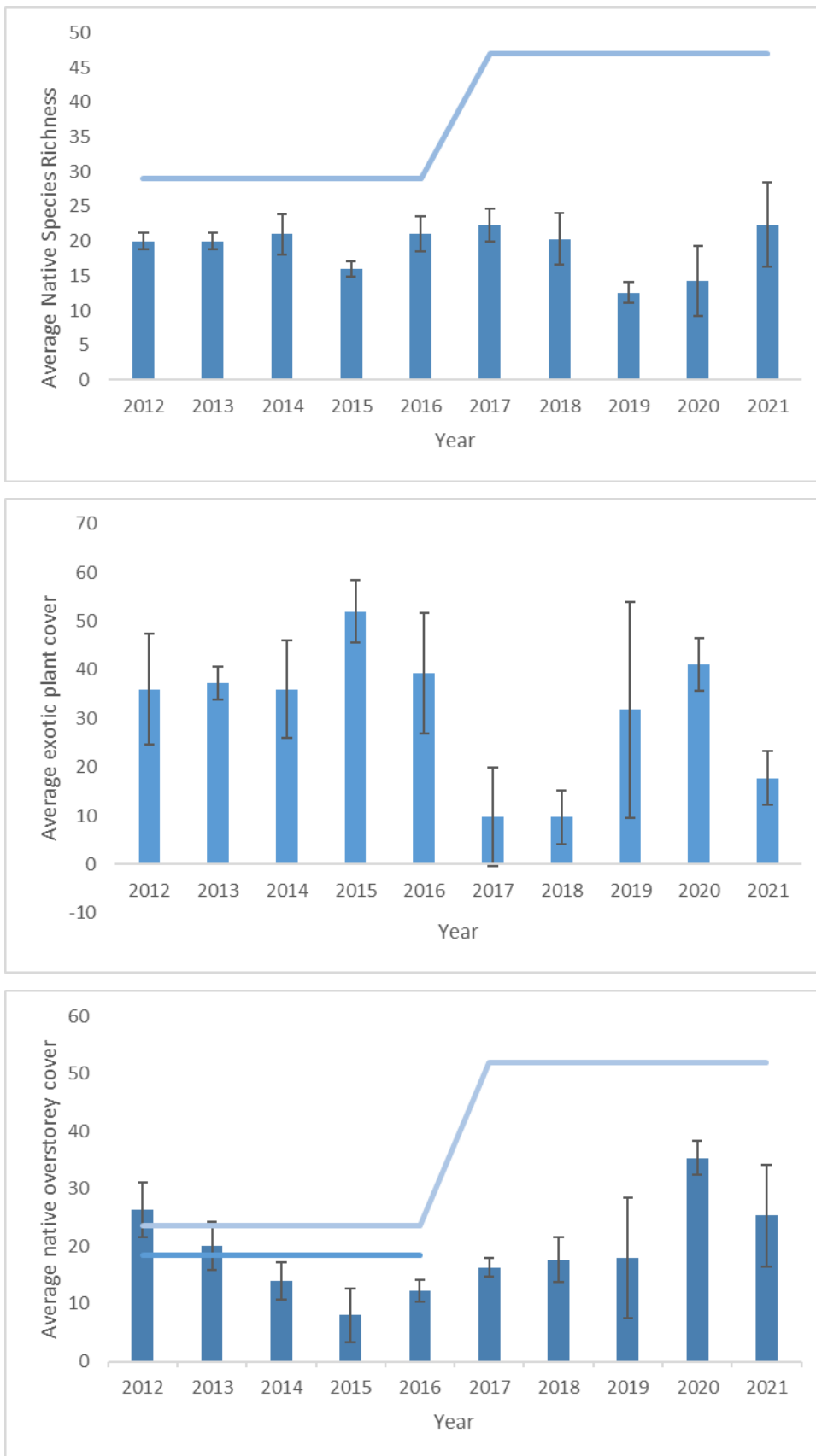
BAM site attribute data was collected at six sites that corresponded to a woodland structure. Three of the sites were collected from MZ5 (MZ5\_001, MZ5\_002 & MZ5\_003) and three were collected from MZ6 (MZ6\_006, MZ6\_007 & MZ6\_008). The data collected is contained in Table 8 (2017-2021 data) and Table 9 (2012-2016 data) (Appendix C). The tables also include the benchmarks for each of the site attributes for the relevant PCT (PCT 850 Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain). Benchmarks for 2012-2016 data are for Biometric Vegetation Type (BVT) HN529.

Graph 1 and Graph 2 show the temporal change for key attributes for woodland plots in MZ5 and MZ6 respectively and compare the average values to benchmarks (shown as line graphs).



**Graph 1: Comparison of key attributes for woodland plots in MZ5 (HN529/PCT850) (Note only High Threat Weeds (HTW) measured in 2017-2021, as per BAM methodology)**

Mean (±SE) 2012-2020 quadrat data ( $n = 3$ ). Benchmark values/ranges shown as line graphs.



**Graph 2: Comparison of key attributes for woodland plots in MZ6 (HN529/PCT850)**  
Mean ( $\pm$ SE) 2012-2021 quadrat data ( $n = 3$ ). Benchmark values/ranges shown as line graphs

#### 4.2.1.2 Discussion

Compositionally, the 2021 data shows the woodland plots remaining below benchmark values for all growth forms in both MZ5 and MZ6, as was the case since 2014. In 2017 when the data updated to the BAM methodology the benchmarks are much higher on a state level and may not comprehensively represent the local vegetation quality but the ultimate objective for good quality remnant vegetation. The average native species richness for MZ5 in 2021 was 15, this is an increase from the previous year. The average native species richness for MZ6 was 22 which is an increase from the previous year and equivalent to the last peak in in 2017 (Table 5).

**Table 5: Native flora recorded from 2012-2021**

Year of survey	Number of native species recorded	
	MZ5	MZ6
2021	15	22
2020	12	14
2019	15	12
2018	21	20
2017	20	22
2016	21	21
2015	22	16
2014	18	21
2013	16	20
2012	19	20

Values of native species richness remains below benchmark in both MZ5 and MZ6 (Graph 1 and 2). Increase in native species diversity within woodland areas is likely attributable to the break in drought conditions in recent years, with subsequent large heavy rainfall events. It is likely over time with the continual management of the site that the vegetation is likely to reach benchmark condition or show a trend towards it.

Structurally, the percent cover of all growth forms remained below benchmark in 2021 for the woodland plots, with the exception of shrub cover in MZ6, which was equivalent to the benchmark (average percentage cover MZ6=18), as has been the case since 2016. However, shrub cover in MZ5 was below the benchmark for the first time since 2016 (average percentage cover MZ5=16.8).

The average native overstorey cover (tree cover) for 2021 was below benchmark with a drop in MZ6 compared with the previous year and a slight decrease in MZ5 compared with previous year (see Graph 1 and 2). Regeneration of canopy species was observed in all plots, except for plot MZ6\_006. Given the current management of MZ5 and MZ6 and the fact that five of the six plots had regenerating overstorey species (stem size class <5 cm and 5-9cm DBH present), it is considered that MZ5 and MZ6 are likely to maintain a healthy overstorey canopy in future years.

Native ground-cover grasses (grass cover/NGCG) averaged substantially lower than benchmark. The previous years monitoring in MZ6 average grass cover was 1.2%, which increased to 7.5% in 2021. This increase is likely the result of wetter site conditions influencing growth of ground-cover grasses. In MZ5 the average grass cover has decreased slightly. These reductions in grass cover may be due to timing of survey or unfavourable weather conditions throughout the year. The 2021-2017 monitoring data shows a

substantial decrease in native ground-cover grasses compared with 2016, however it should be noted that the method for collecting cover data has changed with BAM (from BBAM).

Native shrub cover remained above benchmark in all years from 2020-2016. As stated in the 2020 monitoring report, this was attributed to the regeneration of blackthorn, which has steadily increased over monitoring period. In the 2020 report it was anticipated that the shrub cover would stabilise with management of the offset area. The 2021 survey data supports this prediction, as shrub cover in MZ5 is just below benchmark, which is most likely due to management. Native ground-cover other (NGCO) remained below benchmark at less than 1% (benchmark 5%) in 2021 and has been since 2017, which was a decrease from 2016 where this attribute was within benchmark for the first time since monitoring commenced, and an increase from 2015 average. Again, the change in methodology could be attributed to this change.

Functionally, average litter cover was equal to benchmark values in 2021, compared to 2020 which was below benchmark and previous years (2019-2017), which were above benchmark. Trees with hollows (NTH) were present in two of the six plots in 2021, which is one less hollow compared to the 2020 data. The length of fallen logs (FL) remained well below the benchmark of 40 metres in all of the woodland plots.

Exotic plant cover (EPC) during 2021 was lower in MZ5 compared with 2020 data at 2.7% (8% in 2020, 6% in 2019, 5% in 2018, down from 11% in 2017), and significantly lower in MZ6 in 2021 (17.7%), compared with 41.1% in 2020 and 31.8% in 2019 (Graph 1 and Graph 2). Exotic cover has reduced in the past year compared with previous years at MZ6, with consistently low percentages for MZ5 since 2017. Consistently low weed cover in MZ5 reflects the historic bush restoration works, which have involved woody weed control as well as management of other weeds. A reduction of weed cover for MZ6 suggests that bush regeneration works in MZ6 are currently adequate and need to be continued.

Woody weeds such as African Olive and African Boxthorn are persisting in the woodland area throughout MZ5 and MZ6 and it is recommended that woody weed control continue to be undertaken in this area in 2022. The African Olive can dominate the ground cover with juvenile individuals sprouting rapidly underneath the canopy.



## 4.2.2 Blackthorn thicket



**Plate 2. Blackthorn thicket in plot MZ5-004 in 2021**

### 4.2.2.1 Plot data

BAM site attribute data was collected at two sites within patches of Blackthorn thicket. One site was located within the M5 offset area (MZ5\_004), and the other in the MZ6 (MZ6\_010) voluntary management site. The data collected is presented in Table 10 (2017-2021 data) and Table 11 (2012-2016 data) (Appendix C), which also includes the benchmarks for each of the site attributes for the relevant PCT (PCT 850 Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain). Benchmarks for 2012-2016 data are for BVT HN529.

### 4.2.2.2 Discussion

The 2021 results for Blackthorn thicket were relatively consistent with previous monitoring years, though shrub cover has significantly decreased in 2021. Results for the plots within the Blackthorn thicket should be interpreted with caution, as the thicket in both MZ5 and MZ6 were so dense that it prevented access to much of the plot and it was not possible to run the 50 m transect out. As such, estimates have been used to gather the data since 2015.

Compositionally, Blackthorn thickets plots scored below benchmark for all growth form groups in 2021, consistent with previous years. Native plant species richness (NPS) has scored below benchmark in all monitoring years, including 2021. However, this was to be expected given the dominance of Blackthorn.

Structurally, the percent cover of all growth forms has remained below benchmark for the Blackthorn thicket plots since 2017, with the exception of shrub cover, which was above benchmark in all years, with the exception of this year where in MZ5 shrub cover has significantly decreased, whereas MZ6 is above benchmark (MZ5=0.2 and MZ6=68) No canopy species were recorded within the Blackthorn thicket plots,

therefore native overstorey cover (tree cover/NOS) and overstorey regeneration (presence of stem size class <5 cm DBH/OR) were zero. It has been raised previously in Niche monitoring reports that, given the density of these thickets, there would be some ecological benefit to thinning the Blackthorn to diversify the habitat structure. One such ecological benefit may be in controlling the Bell Bird population, as discussed below. As previously stated, the density of Blackthorn in these areas is considered unnaturally high.

Native ground-cover grasses (NGCG) was below benchmark in 2021 and has been since 2017. Native ground-cover other (NGCO) in 2021 was also well below previous monitoring years (pre 2017 BBAM data) and consistent with BAM data collection in in 2017-2019. Native ground-cover grass has significantly dropped in MZ6 in the last two years.

The 2021 data for EPC scored 20.3 percent in MZ6 (a significant decrease from 40 percent in 2020) and 5.2 percent in MZ5 (a decrease from 16 percent in 2020). Exotic cover is relatively high throughout the Blackthorn thicket due to the presence of exotic perennial grasses, Blackberry (*Rubus fruticosus*), African Boxthorn (*Lycium ferocissimum*) and African Olive (*Olea europaea* subsp. *cuspidata*). The presence of African Olive in the midstorey and ground layer is of concern, with numerous seedlings developing underneath the larger specimens. *Lantana camara* (Lantana) was previously recorded in the ground layer of MZ6-010 plot in 2019, disappeared in 2020 and re-emerged in 2021. This may be due to the density of Blackthorn preventing a thorough survey in the understorey. Weed maintenance should be undertaken in this area to prevent African Olive, Blackberry and Lantana dominating.

In the areas of pasture grass and Blackthorn thickets, trees with hollows (NTH) and the length of fallen logs (FL) were zero in 2021 and have been since 2017, as would be expected in the absence of native overstorey cover.

As recommended in previous monitoring reports, bush regeneration works should continue and focus on the removal of African Olive and Blackberry within the vicinity of plot MZ5\_004 and MZ6\_010, due to the presence of the threatened plant, *Pimelea spicata*, at MZ5\_004. Any management in this area should be conducted with care so as to minimise any impact to *Pimelea spicata* individuals. In this area the population of *Pimelea spicata* is largely associated with the Blackthorn thicket.

### 4.2.3 Pasture



Plate 3. Plot (MZ5-005) within pasture land during 2020

#### 4.2.3.1 Plot data

BAM site attribute data was collected at two sites dominated by pasture. One site was located within the MZ5 offset area (MZ5\_005) and the other in the MZ6 voluntary management area (MZ6\_009). The data collected are contained in Table 12 (2021-2017 data) and Table 13 (2012-2016 data) (Appendix C), which also includes the benchmarks for each of the site attributes for the relevant PCT (PCT 850 Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain). Benchmarks for 2012-2016 data are for BVT HN529.

#### 4.2.3.2 Discussion

Compositionally, pasture plots scored below benchmark for all growth form groups and was fairly consistent in 2021 with previous years. Total native plant species richness (NPS) was overall lower than each of the woodland and Blackthorn thicket condition classes for both MZ5 and MZ6. As stated in the previous monitoring reports this is an indication of the poor condition in these areas, the high percentage cover of exotic pasture grasses and few key native grasses (NGCG) such as Weeping Grass (*Microlaena stipoides*), Kangaroo Grass (*Themeda australis*) and Wallaby Grass (*Rytidosperma racemosum*).

As discussed in previous monitoring reports (Niche 2012, 2013, 2015, 2016, 2017, 2018, 2019, and 2020), effective regeneration of these areas would be difficult without some re-vegetation of overstorey species, though in time Blackthorn is likely to establish. As discussed in Niche (2014) better patches of pasture that are dominated by native grasses should be prioritised if any weed management work is conducted in these pastures. Chilean Needle Grass (*Nassella neesiana*) has been recorded in the pasture plot in MZ6 since 2017 and is observed to be dominant in parts of pasture surrounding the woodland areas. This exotic grass is very invasive and should be appropriately controlled as part of the bush regeneration program.

### 4.3 Bell Minors

During the monitoring surveys in 2017-2019, it was noted that Bell Miners were abundant in the MZ5 area. Management actions to reduce the Bell Miner colony should be considered as the birds seem to be having an impact on mature overstorey in woodland areas in MZ5. Eucalypt dieback in association with Bell Miners is listed as a Key Threatening Process on the NSW *Biodiversity Conservation Act 2016* (Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners). However, during the 2020 and 2021 monitoring surveys the Bell Miners were not in large numbers, and this may be due to the now lack of habitat.

An independent review of bell miner associated dieback was commissioned by Office of Environment and Heritage, which details management recommendations for bell miner associated dieback (Silver and Carnegie 2017):

- Prevention:
  - Disturbance of the canopy should be minimised where possible.
  - Where the canopy is disturbed, rehabilitation should focus on re-establishment of a canopy as soon as possible to limit unnatural understorey density.
  - Site rehabilitation should include ongoing management of invasive weeds, particularly those that minimise natural regeneration and can act as superior nesting sites for Bell miners.
  - Exclusion of fire is an artificial disturbance activity that can lead to woody weed invasion. Appropriate fire regimes should be designed and implemented.
- Treatment
  - A site assessment should be undertaken to ensure that Bell miners are present and psyllid attack is the primary cause of dieback.
  - If the prevailing vegetation community is naturally dense in the understorey or midstorey then consideration should be given to not intervening in the site as Bell Miner associated dieback (BMAD) may be a natural process there.
  - At sites with an unnatural level of understorey and/or midstorey density the viability of the seed bank for rehabilitation without planting should be assessed.
  - In sites with high value assets being impacted by BMAD (e.g. threatened flora or fauna) consideration should be given to culling of Bell miners followed by site rehabilitation. This has been shown to have an immediate reduction on exclusion of other bird species for example.
  - The primary aim of site treatment should be to reduce the occurrence of superior nesting sites for the Bell miner. The method best to use to achieve this will depend on site-specific characteristics.

Management at the offset site would involve undertaking primary weed management works surrounding areas of woodland. Weed management would involve removing all woody weeds, including African Olive and African Boxthorn and potentially plantings of native overstorey species, primarily Eucalyptus. Given the potential decrease of Bell Miners in MZ5 over the last two survey periods, an additional recommendation is to monitor the presence of Bell Miners and canopy dieback in MZ5 over the coming years and alter the management plan if required.

### 4.4 *Pimelea spicata*

A known area of habitat for *Pimelea spicata* was identified based on the extent of the population observed during the original field survey in October 2012. This extent is shown in Figure 2, which also illustrates the locations of the 10 x 10 metre plots in which counts of individual plants were conducted. The result of the counts in 2012, 2017, and 2021 is provided in Table 6.

**Table 6: *Pimelea spicata* census**

Plot location	Easting	Northing	Count			Plot size	Area (ha)	Individuals/ha		
			2012	2017	2021			2012	2017	2021
ps1	290366	6216665	5	4	4	10 x 10	0.01	500	400	400
ps2	290285	6216758	12	47	14	10 x 10	0.01	1,200	4,700	1,400
ps3	290195	6216723	52	72	302	10 x 10	0.01	5,200	7,200	30,200
ps4	290096	6216758	25	24	70	10 x 10	0.01	2,500	2,400	7,000
ps5	290078	6216812	0	0	0	10 x 10	0.01	0	0	0
<b>Average</b>								<b>1,880</b>	<b>2,940</b>	<b>7,800</b>

The extent of the population of *Pimelea spicata* is 3.33 hectares. Therefore, based on an average of 7,800 *Pimelea spicata* individuals per hectare the size of the local population within MZ5 in 2021 is estimated at 25,974. This is an increase from an estimated population of 9,702 individuals in 2017. This increase in population demonstrates that site management to date has been beneficial to the species. As detailed in the 2012 report (Niche 2012), it is likely that such large numbers of the species would represent a significant local source population.

The key on-going management actions include excluding stock permanently from MZ5, feral animal control (evidence of rabbit occupation during surveys), weed management targeting blackberry and African olive within the extent of the population (these exotic species were observed in abundance within known habitat) and monitoring the health of the population as native herbs and grasses compete more vigorously upon the exclusion of grazing. Any weed management in these areas should exclude spraying of Blackberry as many *Pimelea spicata* individuals were present within and around blackberry patches. Any blackberry patches throughout the site should be visually inspected for *Pimelea spicata* individuals prior to spraying.

It should however be noted that the long-term absence of any disturbance mechanism may itself be detrimental to the longevity a population as it appears that at least some disturbance may be an important germination cue for the species (NPWS 2004).

#### 4.5 Photo-points

Photo-point monitoring was conducted at each of the locations shown in Figure 2. A selection of the photo points has been provided in Appendix E (Table 14- Table 20). Changes evident include increased cover of ground and shrub layer over the monitoring period (2012 to present). Continued woody weed control is required in 2022, evidenced by the increase in woody weeds in the photo point monitoring.

## 4.6 Vegetation distribution monitoring

The extent of the wooded native vegetation of MZ5 and MZ6 was mapped using aerial photography from NearMap (latest imagery November 2021) and data from the field surveys. The results were then compared with previous monitoring years.

An increase in woody native vegetation cover has been detected since the 2020 monitoring event. The vegetation extent is illustrated in Figure 3 and Table 7.

**Table 7. Woody native vegetation changes per monitoring year**

Management zone	2011 (NPWS 2003)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
M5 Woody vegetation	5.28 ha	6.58 ha (1.3 ha increase)	6.73 ha (0.15 ha increase)	7.19 ha (0.46 ha increase)	7.19 ha (no detectable increase since 2014)	7.19 ha (no detectable increase since 2014)	7.27 ha (0.08 ha increase)	7.27 ha (no detectable increase since 2017)	7.27 ha (no detectable increase since 2017)	7.27 ha (no detectable increase since 2017)	7.62 ha (0.35 ha increase)
M6 Woody vegetation	4.49 ha	7.99 ha (3.5 ha increase)	8.34 ha (0.35 ha increase)	8.79 ha (0.45 ha increase)	8.79 ha (no detectable increase since 2014)	8.79 ha (no detectable increase since 2014)	8.91 ha (0.12 ha increase)	8.91 ha no detectable increase since 2017)	8.91 ha no detectable increase since 2017)	8.91 ha no detectable increase since 2017)	9.30 ha (0.39 ha increase)
<b>Total native woody vegetation</b>	<b>9.77 ha</b>	<b>14.57 ha</b>	<b>15.07 ha</b>	<b>15.98 ha</b>	<b>15.98 ha</b>	<b>15.98 ha</b>	<b>16.18 ha</b>	<b>16.18 ha</b>	<b>16.18 ha</b>	<b>16.18 ha</b>	<b>16.92 ha</b>

## 5. Recommendations

---

The management actions recommended in the BMP are provided in Appendix A. A summary of the management actions implemented throughout 2021-22, and a qualitative assessment of the outcomes and recommendations for 2022-23 are each described below.

### 5.1 Fencing and stock management

**Description/Requirement** – Stock exclusion through the upgrading of existing fences and installation of new fences where required. Stock excluded from offset area (MZ5).

**Enacted management** – New four-strand post and wire fencing was installed in 2011 and stock removed from the offset area. The top strand is barbed wire.

**Outcome (Spring 2021)** – Fencing was intact. No recent evidence of stock in offset areas during field survey.

#### Recommendations for 2022

1. Continue to ensure integrity of fencing through regular inspections of the site
2. Continue to exclude stock from MZ5.

### 5.2 Bush regeneration

**Description/Requirement** – Primary, secondary and maintenance weed management by Toolijooa has been conducted since 2011 in the MZ5 offset area, and the MZ6 voluntary management area. Since 2019 Landcare Australia (2019) has undertaken primary, secondary and maintenance weed management. In 2021 Landcare Australia undertook primary, secondary and maintenance weed management on a quarterly basis (Landcare 2021).

Previous weed species targeted include: Blackberry (*Rubus fruticosus*), African Olive (*Olea europaea* subsp. *cuspidata*), Lantana (*Lantana camara*), African Boxthorn (*Lycium ferocissimum*), Privet (*Ligustrum* sp.), Cape Ivy (*Delairea odorata*) and a variety of exotic perennial grasses such as African lovegrass (*Eragrostis curvula*), Rhodes grass (*Chloris gayana*), Chilean needle grass (*Nassella neesiana*) and Kikuyu (*Pennisetum clandestinum*).

The weed species identified and targeted in 2021 included: *Olea europaea* subsp. *cuspidata* (African olive), *Lycium ferocissimum* (African boxthorn), *Rubus* sp. (Blackberry), *Brassica* sp. (Brassica), *Cirsium vulgare* (Spear thistle), *Onopordum acanthium* (Scotch thistle), *Conyza* sp. (Fleabane), *Echium plantagineum* (Paterson's curse), *Setaria sphacelata* (Pidgeon grass), *Gomphocarpus fruticosus* (Cotton bush), *Sida rhombifolia* (Paddy's Lucerne) and *Verbena bonariensis* (Purpletop).

**Enacted management** – Landcare Australia was engaged to undertake bush regeneration in 2019, 2020 and 2021. Landcare Australia has completed six quarterly site visits on the following dates: 2 July 2020, 10 November 2020, 8 December 2020, 15 January 2021, 25 March 2021 and 29 April 2021.

**Outcome (Spring 2021)** – Evidence of weed control shows in the monitoring data, with a reduction in EPC and HTW in MZ5 in 2021.

#### Recommendations for 2022

1. Continue bush regeneration works, to target woody and vine weeds within better condition areas, beneath driplines of large trees and adjacent to regenerating overstorey plants.

2. Ensure that herbaceous weeds and introduced grasses are targeted within woodland areas.
3. Areas which have had large woody weed removal should be followed up to promote native regeneration and ensure herbaceous weeds do not dominate.
4. Targeted spraying of Blackberry (or otherwise recommended treatment) throughout MZ5 and MZ6. Ensure that those areas previously treated are re-inspected and follow up conducted where required.
5. Targeted removal of Chilean Needle Grass, which is beginning to dominate in parts of the pasture areas surrounding the woodland.
6. Ensure staff of the bush regeneration company are familiar with *Pimelea spicata* so as to identify and avoid individuals during bush regeneration activities, especially weed spraying.
7. Selectively remove/trim areas of Blackthorn thicket surrounding eucalypts. This will help reduce Bell Birds population.

### 5.3 Monitoring of native vegetation and *Pimelea spicata*

**Description/Requirement** – Design a program to determine the success of management or the need for intervention including assessment of improvement in the condition of native vegetation, annual *Pimelea spicata* population counts, assessment of species and habitat condition and monitoring against stochastic environmental events.

**Enacted management** – Niche was engaged to develop and implement a monitoring strategy. The methodology is based on the BioBanking Assessment Methodology (DECCW 2014) (now modified to be consistent with the Biodiversity Assessment Method (DPIE 2020), photographic records and formalised *Pimelea spicata* population counts.

**Outcome (Spring 2021)** – Monitoring of native vegetation was undertaken in November and December 2021, using five fixed BAM plots in MZ5, five fixed BAM plot in MZ6 and a number of photo points. Reduction in species diversity across management zones may be attributable to ongoing drought conditions. Weed control required in 2022 to reduce exotic species cover.

Monitoring of *Pimelea spicata* was conducted in October for the 2021/2022 monitoring year, using five fixed monitoring plots established in 2012. There has been a significant increase in the estimated population of *Pimelea spicata*, however individual monitoring plots showed a fluctuation in counts. **Recommendation for future monitoring**

1. Conduct the next monitoring of native vegetation in Spring 2022.
2. Conduct the population census during next monitoring of *Pimelea spicata* during its correct flowering period (October-November) in 2026.
3. Maintain annual presence/absence and stem count monitoring for *Pimelea spicata* within BAM plots, and continue opportunistic observations of the presence and spread of the species throughout the offset area.
4. Ensure staff of the bush regeneration company are familiar with *Pimelea spicata* so as to identify and avoid individuals during bush regeneration activities, especially weed spraying.



## 6. Conclusions

---

The aim of this report was to demonstrate the results of the on-going management actions at the offset area (MZ5) and voluntary management area (MZ6) associated with the Appin Ventilation Shaft Site No.6 Site. The on-going management actions at MZ5 and MZ6 has resulted in improved vegetation condition overall, measured by the collection of empirical data, through undertaking annual mapping of the vegetation extent on the site and through a photographic record.

For the most part, the offset area requires an on-going commitment to weed management and ecological restoration in order to reach a benchmark state and successfully achieve and improve or maintain outcome for biodiversity.

Recommendations for future adaptive management and monitoring of the management zones include:

1. Continue to ensure integrity of fencing through regular inspections.
2. Continue to ensure stock remains excluded from MZ5 in order to ensure the recovery and conservation of the *Pimelea spicata* population.
3. Continue to target woody and vine weeds within better condition areas, beneath driplines of large trees and adjacent to regenerating overstorey plants.
4. Conduct herbaceous weed management and introduced grass management within areas of woodland and immediate surrounds.
5. Continue targeted spraying of Blackberry (or otherwise recommended treatment) throughout site. This includes re-visiting areas that have been previously treated to ensure treatment has been effective.
6. Consider management actions to reduce the Bell Miner colony which seems to be having an impact on mature overstorey. This would involve initially undertaken primary works surrounding areas of woodland, or where emergent canopy species occur within Blackthorn thicket. This would first involve removing all woody weeds, including African Olive and African Boxthorn; then thinning areas of Native Blackthorn (*Bursaria spinosa*).
7. Consider feral herbivore control (rabbits), as evidence of rabbit occupation within *Pimelea spicata* habitat was observed.
8. Ensure bush regeneration staff are familiar with the identification of *Pimelea spicata*.
9. Maintain the timing of annual vegetation monitoring surveys to late October - early December such that the data collected for the species richness and native ground-cover attributes are optimised.

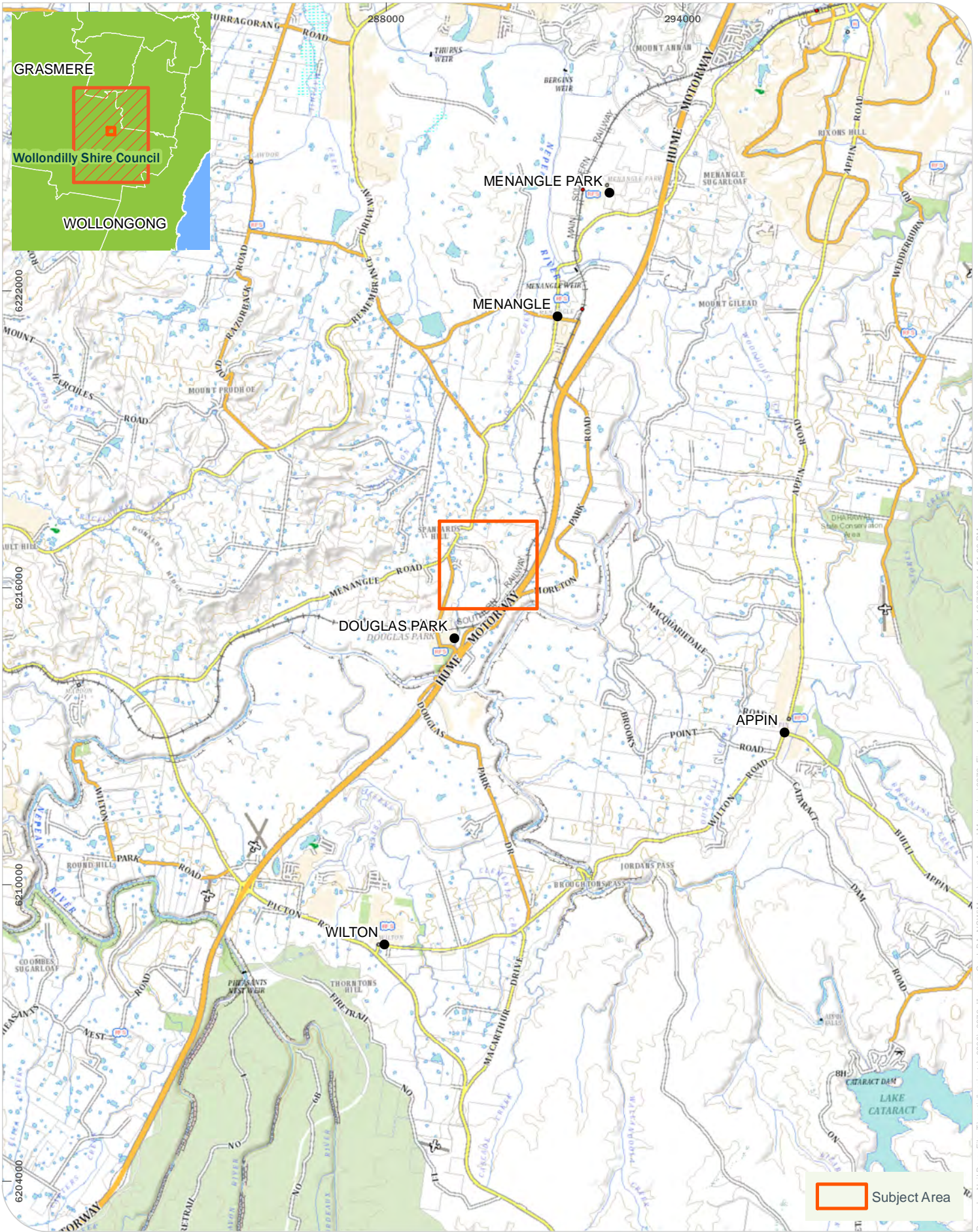
## References

---

- DECC (2014) *BioBanking Assessment Methodology 2014*. Office of Environment and Heritage. Dated September (2014).
- DPIE (2020) *Biodiversity Assessment Method*. NW Office of Environment and Heritage. Dated December 2020.
- Landcare (2021) *Vent Shaft 6 Bush Regeneration Report for South32 2021*, prepared for Illawarra Coal by Landcare Australia.
- Niche (2011) *Appin Mine Ventilation Shaft No.6 Project - Biodiversity Management Plan*, prepared for Illawarra Coal.
- Niche (2012) *Appin Ventilation Shaft No. 6 Offset Area Monitoring Report 2012*, prepared for Illawarra Coal.
- Niche (2013) *Appin Ventilation Shaft No. 6 Offset Area Monitoring Report 2013*, prepared for Illawarra Coal.
- Niche (2014) *Appin Ventilation Shaft No. 6 Offset Area Monitoring Report 2014*, prepared for Illawarra Coal.
- Niche (2015) *Appin Ventilation Shaft No. 6 Offset Area Monitoring Report 2015*, prepared for Illawarra Coal.
- Niche (2016) *Appin Ventilation Shaft No. 6 Offset Area Monitoring Report 2016*, prepared for South32 Illawarra Coal.
- Niche (2017) *Appin Ventilation Shaft No. 6 Offset Area Monitoring Report 2017*, prepared for South32 Illawarra Coal.
- Niche (2018) *Appin Ventilation Shaft No. 6 Offset Area Monitoring Report 2018*, prepared for South32 Illawarra Coal.
- Niche (2019) *Appin Ventilation Shaft No. 6 Offset Area Monitoring Report 2019*, prepared for South32 Illawarra Coal.
- Niche (2020) *Appin Ventilation Shaft No. 6 Offset Area Monitoring Report 2020*, prepared for South32 Illawarra Coal.
- OEH (2009) *BioBanking Assessment Methodology and Credit Calculator Operational Manual*, Sydney, NSW.
- Silver, MJ and Carnegie AJ (2017) *An independent review of bell miner associated dieback*. Final report prepared for the Project Steering Committee: systematic review of bell miner associated dieback.
- South32 Illawarra Coal (2017) *Appin VS#6 Biodiversity Management Plan Bulli Seam Operations*. Version P5. Dated 30/01/2017.

## Figures

---



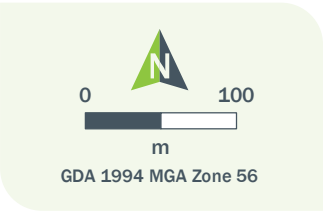
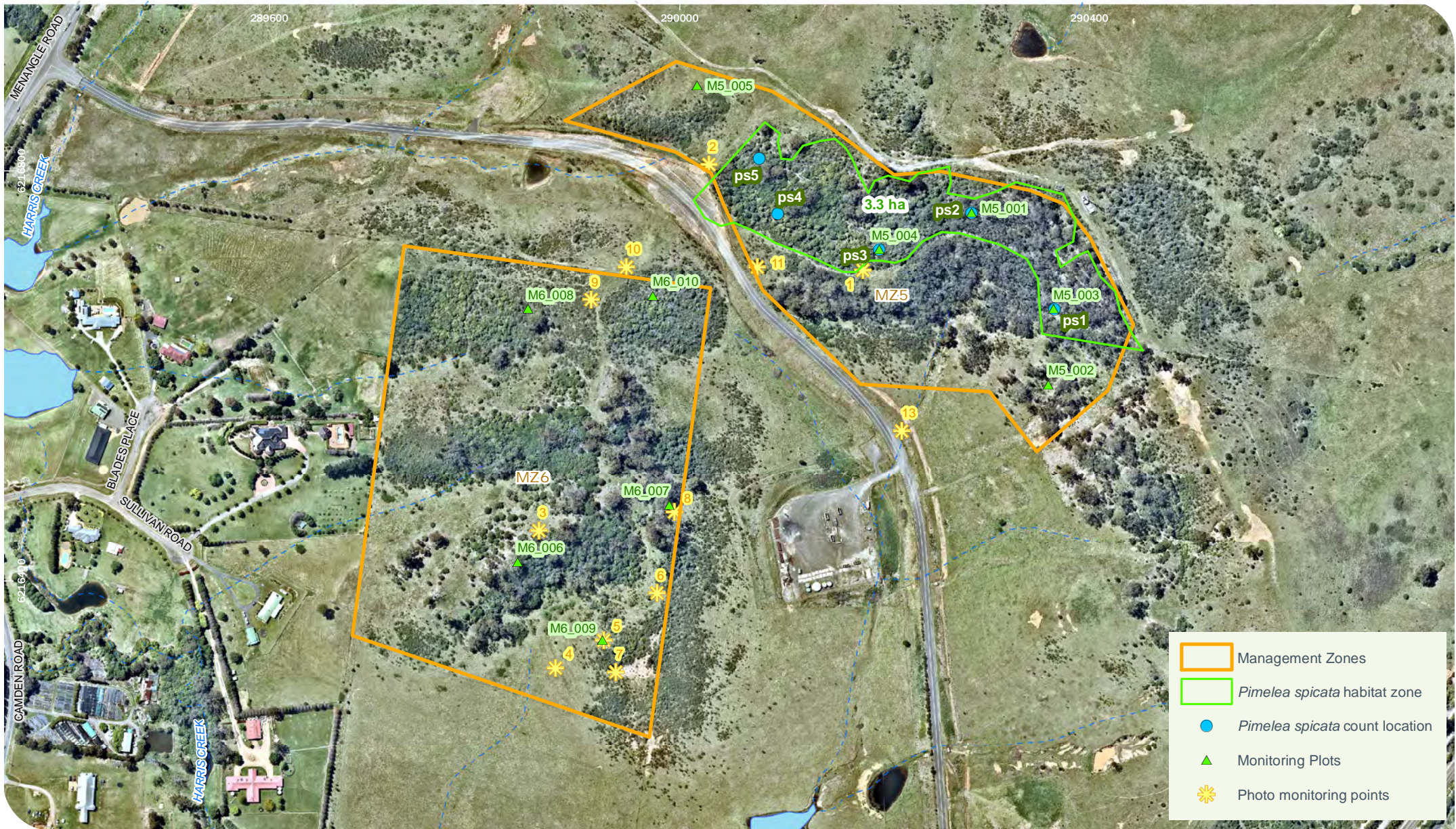
Drawn by: Neil Berry File: T:\spatial\projects\6876 - llawarra\Coal\_BA\_NSW\Map\report\Annual Monitoring\6876 - Figure\_1\_Location.mxd Last updated: 12/7/2021 1:51:36 PM



Niche PM: Sian Griffiths  
 Niche Proj. #: 6876  
 Client: South32-IMC

**Location Map**  
 VentShaft 6 – Annual Biodiversity Monitoring FY2022

**Figure 1**



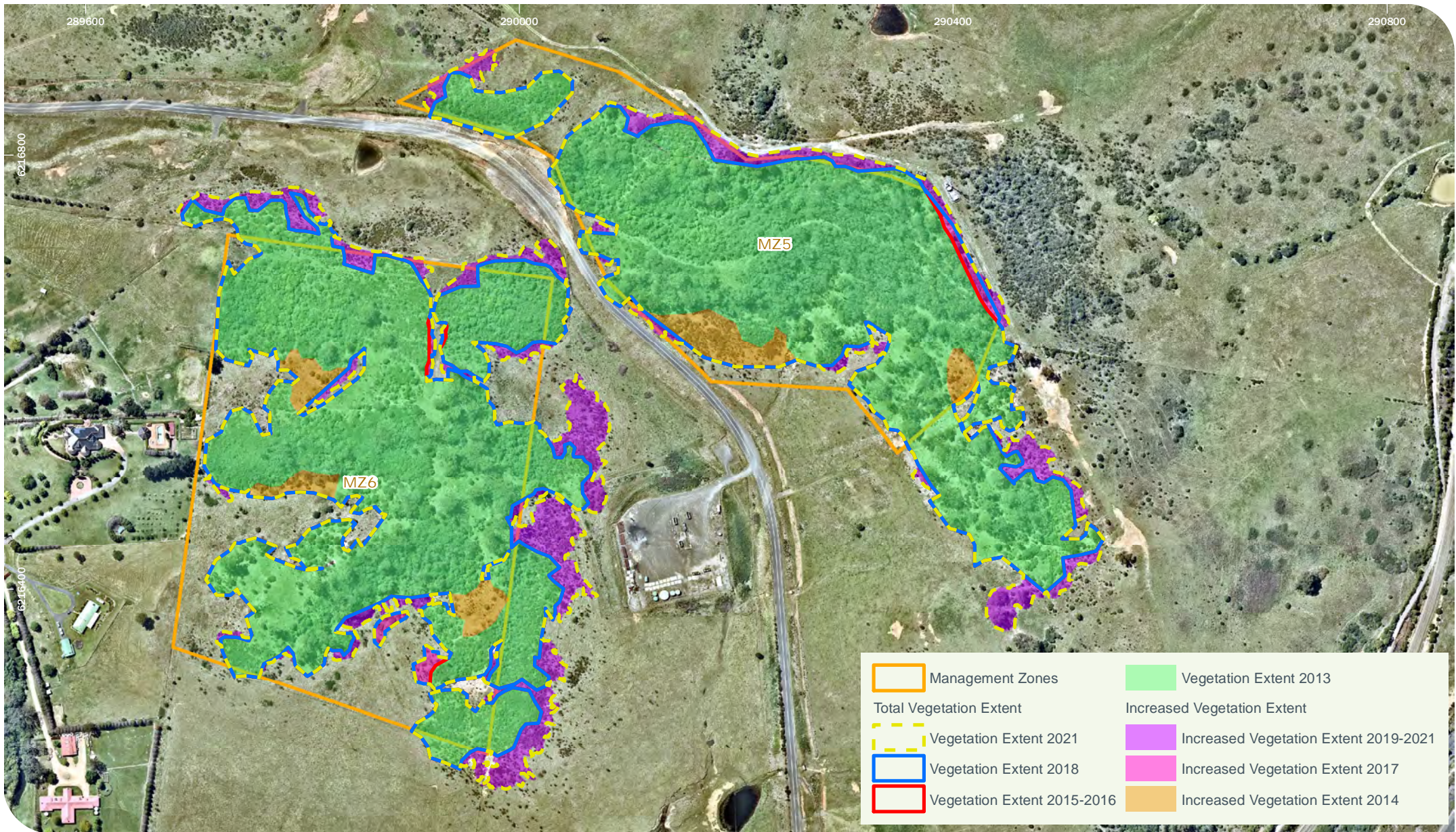
Niche PM: Sian Griffiths  
 Niche Proj. #: 6876  
 Client: South32 - IMC

**Monitoring locations**  
 VentShaft 6 – Annual Biodiversity Monitoring FY2022

**Figure 2**

Imagery: Nearmap (October 2021)

Drawn by: Neil Berry Last updated: 12/8/2021 9:27:41 AM File: T:\spatial\projects\6800\va6876\_illawarra\Coal\_BA\_NSWM\aps\vepon\Annual Monitoring\6876\_Figure 2\_Monitoring.mxd



## Appendix A– Management actions, performance criteria, corrective actions and timeframes

Action	Description	Performance target (milestones)	Corrective actions	Timeframe
MZ5 and MZ6 Fencing	The first action within the offset area will be to exclude stock. Existing four-strand post-and-wire fence will be utilised and additional fencing installed where required. No barbed-wire will be used and the bottom strand will have a clearance of 400mm above the ground to allow the movement of native fauna. Stock will be herded out of the area prior to fencing taking place.	Four-strand post-and-wire fence has been installed, no strands barbed and 400 mm separation from ground to lowest strand.	Maintenance of fencing – fencing to be inspected at regular intervals and repairs made as required.	Every 3 months
Bush Regeneration in MZ5	Primary, secondary and maintenance weed management within MZ5 will target the treatment of Blackberry, African Olive, Lantana, African Boxthorn, Privet, Cape Ivy and a variety of exotic perennial grasses such as African lovegrass, Rhodes Grass, Kikuyu and Couch. All weed management works will be supervised by a suitably qualified bush regenerator. A team of four bush regenerators will be engaged for five days for the primary weeding and then a team of two for one day every four months thereafter for secondary and maintenance weed management as required.	Engagement of a suitably qualified bush regeneration contractor to implement primary, secondary and maintenance weed management program has occurred. Annual vegetation condition assessment has commenced. Improvement in condition of offset bushland to within, or as near as possible to, benchmark condition levels – on-going.	On-ground weed management regime to be adaptable and able to respond to changing conditions and weed problems. Given that the offset area has an intact soil profile and moderate resilience, sound bush regeneration methods and observance of integrated pest management should minimise the need for corrective actions. Weed management program in offset area to be annually reviewed and altered actions documented and implemented. Revegetation with locally collected native vegetation of local genetic stock as recommended by an appropriately qualified expert.	Annually
<i>Pimelea spicata</i> Monitoring program	Design a program to determine the success of management or the need for intervention. Annual population counts within permanent plots. 5 yearly population census. Condition of individual plants from mixed cohorts. Condition of habitat.	Sustainable <i>Pimelea spicata</i> population with population numbers staying level with or exceeding current numbers.	Annual count trigger for intervention is significant loss of population (>20% of monitored population within BioBanking Plots). Response: undertake full scale census. Stochastic events (such as one off fire events) will reset the baseline population size which will be determined	Annually as part of the fixed plot vegetation monitoring

Action	Description	Performance target (milestones)	Corrective actions	Timeframe
	<p>Annual inspections of fencing to ensure maintenance and up-keep.</p> <p>Regular site visits the potential presence of stock and/or feral herbivores that have breached fencing to ensure that such impact is eliminated by fencing and that trapped stock or feral herbivores are freed.</p> <p>Monitoring against stochastic events.</p>		<p>after a population census immediately after the event and then again at six, twelve, eighteen and twenty four months post disturbance.</p> <p>5 yearly population census trigger for intervention is:</p> <ul style="list-style-type: none"> <li>• &gt;35% decline in population from preceding census; or</li> <li>• Two consecutive (over two census') declines of &gt;20%; or</li> <li>• Area of occupancy is mapped to decrease to 50% or lower than originally mapped.</li> </ul> <p>Intervention Actions:            Stop regeneration works;            Consult with experts (RBG Mt Annan);            Implement actions as recommended by experts; additional actions may include slashing of competing native grasses, thinning of competing native shrubs or trees (e.g., <i>Bursaria spinosa</i>), ecological burning or resting of weed management until the population stabilises.. Crash grazing should only be utilised as a last resort. In emergency situations, plant rescue and re-introduction may be required.</p>	and population census undertaken every five years
Bush Regeneration in MZ6	<p>Weed management within MZ6 will target the treatment of Blackberry, African Olive, Lantana, African Boxthorn, Privet, Cape Ivy and a variety of exotic perennial grasses such as African Lovegrass, Rhodes Grass, Kikuyu and Couch.</p> <p>All weed management works will be supervised by a suitably qualified bush regenerator.</p>	<p>Engagement of a suitably qualified bush regeneration contractor to implement weed management program has occurred</p> <p>Improvement in condition of offset bushland to within, or as near as possible to,</p>	<p>On-ground weed management regime to be adaptable and able to respond to changing conditions and weed problems. Given that the native vegetation areas have an intact soil profile and moderate resilience, sound bush regeneration methods and observance of integrated pest management should minimise the need for corrective actions.</p>	Annually



Action	Description	Performance target (milestones)	Corrective actions	Timeframe
		benchmark condition levels – on-going.	Weed management program in native vegetation area to be annually reviewed and altered actions documented and implemented.	

## Appendix B. Plant species list (2021)

Scientific name	M5_001		M5_002		M5_003		M5_004		M5_005		M6_006		M6_007		M6_008		M6_009		M6_010	
	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Acacia asparagoides</i>															1	10				
<i>Acacia implexa</i>															5	15				
<i>Anagallis arvensis</i>															0.1	10	0.2	50		
<i>Anagallis arvensis</i> subsp. <i>arvensis</i>			0.1	10							0.1	5								
<i>Angophora floribunda</i>											12	1								
<i>Araujia sericifera</i>			0.1	10	0.1	2					0.1	5			0.1	10				
<i>Aristida ramosa</i>										0.3	100									
<i>Aristida vagans</i>															0.2	50			0.1	10
<i>Asparagus asparagoides</i>	0.1	1									0.1	2							0.1	10
<i>Asperula conferta</i>							0.1	10					0.3	100	0.1	10	0.2	50		
<i>Asperula</i> sp.			0.3	100																
<i>Bidens pilosa</i>					0.1	10					0.1	5	0.1	10						
<i>Bothriochloa macra</i>																	10	500		
<i>Bromus catharticus</i>			0.1	10																
<i>Bromus hordeaceus</i>																	0.3	100		
<i>Brunoniella australis</i>	0.1	10	0.1	10	0.4	50	0.1	10					0.1	10	0.1	10			0.2	15
<i>Bursaria spinosa</i>			15	50																
<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	0.1	10			35	100			0.2	5	10	50	8	30	30	150	4	8	68	50
<i>Calotis cuneata</i>											0.1	5	0.2	30	0.1	15				
<i>Carex inversa</i>			0.2	100					0.5	100			0.2	5	0.1	20			0.2	50
<i>Carthamus lanatus</i>													0.1	10						
<i>Centaurea solstitialis</i>			0.1	1			0.1	10									0.1	50		
<i>Cheilanthes sieberi</i>															0.2	100				
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>																			0.1	10

Scientific name	M5_001		M5_002		M5_003		M5_004		M5_005		M6_006		M6_007		M6_008		M6_009		M6_010	
	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Chloris ventricosa</i>													3	200						
<i>Cirsium vulgare</i>			0.1	10	0.1	10			0.1	10	0.1	3							0.1	5
<i>Clematis aristata</i>	0.1	20			0.1	10	0.2	10			0.2	1			0.1	10			0.1	1
<i>Convolvulus erubescens</i>													0.1	10	0.2	10	0.1	50	0.1	5
<i>Conyza bonariensis</i>					0.2	10	0.1	15			0.1	10			0.1	30			0.1	10
<i>Cyclospermum leptophyllum</i>					0.1	1														
<i>Cynodon dactylon</i> var. <i>dactylon</i>																	0.2	50		
<i>Cyperus gracilis</i>															0.1	10				
<i>Cyperus</i> sp.							0.1	10												
<i>Delairea odorata</i>					5	100														
<i>Desmodium varians</i>			0.1	10							0.1	2	2	300	0.1	50	5	1000	0.1	20
<i>Dichondra repens</i>	0.1	10	8	200	15	1000	0.2	50			0.2	25	10	200	2	200			0.1	10
<i>Einadia nutans</i>					0.2	50							0.3	100						
<i>Einadia nutans</i> subsp. <i>nutans</i>											0.1	5			0.1	20				
<i>Einadia polygonoides</i>															0.1	1				
<i>Einadia trigonos</i>			0.1	10	0.1	20														
<i>Einadia trigonos</i> subsp. <i>trigonos</i>													0.1	10						
<i>Elymus scaber</i>			0.2	100					0.5	50			5	100			8	300		
<i>Eragrostis leptostachya</i>					0.1	1									0.1	10				
<i>Eriochloa pseudoacrotricha</i>													0.1	30						
<i>Eucalyptus amplifolia</i>					10	20														
<i>Eucalyptus crebra</i>			1	1							12	1			20	3				
<i>Eucalyptus moluccana</i>			8	10	8	6					1	1	30	4						
<i>Eucalyptus tereticornis</i>	5	10	5	10							1	1								
<i>Euchiton sphaericus</i>							0.1	10												
<i>Euchiton</i> sp.															0.1	15				

Scientific name	M5_001		M5_002		M5_003		M5_004		M5_005		M6_006		M6_007		M6_008		M6_009		M6_010	
	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Galium</i> sp.							0.1	10							0.1	10				
<i>Geranium homeanum</i>																			0.1	10
<i>Glycine clandestina</i>															0.1	10			0.1	10
<i>Glycine microphylla</i>							0.2	50												
<i>Glycine tabacina</i>			0.1	50	0.2	2					0.2	10			0.1	10				
<i>Gomphocarpus fruticosus</i>			0.1	15											0.1	10				
<i>Hypericum gramineum</i>			0.1	100											0.1	10				
<i>Hypochaeris radicata</i>			0.1	10											0.1	10	0.3	100	0.1	10
<i>Lactuca serriola</i>			0.1	10	0.1	10														
<i>Lagenifera stipitata</i>															0.1	10				
<i>Lagenophora stipitata</i>	0.1	10					0.1	2												
<i>Lantana camara</i>							0.1	10	0.1	1	0.1	10	2	40	25	50			0.1	1
<i>Linum marginale</i>																			0.1	10
<i>Linum monogynum</i>																	0.2	10		
<i>Linum trigynum</i>			0.1	100											0.2	100				
<i>Lolium perenne</i>			0.1	100					0.1	10							0.1	10		
<i>Lycium ferocissimum</i>					0.1	2							0.1	20						
<i>Microlaena stipoides</i> var. <i>stipoides</i>			25	100 0	10	200 0	15	200 0	30	500 0			10	200 0	0.2	50	5	100 0		
<i>Modiola caroliniana</i>															0.1	10				
<i>Nassella neesiana</i>			0.1	10									5	200			10	500	0.1	10
<i>Olea europaea</i> subsp. <i>cuspidata</i>	2	30			0.5	20	5	250			20	200	0.1	10	0.1	10			20	100
<i>Oplismenus aemulus</i>					0.2	150	10	300			0.1	10			0.1	25				
<i>Oplismenus hirtellus</i>																			0.1	10
<i>Opuntia stricta</i>					0.1	1														
<i>Oxalis perennans</i>			0.1	10	0.1	10					0.1	5	0.1	10	0.1	50	0.1	5	0.1	10
<i>Pandorea pandorana</i> subsp. <i>pandorana</i>	0.1	1																		

Scientific name	M5_001		M5_002		M5_003		M5_004		M5_005		M6_006		M6_007		M6_008		M6_009		M6_010	
	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
<i>Paronychia brasiliensis</i>											0.1	10	0.1	5						
<i>Paspalidium criniforme</i>													1	50						
<i>Paspalidium distans</i>													0.1	10						
<i>Paspalum dilatatum</i>									30	300			0.1	5	0.1	5				
<i>Pennisetum clandestinum</i>									10	100										
<i>Phalaris aquatica</i>															0.1	10				
<i>Pimelea spicata</i>			0.1	1			0.2	50												
<i>Plantago lanceolata</i>			0.1	50			0.1	10	0.1	30					0.1	10	0.1	10	0.1	10
<i>Plectranthus parviflorus</i>					0.2	30									0.1	10				
<i>Polycarpon tetraphyllum</i>					0.1	1									0.1	10				
<i>Poranthera microphylla</i>			0.1	1																
<i>Richardia stellaris</i>															0.1	30				
<i>Rubus fruticosus</i> sp. agg.			0.1	20			0.1	2	0.3	1										
<i>Rytidosperma</i> sp.													0.2	50			0.1	10	0.1	10
<i>Senecio madagascariensis</i>													0.1	10	0.1	10	0.1	10	0.1	10
<i>Sida corrugata</i>			0.1	10	0.2	10							0.3	100	0.1	100	0.2	80		
<i>Sida rhombifolia</i>			0.3	100	0.1	50			1	150	0.1	12			0.3	100	0.1	30	0.1	10
<i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i>					0.2	50														
<i>Smilax glycyphylla</i>																			0.1	10
<i>Solanum cinereum</i>					0.3	30														
<i>Solanum nigrum</i>					0.1	1					0.1	1	0.1	10	0.1	10				
<i>Solanum prinophyllum</i>	0.1	10	0.1	10	1	80					0.1	10			0.1	5			0.1	5
<i>Sonchus oleraceus</i>													0.1	1	0.1	10				
<i>Themeda triandra</i>			5	100	2	50									2	100			0.1	15
<i>Verbena bonariensis</i>															0.1	20	0.1	10	0.1	10
<i>Verbena rigida</i>			0.1	50					0.2	50										
<i>Wahlenbergia</i> sp.											0.1	5			0.1	10				

## Appendix C. BAM and BBAM plot (raw data)

### Woodland

#### MZ5 offset area and MZ6 voluntary management area woodland plot comparison

Table 8. Comparison of woodland plots to PCT benchmarks (2017-2021)

Plot	Composition (Richness)					Structure (Cover)						Function					
	T	S	G	F	Fe	O	T	S	G	F	Fe	O	HBT	NLT	LC	FL	HTW
<b>PCT 850 Benchmark</b>	5	8	12	15	2	5	52	18	61	10	1	5	-	3	35	40	0
<b>MZ5</b>																	
M5_001 (2021)	1	1	0	4	0	2	5	0.1	0	0.4	0	0.2	0	0	88	5	2.1
M5_002 (2021)	3	2	4	9	0	2	14	15.1	30.4	9	0	0.2	1	0	5.4	15	0.3
M5_003 (2021)	2	2	4	9	0	2	18	35.3	12.3	17.4	0	0.3	0	1	14	4	5.8
<b>2021 Average</b>	<b>2</b>	<b>1.7</b>	<b>2.7</b>	<b>7.3</b>	<b>0</b>	<b>2</b>	<b>12.3</b>	<b>16.8</b>	<b>14.2</b>	<b>8.9</b>	<b>0</b>	<b>0.2</b>	<b>0.3</b>	<b>0.3</b>	<b>35.8</b>	<b>8</b>	<b>2.7</b>
M5_001 (2020)	2	1	2	5	1	3	17	55	5.5	3.3	0.1	1.3	-	1	32	12	10.2
M5_002 (2020)	1	1	4	3	0	2	0.5	5	31.5	0.3	0	0.2	-	1	15	3	0.6
M5_003 (2020)	2	2	1	4	0	3	20	12	7	2.1	0	0.3	-	2	19	6	13.2
<b>2020 Average</b>	<b>1.6</b>	<b>1.3</b>	<b>2.3</b>	<b>4</b>	<b>0.3</b>	<b>2.6</b>	<b>12.5</b>	<b>24</b>	<b>14.7</b>	<b>1.9</b>	<b>0.03</b>	<b>0.6</b>	<b>-</b>	<b>1.3</b>	<b>22</b>	<b>7</b>	<b>8</b>
M5_001 (2019)	2	2	4	8	0	3	37	45.1	7.1	2.8	0	1.2	-	1	52	8	8.6
M5_002 (2019)	1	1	5	3	0	1	10	15	21	0.4	0	0.1	-	0	43	0	5
M5_003 (2019)	2	1	3	6	0	2	25	20	20	5.7	0	0.2	-	2	36	3	5.7
<b>2019 Average</b>	<b>1.6</b>	<b>1.3</b>	<b>4</b>	<b>5.6</b>	<b>0</b>	<b>2</b>	<b>24</b>	<b>26.7</b>	<b>16</b>	<b>2.9</b>	<b>0</b>	<b>0.5</b>	<b>-</b>	<b>1</b>	<b>43.6</b>	<b>3.6</b>	<b>6.4</b>
M5_001 (2018)	1	2	4	12	0	4	20	45.1	10.6	4.1	0	1.3	-	1	87	36	10.1
M5_002 (2018)	2	1	5	8	0	4	15	15	46.5	1.4	0	0.4	-	0	37	2	1
M5_003 (2018)	2	2	2	10	0	5	23	15.1	15	6.1	0	0.9	-	1	38	0	3
<b>2018 Average</b>	<b>1.7</b>	<b>1.7</b>	<b>3.7</b>	<b>10.0</b>	<b>0.0</b>	<b>4.3</b>	<b>19.3</b>	<b>25.1</b>	<b>24.0</b>	<b>3.9</b>	<b>0.0</b>	<b>0.9</b>	<b>-</b>	<b>0.7</b>	<b>54.0</b>	<b>12.7</b>	<b>4.7</b>
M5_001 (2017)	2	2	6	9	0	4	20	40.1	25.6	4.1	0	0.5	-	1	56	8	5.2
M5_002 (2017)	2	1	5	8	0	3	16	10	27.1	1.2	0	0.3	-	0	22	1	17
M5_003 (2017)	2	2	2	8	0	4	17	9.1	20.5	7.3	0	0.8	-	1	64	3	4.5
<b>2017 Average</b>	<b>2.0</b>	<b>1.7</b>	<b>4.3</b>	<b>8.3</b>	<b>0.0</b>	<b>3.7</b>	<b>17.7</b>	<b>19.7</b>	<b>24.4</b>	<b>4.2</b>	<b>0.0</b>	<b>0.5</b>	<b>-</b>	<b>0.7</b>	<b>47.3</b>	<b>4.0</b>	<b>8.9</b>
<b>MZ6</b>																	

Plot	Composition (Richness)					Structure (Cover)						Function					
	T	S	G	F	Fe	O	T	S	G	F	Fe	O	HBT	NLT	LC	FL	HTW
<b>PCT 850 Benchmark</b>	<b>5</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>2</b>	<b>5</b>	<b>52</b>	<b>18</b>	<b>61</b>	<b>10</b>	<b>1</b>	<b>5</b>	-	<b>3</b>	<b>35</b>	<b>40</b>	<b>0</b>
M6_006 (2021)	4	1	1	6	0	3	26	10	0.1	0.7	0	0.5	0	1	4.6	0	20.4
M6_007 (2021)	1	1	8	8	0	2	30	8	19.6	11.4	0	2.1	1	1	2.6	35	7.5
M6_008 (2021)	1	3	7	15	1	5	20	36	2.8	3.4	0.2	0.6	0	1	45.4	0	25.3
<b>2021 Average</b>	<b>2</b>	<b>1.7</b>	<b>5.3</b>	<b>9.7</b>	<b>0.3</b>	<b>3.3</b>	<b>25.3</b>	<b>18</b>	<b>7.5</b>	<b>5.2</b>	<b>0.1</b>	<b>1.1</b>	<b>1</b>	<b>1</b>	<b>17.5</b>	<b>11.7</b>	<b>17.7</b>
M6_006 (2020)	1	2	3	4	1	4	41	5.1	0.9	0.5	0.1	0.5	-	2	18	20	37
M6_007 (2020)	1	1	5	3	0	2	45	5	1.9	0.4	0	0.3	-	8	35	17	51.1
M6_008 (2020)	1	2	4	6	1	2	20	75	0.9	0.9	0.1	0.2	-	1	10	0	35.2
<b>2020 Average</b>	<b>1.0</b>	<b>1.7</b>	<b>4.0</b>	<b>4.3</b>	<b>0.7</b>	<b>2.7</b>	<b>35.3</b>	<b>28.4</b>	<b>1.2</b>	<b>0.6</b>	<b>0.1</b>	<b>0.3</b>	-	<b>3.7</b>	<b>21.0</b>	<b>12.3</b>	<b>41.1</b>
M6_006 (2019)	2	1	4	8	0	0	25	50	55.1	4.1	0	0	-	2	39	7	1
M6_007 (2019)	1	1	4	4	0	0	50	10	12.5	6.2	0	0	-	2	97.4	0	75
M6_008 (2019)	1	2	6	3	0	1	15	30	45.8	5.6	0	0.1	-	1	62	0	19.4
<b>2019 Average</b>	<b>1.3</b>	<b>1.3</b>	<b>4.6</b>	<b>5</b>	<b>0</b>	<b>0.3</b>	<b>30</b>	<b>30</b>	<b>37.8</b>	<b>5.3</b>	<b>0</b>	<b>0.1</b>	-	<b>1.6</b>	<b>66.1</b>	<b>2.3</b>	<b>31.8</b>
M6_006 (2018)	4	1	5	11	0	3	23	20	12.6	5.7	0	0.3	-	2	71	24	6
M6_007 (2018)	1	1	2	7	0	2	20	12	9	2.8	0	0.2	-	3	77	50	20.4
M6_008 (2018)	1	2	5	11	0	5	10	53	18.6	4.7	0	0.9	-	1	75	8	2.6
<b>2018 Average</b>	<b>2.0</b>	<b>1.3</b>	<b>4.0</b>	<b>9.7</b>	<b>0.0</b>	<b>3.3</b>	<b>17.7</b>	<b>28.3</b>	<b>13.4</b>	<b>4.4</b>	<b>0.0</b>	<b>0.5</b>	-	<b>2.0</b>	<b>74.3</b>	<b>27.3</b>	<b>9.7</b>
M6_006 (2017)	3	1	6	10	0	2	19	15	24.1	4.2	0	0.3	-	2	52	18	7.2
M6_007 (2017)	1	1	7	6	0	4	20	25	18.3	7.4	0	0.4	-	6	48	51	15.9
M6_008 (2017)	1	2	8	11	0	4	10	50	21.4	4.2	0	0.5	-	1	61	4	4.2
<b>2017 Average</b>	<b>1.7</b>	<b>1.3</b>	<b>7.0</b>	<b>9.0</b>	<b>0.0</b>	<b>3.3</b>	<b>16.3</b>	<b>30.0</b>	<b>21.3</b>	<b>5.3</b>	<b>0.0</b>	<b>0.4</b>	-	<b>3.0</b>	<b>53.7</b>	<b>24.3</b>	<b>9.1</b>

Note: T – Tree, S – Shrub, G – Grass and Grass-like, F – Forb, Fe – Fern, O – Other, HBT – Hollow Bearing Trees, NLT – Number of Large Trees, LC – Litter Cover, FL – Fallen Logs, HTW – High Threat Weed

**Table 9. Comparison of woodland plots to BVT benchmarks (2012-2016)**

Plot	NPS	NOS		NMS		NGCG		NGCS		NGCO		EPC	NTH	OR	FL
		L	U	L	U	L	U	L	U	L	U				
<b>Benchmark</b>	<b>29</b>	<b>18.5</b>	<b>23.5</b>	<b>20</b>	<b>30</b>	<b>23</b>	<b>31</b>	<b>0</b>	<b>5</b>	<b>11.75</b>	<b>19.75</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
<b>MZ5</b>															
M5_001 (2016)	22		3.5		26		44		28		22	24	1	1	37
M5_002 (2016)	17		6		1.2		94		8		8	24	1	1	2
M5_003 (2016)	23		0.5		17.5		76		4		8	16	1	1	10
<b>Average 2016</b>	<b>21</b>		<b>3.3</b>		<b>14.9</b>		<b>71.3</b>		<b>13.3</b>		<b>12.7</b>	<b>21.3</b>	<b>1</b>	<b>1</b>	<b>16.3</b>
M5_001 (2015)	24		1		41.5		92		10		4	56	1	1	15
M5_002 (2015)	20		4.5		1.5		86		2		18	36	1	1	0
M5_003 (2015)	23		0.5		22.5		68		16		6	64	1	1	8
<b>Average 2015</b>	<b>22</b>		<b>2.0</b>		<b>21.8</b>		<b>82.0</b>		<b>9.3</b>		<b>9.3</b>	<b>52.0</b>	<b>1.</b>	<b>1</b>	<b>7.7</b>
M5_001 (2014)	21		0		62.5		26		26		6	10	1	1	12
M5_002 (2014)	17		7.5		0		78		2		0	12	1	1	3
M5_003 (2014)	16		30		53		22		28		9	14	2	1	0
<b>Average 2014</b>	<b>18</b>		<b>12.5</b>		<b>38.5</b>		<b>42</b>		<b>18.5</b>		<b>5</b>	<b>12</b>	<b>1</b>	<b>1</b>	<b>5</b>
M5_001 (2013)	12		9		20.5		58		10		42	39	1	1	12
M5_002 (2013)	18		2		1.5		82		0		30	44	1	1	6
M5_003 (2013)	17		24		3		6		2		16	23	2	1	0
<b>Average 2013</b>	<b>16</b>		<b>11.6</b>		<b>8.3</b>		<b>48</b>		<b>4</b>		<b>29</b>	<b>35</b>	<b>1</b>	<b>1</b>	<b>6</b>
M5_001 (2012)	17		5.5		24		66		8		50	24	1	1	8
M5_002 (2012)	18		6.5		3		92		2		18	50	1	1	6
M5_003 (2012)	21		22.5		1		3.8		3.4		12	6	2	1	0
<b>Average 2012</b>	<b>19</b>		<b>11.5</b>		<b>9.3</b>		<b>53.9</b>		<b>4.5</b>		<b>26.6</b>	<b>26.6</b>	<b>1</b>	<b>4.6</b>	<b>4.6</b>
<b>MZ6</b>															
M6_006 (2016)	23		10		15		88		16		20	24	6	1	32
M6_007 (2016)	16		16		10		36		20		4	64	8	1	70
M6_008 (2016)	24		10.5		30		70		14		16	30	1	1	10
<b>Average (2016)</b>	<b>21</b>		<b>12.2</b>		<b>18.3</b>		<b>64.7</b>		<b>16.7</b>		<b>13.3</b>	<b>39.3</b>	<b>5</b>	<b>1</b>	<b>37.3</b>
M6_006 (2015)	16		0		60		85		0		6	50	1	0	0
M6_007 (2015)	18		16		7.5		26		16		10	42	4	1	40



Plot	NPS	NOS		NMS		NGCG		NGCS		NGCO		EPC	NTH	OR	FL
		L	U	L	U	L	U	L	U	L	U				
<b>Benchmark</b>	<b>29</b>	<b>18.5</b>	<b>23.5</b>	<b>20</b>	<b>30</b>	<b>23</b>	<b>31</b>	<b>0</b>	<b>5</b>	<b>11.75</b>	<b>19.75</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
M6_008 (2015)	14		8.5		13.5		76		12		6	64	1	1	8
<b>Average (2015)</b>	<b>16</b>		<b>8</b>		<b>27</b>		<b>62</b>		<b>9</b>		<b>7</b>	<b>52</b>	<b>2</b>	<b>1</b>	<b>16</b>
M6_006 (2014)	27		18		8		60		6		30	48	2	1	16
M6_007 (2014)	21		17		0		26		16		24	16	4	1	10
M6_008 (2014)	17		8		16		50		0		16	44	1	1	8
<b>Average 2014</b>	<b>21</b>		<b>14</b>		<b>8</b>		<b>45</b>		<b>7</b>		<b>23</b>	<b>36</b>	<b>2</b>	<b>1</b>	<b>11</b>
M6_006 (2013)	22		26		16		90		2		30	34	2	1	22
M6_007 (2013)	20		22		0		22		12		16	44	4	1	20
M6_008 (2013)	18		12		12		60		12		18	34	1	1	10
<b>Average (2012)</b>	<b>20</b>		<b>20</b>		<b>9.3</b>		<b>57.3</b>		<b>8.6</b>		<b>21.3</b>	<b>37.3</b>	<b>2.3</b>	<b>1</b>	<b>17.3</b>
M6_006 (2012)	20		26.5		10.5		82		4		44	42	2	1	22
M6_007 (2012)	18		34.5		0		8		18		6	14	4	1	14
M6_008 (2012)	22		18		10		72		0		22	52	1	1	8
<b>Average (2012)</b>	<b>20</b>		<b>26.3</b>		<b>6.8</b>		<b>54.0</b>		<b>7.3</b>		<b>24</b>	<b>36</b>	<b>2.3</b>	<b>1</b>	<b>14.6</b>

Note: NPS – Native Plant Species richness, NOS – Native Over-storey cover, NMS – Native Mid-storey cover, NGCG – Native Ground-cover (grasses), Native Ground-cover (shrubs), Native Ground-cover (other), EPC – Exotic Plant Cover, NTH – Number of Trees with Hollows, OR – Over-storey regeneration, FL – Length of Fallen Logs. L – Lower Benchmark, U – Upper Benchmark

## Blackthorn thicket

### MZ5 offset area and MZ6 voluntary management area Blackthorn thicket plot comparison

Plot	Composition (Richness)						Structure (Cover)						Function			
	T	S	G	F	Fe	O	T	S	G	F	Fe	O	NLT	LC	FL	HTW
<b>Benchmark</b>	<b>5</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>2</b>	<b>5</b>	<b>52</b>	<b>18</b>	<b>61</b>	<b>10</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>35</b>	<b>40</b>	<b>0</b>
M5_004 (2021)	0	1	3	6	0	2	0	0.2	25.1	0.7	0	0.4	0	4.4	0	5.2
M5_004 (2020)	0	3	4	4	0	3	0	55.2	20.6	0.5	0	0.3	0	10	0	16
M5_004 (2019)	0	3	4	5	0	3	0	70.2	20.3	1	0	0.3	0	45	0	30.1
M5_004 (2018)	0	2	6	7	0	5	0	66	31	0.9	0	0.5	0	52	0	26.1
M5_004 (2017)	0	2	6	7	0	4	0	42	29.1	2.7	0	0.4	0	40	0	10.1
M6_010 (2021)	0	1	5	6	1	5	0	68	0.6	0.7	0.1	0.5	0	12	0	20.3

Plot	Composition (Richness)						Structure (Cover)						Function			
	T	S	G	F	Fe	O	T	S	G	F	Fe	O	NLT	LC	FL	HTW
<b>Benchmark</b>	<b>5</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>2</b>	<b>5</b>	<b>52</b>	<b>18</b>	<b>61</b>	<b>10</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>35</b>	<b>40</b>	<b>0</b>
M6_010 (2020)	0	1	4	3	0	4	0	65	5.4	1.3	0	0.4	0	6	0	40.1
M6_010 (2019)	0	1	7	3	0	3	0	60	65.2	0.6	0	0.3	0	68	0	30.2
M6_010 (2018)	0	1	4	6	0	4	0	60	11.2	1.9	0	0.4	0	50	0	15.2
M6_010 (2017)	0	1	3	5	0	5	0	45	19.1	7.3	0	0.6	0	39	0	10.1

T – Tree, S – Shrub, G – Grass, F – Forb, Fe – Fern, O – Other; NLT – Number of Large Trees, LC – Litter cover, FL – Length of Fallen Logs. HTW – High Threat Weeds

**Table 10. Comparison of blackthorn thicket plots to BVT benchmarks (2012-2016)**

	NPS	NOS		NMS		NGCG		NGCS		NGCO		EPC	NTH	OR	FL
		L	U	L	U	L	U	L	U	L	U				
<b>Benchmark</b>	<b>29</b>	<b>18.5</b>	<b>23.5</b>	<b>20</b>	<b>30</b>	<b>23</b>	<b>31</b>	<b>0</b>	<b>5</b>	<b>11.75</b>	<b>19.75</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
M5_004 (2016)	16		0		37.5		80		4		24	18	0	0	0
M5_004 (2015)	16		0		45		75		5		20	25	0	0	0
M5_004 (2014)	18		0		20		70		28		22	55	0	0	0
M5_004 (2013)	15		0		18		84		22		24	55	0	0	0
M5_004 (2012)	18		0		11		82		26		32	67	0	0	0
M6_010 (2016)	18		0		60		65		10		8	60	0	1	0
M6_010 (2015)	10		12		10.5		74		20		2	38	3	1	15
M6_010 (2014)	18		0		50		54		2		32	28	0	0	0
M6_010 (2013)	20		0		60		62		12		20	10	0	0	0
M6_010 (2012)	20		0		53		56		14		18	10	0	0	0

NPS – Native Plant Species richness, NOS – Native Over-storey cover, NMS – Native Mid-storey cover, NGCG – Native Ground-cover (grasses), Native Ground-cover (shrubs), Native Ground-cover (other), EPC – Exotic Plant Cover, NTH – Number of Trees with Hollows, OR – Over-storey regeneration, FL – Length of Fallen Logs. L – Lower Benchmark, U – Upper Benchmark

## Pasture

**Table 11. Comparison of pasture plots to PCT benchmarks (2017-2021)**

Plot	Composition (Richness)						Structure (Cover)						Function			
	T	S	G	F	Fe	O	T	S	G	F	Fe	O	NLT	LC	FL	HTW
<b>Benchmarks</b>	<b>5</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>2</b>	<b>5</b>	<b>52</b>	<b>18</b>	<b>61</b>	<b>10</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>35</b>	<b>40</b>	<b>0</b>
M5_005 (2021)	0	1	4	0	0	0	0	0.2	31.3	0	0	0	0	0	0	30.4

Plot	Composition (Richness)						Structure (Cover)						Function			
	T	S	G	F	Fe	O	T	S	G	F	Fe	O	NLT	LC	FL	HTW
<b>Benchmarks</b>	<b>5</b>	<b>8</b>	<b>12</b>	<b>15</b>	<b>2</b>	<b>5</b>	<b>52</b>	<b>18</b>	<b>61</b>	<b>10</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>35</b>	<b>40</b>	<b>0</b>
M5_005 (2020)	0	1	3	2	0	2	0	2	9.5	0	0.6	0.2	0	0	0	0.7
M5_005 (2019)	0	1	4	1	0	2	0	2	17	0.5	0	0.2	0	20	0	2.2
M5_005 (2018)	0	2	4	4	0	3	0	2.1	28	20.7	0	0.3	0	24	0	6.5
M5_005 (2017)	0	1	6	3	0	1	0	1	22.1	2.1	0	0.1	0	28	0	11.1
<b>MZ6_009 (2021)</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>23.3</b>	<b>0.5</b>	<b>0</b>	<b>5.1</b>	<b>0</b>	<b>0.8</b>	<b>0</b>	<b>10</b>
MZ6_009 (2020)	0	1	3	2	0	1	0	20	15.4	0.3	0	0.1	0	5	0	0.5
MZ6_009 (2019)	0	1	6	3	0	1	0	5	83	0.3	0	0.1	0	33	0	3.5
MZ6_009 (2018)	0	1	4	8	0	2	0	5	13.2	0.8	0	1.1	0	24	0	5
MZ6_009 (2017)	0	1	5	5	0	2	0	4	18.1	0.5	0	0.2	0	14	0	23.5

T – Tree, S – Shrub, G – Grass, F – Forb, Fe – Fern, O – Other; NLT – Number of Large Trees, LC – Litter cover, FL – Length of Fallen Logs. HTW – High Threat Weeds

**Table 12. Comparison of the pasture plots to BVT benchmarks (2012-2016)**

	NPS	NOS		NMS		NGCG		NGCS		NGCO		EPC	NTH	OR	FL
		L	U	L	U	L	U	L	U	L	U				
<b>Benchmark values</b>	<b>29</b>	<b>18.5</b>	<b>23.5</b>	<b>20</b>	<b>30</b>	<b>23</b>	<b>31</b>	<b>0</b>	<b>5</b>	<b>11.75</b>	<b>19.75</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
M5_005 (2016)	10		0		0		90		0		8	56	0	0	0
M5_005 (2015)	12		0		0		94		0		4	72	0	0	0
M5_005 (2014)	14		0		0		76		0		2	50	0	0	0
M5_005 (2013)	10		0		0		86		0		0	64	0	0	0
M5_005 (2012)	12		0		0		78		0		0	74	0	0	0
M6_009 (2016)	13		0		1.2		88		0		10	52	0	1	0
M6_009 (2015)	18		0		44		2		0		0	99	0	1	0
M6_009 (2014)	13		0		0		38		6		12	76	0	0	0
M6_009 (2013)	14		0		0		50		0		0	68	0	0	0
M6_009 (2012)	16		0		0		58		0		0	70	0	0	0

NPS – Native Plant Species richness, NOS – Native Over-storey cover, NMS – Native Mid-storey cover, NGCG – Native Ground-cover (grasses), Native Ground-cover (shrubs), Native Ground-cover (other), EPC – Exotic Plant Cover, NTH – Number of Trees with Hollows, OR – Over-storey regeneration, FL – Length of Fallen Logs. L – Lower Benchmark, U – Upper Benchmark

## Appendix D. Biodiversity Assessment Method: measuring vegetation integrity attributes (DPIE 2020)

---

### Composition

- Assessment of composition is based on the number of native plant species (richness) observed and recorded by the assessor within a plot for each growth form group shown in Table 2 of the BAM (DPIE 2020).
- The assessor must assign a native plant species to a growth form group according to the definitions set out in Appendix F of the BAM. An assessor must allocate a species to one growth form group based on the adult/mature growth form of the species.
- The minimum vegetation survey data required to be recorded by the assessor for composition at each 20m x 20m condition plot are:
  - (a) full species name (*Genus species*) 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, and
  - (b) genus name or the full species name where practicable for all other species. Practicable means that sufficient plant material is present to make a species level identification and the assessor has sufficient skills and knowledge to make the identification in the field
  - (c) whether each species is native, exotic, or high threat exotic
  - (d) the growth form group to which each native species has been allocated.
- The composition of each growth form group is assessed by counting the number of different native plant species recorded within each growth form group within each 20m × 20m condition plot.

### Structure

- Structure is the assessment of foliage cover for each growth form group within the 20m x 20m plot boundary. 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 must record 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 must draw from the following number series: 0.1, 0.2, 0.3,.....1, 2, 3,.....10, 15, 20, 25,.....100%.
- The assessor must not use methods such as Braun-Blanquet (or other) classes, or a transect point intercept method to record the foliage cover score for a growth form group.
- The structure of each growth form group for the 20m x 20m plot is 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 must assign each non-native (exotic) plant species a foliage cover estimate and either E (exotic) or HTW (high threat weed).

### Function

- The number of large trees, tree stem size class, tree regeneration and length of fallen logs is recorded within a 1000m<sup>2</sup> plot.
- Tree stem size classes should be 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 contribute to counts for determination of presence and for a multi-stemmed tree, only the largest living stem is included in the count.

- 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 must be equal to or greater than the large tree benchmark DBH size to count as a large tree.
- Stem size class is 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).
- For a multi-stemmed tree, only the largest living stem is counted for determining the presence or absence of stems within each size class.
- Regeneration is 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 must only record 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. Litter cover includes leaves, seeds, twigs, branchlets and branches (<10cm in diameter). The assessment of litter cover must include all plant material that is 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 should be considered as the two-dimensional litter layer and includes litter under the canopies of erect plants.
- The number of trees with hollows is 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 can include native species allocated to the shrub growth form group. It must include both living and dead trees.
- The number of trees with hollows does 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 and for identifying the credit class for biodiversity credits in Chapter 10.2 of the BAM.

Appendix E. Photo point monitoring

Table 13: Derived grassland and area of woodland from MZ6\_009 (photo point 5)



2012



2013



2014



2015



2016



2017



2018



2019



2020



2021

Table 14: Derived grassland from photo point 4



2012



2013



2014



2015



2016



2017



2018



2019



2020



2021

Table 15: Area of erosion, Photo point 7



2012



2013



2014



2015

No Data



2016



2017



2018

2019



2020



2021



Table 16: MZ6\_006. Note the obvious cover differences between the years. Woody weed control required in 2022.



2012



2013



2014



2015



2016



2017



2018



2019



2020



2021

Table 17: MZ6\_007. Note the ground cover since 2012. Woody weed control required in 2022.



2012



2013



2014



2015



2016



2017



2018



2019



2020



2021

Table 18: Regenerating woodland from MZ5\_002. Note the increase in the regeneration of *Bursaria spinosa* within the woodland understorey



2012



2013



2014



2015



2016



2017



2018



2019



2020



2021

Table 19: Derived grassland from M5\_005.



2012



2013



2014



2015



2016



2017



2018



2019



2020



2021

## Contact Us

Niche Environment and Heritage  
02 9630 5658  
info@niche-eh.com

NSW Head Office – Sydney  
PO Box 2443 North Parramatta  
NSW 1750 Australia

QLD Head Office – Brisbane  
PO Box 540 Sandgate  
QLD 4017 Australia

Sydney  
Illawarra  
Central Coast  
Newcastle  
Mudgee  
Port Macquarie  
Brisbane  
Cairns



## Our services

### Ecology and biodiversity

Terrestrial  
Freshwater  
Marine and coastal  
Research and monitoring  
Wildlife Schools and training

### Heritage management

Aboriginal heritage  
Historical heritage  
Conservation management  
Community consultation  
Archaeological, built and landscape values

### Environmental management and approvals

Impact assessments  
Development and activity approvals  
Rehabilitation  
Stakeholder consultation and facilitation  
Project management

### Environmental offsetting

Offset strategy and assessment (NSW, QLD, Commonwealth)  
Accredited BAM assessors (NSW)  
Biodiversity Stewardship Site Agreements (NSW)  
Offset site establishment and management  
Offset brokerage  
Advanced Offset establishment (QLD)



---

**Appendix 13: Ventilation Shaft No. 6 Bush Regeneration Report - 2021/2022**



**Landcare Australia**

**Vent Shaft 6 Bush Regeneration  
Report for South32**

**August 2021**

## Document Control

### Project Name

VENT SHAFT 6 BUSH REGENERATION REPORT FOR SOUTH32

		Date
<b>Prepared by</b>	Anna Charlton Shick	29/7/2021
<b>Approved by</b>	Rob Porter	2/8/2021

### Disclaimer

This document may only be used in accordance with the contract between Landcare Australia Ltd and South32. The scope of services was defined in agreement with South32, and preparation has relied upon the data collected at the time and the availability of information and other data on the subject property. Legislation, regulations, and relevant information changes on an on-going basis. Readers are advised to obtain up to date Information.

Landcare Australia Pty Ltd has prepared this report for South32 and accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this document and its supporting material by any third party. Information provided is not intended to be a substitute for site-specific assessment or legal advice in relation to any matter.



# Landcare Australia – Vent Shaft 6 Bush Regeneration Report

## 1. Introduction

Vent Shaft 6 is located to the northeast of the township of Douglas Park and Landcare Australia was engaged to undertake bush regeneration works (including weed control and reporting) at the site between July 2020 - July 2021.

The bush regeneration works associated with this project relate to:

- Management Zone 5 (MZ 5) the offsets area, and;
- Management Zone 6 (MZ 6) the native vegetation area.

Refer to the map in Section 5 for location details.

Shale Hills Woodland (a community of the Cumberland Plain Woodland) and exotic pastures form the bulk of the site as mapped in the Appin Vent Shaft 6 Biodiversity Management Plan. Both management zones are heavily affected by invasive woody and herbaceous weed species.

## 2. Description of Work

Management Zones	Type of Work	Weed Type	Work Description
MZ5	Primary	Woody	Cut and paint or drill stem injection of woody weeds. Target weeds include, African olive, African boxthorn, and Blackberry. All vegetative material was cut into piles and left onsite.
	Maintenance	Woody and Herbaceous	Follow-up spot spraying and hand weeding the areas previously treated within native vegetation. Target weeds include Blackberry, African olive and African boxthorn regrowth and Scotch thistle, Paterson's curse, Purpletop, Fleabane, and Brassica.
MZ6	Primary	Woody	Cut and paint or drill stem injection of woody weeds. Target weeds include, African olive, African boxthorn, and Blackberry. All vegetative material was cut into piles and left onsite.
	Maintenance	Woody and Herbaceous	Follow-up spot spraying and hand weeding the areas previously treated within native vegetation. Target weeds include Blackberry, African olive and African boxthorn regrowth and Scotch thistle, Paterson's curse, Purpletop, Fleabane, and Brassica.

Table 1: Description of work

### Notes:

- All spraying utilised a 1% solution of Roundup Biactive unless otherwise stated

- All cut/scrape and painting or drill stem injection was done using neat Roundup Biactive and a marker dye.
- Refer to the attached map for location of areas treated for both primary and maintenance weed control.

### 3. Comments

#### 3.1. Management Issues:

Previous erosion observed to the unnamed creek in MZ5 running east to west (refer to blue highlighted area on the map for location details). Erosion appears to have not worsened during large rainfall events although erosion is still present.

Both management zones are largely impacted by the presence of African olive and to a lesser extent, African boxthorn, Blackberry and a range of herbaceous species from previous land uses.

#### 3.2. Site Progress

Landcare Australia has completed six (6) site visits on the following dates, including:

- 2 July 2020
- 10 November 2020
- 8 December 2020
- 15 January 2021
- 25 March 2021
- 29 April 2021

A full list of all weed species observed and treated in both management zones during these site visits is listed in table 2.

No observations of *Pimelea spicata* occurred during these site visits. The completion of primary and maintenance weed treatment during this period ensures compliance with Management Actions 13 and 16 of the Appin Vent Shaft 6 Biodiversity Management Plan, Bulli Seam Operations.

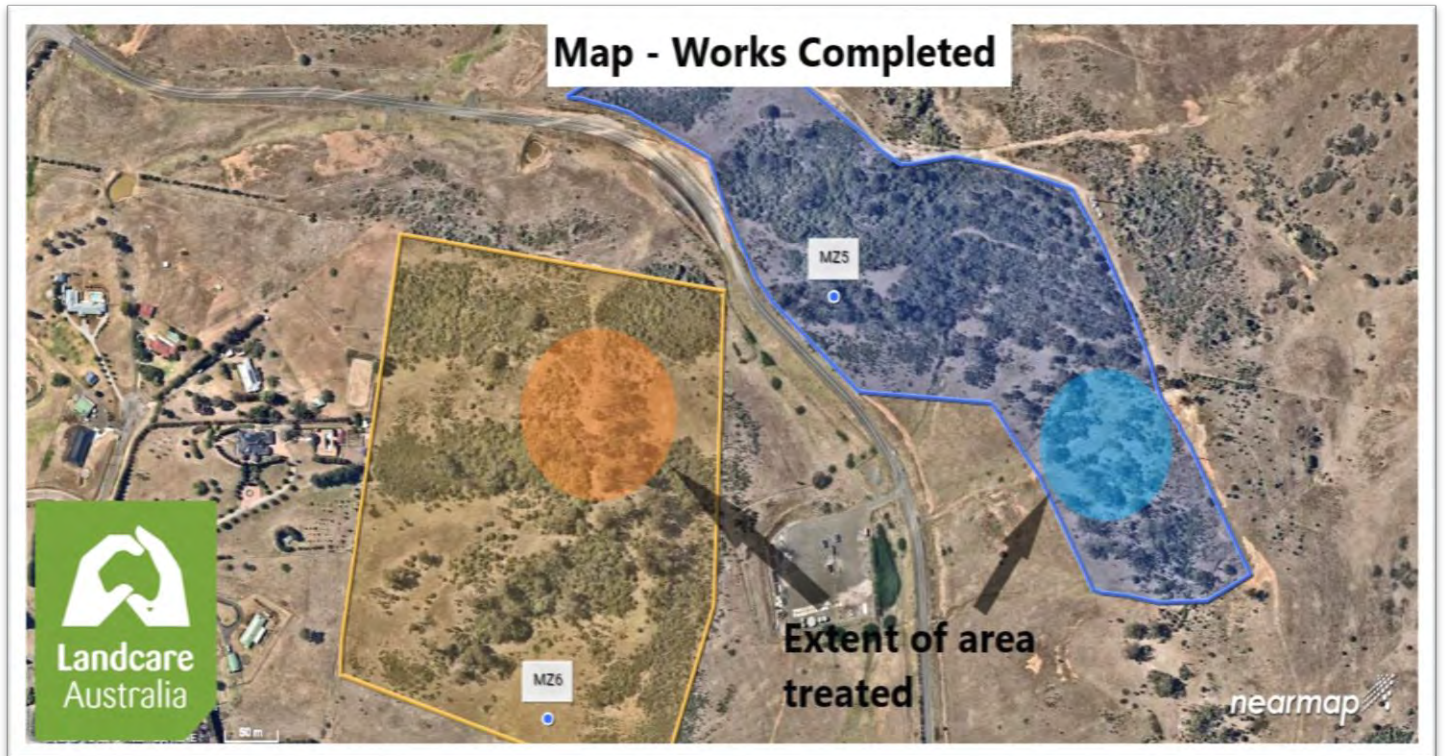
### 4. Weed Species Identified and Treated within MZ 5 and MZ 6

Scientific Name	Common Name
<b>Herbaceous</b>	
<i>Brassica spp.</i>	Brassica
<i>Cirsium vulgare</i>	Spear thistle
<i>Onopordum acanthium</i>	Scotch thistle
<i>Conyza spp.</i>	Fleabane
<i>Echium plantagineum</i>	Paterson's curse
<i>Setaria sphacelata</i>	Pidgeon grass
<i>Gomphocarpus fruticosus</i>	Cotton bush
<i>Sida rhombifolia</i>	Paddy's Lucerne
<i>Verbena bonariensis</i>	Purpletop
<b>Woody</b>	
<i>Olea europaea subsp. cuspidata</i>	African olive

<i>Lycium ferocissimum</i>	African boxthorn
<i>Rubus sp.</i>	Blackberry

Table 2: Weed species onsite

## 5. Map of Management Zones and Areas Treated



Map 1: Location of areas treated within MZ 5 and MZ 6



---

**Appendix 14: EPBC Approval 2010/5350 Compliance Report - FY22**



## Bulli Seam Operations Annual Compliance Report – August 2022 (EPBC 2010/5350)

**Date of submission:** 12 August 2022

**South32 Website Upload Date:** 12 August 2022

Abbreviations:

DOtEE – Federal Department of the Environment and Energy (now DAWE)

DAWE – Department of Agriculture, Water and the Environment (formerly DOtEE)

DCCEEW – Department of Climate Change, Energy, the Environment and Water (formerly DAWE)

OEH – NSW Office of Environment and Heritage (now Biodiversity and Conservation Science Directorate)

CCL – Consolidated Coal Lease

EPBC – Environment Protection and Biodiversity Conservation

IMC – Illawarra Metallurgical Coal

In accordance with condition 14 of the EPBC Approval (2010/5350), within three months of every 12 month anniversary of the commencement of the action, the person taking the action must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the department at the same time as the compliance report is published.

Condition	Condition Summary	Status	Compliant 2022
1	<u>Persoonia Hirsuta (Hairy Geebung)</u> Approval holder must legally secure the approved offset area for conservation for the duration of the EPBC approval.	Proposed offset area submitted to DOtEE in the <i>Persoonia hirsuta</i> Offset Management Plan. Application submitted on 26 Nov 2013 to amend CCL724 via a s238 Condition under the Mining Act 1992 to legally secure a <i>Persoonia hirsuta</i> Offset Area at Appin North (formerly West Cliff Mine) as required by the Bulli Seam Operations EPBC Approval (2010/5350). The Minister for Resources and Energy amended CCL 724 on 23 March 2014.	Yes



Condition	Condition Summary	Status	Compliant 2022
2	<p><u>Persoonia Hirsuta</u></p> <p>Develop a management plan for the <i>Persoonia hirsuta</i> offset area.</p> <p>Annual monitoring requirements and provide results of the monitoring to the Dept within a timeframe.</p> <p>No clearing of Stage 4 emplacement area permitted until the Offset MP has been approved by the Minister.</p>	<p><i>Persoonia hirsuta</i> Offset Management Plan was submitted to DOfEE prior to 31 December 2012 and approved on 22 November 2013 (ref 2013/10882). The latest revision (Version 1.1) was approved in May 2022. The Plan is available on South32 website using this link: <a href="#">Persoonia hirsuta Offset Management Plan</a>.</p> <p><i>Persoonia hirsuta</i> Condition Reports were submitted as required in 2013, 2014, 2015 (submitted late), 2016, 2017, 2018, 2019, 2020 and 2021.</p> <p>Clearing for Stage 4 coal-wash emplacement has not yet been undertaken.</p>	Yes
3	<p><u>Persoonia Hirsuta</u></p> <p>Engage a suitably qualified expert to undertake targeted research to inform conservation activities. Make research publicly available.</p>	<p>IMC received an extension to the deadline for finalising and reporting the research to 30 June 2021. The research report was submitted to DAWE on 29 June 2021. The research report is available on the South32 website using this link: <a href="#">Persoonia hirsuta Research Report</a>.</p> <p>The research report is included within the approved Offset MP (see link above).</p>	Yes
4	<p><u>Shale/Sandstone Transition Forest</u></p> <p>Implement the approved SSTF Offset MP.</p> <p>Legally secure the offset for long term conservation.</p>	<p>In 2012, IMC provided an offset management plan as well as ecological survey information to comply with these conditions. The plan was approved by DOfEE in June 2013. In 2014, IMC requested an extension to the deadline to have the offset secured in perpetuity. DOfEE granted an additional 18 months, making the deadline March 2016.</p> <p>In October 2015, IMC made an application to (then) NSW Office of Environment &amp; Heritage (OEH) to have the SSTF offset secured via a BioBanking Agreement</p>	Yes



Condition	Condition Summary	Status	Compliant 2022
		under Part 7A Division 2 of the <i>Threatened Species Conservation Act 1995</i> . The BioBanking Agreement was finalised and executed on 1 February 2017.	
5	<p><u>Shale/Sandstone Transition Forest</u></p> <p>Provide a management plan for shale/sandstone transition forest.</p>	<p>Management plan submitted and approved on 7 June 2013. The revised Plan was updated and approved on 2 September 2014.</p> <p>The Management Plan was updated in 2018 and re-submitted to the DOtEE to reflect the new offset mechanism (BioBanking). Condition 5A was added to the EPBC approval in May 2018:</p> <div style="border: 1px solid black; padding: 5px;"><p>Conditions attached to the approval</p><p>5A If the <b>Shale Sandstone Transition Forest</b> is legally secured as a registered NSW BioBanking site, the management plan developed under the NSW BioBanking Agreement for that site is an Offset Management Plan for the purposes of Condition 4. The annual reporting required under that scheme may be provided to the <b>department</b> in place of the reports containing monitoring results required at Condition 5c, on the proviso that all measures specified in Condition 5 are covered.</p></div> <p>The 2017/18, 2018/19, 2019/20, 2020/21 SSTF monitoring was conducted under the requirements of the Biobanking Agreement.</p> <p>The 2021 annual report was also completed in accordance with the BioBanking Agreement and will be provided to DAWE in August 2022.</p> <p>In the Independent Environmental Audit (Dec 2019) that was conducted for the Bulli Seam Operations (BSO) under Condition 9 of Schedule 6 of the BSO Project Approval and Condition 18 of EPBC Approval 2010/5350, an administrative non-compliance was noted, and a recommendation was made as follows:</p>	Yes



Condition	Condition Summary	Status	Compliant 2022
		<p><i>It is recommended that confirmation be sought from the Department that the required timing for submission of the monitoring report in Condition 5c be changed to that required under the Biobanking Scheme.</i></p> <p>South32 received the below response from DAWE in July 2020:</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>From:</b> Peter Blackwell &lt;<a href="mailto:Peter.Blackwell@awe.gov.au">Peter.Blackwell@awe.gov.au</a>&gt;  <b>Sent:</b> Friday, 10 July 2020 2:34 PM  <b>To:</b> Schultz, Chris &lt;<a href="mailto:Chris.Schultz1@south32.net">Chris.Schultz1@south32.net</a>&gt;  <b>Cc:</b> Vaughn Cox &lt;<a href="mailto:Vaughn.Cox@awe.gov.au">Vaughn.Cox@awe.gov.au</a>&gt;  <b>Subject:</b> RE: Submission date for Biobanking Report - Shale/Sandstone Transition Forest Offset [SEC=OFFICIAL]</p> <p>Hi Chris</p> <p>I confirm that, consistent with the intent of condition 5A, added to the conditions attached to the approval on 4 May 2018, if the SSTF is legally secured as a registered NSW BioBanking site, the annual reporting required under NSW BioBanking for that site may be provided to the Department in place of the reports containing monitoring results required at condition 5c, and thus such reports should be provided to the Department in accordance with the timing required under NSW BioBanking for that site.</p> <p>Cheers</p> <p><b>Peter Blackwell</b>  Post Approvals Section  Assessments (WA, SA, NT), Post Approvals and Policy Branch  Environment Approvals Division</p> <p>Department of Agriculture, Water and the Environment   <a href="http://awe.gov.au">awe.gov.au</a>  T: 03 6208 2927   E: <a href="mailto:peter.blackwell@awe.gov.au">peter.blackwell@awe.gov.au</a></p> </div> <p>In June 2021, the wording in Condition 5 of the approval was amended to remove ambiguity.</p> <p>The Shale Sandstone Transition Forest Offset Management Plan was updated in July 2021. The current version of the SSTF OMP (APNMP0118 Version 1.0) is available on the IMC website at: <a href="#">Shale Sandstone Transition Forest Offset Management Plan</a>.</p>	
6	<p><u>Coal Wash Emplacement Staging and Rehabilitation Plan</u></p> <p>Develop a Coal Wash Emplacement Staging and</p>	<p>The Coal Wash Emplacement Area Management Plan (available on the South32 website using <a href="#">this link</a>) incorporates the requirements of both the</p>	Yes





Condition	Condition Summary	Status	Compliant 2022
	<p>Rehabilitation Plan for stage 4 coal wash emplacement area.</p> <p>Submission of rehabilitation monitoring results.</p>	<p>EPBC Act approval and NSW EP&amp;A Act. The latest version of the Plan was approved by DAWE on 28 January 2021.</p> <p>Results of the monitoring are provided in the Annual Review which is published on the South32 website. The 2021 report was submitted on time by email on 11 August 2022 and will be included in the FY22 Annual Review.</p>	
7	<p><u>Southern Brown Bandicoot and Broad Headed Snake Management Plan or Plans</u></p> <p>Develop a Southern Brown Bandicoot and Broad Headed.</p> <p>Snake conservation management plan or plans.</p>	<p>Draft Plans completed and submitted to DOtEE on 15 May 2013.</p> <p>Plans were revised following comments from DOtEE and OEH. Final Plans re-submitted to DOtEE and OEH on 29 April 2014. Plans approved on 28 May 2014.</p> <p>The Plans were revised and combined in 2020 in APNMP0111. The plan was approved by DAWE on 28 January 2021. The current Plan is available on the South32 website at <a href="#">Broad-headed Snake and Southern Brown Bandicoot Management Plan</a>.</p>	Yes
8	<p><u>Surface and Ground Water Quality Monitoring and Adaptive Management Plan</u></p> <p>Develop a Surface and Ground Water Quality Monitoring and Adaptive Management Plan for species listed in the EPBC Act.</p>	<p>Original Plan submitted on the 30 September 2012 to DOtEE. Plan was approved on 3 July 2014.</p> <p>The Plan was revised in 2020 and approved by DAWE on 28 January 2021. The current plan is available on the South32 website at: <a href="#">Adaptive Management Plan for Water Sensitive EPBC Species</a>.</p>	Yes
9	<p><u>Mine Closure Environmental Management Plan</u></p> <p>Develop a mine closure plan 3 years prior to closure for EPBC Act listed species.</p>	<p>Mine Closure Plan not yet submitted. Closure is not planned in the next three years.</p>	N/A



Condition	Condition Summary	Status	Compliant 2022
10	<u>Mine Closure Environmental Management Plan</u> Management for EPBC listed bats through the decommissioning of mining equipment.	Mine Closure Plan will include management of EPBC listed bats as applicable. Mine Closure Plan not yet submitted. Closure is not planned in the next three years.	N/A
11	<u>Shapefiles</u> Provide offset area shapefiles to the DOtEE.	Shapefiles provided on 26 November 2013.	Yes
12	<u>Notification of Actual Date of Commencement</u> Notification date of commencement to be supplied to DSEWPaC.	Letter sent to DOtEE (previously DSEWPaC) on 31 May 2012.	Yes
13	<u>Publication Requirements</u> Publish all management plans, reports, strategies or agreements with the Department	Undertaken as required. See South32 website: <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a> .	Yes
14	<u>Compliance Report</u> Publish a report on website addressing compliance with each of the conditions of this approval.	This compliance report meets this condition. The 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020 and 2021 reports were submitted and are available on the South32 website.	Yes
15	<u>Accurate Records Must be Maintained</u> Maintain accurate records substantiating all activities associated with or relevant to the conditions of approval.	Documents are maintained in the IMC controlled document system.	Yes
16 (16A, 16B, 16C, 16D, 16E)	<u>Minister's Approval of the Modification to a Management Plan, Report, Strategy or Agreement</u> Apply to the minister for approval to modify management plans, reports, strategies or agreements.	The following management plans were submitted in FY21: <ul style="list-style-type: none"> <li>- Broad-headed Snake and Southern Brown Bandicoot Management Plan</li> <li>- Adaptive Management Plan – Water Sensitive EPBC Act Listed Species</li> <li>- Coal Wash Emplacement Area Management Plan</li> </ul>	Yes



Condition	Condition Summary	Status	Compliant 2022
		<p>Minor amendments to these documents were included in the revisions. The management plans were approved by the Minister.</p> <p>The Shale Sandstone Transition Forest Offset Management Plan was reviewed however does not require approval by the Minister.</p> <p>No EPBC Approval related management plans were reviewed in FY22.</p>	
17	<p><u>Minister's Modification to a Management Plan, Report, Strategy or Agreement</u></p> <p>Comply with the minister's request to modify management plans, reports, strategies or agreements.</p>	<p>No requests received from the Minister for modifications in this reporting period.</p>	N/A
18	<p><u>Independent Auditor</u></p> <p>Commission and pay the full cost for independent environmental auditor of the project.</p>	<p>Independent audits were carried out in accordance with the conditions in 2013/14, 2017 and 2019. This most recent report is available on the South32 website at: <a href="#">IEA 2019</a>. There was no audit undertaken in this reporting period.</p> <p>The next audit will take place prior to the end of December 2022. Endorsement of the audit team has been received by DCCEEW.</p>	Yes
19	<p><u>Unsatisfactory Commencement of Action</u></p> <p>If work has not commenced within 5 years of approval, written approval needs to be obtained from the minister.</p>	<p>Work commenced on 15 May 2012 as per date of commencement letter sent to the Department.</p>	Yes

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

			Outcome	Comment	Proposed Action
AUDIT REVIEW					
Section	MP Ref.	Requirement / Obligation			
Management Strategies	6.1	Clearing practices will incorporate appropriate controls to minimise mortality and injury to Broad-headed Snakes and Southern Brown Bandicoots occupying the site.	In Control	Clearing practices involve a two-staged process as required by the MP.	
Pre clearance surveys	6.1.1	Prior to the first stage of clearing, the area to be cleared will be marked using flagging and surveyed by an ecologist or suitably trained site environmental representative to locate, record and mark specific habitat features that are proposed for preservation and redistribution to the emplacement (e.g. rocks and boulders, stags and large hollows).	In Control	Pre-clearing assessment undertaken as required which contains instructions for redistributing habitat	
Two stage Clearing	6.1.2	Where possible, (i.e. where access to trees by the excavator is safe and practical), clearing of hollow bearing trees will be performed in a two stage process where surrounding vegetation is cleared separately, before the removal of habitat trees to allow fauna an opportunity to move.	In Control	Clearing practices involve a two-staged process as required by the MP.  Pre-clearing assessment undertaken as required which contains instructions for redistributing habitat.	
Management of Captured Animals	6.1.3.1	If a Broad-headed Snake is found during the two-stage clearing process, the animal will be relocated to pre-determined suitable habitat within the Appin North surface mining lease area	In Control	In April 2016, one individual Broad-headed Snake was found in the Stage 3 area during a pre-clearing survey. The individual was captured and released to another location in accordance with this Plan. No other individuals have been located since.	

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Management of Captured Animals	6.1.3.1	Pre-determined sites for relocation will take into account the species home ranges and be evenly spaced to avoid social conflict. Ideally, predetermined relocation sites should not be inhabited by another Broad-headed Snake at the time of relocation.	In Control	In April 2016, one individual Broad-headed Snake was found in the Stage 3 area during a pre-clearing survey. The individual was captured and released to another location in accordance with this Plan. No other individuals have been located since.	
Management of Captured Animals	6.1.3.1	Pre-determined relocation sites will necessarily consist of the following: <ul style="list-style-type: none"> <li>• occur on Hawkesbury Sandstone within the current known range of the species and provide rocky outcrops with a westerly or north-westerly aspect, and horizontal crevices (Webb and Shine 1998c); and/or</li> <li>• have large adjacent areas of woodland that support large stags or trees bearing numerous hollows (Webb and Shine 1997b). The adjacent woodland will ideally be larger than the area supporting rocky outcrops (Webb and Shine 1997a) and contain preferred species of 'habitat trees' (trees most often selected by Broad-headed Snakes) such as <i>Eucalyptus gummifera</i>, <i>E. punctata</i>, <i>E. agglomerata</i> and <i>E. piperita</i> (Webb and Shine 1997b).</li> </ul>	In Control	The snake found in April 2016 was relocated to pre-determined habitat in accordance with Figure 3 of the MP.	
Management of Captured Animals	6.1.3.1	Any other fauna located within the CWEA during the pre-clearing survey will also be relocated. In particular, any Velvet Geckos (and other lizards) encountered will be relocated to the same pre-determined sites for Broad-headed Snakes to provide prey for the relocated snakes.	In Control	Not triggered	

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Management of Captured Animals	6.1.3.1	Where possible, snakes will be translocated from the initial capture point to the nearest site considered suitable for the long-term habitation by the species, but not more than 1 km from that point (where possible) to reduce the possibility for unfavourable genetic mixing.  Snakes will be released at sites as soon as practicable after capture.	In Control	The snake found in April 2016 was relocated to pre-determined habitat in accordance with Figure 3 of the MP.	
Management of Captured Animals	6.1.3.1	BCD will be notified within one month of any Broad-headed Snakes identified during preclearing surveys and relocated.	In Control	Not triggered	
Management of Captured Animals	6.1.3.2	Sites for relocation will take into account the species home ranges and be evenly spaced to avoid social conflict. Where possible, captured bandicoots will be translocated from the initial capture point to the nearest site considered suitable for the long-term habitation by the species, but not more than 1 km from that point (where possible) to reduce the possibility for unfavourable genetic mixing.	In Control	Not triggered	
Management of Captured SBBs	6.1.3.2	Bandicoots will be released at sites as soon as practicable after capture.	In Control	Not triggered	
Habitat Translocation - Broad-headed Snake	6.1.4	Suitable winter habitat occurring within the Stages 3 and 4 of the Emplacement Area will be identified during the pre-clearing survey.	In Control	Pre-clearing assessment undertaken as required which contains instructions for redistributing habitat.	

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Habitat Translocation - Broad-headed Snake	6.1.4	<p>Rehabilitation of the CWEA behind the line of clearing for the Broad-headed Snake, in terms of winter habitat, will include the following:</p> <ul style="list-style-type: none"><li>• Translocated rocky outcrops and boulders will ideally be positioned with a westerly or north-westerly aspect and crevices should remain horizontal (Webb and Shine 1998c; Goldingay and Newell 2017).</li><li>• The Velvet Gecko should also be translocated (Webb and Shine 2000). Suitable habitat for this prey species is the same as for the Broad-headed Snake's winter habitat and includes loose rock on rock substrate (Shine et al. 1998, Webb and Shine 1998c, Croak et al. 2013).</li><li>• The above shelter sites will ideally be evenly spaced and not clumped together to encourage a greater number of Broad-headed Snakes to the area (Webb and Shine 1997a). If shelter sites are too close together, they are likely to remain uninhabited due to home range overlap. Shelter sites will ideally be placed at least 300 m apart and close/adjacent to suitable summer habitat (translocated hollow-bearing trees or limbs within rehabilitating sections</li></ul>	In Control	Artificial pavers were installed in the emplacement area in FY22.	
--	-------	--	------------	---	--

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

		<ul style="list-style-type: none"> <li>• Artificial rocks/concrete pavers will be added to the CWEA behind the line of clearing to increase habitat opportunities for prey items and the Broad-headed Snake if insufficient natural rock cannot be sourced from the CWEA for this purpose. Webb and Shine (2000) recommend the use of large pavers (30 – 45 cm wide and 5 – 10 cm thick), as well as a range of smaller pavers (e.g. 19 cm wide) and thicker pavers (e.g. &gt; 30 cm thick) placed with a variety of crevice sizes (up to 10 mm). The artificial rocks will be placed in both shaded and exposed areas to provide a range of suitable micro-climates for the snake and its prey depending on the time of year (Croak et al. 2013, Croak et al. 2008, Croak, et al. 2010).</li> <li>• Hollow logs and hollow-bearing stags will also be translocated to provide additional retreat-sites for the Broad-headed Snake and its prey (Webb and Shine 1997b).</li> </ul>			
Habitat Protection during construction	6.1.5	Sediment control measures will be adopted during clearing, as outlined in the CWEAMP.	In Control	Incorporated into emplacement design requirements	
Habitat Protection during construction	6.1.5	The CWEA will be clearly demarcated and regularly surveyed to prevent unnecessary clearing or access by construction vehicles and plant to surrounding potential habitat.	In Control	Emplacement boundaries are defined on digital plans and bounded by haul roads and diversion drains.	



BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Habitat Protection during construction	6.1.5	Construction materials and spoil must not be stored, dumped or stockpiled within surrounding habitat.	In Control	Stockpiling of freshly stripped topsoil is avoided through progressive rehabilitation. There are some stockpiles onsite containing topsoil material from the original stage 3 emplacement development construction; however this is strategically set aside for future capping material as the emplacement progresses down the valley. These stockpiles are stable and non-polluting and situated within the approved disturbance footprints.	
Habitat Protection during construction	6.1.5	Induction of the CWEA Supervisory personnel will include information about the Southern Brown Bandicoot and its habitat within Stage 4 of the CWEA, along with protection measures that will be in place and enforced during the construction period.	In Control	Construction in Stage 4 has not yet commenced.	

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Habitat Protection during construction	6.1.5	General information on threatened species (including key site contacts for threatened species) will be provided to all CWEA personnel.	In Control	In late 2020 the Emplacement operational personnel were refreshed on the requirements for threatened species during emplacement construction.	Refresher planned in FY23.
Summary of Impact Minimisation Strategies	6.2/ Table 3	Vegetation clearing to be within approved boundaries	In Control	Boundaries set out in Emplacement MP.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Future development requiring land clearing to consider Broad-headed Snake and Southern Brown Bandicoot individuals.	In Control	Any additional clearing (outside the emplacement area) onsite will consider internal and external approval requirements.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Conduct pre-clearance surveys in the Stage 3 and 4 CWEAs and subsequent two-stage clearing, to give animals the opportunity to move away.  Individuals found will be relocated to pre-determined suitable habitat within the Appin North surface mining lease area.	In Control	Two-stage clearing processes are being followed as required. No SBB individuals have been found to date.  The BHS found in April 2016 was relocated to pre-determined habitat in accordance with Figure 3 of the MP.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Document by preparation of pre-clearing survey reports for every emplacement phase cleared including use of GIS coordinates for survey results.	In Control	Pre-clearance survey reports completed as required and issued to the emplacement contractors undertaking the clearing.	

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Summary of Impact Minimisation strategies	6.2/ Table 3	Document by preparation of pre-clearing survey reports for every emplacement phase cleared including use of GIS coordinates for survey results.	In Control	Pre-clearance survey reports completed as required and issued to the emplacement contractors undertaking the clearing. Last report completed January 2021.	
Summary of Impact Minimisation strategies	6.2/ Table 3	Document numbers of individuals trapped and released. Observation of animal condition. Record release location.	In Control	S32 engaged a snake expert from Niche Environment & Heritage in 2016 to capture and relocate the individual. A brief report was prepared documenting the process.	
Summary of Impact Minimisation strategies	6.2/ Table 3	Placement of hollow logs and rock outcrop elements of habitat for the Broad-headed Snake in rehabilitated areas.	In Control	Rehabilitation includes placement of rocks and hollows as required. Pre-clearance inspections also identify flat rock to be retained and translocated to the rehab areas. Artificial pavers were installed in the emplacement area in FY22. No translocation of Velvet Geckos has been undertaken or required.	
Summary of Impact Minimisation strategies	6.2/ Table 3	Installation of artificial habitat (e.g. concrete paving slabs) if necessary as per Webb and Shine (2000).	In Control	Rehabilitation includes placement of rocks and hollows as required. Pre-clearance inspections also identify flat rock to be retained and translocated to the rehab areas. Artificial pavers were installed in the emplacement area in FY22. No translocation of Velvet Geckos has been undertaken or required. Monitoring of habitat use is planned to be undertaken.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Placement of topsoil, hollow logs and other structural elements of habitat for the Southern Brown Bandicoot in rehabilitated areas.	In Control	Undertaken as part of the progressive rehabilitation program - See Annual Emplacement Rehabilitation Monitoring Report.	

## BULLI SEAM OPERATIONS

### Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Summary of Impact Minimisation Strategies	6.2/ Table 3	Annual Emplacement Rehabilitation Inspection program undertaken	In Control	As above	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Reports from the annual rehabilitation monitoring program to be attached to the Appin Mine Annual Review.	In Control	Report is included each year as an appendix to the Annual Review.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Dust impacts from emplacement operations will be mitigated by the coal wash material being wet from coal washing processes and being compacted once emplaced.	In Control	In addition to coal wash moisture content, a watercart is in use for the active emplacement areas as additional dust control.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Active emplacement areas will be capped and vegetated as soon as practicable.	In Control	Rehabilitation is progressive as required.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Annual environmental reporting of air quality results and performance of mitigation measures in the Appin Mine Annual Review.	In Control	Dust results are provided in the Annual Review each year as required.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Participation in regional vertebrate pest programs with National Parks & Wildlife Service and Sydney Catchment Authority.	In Control	Not aware of any such program existing. No population of SBBs has been confirmed or defined.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Note: The regional research program established under the EPBC Act project approval (condition 7b) will focus on population monitoring. A regional pest problem will be designed once a population of Southern Brown Bandicoots has been confirmed and defined.	In Control	No population of SBBs has been confirmed or defined.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Reporting of project to DAWE and other stakeholders.	In Control	DAWE is provided with a copy of the Annual Review each year.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Adjustments made to systems and methods as required	In Control	Not Triggered	

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Summary of Impact Minimisation Strategies	6.2/ Table 3	Monitoring including pre-clearing surveys, capture and transfer of animals, implementation of two-stage clearing, success of translocation efforts, progress in rehabilitation of emplacement sites, success of captive breeding programs if applicable.	In Control	Pre-clearance surveys undertaken as required, no SBB have been captured and no BHS since 2016. Success of rehabilitation reported in the Annual Review.	
Summary of Impact Minimisation Strategies	6.2/ Table 3	Annual compliance report to DAWE.	In Control	Annual compliance report submitted as required.	
Provision of Regional Funding	7.1	Illawarra Coal (IC) has funded \$250,000 towards the regional management of the Southern Brown Bandicoot and Broad-headed Snake programs as outlined in this Plan and as detailed in the Offset Strategy (Appendix 5). The project took place over three years commencing July 2014 and finishing June 2017 with payments issued as follows: • Year 1 \$85,000 July 2014. • Year 2 \$85,000 July 2015. • Year 3 \$80,000 July 2016.	In Control	Program completed as required	
Actions to be funded	7.2	OEH developed a Project Proposal to be funded by IC, which addressed points (c) to (f) of the EPBC Approval Condition 7. The Project Proposal, OEH Letter of endorsement and BHPBilliton letter of endorsement are provided in Appendix 5, Appendix 6 and Appendix 7 respectively.	In Control	The (then) NSW Office of Environment and Heritage (OEH) developed a Project Proposal to be funded by IC, which addresses points (c) to (f) of the EPBC Act Approval Condition 7.	

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Impacts to other EPBC Act Listed Species	7.3	Condition 7(d) of the EPBC Approval for works conducted by OEH as follows: (d) a demonstration that management actions to be undertaken will not adversely impact EPBC Act listed species; The OEH Proposal addressed the above requirement (see section titled Consideration of Impacts of the Project).	In Control	The OEH Proposal addressed the above requirement.	
Funding Arrangements	7.4	OEH provided a Project Proposal for the Broad headed snake and Southern Brown bandicoot Recovery Actions (see Appendix 5). IC provided the funding through a Non-order Invoice (NOI). OEH issued three separate invoices, prior to the start of each financial year i.e. Year 1, Year 2 and Year 3.	In Control	IMC provided the funding through a Non-order Invoice (NOI). OEH issued three separate invoices, prior to the start of each financial year i.e. year 1, year 2 and year 3.	
Documentary Evidence of Funding	7.5	IC provided documentary evidence to the DoTE&E in September 2016 to satisfy this condition. The relevant results were included in the FY17 BSO Annual Review.	In Control	IMC provided documentary evidence to the DoTE&E in September 2016 to satisfy this condition.  <a href="https://www.south32.net/docs/default-source/illawarra-coal-bulli-seam-operations/annual-review/bulli-seam-operations-project-annual-review-fy2017.pdf?sfvrsn=2ace739a_4">https://www.south32.net/docs/default-source/illawarra-coal-bulli-seam-operations/annual-review/bulli-seam-operations-project-annual-review-fy2017.pdf?sfvrsn=2ace739a_4</a>	
Reporting	8.1.1	Annual reporting is undertaken as per Condition 14 of the EPBC Approval.  The Compliance Report is required to be submitted to DAWE by 15 August of each year via EPBCMonitoring@environment.gov.au and is attached as an appendix in the Annual Review.	In Control	The Compliance Report has been submitted as required and attached as an Appendix in the Annual Review.	

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Reporting	8.1.2	<p>IMC will report on the performance of the SBMP in the Annual Review.</p> <p>The Annual Review is prepared in accordance with Condition 4 of Schedule 6 of the Project Approval and is submitted to relevant agencies in September each year. Annual Reviews are made available to the general public via the South32 website.</p>	In Control	<p>The Annual Reviews have been completed as required and published to the South32 website.</p> <p>Actions taken to support the SBMP will be detailed in the Annual Review.</p>	
Review of SBMP	8.2	<p>In accordance with Condition 5 of Schedule 6 of the Project Approval, the SBMP will be reviewed, and if necessary revised, within three months, of:</p> <ul style="list-style-type: none"> <li>• the submission of an annual review;</li> <li>• the submission of an incident report;</li> <li>• the submission of an Independent Environmental Audit report; or</li> <li>• any modification to the conditions of the Project Approval (unless the conditions require otherwise).</li> </ul> <p>Outcomes from each review will be documented in the Management Plan Review Log. The SBMP will only be revised where a material change to site operations or environmental management has occurred, or in accordance with the review period on the SBMP.</p> <p>Administrative or descriptive changes do not constitute a material change.</p> <p>Where a review triggers a revision of the SBMP, the SBMP will be revised and submitted to the Secretary and/or Minister for approval.</p>	In Control	<p>The SBB and BHS Management Plans were reviewed in FY21 and combined. The revised document was approved by DPIE on 18/12/2020 and by DAWE on 28/01/2021.</p> <p>The Management Plan Review log is being maintained.</p>	

BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

Publication	12.3	<p>Condition 13 of the EPBC Approval requires the proponent to:  <i>...publish all management plans, reports, strategies or agreements required by these conditions of approval on their website. Each management plan, report strategy or agreement must be published on the website within 30 days of being approved.</i>                      Approved versions of the SBMP will be displayed on the South32 regulatory page at:  <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>.</p>	In Control	The approved SBMP is available on the South32 website.	
Independent Environmental Audit	12.4.1	<p>In accordance with Condition 9 of Schedule 6 of the Project Approval and Condition 18 of the EPBC Approval, an Independent Environmental Audit (IEA) shall be commissioned every three years, that will include a review of the SBMP. The report is required to be submitted to the Secretary within six weeks of completion of the audit, in accordance with Condition 10 of Schedule 6 of the Project Approval and Condition 18 of the EPBC Approval. IEAs have been conducted in 2013, 2016/17 and 2019, with the next IEA to be conducted in 2022. Recommendations from the IEA will be incorporated into the SBMP where appropriate.</p>	In Control	<p>The last IEA was conducted in 2019.</p> <p>The next IEA will be completed in 2022.</p>	



BULLI SEAM OPERATIONS

Broad-headed Snake and Southern Brown Bandicoot Management Plan

APNMP0111

Management Plan Version 1.1

ISO 14001	12.4.2	As part of the ISO 14001 certification, IMC maintains an environmental auditing and governance program across all of its operational sites. The program, which includes the use of competent internal and accredited external auditors, is an integral part of maintaining certification under the ISO 14001 standard. External surveillance audits are undertaken on an annual basis, with recertification audits undertaken every three years. Internal Governance Reviews of the SBMP are nominally undertaken on a three yearly basis.	In Control	The last Governance Review was undertaken in October 2021.	
-----------	--------	--	------------	--	--

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

AUDIT REVIEW			Outcome	Comment & Evidence	Proposed Action
Section	MP Ref.	Requirement / Obligation			
Protection Mechanism	3.2.2	The Persoonia hirsuta Offset Area is protected by incorporating a condition into Consolidated Coal Lease No. 724 (CCL724)	In Control	Refer to lease conditions	
Protection Mechanism	3.2.2	The leaseholder must comply with the <i>Persoonia hirsuta</i> Offset Management Plan approved (and modified if applicable) in accordance with the requirements of the Bulli Seam Operations Expansion, Bulli, NSW (EPBC 2010/5350) Approval dated 15 May 2012, made under sections 130(1) and 133 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act Approval).	In Control	Last IEA was completed in 2019. Next IEA scheduled for 2022.	
Protection Mechanism	3.2.2	The leaseholder must provide the Department of Trade and Investment NSW - Mineral Resources Unit with a copy of the Compliance Report required by condition 14 of the EPBC Act Approval at the same time that the report is published in accordance with the requirements of Condition 14.	In Control	The FY21 Compliance Report was submitted at the same time as it was submitted to DAWE.	

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Protection Mechanism	1.4.1	The leaseholder must also provide Department of Trade and Investment NSW - Mineral Resources Unit with a copy of the Audit Report required by Condition 18 of the EPBC Act Approval as soon as practicable following confirmation that the Audit Report addresses the audit criteria to the satisfaction of the Minister responsible for the administration of the EPBC Act (or their delegate).	In Control	The triennial audit reports are provided to the Resources Regulator as required. The last IEA was undertaken in 2019. The next IEA is scheduled for 2022.	
----------------------	-------	--	------------	---	--

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Protection Mechanism	1.4.1	<p>In the event that the Persoonia Offset cannot achieve the objectives of Conditions 1 and 2 of the EPBC Approval, ICHPL will provide an offsite offset or alternative offset if:</p> <ul style="list-style-type: none"> <li>- Annual surveys over the period 2037 – 2039 (both inclusive) demonstrate that the P. hirsuta core population has not been maintained or enhanced to the satisfaction of the Department. An offsite offset to be agreed by the department must be provided. The offsite offset must be secured by a legal mechanism acceptable to the Department six months prior to the expiry date of the EPBC approval (by 18 December 2041). In the event it can be demonstrated that a suitable offsite offset could not be found, ICHPL will provide an alternative compensatory measure commensurate with the requirements of Condition 1 of the EPBC Approval to the satisfaction of the Department, or</li> <li>- CCL724 is not renewed or is revoked at any time prior to the expiry date of the EPBC approval (15 May 2042). An alternative offset to be agreed by the Department must be secured by a legal mechanism acceptable to the Department within two years of the relinquishment or revocation of CCL724.</li> </ul> <p>In the event it can be demonstrated that a</p>	In Control	Not triggered.	
----------------------	-------	---	------------	----------------	--

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

		suitable alternative offset could not be found, ICHPL will provide an alternative compensatory measure commensurate with the requirements of Condition 1 of the EPBC Approval to the satisfaction of the Department.			
Persoonia Monitoring	5.2.1	All extant plants will be inspected annually to record the following attributes: * height and width to measure growth rates; * age class and condition to assess reproductive activity, age to maturity overall health of the population etc; * visual observations for any seedlings; and * comments on any imminent threat or risk to the plants health (e.g. apparent disease, excessive dust deposition) to assess the effectiveness of management actions contained within the OMP.	In Control	See Annual Persoonia health monitoring report that is submitted each year to DAWE.	

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Persoonia Monitoring	5.2.1	<p>Height will be measured using a tape measure, measuring from the ground surface to the highest point on the plant, without physically moving any part of the plant. Condition will be defined using a combination of factors, including the percent cover of leaves, colour of leaves and the presence or absence of fruit or flowers, rating condition from 0 to 6, or from very poor condition to excellent condition.</p> <p>All plants have been recorded with a Garmin GPS and flagged with fluorescent, biodegradable flagging tape and given a unique ID.</p>	In Control	Monitoring methods as per the above.	
Survey Timing	5.2.1	<p>The survey will be conducted from late spring into early summer which is the peak flowering period for the species.</p>	In Control	Monitoring is undertaken during the peak flowering season. This does change slightly depending on season but generally falls late Spring into early summer.	
Reporting	5.2.3	<p>In accordance with Condition 2 (h) of the EPBC Approval, the results of the monitoring will be provided to the Department within 30 days of every 12 month anniversary of the implementation date of the OMP.</p>	In Control	2021 report was submitted on 23 December 2021 as required.	

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Research	6	ICHPL has engaged the University of Wollongong (UoW) and Royal Botanic Gardens Trust to conduct research on P. hirsuta. The aim of the research is to gain a better understanding of the ecology and genetics to satisfy Condition 3 of the EPBC Act Approval. A summary of the research undertaken to-date as well as the research planned is provided in Table 3.	In Control	<p>Research is now underway at the Mt Annan Royal Botanic Gardens as per strategy.</p> <p>The research report was submitted to DAWE on 29 June 2021 in accordance with Condition 3e of EPBC Approval 2010/5350.</p>	
Research	6	As new information becomes available regarding the local population of P. hirsuta, this will be incorporated into the OMP revisions as required.	In Control	<p>The research report was submitted to DAWE on 29 June 2021 in accordance with Condition 3e of EPBC Approval 2010/5350.</p> <p>The Offset Management Plan will be reviewed to incorporate the outcomes of the research.</p>	
Research	6	In accordance with Condition 3 of the EPBC Approval, ICHPL prepared a research report that was submitted to DAWE by 30 June 2021. The research report is available on the IMC website in accordance with Condition 3 (f) of the EPBC Act Approval.	In Control	<p>The research report was submitted to DAWE on 29 June 2021 in accordance with Condition 3e of EPBC Approval 2010/5350.</p> <p>The research report has been published on the IMC website.</p>	
Performance Objectives and Management Actions	7.1	1a. Secure Offset by the required timeframe i.e. 15 May 2014.	In Control	Offset secured as per timing requirements.	

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Performance Objectives and Management Actions	7.1	1b. Offset must include a minimum area of suitable habitat to support at least 150 <i>P. hirsuta</i> plants.	In Control	As per the Offset Management Plan.	
Performance Objectives and Management Actions	7.1	1c. Maintain or increase the number of individual plants in the Offset Area relative to the 2012 baseline population (~44 plants).	In Control	Three translocations have been undertaken to Appin North (Autumn 2019, Autumn 2021 and Autumn 2022).	Continue to monitor translocated <i>Persoonia</i> plants.
Performance Objectives and Management Actions	7.1	2a. Develop a <i>P. hirsuta</i> research strategy	In Control	Research strategy is included in the MP.	
Performance Objectives and Management Actions	7.1	2b. Targeted research commenced by July 2013	In Control	Targeted research has been underway since 2013.	
Performance Objectives and Management Actions	7.1	2c. Research findings published by 30 June 2021 as per the EPBC Approval.	In Control	The research report was submitted to DAWE on 29 June 2021 in accordance with Condition 3e of EPBC Approval 2010/5350.	
Performance Objectives and Management Actions	7.1	2d. Undertake Phase 3 translocation in FY22.	In Control	The Phase 3 translocation was undertaken in May 2022.	
Performance Objectives and Management Actions	7.1	2e. Continue to monitor outcomes of translocation trials.	In Control	Annual monitoring of the trials will continue to be undertaken.	



BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Performance Objectives and Management Actions	7.1	2f. Investigate opportunities with suitable organisations and research institutions for undertaking targeted research to progress recommendations as outlined in the Research Report.	In Control	Initial discussions have been held with the Mt Annan Botanic Gardens. These discussions will continue to FY23. Progress will be reported in the Annual Review.	
Performance Objectives and Management Actions	7.1	3a. No loss of <i>P. hirsuta</i> in the Offset Area due to land clearing or operational activities	In Control	Plants in an exposed position are clearly demarcated. There has been no loss due to land clearing or operational activities.  Permit to Disturb process is in place (IMCF0209).	
Performance Objectives and Management Actions	7.1	3b. No loss of <i>P. hirsuta</i> in other areas of site (outside the approved emplacement and development footprints) due to land clearing or operational activities.	In Control	Plants in an exposed position are clearly demarcated. There has been no loss due to land clearing or operational activities.	
Performance Objectives and Management Actions	7.1	3c. Restrict access to Offset Area.	In Control	Signage in place. Access to Appin North is restricted. Permit to Disturb process in place.  The area is not fenced to allow unimpeded access for wildlife and pollination vectors across the site.	

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Performance Objectives and Management Actions	7.1	3d. Avoidance of surface runoff from emplacement areas entering the <i>Persoonia hirsuta</i> Offset Area	In Control	<p>Routine inspections of the Offset have not identified any issues regarding surface runoff from emplacement areas. Stage 4 emplacement construction has not yet commenced. Stage 3 is buffered by a haul road separating the Offset from the active disturbance areas. Drainage from disturbance areas is directed to dedicated catchment ponds.</p> <p>Drainage will be incorporated into the design of Stage 4 emplacement. Not yet required.</p>	
Performance Objectives and Management Actions	7.1	3e. Minimise weed infestation within the Offset Area	In Control	Minor weed control is undertaken by experienced personnel for perennial grasses on the powerline easement.	Weed control is ongoing.
Performance Objectives and Management Actions	7.1	3f. Minimise dust impacts to <i>P hirsuta</i> from operational activities.	In Control	<p>Dust from emplacement areas is mitigated by the wet coal washing process and the compaction of emplaced coal wash. Areas are rehabilitated as soon as practicable. Watercarts are in use on the active emplacement area.</p> <p>Routine inspections of the Offset have not identified any issues regarding dust impacts.</p>	

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Performance Objectives and Management Actions	7.1	4. Adequate regeneration of emplacement as per the approved CWEA Management Plan.	In Control	As per annual Emplacement Rehabilitation Report.	
Performance Objectives and Management Actions	7.1	Soil translocation protocols and re-vegetation protocols are implemented as per the CWEA Management Plan e.g. Topsoil from the donor site will be stripped from the surface in layers. The most valuable layer is the top 50 mm of soil which contains the majority of soil stored seed and propagules, plant nutrients and beneficial soil microbes.	In Control	As per CWEAMP.	
Performance Objectives and Management Actions	7.1	P. hirsuta individuals within the approved emplacement and development footprints may be translocated to the rehabilitating emplacement.	N/A	Not required at this stage.	
Performance Objectives and Management Actions	7.1	Successfully propagated plants (or seed from propagated plants) are introduced from the nursery at Mt Annan Botanic Gardens to the rehabilitating emplacement (or other suitable areas outside the emplacement and disturbance footprints).	In Control	Translocation of Persoonia Plants into the Offset Area (Stage 3) was undertaken in Autumn 2022.	
Performance Objectives and Management Actions	7.1	Annual rehabilitation survey will be conducted and a report attached to the Appin Mine Annual Review.	In Control	Annual report is attached as an appendix each year to the Annual Review. The most recent rehabilitation report was submitted to DAWE via email 11/08/2022.	

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Management Actions and Commitments from Research	7.2	<p>1. Promoting outcrossing conditions.</p> <ul style="list-style-type: none"><li>• This has been achieved through sourcing propagative material over three years (2017-2019) from several wild populations throughout the Sydney region to supply the P. hirsuta translocation trials occurring at Appin North. This strategy ensures the translocated population will contain a level of genetic diversity that reflects the natural species' distribution.</li><li>• Genetic studies conducted by Mount Annan Botanic Gardens have confirmed there is a significant amount of genetic diversity in the Sydney region which has been enhanced in the Appin North translocations.</li><li>• The following sourced material (location, year, propagative material) was utilised in the translocations stages 1 and 2 and will also be utilised in the stage 3 translocation:<ul style="list-style-type: none"><li>- Appin North, 2017, vegetative cuttings and seeds (stages 1 &amp; 2)</li><li>- Glenorie, 2017-19, seeds (stages 1 &amp; 2)</li><li>- Yanderra, 2018, vegetative cuttings (stages 1 &amp; 2)</li><li>- Parr SCA, 2019, seeds (stage 2)</li><li>- Yango NP, 2017-2019. Seeds and cuttings (stage 2)</li></ul></li></ul>	In Control	Sourcing of vegetative material from a diverse set of locations for the P. hirsuta translocations has achieved this action.	
--	-----	--	------------	---	--

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

<p>Management Actions and Commitments from Research</p>	<p>7.2</p>	<p>2. Encouraging the presence of natural pollinators.</p> <ul style="list-style-type: none"> <li>• This will be achieved by constructing artificial Bee Habitats on site, promoting the presence of native bee species. This will be primarily focused around the introduction of bees that have been known to successfully pollinate <i>P. hirsuta</i>, namely <i>Megachile</i> and <i>Leioproctus</i> species.</li> <li>• The presence of natural pollinators is also being encouraged in the Appin North Rehabilitation areas through promoting the growth of native flowering plants that attract natural pollinators. This is achieved through using fresh soil with a naturally occurring seed bank of flowering native plant species as capping material for the rehabilitation areas as well as directly seeding native flowering plants onto the freshly capped areas. This will encourage native Australian bees to naturally inhabit areas within the Appin North site. Some native flowering species present on the Emplacement Rehabilitation Areas that are known to attract Native Australian Bees include:             <ul style="list-style-type: none"> <li>o <i>Angophora</i> spp.</li> <li>o <i>Callistemon</i> spp.</li> <li>o <i>Eucalyptus</i> spp.</li> <li>o <i>Grevillea</i> spp.</li> <li>o <i>Leptospermum</i> spp.</li> </ul> </li> </ul>	<p>Improvement opportunity</p>	<p>Native bee habitats have not yet been constructed. This is planned to be progressed in FY23.</p> <p>The translocation of soil from areas stripped in advance of the CWEA onto the active rehabilitation area will continue to be implemented. Seeding of the translocated soil to initiate the growth of various native flowering plants will also be continued.</p>	<p>Construct native bee habitats at Appin North to promote native bee populations in the area.</p>
---	------------	---	--------------------------------	---	--

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

<p>Management Actions and Commitments from Research</p>	<p>7.2</p>	<p>3. Discouraging damage of plants from herbivory.</p> <ul style="list-style-type: none"> <li>• Translocated plants will be protected with plant guards to assist in preventing potential herbivory, particularly in early translocation stages where introduced plants are adapting to an in-situ environment.</li> <li>• IMC will place mesh plant guards around the remaining <i>P. hirsuta</i> individuals in the Stage 1 translocation area as well as placing plant guards on all future translocations to protect them from herbivory.</li> </ul>		<p>Stage 1 translocation trial adopted mesh guards for a portion of the individuals to allow for observation of herbivory.</p> <p>Stages 2 and 3 translocations included the use of mesh guards on all plants.</p>	
<p>Management Actions and Commitments from Research</p>	<p>7.2</p>	<p>4. Managing bushfire risk.</p> <ul style="list-style-type: none"> <li>• Research has identified the importance of extended fire intervals in <i>Persoonia</i> populations.</li> <li>• The Appin Mine Bushfire Management Plan will be updated to show the location of adult plants at Appin North. The plan can be referred to in the event of a bushfire to avoid backburning in these areas.</li> </ul>	<p>In Control</p>	<p>The Appin Mine Bushfire Management Plan has been updated to include the location of these plants.</p>	

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Management Actions and Commitments from Research	7.2	<p>5. Maintaining Persoonia stocks through propagation.</p> <ul style="list-style-type: none"> <li>• Translocations of Persoonia plants have been effective in maintaining populations.</li> <li>• South32 will support the Mt Annan Botanic Gardens to maintain a stock of Persoonia plants in their nursery for future translocations and collection of seed (to be reviewed annually).</li> </ul>		<p>Two Persoonia hirsuta translocations have occurred within the offset area within Appin North to maintain populations. One Persoonia hirsuta translocation has also occurred within the rehabilitation area.</p> <p>Mount Annan have been approached to maintain Persoonia hirsuta stocks to supplement populations as required.</p>	
Review of the OMP	7.3	<p>In accordance with Condition 5 of Schedule 6 of the Project Approval, the OMP will be reviewed, and if necessary revised, within three months, of:</p> <ul style="list-style-type: none"> <li>• the submission of an Annual Review;</li> <li>• the submission of an incident report;</li> <li>• the submission of an Independent Environmental Audit (IEA) report; or</li> <li>• any modification to the conditions of the Project Approval (unless the conditions require otherwise).</li> </ul>	In Control	<p>The research report was submitted to DAWE on 29 June 2021 in accordance with Condition 3e of EPBC Approval 2010/5350.</p> <p>The Offset Management Plan will be reviewed within 6 months of 15 May 2021.</p>	
Review of the OMP	7.3	<p>Outcomes from each review will be documented in the Management Plan Review Log. The OMP will only be revised where a material change to site operations or environmental management has occurred, or in accordance with the review period on the OMP. Administrative or descriptive changes do not constitute a material change.</p>	In Control	<p>No material changes required since the last review of the OMP in FY22.</p>	

BULLI SEAM OPERATIONS

Persoonia hirsuta Offset Management Plan

APNMP0122

Management Plan Version 1.1

Review of the OMP	7.3	Where a review triggers a revision of the OMP, the OMP will be revised and submitted to the Secretary for approval.	N/A	No material changes required since the last review of the OMP in FY22.	
Review of the OMP	7.3	The OMP will be reviewed in accordance with Condition 2(i) of the EPBC Approval. The findings from the research programs required by Condition 3 will be incorporated into the approved Persoonia hirsuta OMP and the revised plan will be re-submitted to the Minister for approval within 6 months of the research being finalised, i.e. within 6 months of 30 June 2021.	In Control	This was completed in FY22.  The OMP was approved on 18 May 2022.	



BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

AUDIT REVIEW			Outcome	Comment & Evidence	Proposed Action
Section	MP Ref	Requirement / Obligation			
Monitoring and Adaptive Management Framework	3	Potential impacts from mining induced subsidence is monitored and managed via an Extraction Plan which is to be approved by the Secretary of DPIE prior to longwall mining commencing in any area.	In Control	Extraction plans in place for Area 9. SMP for Area 7.	
Ecological Outcomes and Performance Measures	5	The "Trigger-Action-Response Plans (TARPs)" relate to identifying, assessing and responding to the range of conditions related to potential subsidence impacts on the Rivers which form the potential habitat for Macquarie Perch which is the primary species of management concern in this Plan. Detailed performance indicators are outlined in the Extraction Plan TARPs for each mining area.	In Control	Refer to each Extraction Plan/SMP.	

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Ecological Outcomes and Performance Measures	5	If any impact is recorded, consideration would be given to implementing appropriate management, remediation and/or mitigation measures in consultation with Biodiversity and Conservation Division, DAWE and other relevant stakeholders (refer Section 9). If the performance measures are exceeded, IMC will notify relevant stakeholders and implement the Contingency Plan (Section 10).	In Control	Recorded impacts are reported to relevant agencies in line with the Trigger Action Response Plan (TARP). This includes initiating discussion around remediation measures. The Georges River Rehabilitation Plan has been developed, incorporating detailed feedback from agencies, prior to being approved by DPIE and the Resources Regulator. Additional approvals will be sought to undertake the remediation, as per the plan. The findings from remediation at WC21 will be applied to the Georges River remediation. Completion of this trial has been delayed due to catchment closures as a result of excessive rainfall.	Execute the Georges River Rehabilitation Plan, once all necessary approvals in place and the trial at WC21 has been completed.
Water Requirements for Fish	6.1	Macquarie Perch could be impacted by subsidence through reduced habitat availability through pool diminution and possible discontinuity in smaller tributaries. These impacts are largely mitigated through the Mine Plan or longwall layout that does not longwall mine below rivers and aims to avoid impacts to critical ecological assets such as the Macquarie Perch.	In Control	No Macquarie Perch have been identified within mining areas. Longwall mining does not occur below named streams where Macquarie Perch are found.  eDNA analysis of sediment samples was undertaken in FY22. No DNA for Macquarie Perch was identified.	Continue monitoring fish habitat in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Water Requirements for Fish	6.1	Any impacts to potential habitat for Macquarie Perch would be rehabilitated as part of the BSO Project.	N/A	There have been no impacts to known Macquarie Perch habitat.	Continue monitoring fish habitat in the mining areas.
Water Requirements for Fish	6.1	Through the implementation of programs to reduce pollutants and compliance with license requirements, impacts from mine water discharges such as the BCD discharge are mitigated.	In Control	EPL 2504 is in place at Appin North.	
Water Requirements for Fish	6.1	A water treatment plant (WTP) is planned for Appin North to provide an improvement in water quality released from site. It is planned for the WTP to release 1.5 ML/day averaged over the month.	In Control After Action Close-out	A temporary water treatment plant (WTP) is currently operational, producing high quality water for discharge to Brennans Creek. A long-term WTP is under construction. Discharge from BCD will be modified once consistent flow from the WTP is achieved.	Complete construction of long-term WTP.
Water Requirements for Fish	6.1	Monitoring of mine water discharge and upstream and downstream water quality is an EPL requirement and is part of the ongoing management of mine water releases e.g. Brennans Creek.	In Control	As per EPL requirements.	
Water Requirements for Fish	6.1	Hydrological and water quality monitoring of streams within the Project mining areas is conducted to determine any surface water and surface/ground water impacts. This monitoring will fall under the Extraction Plan process.	In Control	Localised impacts to fish habitat has occurred as predicted in the EIS. No listed species of fish have been impacted.	Continue monitoring fish habitat in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Water Requirements for Amphibians	6.2	<p>No EPBC listed threatened amphibian species have been recorded in the BSO project area therefore it is highly unlikely that project discharges will affect any populations.</p> <p>Subsidence related impacts may affect small permanent, semi-permanent pools which they require to complete their life cycle. These impacts are largely mitigated through the mine planning that aims to avoid critical ecological areas.</p>	In Control	No EPBC listed threatened amphibian species have been recorded in the BSO project area.	Continue monitoring impacts in the mining areas.
Monitoring Overview	8.1	There are no records for Macquarie Perch within the Project Area. Potential habitat occurs in the project area but the species is highly unlikely to be present due to numerous fish barriers in the subject watercourses. A precautionary approach has been taken and routine aquatic monitoring (including fish sampling) is being undertaken in the relevant watercourses.	In Control	No Macquarie Perch have been identified within mining areas. Longwall mining does not occur below named streams where Macquarie Perch are found.	Continue monitoring fish habitat in the mining areas.
Monitoring Overview	8.1	There are no records for either the Giant Burrowing Frog or Littlejohns Tree Frog within the Project Area despite targeted surveys for these species. Marginal potential habitat exists within the Project Area but the species are unlikely to be present due to lack of preferred habitat. Accordingly, no targeted monitoring is proposed for these species unless unpredicted impacts occur or these species are detected.	In Control	No EPBC listed threatened amphibian species have been recorded in the BSO Project Area.	Continue monitoring impacts in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Monitoring Overview	8.1	Potential habitat for the Woronora Beard-heath ( <i>Leucopogon exolasius</i> ) occurs within the Georges River but there are no records for this species within the Project Area despite survey completed for this species. Accordingly, no targeted monitoring is proposed for these species unless this species is detected in the project area.	In Control	Potential habitat for the Woronora Bearded Heath ( <i>Leucopogon exolasius</i> ) occurs within the Georges River but there are no records for this species within the Project Area despite survey completed for this species.	Continue monitoring impacts in the mining areas.
Table 4 Monitoring Summary for Macquarie Perch	8.1	Aquatic monitoring (including fish sampling) via the Appin Area 7 Longwalls 701 – 710 Extraction Plans (Biodiversity Management Plan). Refer Section 8.2, Figure 10 and Appendix 3.	In Control	Monitoring plan in place.	Continue monitoring impacts in the mining areas.
Table 4 Monitoring Summary for Macquarie Perch	8.1	Aquatic monitoring (including fish sampling) via the West Cliff Area 5 Longwall 34 - 36 Extraction Plans (Biodiversity Management Plan). Refer Section 8.2, Figure 11, Appendix 4 and Appendix 5.	In Control	Monitoring plan in place.	Continue monitoring impacts in the mining areas.
Table 4 Monitoring Summary for Macquarie Perch	8.1	Aquatic monitoring (including fish sampling) via the Appin Area 9 Longwall 901-904 Extraction Plans (Biodiversity Management Plan). Refer Section 8.2, Figure 10 and Appendix 6.	In Control	Monitoring plan in place.	Continue monitoring impacts in the mining areas.
Table 4 Monitoring Summary for Macquarie Perch	8.1	EPL 2504 Water quality monitoring (EPA Licence) for West Cliff, Appin East and Appin West Pit Top sites. Refer Section 8.2, Section 8.5 and Appendix 7.	In Control	As per EPL requirements	Continue monitoring in line with plans.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Table 4 Monitoring Summary for Macquarie Perch	8.1	General water quality monitoring of subsidence impacts under the Extraction Plans referred to above.	In Control	Water quality monitoring is being undertaken in the BSO project area in line with the SMP, EP or EMP for each area or specific feature e.g. Georges River.	Continue monitoring in line with plans.
Table 4 Monitoring Summary for Macquarie Perch	8.1	EPL Georges River Aquatic Health Monitoring Program (including program to improve water quality and minimum flow requirements) - Appendix 8.	In Control	Aquatic Health Monitoring Program in place.	Continue monitoring in line with plans.
Table 4 Monitoring Summary for Macquarie Perch	8.1	Surface water (hydrological) monitoring via Extraction Plans referred to above. Refer Section 8.	In Control	Surface water monitoring plan in place.	Continue monitoring impacts in the mining areas.
Table 4 Monitoring Summary for Macquarie Perch	8.1	Monitoring of subsidence impacts via Extraction Plans referred to above.	In Control	Subsidence monitoring plan in place.	As above
Table 4 Monitoring Summary for Giant Burrowing Frog	8.1	Targeted monitoring may be initiated if relevant subsidence management TARPs reach level 3, triggering corrective management actions for terrestrial biodiversity. Refer to the relevant Extraction Plan.	In Control	TARPs are in place and reported, corrective actions as required.	TARPS have been reported and actioned as required.
Table 4 Monitoring Summary for Giant Burrowing Frog	8.1	Any individuals of this species discovered in the Project Area will be addressed by targeted monitoring that will be included in subsequent revisions of this Plan.	In Control	No individuals identified.	Continue monitoring impacts in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Table 4 Monitoring Summary for Littlejohns Tree Frog	8.1	Targeted monitoring may be initiated if relevant subsidence management TARPs reach level 3, triggering corrective management actions for terrestrial biodiversity. Refer to the relevant Extraction Plan.	In Control	No individuals identified.	Continue monitoring impacts in the mining areas.
Table 4 Monitoring Summary for Littlejohns Tree Frog	8.1	Any individuals of this species discovered in the Project Area will be addressed by targeted monitoring that will be included in subsequent revisions of this Plan.	In Control	No individuals identified.	Continue monitoring impacts in the mining areas.
Table 4 Monitoring Summary for <i>Leucopogon exolasius</i>	8.1	Any individuals of this species discovered in the Project Area will be addressed in subsequent revisions of this Plan.	In Control	No individuals identified.	Continue monitoring impacts in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

<p>Aquatic Monitoring Programs</p>	<p>8.2.2</p>	<p>Currently aquatic monitoring is conducted across four programs relating to the current longwall mining areas (Appin Area 7, Area 9 and West Cliff Area 5) and monitoring under the Georges River Aquatic Health Monitoring Program required by EPL 2504. These programs are itemized below with references to further specific information attached to this document.</p> <ul style="list-style-type: none"> <li>• Aquatic monitoring (including fish sampling) via the Appin Area 7 Longwalls 701 – 710 Extraction Plans (Biodiversity Management Plan). Refer Appendix 3.</li> <li>• Aquatic monitoring (including fish sampling) via the West Cliff Area 5 Longwall 37 - 38 Extraction Plan (Biodiversity Management Plan). Refer Appendix 5.</li> <li>• Aquatic monitoring (including fish sampling) via the Appin Area 9 Longwall 901 - 904 Extraction Plans (Biodiversity Management Plan). Refer Appendix 6.</li> <li>• Georges River Aquatic Health Monitoring Program. The Aquatic Health Monitoring Program incorporates (refer to Appendix 8):             <ul style="list-style-type: none"> <li>• quantitative sampling of macroinvertebrates;</li> <li>• ecological assessment processes using DNA extracted from sediment;</li> <li>• in-stream water quality; and</li> <li>• laboratory water testing.</li> </ul> </li> </ul>	<p>In Control</p>	<p>Georges River Aquatic Health Monitoring Program is in place.</p>	<p>Continue monitoring impacts in the mining areas.</p>
------------------------------------	--------------	--	-------------------	---	---



BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Aquatic Monitoring Methods	8.2.3	<p>The following habitat features are recorded:</p> <ul style="list-style-type: none"> <li>* in-stream features such as sequence of pools, runs and riffles;</li> <li>* stream substratum;</li> <li>* presence, type and extent of aquatic vegetation;</li> <li>* presence of barriers to fish passage into and beyond the study area; and</li> <li>* a photographic record of the habitat.</li> </ul>	In Control	Refer Georges River Aquatic Health Monitoring Program methods.	
Aquatic Monitoring Methods	8.2.3	<p>Water quality will be measured at each site using a water quality probe. Variables to be measured include; pH, dissolved oxygen, oxidation-reduction potential, temperature, turbidity and conductivity. Where applicable, the results will be compared to ANZECC (2000) water quality guidelines for the protection of aquatic ecosystems.</p>	In Control	Georges River Aquatic Health Monitoring Program is in place.	Continue monitoring in line with plans.
Aquatic Monitoring Methods	8.2.3	<p>Fish will be sampled using a back-pack electro fisher and baited traps. At each site, six baited traps are to be deployed in a variety of habitats such as amongst aquatic plants and snags, in deep holes and over bare substratum. The back-pack electro fisher is to be operated around the edge of pools and in riffles. At each site, four, two minute shots are to be performed. Fish are to be collected in a scoop net, identified and measured. Native species are to be released unharmed whilst exotics are not to be returned to the water.</p>	In Control	Georges River Aquatic Health Monitoring Program has no requirement to monitor fish. This is only relevant to extraction plan monitoring.	Continue monitoring impacts in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Aquatic Monitoring Methods	8.2.3	At each site macroinvertebrates will be sampled using the AusRivAS protocol developed under the National River Health Program. Where available, riffle and edge habitats will be sampled using a dip net along a 10m stretch of habitat. Samples will be sorted in the field, preserved in alcohol and transported to a laboratory for identification. Taxa will be identified to levels required for calculating SIGNAL2 values according to the AusRivAS protocol.	In Control	Monitoring plan in place.	Continue monitoring impacts in the mining areas.
Aquatic Monitoring Methods	8.2.3	Reports will be produced at the conclusion of each aquatic monitoring survey that provide sufficient information to describe the habitats and biota that may be affected by subsidence or Appin Mine water releases.	In Control	Refer to last AHMP report on South32 website: <a href="https://www.south32.net/docs/default-source/illawarra-coal-bulli-seam-operations/licenses/csiro_grahp_report1_final_28042022.pdf?sfvrsn=50f5c92_6">https://www.south32.net/docs/default-source/illawarra-coal-bulli-seam-operations/licenses/csiro_grahp_report1_final_28042022.pdf?sfvrsn=50f5c92_6</a>	Continue monitoring impacts in the mining areas.
Management Responses Monitoring Methods	8.2.4	If level 3 TARPs are triggered within potential Macquarie Perch habitat, Corrective Management Actions (CMAs) such as additional monitoring, habitat rehabilitation or other adaptive management measures will be considered.	In Control	No Macquarie Perch identified.	Continue monitoring impacts in the mining areas. Annual reports to be uploaded to the S32 website.
Management Responses Monitoring Methods	8.2.4	Monitoring results will be reviewed by the IMC Subsidence Management Committee and determine whether performance indicators have been exceeded; and whether CMAs are required.	In Control	Monthly meetings are conducted.	Continue with meetings and documentation.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Management Responses Monitoring Methods	8.2.4	If the findings of monitoring are deemed to warrant an immediate response, the Manager Approvals will initiate the requirements of the TARP.	In Control	Actions are implemented as required and reported in the Monthly Subsidence Meeting Minutes.	Continue with meetings and documentation.
Terrestrial Biodiversity Monitoring Methods	8.3.2	Terrestrial monitoring occurs over longwall mining areas (i.e. Appin Area 7, Appin Area 9 and West Cliff Area 5) and focuses on detecting significant changes to vegetation communities and fauna habitat present within the mining area and aims to ensure complete coverage across the Study Area. Specific targeted monitoring sites will be determined if justified (e.g. if threatened species populations, EECs or habitats are known and have more than a negligible potential to be impacted).	In Control	Monitoring plan in place.	Continue monitoring impacts in the mining areas. Annual reports to be uploaded to the S32 web page. Negligible impact to EECs, habitats or populations to date.
Terrestrial Biodiversity Monitoring Methods	8.3.2	Inspections of vegetation communities within the mining areas is undertaken as a part of routine landscape and water monitoring programs. Targeted inspection by a qualified ecologist will follow should vegetation health changes be observed.	In Control	No vegetation health changes detected to date.	Continue monitoring impacts in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Terrestrial Biodiversity Monitoring Methods	8.3.2	<p>Monitoring will focus on detecting significant changes to vegetation communities and fauna habitat present within the Study Area and will aim to ensure complete coverage across the Study Area.</p> <p>Inspections of vegetation condition will assess the following:</p> <ul style="list-style-type: none"><li>* Does the vegetation appear healthy?</li><li>* Are there any detectable visual impacts (e.g. canopy thinning, thinning of shrub layer, loss of ground cover, dead branches present)?</li><li>* Are there any significant detectable visual impacts (e.g. canopy loss with areas of dieback present, loss of whole shrubs, loss of ground cover)?</li></ul> <p>Areas of impact or any subsidence effects will be mapped and documented using digital photography.</p> <p>Where a significant visual impact is detected a qualified ecologist will be engaged to document the following:</p> <ul style="list-style-type: none"><li>* the total area of impact. This will be mapped using a GPS and aerial photo interpretation;</li><li>* the Foliage Percentage Cover (FPC); and</li><li>* Modified Braun-Blanquet cover abundance scores for each species.</li></ul>	In Control	No vegetation health changes detected to date.	Continue monitoring impacts in the mining areas.
---	-------	---	------------	--	--

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Terrestrial Biodiversity Monitoring Methods	8.3.2	This information will be used to objectively assess extent and degree of impact. Assessment of similar vegetation communities or fauna habitat within the broader locality will be undertaken to determine if the detected changes are within normal variation or represent a possible impact of mining. Additional studies (e.g. gas release measurements) will be commissioned in response to an observed mining impact to understand the mechanism involved and consider any CMAs that may be required.	In Control	No vegetation health changes detected to date.	Continue monitoring impacts in the mining areas.
Terrestrial Biodiversity Monitoring Methods	8.3.2	Impacts are to be monitored as a part of ongoing observations to determine any change in extent or degree.	In Control	No vegetation health changes detected to date.	Continue monitoring impacts in the mining areas.
Terrestrial Biodiversity Monitoring Methods	8.3.2	The typical frequency of terrestrial biodiversity monitoring is: <ul style="list-style-type: none"> <li>* two baseline monitoring campaigns 1 year prior to mining;</li> <li>* monthly visual inspections (as part of Landscape Features Monitoring), increased to weekly inspections during critical periods during mining;</li> <li>* six monthly monitoring for two years (as part of Landscape Features Monitoring) post mining;</li> <li>* general observation of active mining areas during all other monitoring.</li> </ul>	In Control	No vegetation health changes detected to date.	Continue monitoring impacts in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Terrestrial Biodiversity Monitoring Methods	8.3.2	IMC will implement remediation measures where impacts to vegetation communities or fauna habitat are deemed to be caused by subsidence effects.	In Control	Georges River Rehabilitation Plan has been approved by DPIE and the Resources Regulator. Additional approvals will be sought to undertake the remediation, as per the plan.	Execute the Georges River Rehabilitation Plan, once all necessary approvals in place and outcomes from trial at WC21 have been received.
Monitoring methods for <i>Leucopogon exolasius</i>	8.4.2	Standard monitoring will be conducted as per Section 8.3.2. Any future targeted monitoring for this species may include (but not be limited to): * Fixed photo points. * Fixed vegetation quadrats. Data collected from each quadrat may include species richness, community structure and composition, vegetation condition, mortality and recruitment, the presence of soil profile development (leaf litter, presence/absence of invertebrates). * Random meander transects in targeted monitoring areas in order to identify recruitment.	In Control	<i>Leucopogon exolasius</i> not identified in monitoring program.	Continue monitoring impacts in the mining areas.
Water Monitoring Overview and Context for EPBC Listed Species	8.5.1	Water releases from surface operations are monitored and managed via the relevant management plans as shown in Diagram 1.	In Control	Refer to Appin Mine Water MP, Coal Wash Emplacement Area MP and Georges River Aquatic Health Monitoring Program on the IMC website.	
Water Monitoring Overview and Context for EPBC Listed Species	8.5.1	Impacts associated with longwall mining areas are addressed through specific Extraction Plans (and their associated Water Management Plans).	In Control	Extraction plans/SMPs for Area 7 and 9 are on South32 website. <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a>	

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Water Monitoring for Potential Impacts from Mining Induced Subsidence	8.5.2	Extractions Plans with detailed monitoring programs are submitted on a progressive basis as mining commences in each mining domain.	In Control	Approved monitoring plans in place.	Continue monitoring impacts in the mining areas.
Water Monitoring for Potential Impacts from surface Operations	8.5.3	Potential impacts from Appin Mine surface operations are monitored and managed via the Water Management Plan and EPL 2504 (Appendix 7).	In Control	Refer to Appin Mine Water MP, Coal Wash Emplacement Area MP and Georges River Aquatic Health Monitoring Program on the IMC website.	
Monitoring Parameters and Performance Indicators	8.5.4	EPL 2504 regulates, among other things, the discharge of water from the surface operations into receiving waters. Quantified limits are currently stated in EPL 2504 for a range of parameters. These limits are effectively the surface water quality performance indicators for the AMP as they are aimed at maintaining suitable water quality to support downstream aquatic habitat for species such as Macquarie Perch.	In Control	EPL 2504 is in place.	
Monitoring Parameters and Performance Indicators	8.5.4	Monitoring is conducted monthly.	In Control	Monthly samples are collected as required by EPL 2504	
Summary of Performance Measures	9.1	The implementation of remedial or adaptive management measures would be assessed through the results of the Extraction Plan monitoring programs, EPL (surface water discharge) monitoring and additional detailed assessments as required.	In Control	Georges River Remediation Plan and Georges River Aquatic Health Monitoring Program are in place.	

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Summary of Performance Measures	9.1	In the event the Performance Measures detailed in Table 7 of the AMP are considered to have been exceeded, or are likely to be exceeded, IMC will implement a Contingency Plan (refer Section 10) to manage any unpredicted impacts and their consequences. Such an exceedance would normally represent a Level 3 TARP for surface water quality, flow or aquatic habitat being triggered.	In Control	No Macquarie Perch identified to date.	Continue monitoring impacts in the mining areas.
Adaptive Management Options - Mine Planning	9.2.1	If impacts exceed performance measures, adaptive management techniques will be considered, such as seeking variations to adjust the length of planned longwalls. This has been implemented in the past for Longwall 34 in West Cliff Area 5 where Level 2 impacts were identified from Longwall 33.	In Control	No performance measures exceeded. Georges River Rehabilitation Plan has been approved by DPIE and the Resources Regulator.	Execute the Georges River Rehabilitation Plan, once all necessary approvals in place and outcomes from trial at WC21 have been received.
Active Flow Management	9.2.2	During no or low rainfall periods the flow in the Georges River is largely determined by the volume of water discharged via licence discharge point 10 from BCD and from Appin East. If the Level 2 trigger for minor cracking leading to a reduction in pool water level is observed, then additional flow can be released from BCD and/or Appin East to ensure pool water levels are maintained.	In Control	Supplementary flows are and have been provided via BCD and from the temporary WTP at Appin North. The EPA and Georges River Stakeholder Group is regularly advised and where required, consulted on the discharge from BCD.	Complete construction of long-term WTP.



BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Water Quality and Discharge Management	9.2.3	Where low water quality is identified to be resulting from mining induced subsidence or surface discharges this exceeds relevant TARPs , consideration of appropriate CMAs will be undertaken with relevant stakeholders. Any CMA will be highly dependent on the parameter being exceeded and technical feasibility of interventions.	In Control	No performance measures exceeded. Georges River Rehabilitation Plan has been approved by DPIE and the Resources Regulator.	Execute the Georges River Rehabilitation Plan, once all necessary approvals in place and outcomes from trial at WC21 have been received.
Natural Remediation	9.2.4	While sealing of surface fractures will occur naturally in some instances and over time, it is recognised that this may not provide sufficient mitigation in some situations and that active sealing of the streams may be required in some locations.	In Control	Active sealing of streams, with the exception of Georges River, not yet triggered	
Hand Mortaring	9.2.5.1	Should large fractures occur in the base of the pools they may be sealed over with hand placed cement grout and natural oxides.	In Control	Georges River Rehabilitation Plan has been approved by DPIE and the Resources Regulator.	Execute the Georges River Rehabilitation Plan, once all necessary approvals in place and outcomes from trial at WC21 have been received.
Injection Grouting	9.2.5.2	These rehabilitation operations have the potential to cause adverse environmental impacts through the materials used and the disturbance associated with access and will be carefully planned to avoid contamination of watercourses. Bunds will be used to contain any spillage at mixing points. The materials used in these processes are non-toxic, environmentally inert and do not significantly impact upon the natural habitats of aquatic species.	In Control	Georges River Rehabilitation Plan approved by DPIE and the Resources Regulator incorporates these requirements.	

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Surface Treatment	9.2.5.6	Where cracking develops in significant areas and natural sealing is not progressing, the cracks may require forking over and compacting to prevent subsequent erosion. Larger cracks may require more work to repair them, for example, mulch or other protection to prevent the development of erosion channels. Surface protection will remain in place until revegetation covers the disturbed area. In some cases, e.g. if the cracks are wider they may require gravel or sand filling up to surface level and revegetation using local native plants. Such rehabilitation measures have the potential to cause impact through the materials used and the disturbance associated with access. Considerable care and relevant approvals will be obtained to ensure the protection of the environment as such works are implemented.	In Control	No significant cracks have been observed that require remediation to prevent erosion. Fracturing in Georges River is covered by above sections 7.2.5 and 7.2.6	
Gas Releases	9.2.6	Where vegetation is impacted by gas releases, the areas affected will be revegetated once monitoring determines the gas releases have ceased or reduced to an extent that vegetation is no longer affected.	In Control	No vegetation health changes detected to date.	Continue monitoring impacts in the mining areas.
Gas Releases	9.2.6	Where low dissolved oxygen is identified to be resulting from mining induced gas release and this exceeds relevant TARPS, consideration of appropriate CMAS will be undertaken with relevant stakeholders.	In Control	No CMAs have been required as a result of low DO from gas release zones. Consideration includes agencies and specialist consultants.	Continue monitoring impacts in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Contingency and Response Plans	10.1	<p>In the event the Performance Measures pertaining to Macquarie Perch or other EPBC listed species detailed in Section 9 of the AMP are considered to have been exceeded, or are likely to be exceeded, IMC will implement a Contingency Plan to manage any unpredicted impacts and their consequences. This would involve:</p> <ul style="list-style-type: none"> <li>* capture photographic record if appropriate;</li> <li>* notify relevant stakeholder, agencies and specialists soon as practicable;</li> <li>* conduct site visits with stakeholders as required;</li> <li>* contract specialists to investigate and report on changes identified;</li> <li>* provide incident report to relevant agencies;</li> <li>* review monitoring and implement additional monitoring if required;</li> <li>* inform relevant agencies and stakeholders of results of investigation;</li> <li>* develop site CMA in consultation with key stakeholders if required and seek approvals;</li> <li>* implement CMA as agreed with stakeholders following approvals;</li> <li>* conduct initial follow up monitoring and reporting following CMA completion;</li> <li>* review relevant management plan(s); and</li> <li>* report in regular reporting and Annual Review.</li> </ul>	In Control	No Macquarie Perch identified to date.	Continue monitoring impacts in the mining areas.
Contingency and Response Plans	10.1	IMC will consult with appropriate specialists and relevant agencies in order to devise an appropriate response in respect to any identified exceedance.	In Control	No exceedance to date.	Continue monitoring impacts in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Contingency and Response Plans	10.1	The development and implementation of contingency measures will be designed to address the specific circumstances of the exceedance and assessment of environmental consequences.	In Control	No exceedance to date.	Continue monitoring impacts in the mining areas.
Contingency and Response Plans	10.1	If the contingency measures implemented by IMC fail to remediate or mitigate the impact or the Secretary of DPIE determines that it is not reasonable or feasible to remediate the impact, IMC will provide a suitable offset to compensate for the impact to the satisfaction of the Secretary of DPIE (or DAWE as appropriate), in accordance with Condition 2 of Schedule 3 of the Project Approval.	In Control	No exceedance to date.	Continue monitoring impacts in the mining areas.
Non-compliance, Corrective Action and Preventative Action	10.2	Events, non-compliances, corrective actions and preventative actions are managed in accordance with the Reporting and Investigation Standard and Environmental Compliance/Conformance Assessment and Reporting Procedure. These procedures, which relate to all IMC operations, detail the processes to be utilised with respect to event and non-conformance/non-compliance classification and reporting, and identification of corrective and preventative actions.	In Control	No incidents to date.	Continue monitoring impacts in the mining areas.

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Performance Improvement	9	<p>As part of the Statement of Commitments prepared for the BSO Project EA, IMC committed to implement “research, offset and compensatory measures for Project impacts on water quality and ecological aspects” with the aim of continual performance review and improvement.</p> <p>The annual review process will also formalise opportunities for improvement based on the monitoring data.</p>	In Control	As per Persoonia Offset and research, Georges River Aquatic Health Monitoring Program and installation of a long-term WTP at Appin North.	
Compliance Report	12.1.1	<p>Annual reporting is undertaken as per Condition 14 of the EPBC Approval which requires the proponent to:</p> <p><i>Within three months of every 12 month anniversary of the commencement of the action, the person taking the action must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the department at the same time as the compliance report is published.</i></p> <p>The Compliance Report is required to be submitted to DAWE by 15 August of each year via EPBCMonitoring@environment.gov.au and is attached as an appendix in the Annual Review.</p>	In Control	This report	

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Annual Review	12.1.2	<p>IMC will report on the performance of the AMP in the Annual Review.</p> <p>The Annual Review is prepared in accordance with Condition 4 of Schedule 6 of the Project Approval and is submitted to relevant agencies in September each year. Annual Reviews are made available to the general public via the South32 website.</p>	In Control	Annual Reviews are published on the South32 website as required.	
EPL Reporting	12.1.3	<p>The specific requirements for the publication of EPL monitoring results are set out in section 66(6) of the POEO Act. In summary, this provision requires that licensees who undertake monitoring as a result of a licence condition must publish or make available monitoring data that relates to pollution within 14 days of obtaining the data and/or receiving a specific request for a copy of the data</p>	In Control	Results are reporting online via the 14 day monitoring report <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a> .	
EPL Reporting	12.1.4	<p>In addition to the above, an Annual Return is submitted to the NSW EPA as required by the EPL. The EPL also details requirements for the Aquatic Health Monitoring Program.</p>	In Control	The 202/22 Annual Return was submitted as required.	
End of Panel Reports	12.1.5	<p>End of Panel (EoP) reports are prepared in accordance with the relevant Extraction Plan or Subsidence Management Plan. They are prepared following the completion of longwall extraction of each panel. The report outlines the measured and observed impacts relevant to the extraction of the longwall panel and summarises a comparison of observed impacts to predictions and performance criteria.</p>	In Control	The most recent EoP reports completed are for Longwall 708 (April 2022) and Longwall 903 (August 2021).	

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Incident Reporting	12.1.5	In accordance with Condition 7 of Schedule 6 of the Project Approval, IMC is to notify the Secretary of DPIE and relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. Within seven days of the date of the incident, IMC is to provide the Secretary and relevant agencies with a detailed report on the incident.	In Control	Not triggered on the operational mine sites or mining area.	Continue monitoring impacts in the mining areas.
Review	12.2	<p>In accordance with Condition 5 of Schedule 6 of the Project Approval, the AMP will be reviewed, and if necessary revised, within three months, of:</p> <ul style="list-style-type: none"> <li>• the submission of an annual review;</li> <li>• the submission of an incident report;</li> <li>• the submission of an Independent Environmental Audit report; or</li> <li>• any modification to the conditions of the Project Approval (unless the conditions require otherwise).</li> </ul> <p>Outcomes from each review will be documented in the Management Plan Review Log. The AMP will only be revised where a material change to site operations or environmental management has occurred, or in accordance with the review period on the AMP.</p> <p>Administrative or descriptive changes do not constitute a material change.</p> <p>Where a review triggers a revision of the AMP, the AMP will be revised and submitted to the Secretary and/or Minister for approval.</p>	In Control	AMP was reviewed in 2020. The AMP was approved by the Minister on 28 January 2021.	

BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

Publication	12.3	<p>Condition 13 of the EPBC Approval requires the proponent to:  <i>...publish all management plans, reports, strategies or agreements required by these conditions of approval on their website. Each management plan, report strategy or agreement must be published on the website within 30 days of being approved.</i></p> <p>Approved versions of the AMP will be displayed on the South32 regulatory page at:  <a href="https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents">https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/documents</a></p>	In Control	The approved AMP is available on the South32 website.	
Independent Environmental Audit	12.4.1	<p>In accordance with Condition 9 of Schedule 6 of the Project Approval and Condition 18 of the EPBC Approval, an Independent Environmental Audit (IEA) shall be commissioned every three years, that will include a review of the AMP. The report is required to be submitted to the Secretary within six weeks of completion of the audit, in accordance with Condition 10 of Schedule 6 of the Project Approval and Condition 18 of the EPBC Approval.</p> <p>IEAs have been conducted in 2013, 2016/17 and 2019, with the next IEA to be conducted in 2022. Recommendations from the IEA will be incorporated into the AMP where appropriate.</p>	In Control	The last IEA was conducted in 2019. The next IEA is scheduled to be conducted in 2022.	



BULLI SEAM OPERATIONS

Adaptive Management Plan for Water Sensitive EPBC Act Listed Species

IMCMP0253

Version 6

ISO 14001	12.4.2	As part of the ISO 14001 certification, IMC maintains an environmental auditing and governance program across all of its operational sites. The program, which includes the use of competent internal and accredited external auditors, is an integral part of maintaining certification under the ISO 14001 standard. External surveillance audits are undertaken on an annual basis, with recertification audits undertaken every three years. Internal Governance Reviews of the AMP are nominally undertaken on a three yearly basis	In Control	The last Governance Review was undertaken in July 2020.	
-----------	--------	--	------------	---	--

BULLI SEAM OPERATIONS  
 Coal Wash Emplacement Area Management Plan  
 WCPMP0019  
 Management Plan Version 5

AUDIT REVIEW			Outcome	Comment & Evidence	Proposed Action
Section	MP Ref.	Requirement / Obligation			
Scope	1.2	Emplacement construction and operations will be conducted in accordance with the detailed design plans prepared for each emplacement phase. Due to the long life of the emplacement, detailed final design details are prepared progressively and are therefore not outlined in this plan for Stage 4. Emplacement of coal wash in Stage 3 is currently underway. The Stage 4 CWEA is scheduled to commence in approximately ten (10) years.	In Control	Detailed design plans are not yet available. Stage 4 construction is at least ten years away.	
Emplacement Design and Staging	4.1	The maximum design parameters for Stage 3 are: * No more than 60.5 ha of native vegetation to be cleared	In Control	The area cleared to date for Stage 3 is ~40Ha (36Ha in desktop review). With an additional ~1 ha to be added once 2021/2022 clearing is completed.	
Emplacement Design and Staging	4.1	The maximum design parameters for Stage 4 of the emplacement design are: * volume of 26Mt; * height of 331 m AHD; * footprint that retains the existing Brennans Creek Dam storage capacity and stockpile areas (refer to Plan 1); and * maximum of 60ha of native vegetation clearance.	In Control	Detailed design plans are not yet available. Stage 4 construction is at least ten years away.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Emplacement Design and Staging	4.1	<p>Measures to limit the clearing of native vegetation to no more than 60 ha will include:</p> <ul style="list-style-type: none"> <li>• survey and demarcation of the Stage 4 boundary prior to clearing works by a qualified surveyor;</li> <li>• Stage 4 boundary will be clearly outlined on site plans and plans will be provided to clearance contractors;</li> <li>• pre-clearing survey will be undertaken by Specialist Environment who will be trained appropriately in survey methodology (training provided by external consultancy) or a specialist consultant. The area to be cleared will be clearly demarcated with flagging tape. Boundary markings will be placed in a way to ensure that each marker is within line of site.</li> </ul>	In Control	Detailed design plans are not yet available. Stage 4 construction is at least ten years away.	
Emplacement Design and Staging	4.1	The Stage 3 valley will be filled in a north westerly direction and Stage 4 from the eastern (or upstream/upslope) boundary and progress in corridors from east to west down the valley, as required by EPBC Approval Condition 6 (d).	In Control	As verified on Arc GIS. Stage 3 is progressing in NW direction.	
Emplacement Design and Staging	4.1	Coal wash will be deposited in benches across the valley (in the case of Stage 4 which will be north-south) and progressively down the valley from east to west.	In Control	Stage 4 not yet commenced. Stage 3 is being deposited in benches across the valley.	
Emplacement Design and Staging	4.1	As each section of fill reaches the designed height, it is top soiled and revegetated. The final landform created by the CWEA will be sympathetic with the regional morphology and will be largely masked from public view by the visual screening of existing eucalypt forest.	In Control	Morphology is as per approved design plans. The completed emplacement is topsoiled and revegetated progressively.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Emplacement Design and Staging	4.1	CWEA construction and operations will be conducted in accordance with the final detailed engineering drawings prepared for each CWEA. The Stage 3 and 4 final landform concept designs are illustrated on Plan 2 and Plan 3.	In Control	Routine surveys and a desktop review on ArcGIS suggests the Stage 3 construction is consistent with the design plans.	
Emplacement Design and Staging	4.1	The engineering drawings for the Stage 4 CWEA will be prepared prior to implementation of the Stage 4 CWEA and these plans will show staging of the emplacement and will comply with Condition 17 (a) and (b) of the Project Approval and Condition 6(b) of the EPBC Approval.	In Control After Action Close-out	To be incorporated into the Stage 4 design plans when available	Design plans to comply with Condition 17 (a) and (b) and Condition 6 of the EPBC approval.
Emplacement Design and Staging	4.1	Plan 4 shows a preliminary concept staging plan that provides for the progressive staging of the Stage 4 CWEA to keep the minimum 100 m wide habitat corridor to link the <i>Persoonia hirsuta</i> core population with habitat north of the Stage 4 CWEA, as required by Condition 6(b) of the EPBC Act Approval.	In Control After Action Close-out	To be incorporated into the Stage 4 design plans when available	Design plans to comply with this condition.
Emplacement Design and Staging	4.1	The Stage 4 Design Plans will be implemented and remain in place for at least ten years, unless otherwise agreed to in writing by the Minister of DAWE, at which point a revised plan taking into account the monitoring referred to above must be submitted to and approved by the Minister.	In Control	Condition not triggered. Stage 4 design plans are not yet initiated	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Haul Road Design	4.2.3.3	<p>Construction of coal wash haul roads associated with the emplacement are to be carried out in accordance with the CWEAMP.</p> <p>Minimum Road Width: Minimum road pavement widths for coal wash haul roads associated with the emplacement area are to be no less than 15 m along curved and straight sections.</p> <p>Maximum Grade: The grade of haul roads should generally not be greater than a 1:9 grade or 11%. If the grade of the haul road is greater than 11%, a risk assessment is to be conducted as detailed in Table 3.</p>	In control	<p>Minimum road widths are no less than 15m along curved and straight sections. Risk assessments and procedures available as required on haul roads graded above 11%. In field inspections are undertaken as required.</p>	
Haul Road Design	Table 3	<p>A risk assessment is to be conducted to identify all the requirements that are to be put in place before operating on 11% to 20% grades.</p>	In control	<p>Risks assessments conducted as required on haul roads graded between 11% and 20%. In field inspections are undertaken as required. All vehicles are rated beyond the grade of all haul roads and access ramps.</p>	
Haul Road Design	Table 3	<p>Risk assessment is to be conducted and approval obtained from the Manager Surface and Infrastructure where haul road is planned to operate for more than 12 months) for grades greater than 20%.</p>	In control	<p>In field verifications are undertaken and any grade above 20% is reported to the Operations Manager. No haul roads have been constructed at a grade above 20%.</p>	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Horizontal Curve Dimensions	4.2.3.3	Horizontal curves will be designed as required to suit site constraints taking into account safety and operational requirements. Where possible, the following guidelines will be applied to haul road design: <ul style="list-style-type: none"> <li>• sharp horizontal curves will be avoided at or near hill crests, at the bottom of hills, and after long sustained downgrades;</li> <li>• if passing will be required, sections of haul road will be designed with long tangents and constant grades intersections will be avoided at the crest of vertical and/or sharp horizontal curves; and</li> <li>• tight curves will be avoided.</li> </ul>	In control	Daily emplacement inspections undertaken to verify requirement. Any potential breach of guidelines is reported to the Operations Manager and rectified.	
Vertical Curve Dimensions	4.2.3.3	Coal wash haul roads associated with the emplacement are to be designed and constructed to a minimum vertical curve radius of 1500 m and a minimum vertical curve length of 150 m.	In Control After Action Close-out	Requires in field verification. Action taken to survey emplacement crest.	In-field verification required.
Construction of Brennans Creek Diversion Channel	4.2.4	Progressive rehabilitation of the Brennans Creek Diversion Channel will be undertaken in accordance with the approved Brennans Creek Bypass Channel Rehabilitation Plan.	In Control	Diversion channel (within channel) has been rehabilitated.	Refresh operational personnel on the requirements of the rehabilitation plan
Erosion and Sediment Control Measures for Clean Water Cut off Drains	4.2.5.2	The drains are positioned to capture clean water runoff from valley sides and divert it past the emplacement dirty water catch pond system and into BCD.	In Control		
Erosion and Sediment Control Measures for Clean Water Cut off Drains	4.2.5.2	The drains are to be sized as required for the catchment area. Excavated material will be placed beside the drains to form access tracks in the valley for construction of catch ponds and development of the emplacement.	In Control		

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Erosion and Sediment Control Measures for Clean Water Cut off Drains	4.2.5.2	The channels will be modified as necessary during the life of the CWEA to adapt to the changing runoff conditions created by the advancing emplacement.	In Control		
Construction of Emplacement Subsoil Drainage Network	4.2.6	Subsurface drains will be installed on the prepared active CWEA under engineering supervision before coal wash emplacement commences. Construction of the subsurface drains shall be installed in accordance with detailed engineering drawings. Subsurface drains will be progressively linked to subsoil drainage from previous sections of the CWEA.	In Control	In field verification is undertaken as required.	
Construction of Emplacement Catch Ponds	4.2.7.1	The CWEA to be supported by two sequential ponds sited down the Brennans Creek Valley. As each phase approaches completion, and filling of the first pond is imminent, a new pond will need to be constructed and so on.	In Control	Stage 3 emplacement is approaching Emplacement Pond 2. Emplacement Ponds 2 and 3 are still in place.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

<p>Construction of Emplacement Catch Ponds</p>	<p>4.2.7.1</p>	<p>Clean water cut-off drains will be established prior to construction of ponds and flows in Brennans Creek will be diverted around the construction area via a temporary dam and pump. This will prevent sediment contamination of clean water from surrounding clean water catchment and treated water from upstream emplacement ponds. Emplacement pond dam walls will be constructed using site won material excavated from an appropriate area onsite (most likely excavated material from the base of the dam storage area or areas being prepared for active emplacement) or coal wash. Where possible, dam wall fill material will be transported directly to construction areas however it may be necessary at times for this material to be temporarily stockpiled until required.</p>	<p>In Control</p>	<p>Clean water drains are in place. Planning for new emplacement ponds is in progress.</p>	
<p>Erosion and Sediment Control Measures for Emplacement Catch Ponds</p>	<p>4.2.7.3</p>	<p>Each phase of the CWEA is supported by two sequential ponds sited down Brennans Creek Valley. The first (upstream) pond allows passive settling of particles, while the second pond will have the capability to be chemically dosed to remove fine particulates from the water column.</p>	<p>In Control</p>	<p>The first (upstream) pond: Emplacement Pond 2 - is utilized for passive settling. The second (downstream) pond: Emplacement Pond 3 - is chemically dosed for assisted settling.</p>	



BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Erosion and Sediment Control Measures for Emplacement Catch Ponds	4.2.7.3	Each pond must be operational prior to commencement of coal wash emplacement in the catchment area for that pond. As each phase approaches completion and filling of the first pond is imminent, a new pond is to be constructed downstream, prior to the emplacement encroaching on the upstream pond. Emplacement pond dam walls will be constructed using coal wash or site won material excavated (sandstone, coal wash or other appropriate material) from prepared active emplacement areas or other suitable areas.	In Control	Stage 3 emplacement is approaching Emplacement Pond 2. No new ponds were created in FY22.	
Preparation of Active Emplacement Areas	4.2.8.1	Preparation of active emplacement areas will take place progressively as the emplacement advances down Brennans Creek Valley.	In Control	As per CWEAMP rehabilitation program.	
Preparation of Active Emplacement Areas	4.2.8.1	The area of land cleared and dedicated as the active emplacement area will be restricted to an operational size of 18 ha (where practical, with a maximum area of 21 ha) in order for the emplacement ponds to effectively treat surface flows.	In Control	As per last desktop review, active emplacement area is within limits. Emplacement Area at 17.93 ha at time of desktop review (9/08/2022). South Eastern face of emplacement currently being covered by topsoil with an additional ~1 ha to be added once 2021/2022 clearing is completed.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Preparation of Active Emplacement Areas	4.2.8.1	In general, stripped topsoil will be placed on finished emplacement areas and stripped sandstone/bedrock will be used onsite for emplacement pond dam wall construction. This may require temporary stockpiling of stripped topsoil and sandstone material and appropriate mitigative measures will be undertaken to minimise the effects of erosion and sediment runoff. Stage 4 of the CWEA has a design footprint of 59.4 ha as shown in Plan 3.	In Control	As per CWEAMP rehabilitation program.  VENM was imported to Appin North in FY22 for use as capping material for the CWEA.	
Vegetation and Topsoil Removal	4.2.8.3	All vegetation including shrubs, trees and roots shall be cleared from the active emplacement area using the two-stage clearing process before coal wash emplacement commences. Loose vegetation from site clearing, such as tree branches, shall be used as mulch or brush matting over areas of the CWEA being rehabilitated. Soil will be stripped from areas cleared for coal wash emplacement and where practicable, the seed rich surface layer of topsoil shall be separated from lower level soils. Stripped soil will be applied to a depth of typically 0.5 m (where appropriate) over completed areas of the emplacement as soon as practical. When seed rich topsoil stripped from cleared areas is available it will be spread as the surface layer on emplacement areas being rehabilitated. Seed rich topsoil is to be reused as quickly as possible to maintain viability of seeds.	In Control	As per CWEAMP rehabilitation program.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Vegetation and Topsoil Removal	4.2.8.3	When the emplacement is progressing to its final stages, particular attention must be paid to stockpiling the necessary volumes of soil to ensure adequate soil cover is achieved during rehabilitation of the final landform. Where required, suitable material may be sourced from off-site locations to supplement on-site material where deficiencies are identified.	In Control After Action Close-out	A Biodiversity Risk Assessment was completed in April 2020 which looked at "topsoil deficit" and identified actions to reduce the risk of a topsoil shortfall.  VENM was imported to Appin North in FY22 for use as capping material for the CWEA.	Incorporate topsoil stockpiling into the design planning for Stage 4 (include a topsoil inventory for Stage 4).  Continue to investigate other options for sourcing alternative material and progress required approvals.
Emplacement of Coal Wash in Active Emplacement	4.2.9.1	Active emplacement areas will be revegetated as soon as possible after the final emplacement design level has been reached.	In Control	Rehabilitation is undertaken progressively.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Coal Wash Transportation	4.2.9.3	<p>The following procedures must be adhered to with regard to transportation of coal wash associated with the emplacement operations:</p> <ul style="list-style-type: none"> <li>• coal wash shall be transported in trucks on the mine site;</li> <li>• coal wash trucks shall be restricted to designated haul roads on the mine site;</li> <li>• coal wash haul roads shall be designed in accordance with the haul road design guidelines in this management plan (see Section 4.2.3.3);</li> <li>• coal wash haul roads must drain to contaminated water catchments and have standard berms installed;</li> <li>• coal wash haul roads must be maintained to minimise airborne dust;</li> <li>• only dump trucks shall be permitted on the emplacement area (semi-trailers shall only be permitted on areas of the emplacement that have been specially prepared for their access);</li> <li>• dump trucks will be speed restricted to an appropriate speed to meet the site requirements; and</li> <li>• all haul trucks must adhere to site speed limits to maintain operational safety and minimise dust impacts.</li> </ul>	In Control	<p>The procedures governing the transportation of coal wash associated with the emplacement operations are consistent with the Management Plan. In field verification is undertaken as required.</p>	
Coal Wash Transportation	4.2.9.3	<p>Coal wash transport will comply with the safety and operational conditions of the West Cliff Surface Transport Management Plan (Document Number: WCPMP0012), Stockpile and Slope Stability Management Plan (Document Number: WCPMP0001), and the Road Maintenance Manual (Document Number: WCPM0004).</p>	In Control		

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Coal Wash Tipping	4.2.9.4	<p>A tipping area is provided on each active coal wash bench for haul trucks to tip their loads onto the bench. There are currently eight different materials which are required to be placed in a controlled manner into the emplacement.</p> <p>The tipping areas must be set up to handle all eight materials, each of which have different characteristics:</p> <ul style="list-style-type: none"> <li>• DCPP coal wash;</li> <li>• WCCPP coal wash;</li> <li>• belt press fines from the WCCPP;</li> <li>• oversize stone (Big Rock) from the WCCPP;</li> <li>• thickener sludge from the WCCPP;</li> <li>• drilling muds, waters and drill cuttings from IMC exploration and methane drainage programs;</li> <li>• inert waste (including concrete and soil) and virgin excavated natural material (VENM); and</li> <li>• sump/dam clean out materials.</li> </ul>	In Control	Tipping areas are set out on individual benches for approved materials as outlined in the Management Plan. In field verification is undertaken as required.	
Coal Wash Tipping	4.2.9.4	<p>The Material Acceptance Form must be completed and approved prior to the transport of any material not generated by the WCCPP or DCPP to the emplacement for use or disposal.</p>	In Control	Material Acceptance Forms are completed as required.	
Coal Wash Tipping	4.2.9.4	<p>Each area is prepared in such a way that allows safe operation of mobile equipment while accessing the area for tipping. This includes:</p> <ul style="list-style-type: none"> <li>• adequate areas and lighting for night time operations;</li> <li>• berms in place;</li> <li>• signage marking tip areas;</li> <li>• allowance for drainage;</li> <li>• surfaces suitable for dump trucks and other approved surface mobile equipment; and</li> <li>• surfaces suitable for tankers around sludge ponds.</li> </ul>	In Control	Each area is prepared in such a way that allows safe operation of mobile equipment while accessing the area for tipping as outlined in the Management Plan. In field verification is undertaken as required.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Coal Wash Tipping	4.2.9.4	The Contract Supervisor for the CWEA operations is responsible for ensuring required inspections are undertaken. The adequacy of these inspection records will be checked by IMC personnel on a periodic basis (nominally annually).	In Control	Required inspections are undertaken and reviewed by IMC.	
Coal Wash Drying	4.2.9.5	If the moisture content of coal wash delivered to the emplacement area is too high for satisfactory compaction it will be left to dry naturally until suitable moisture content for compaction is reached.	In Control	Coal wash that is delivered to the emplacement area that has a high moisture content is left to dry naturally as outlined in the Management Plan.  In field verification is undertaken as required.	
Coal Wash Drying	4.2.9.5	Coal wash slimes/fines will be tipped into shallow temporary drying basins (i.e. sludge ponds) constructed with coarse coal wash. Temporary drying basins will be carefully located on the emplacement area well away from the embankment face and perimeter drains. No surface drainage will be permitted to enter a temporary drying basin.	In Control	Coal wash slimes/fines are handled as outlined in the Management Plan.  In field verification is undertaken as required.	
Compaction	4.2.9.6	Coal wash will be spread from tipped heaps and where necessary compacted with vibratory rollers. Fine coal wash will be combined with coarse coal wash in the spreading and compaction operation. Material from temporary drying basins will be placed and compacted into the emplacement in a similar manner to fine coal wash.	In Control	Tipping methods allow for the adequate mixing of coarse and fine coal wash materials. Confirmed by positive results from compaction testing. Fine coal wash management approved by Engineer of Record under GISTM.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Compaction	4.2.9.6	The Emplacement Supervisor manages the deposition of coal wash and is required to balance available areas for deposition, volumes and material types and compaction results.	In Control	Emplacement Supervisor manages and balances coal wash deposition as outlined in the Management Plan.  In field verification undergone as required.	
Compaction	4.2.9.6	The developing emplacement benches shall be graded back into the valley to prevent surface water flowing over the front batter of the bench.	In Control	Benches constructed as outlined in the Management Plan.  In field verification undertaken as required.	
Compaction	4.2.9.6	Compaction testing is nominally carried out ten times per year with each testing campaign comprised of at least five representative samples. The compaction testing tests for Standard Maximum Dry Density (SMDD) and the results are compared with a compaction criterion of 95% Standard Compaction. The tests are carried out by a Geotechnical consultant at test locations selected by the Contract Supervisor for the emplacement operations.	In Control	Compaction testing completed as per plan.	
Compaction	4.2.9.6	A record of the test results and locations of where they have been taken shall be maintained in the document management system.	In Control	Records of compaction tests are maintained by the emplacement contractor.  Desktop verification undertaken as required.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Bench Heights	4.2.9.7	Coal wash emplacement will progress in a series of filled horizontal benches until each active emplacement area reaches its finished height. Coal wash benches will extend down the valley in a repetitive sequence of tipping, spreading, and compacting. Coal wash material that is too wet to be emplaced immediately will be placed in temporary drying ponds, which will be located within the emplacement footprint.	In Control	Emplacement operations undertaken as outlined in the Management Plan.  In field verification undertaken as required.	
Bench Heights	4.2.9.7	Coal wash emplacement in the valley shall commence at the lower end of the prepared active emplacement area and progress in a series of filled horizontal benches until the emplacement reaches the finished height. Coal wash shall be deposited on the benches and compacted in layers as shown in Figure 1 to achieve better than 95% dry density ratio.	In Control	Emplacement operations undertaken as outlined in the Management Plan.	
Bench Heights	4.2.9.7	The developing benches will be graded back into the valley to prevent surface water flowing over the front batter of the bench and operations will generally aim to maintain coal wash benches with a 30 m lift as outlined in Figure 1.	In Control	Emplacement operations undertaken as outlined in the Management Plan.	



BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Bench Heights	4.2.9.7	<p>The vertical height of a bench is measured at its highest point or crest and at the bench toe. A bench is established in four distinct stages and must be built with the materials' natural angle of repose forming the maximum angle or slope. Any under-cut which increases this angle must be avoided and rectified before tipping can proceed on top of the bench. The procedure for constructing the benches is as follows:</p> <ul style="list-style-type: none"> <li>• each layer of coal wash is pushed off with the dozer;</li> <li>• depending on material type and compaction already achieved, a vibratory roller is used to further compact the coal wash; edges of the bench are further rolled providing increased compaction;</li> <li>• surface gradient of the bench top is provided to facilitate quick water run off for rain events; and</li> <li>• surface contour drains are provided at intervals and a new bench is started. The contour surface drains must have a gradient that allows surface water to be discharged quickly.</li> </ul>	In Control	<p>Emplacement benches established as outlined in the Management Plan.</p> <p>In field verification undertaken as required.</p>	
Bench Heights	4.2.9.7	<p>Best practice at the CWEA has limited bench heights to 30 m. This height can only be exceeded following a formal risk assessment which involves suitably qualified personnel other than the contractor or persons normally supervising the work.</p>	In Control	<p>Bench heights of 30 m are not exceeded in the CWEA.</p>	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Bench Heights	4.2.9.7	The surface shape of the CWEA will be finished to blend with the surrounding landform (as per the approved final landform) and provide for non-eroding table drains to carry surface water runoff to the emplacement perimeter drains. Batter slopes on the finished emplacement will be constructed to non-eroding grades where practical in accordance with the approved finished profile design contours. This profile has been designed to a maximum grade of 1(V):3(H) to prevent erosion and sediment runoff. Suitable erosion control methods will be adapted as necessary.	In Control	The finished landform is as per approved design plans in the emplacement management plan.	
Redirect Coal Wash to Beneficial Uses	4.2.12	IMC has committed to pursuing alternative uses for coal wash as part of the Project Approval and the Dendrobium Mine Development Consent. This commitment is demonstrated from the continuing work in this area, including researching new technologies which would enable beneficial coal wash uses.	In Control	Beneficial uses of coal wash continue to be investigated. Due to COVID and reduced opportunities, the volume of coal wash from the DCPD able to be directed to beneficial use was reduced.	
Cultural Heritage Management	5.1	Detailed design plans which include options for reducing, avoiding and/or managing impacts on Aboriginal heritage sites in and adjacent to the southwestern fringe of the proposed Stage 4 footprint (including sites 52-2-2228/3617, 52-2-1373, 52-2-3533/3613 and 52-2-3506);	In Control	Stage 4 not yet commenced	
Cultural Heritage Management	5.1	Management strategies to ensure no impacts to Aboriginal heritage site 52-2-3505 other than negligible impacts, including consideration of potential staged development of the emplacement and/or buffer areas.	In Control	Emplacement is at least five years away from this location. The site is also buffered by the Brennans Creek Diversion Channel.	
Management and Mitigation	5.7	There are 13 cultural heritage sites within the CWEA that will require some form of management. Refer to Appendix 3.	In Control	Cultural heritage is managed as per the approved CWEAMP.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Management and Mitigation	5.7	For sites located within the boundaries of the proposed Stage 4 CWEA, the proposed management approach is to conduct detailed recording and, where appropriate, archaeological salvage of a sample of occupation deposit. This strategy is consistent with that successfully employed for the Stage 3 CWEA.	In Control	Cultural heritage is managed as per the approved CWEAMP.	
Management and Mitigation	5.7	For sites avoided by the emplacement footprint, but located in close proximity, proposed management includes conducting detailed recording of the site prior to works in the vicinity, and demarcation of the site to minimize the potential for accidental impacts from mobile machinery working in the area.	In Control	Cultural heritage is managed as per the approved CWEAMP. Consultation with Aboriginal Groups planned in FY23.	
Management and Mitigation	5.7	Detail and scheduling of these management strategies should be developed in consultation with the Aboriginal community through the AHP process.	In Control After Action Close-out	Cultural heritage is managed as per the approved CWEAMP. Consultation with Aboriginal Groups planned in FY23.	Undertake consultation with local Aboriginal groups in FY23.
Vegetation and Fauna Management	6.1.1	The unit of vegetation to be cleared will be surveyed by appropriately qualified personnel (suitably trained Environmental Representative or specialist consultant) and marked out using flagging tape.	In Control	Relevant site personnel have been trained	
Vegetation and Fauna Management	6.1.1	Surveys of each unit will involve traversing the study area to locate, record and mark specific habitat features that are proposed for preservation and redistribution to the emplacement (e.g. rocks and boulders, stags and large hollows).	In Control	Pre-clearance inspections are undertaken as required.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Vegetation and Fauna Management	6.1.1	Prior to any vegetation clearance occurring on site, specific details including the type and number of each habitat feature will be clearly recorded and identified on a pre-clearing checklist. Clearance will only occur following demarcation and survey by appropriately qualified personnel.	In Control	Pre-clearance inspections are undertaken as required.	
Vegetation and Fauna Management	6.1.1	The survey will identify appropriate candidate boulders and outcrop rock that could be translocated for habitat creation in revegetated areas. Boulders shall be placed on top of replaced soils (on top of the CWEA) to recreate habitat for species dependent on rocky outcrops, such as the Broad-headed Snake.	In Control	Pre-clearance inspections are undertaken as required and suitable boulders identified.	
Vegetation and Fauna Management	6.1.1	During the pre-clearance survey, habitat features within each unit will be inspected in order to identify the need for any relocation of resident fauna species. Relocation of fauna will also involve the identification of capture and release methods and release areas for the relocation of fauna species prior to clearing.	In Control	Pre-clearance inspections are undertaken as required. No relocations were required in FY22.	
Permit to Disturb	6.1.2	Prior to any vegetation clearance occurring on site, a Permit to Disturb (ICHF0209) is to be issued. Specific details including the type and number of each habitat feature will be clearly recorded and identified on Permits to Disturb prior to issue. Permits to Disturb will only be issued following demarcation and survey by the Environmental Representative.	In Control	Permits to Disturb are completed as required.	
Permit to Disturb	6.1.2	A post-clearing inspection will be undertaken by the site Environmental Representative to verify the clearing was done in accordance with the Permit to Disturb.	In Control	Permits to Disturb are completed as required.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Permit to Disturb	6.1.2	If unapproved clearing goes beyond the emplacement boundary: <ul style="list-style-type: none"> <li>• the incident will be reported in accordance with the Environmental Compliance/Conformance Assessment and Reporting Procedure (IMCP0186); and</li> <li>• the disturbed area will be rehabilitated as soon as practicable.</li> </ul>	N/A	Not triggered	
Clearing Process - Timing	6.2.1	Where possible, the timing of vegetation clearance of important habitat features will be between January and May to avoid the primary breeding and nesting periods of most hollow-dwelling species.	In Control	The last emplacement clearing permit was issued in January 2021. However, due to other site projects taking priority use of site excavators, the 1st stage clearing work had not commenced until July 2021. Additionally, high rainfall occurrences in early 2022 resulted in further delays to clearing this area, ~2 ha of the total 2.5 ha area approved for clearing has been completed.	
Two-Stage Clearing	6.2.2	Where possible, (i.e. where access to trees by the excavator is safe and practical), clearing of hollow bearing trees will be performed in a two-stage process where surrounding vegetation is cleared separately, before the removal of habitat trees to allow fauna an opportunity to move.	In Control	Two stage clearing undertaken as required and as per requirements of the pre-clearing assessment report that is issued to the contractor before clearing can take place.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Injured Animals	6.2.2.3	The general practice of dealing with injured or captured fauna will be for the site operators to notify the site Environmental Representative who will arrange for fauna rescue or veterinary treatment. If the site Environmental Representative is not present when an injured or juvenile animal is found, the following steps will be implemented: <ul style="list-style-type: none"> <li>• cover animal with a towel or blanket to minimise stress and place in an appropriate hessian or cloth bag;</li> <li>• move animal to designated holding area; and</li> <li>• contact the local animal welfare group or veterinarian immediately</li> </ul>	N/A	Not triggered	
Stockpiling	6.2.3	Vegetation shall be removed from the area in stages and stockpiled adjacent to the clearing.	In Control	Stockpiling is avoided where possible. Material is preferentially translocated directly to the areas being rehabilitated.	
Stockpiling	6.2.3	Rocks and logs are to be redistributed to the recipient sites (as per the Permit to Disturb). Large boulders and stags which require partial soil cover to be secured in place will be moved to the recipient sites prior to soil translocation.	In Control	Rocks and logs are collected. Large boulders and stags are relocated as required where identified.	
Stockpiling	6.2.3	Where practical, soil stockpiling will be avoided, and stripped soil layers will be immediately redistributed to the donor sites. Soils will not be stockpiled for long periods of time. Soil horizons will not be removed during or immediately following rain to minimise the composting process during stockpiling.	In Control	Stockpiling is avoided where possible. Material is preferentially translocated directly to the areas being rehabilitated.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Stripping of soil horizons	6.2.4	Topsoil from the donor site will be stripped from the surface in layers. The most valuable layer is the top 50 mm of soil which contains the majority of soil stored seed and propagules, plant nutrients and beneficial soil microbes. The top 50 mm of soil will be stripped and mixed with the cleared vegetation and stockpiled adjacent to or on the selected and pre-prepared recipient site ready for spreading.	In Control	Topsoil stripping and placement is undertaken as detailed. The success of this methodology is noted in the CWEA monitoring report.	
Stripping of soil horizons	6.2.4	Stripping and stockpiling of subsoil horizons will be undertaken depending on depth of bedrock. Where possible the depth of subsoil removal should exceed 500 mm. Subsoil layers will then be translocated to the recipient sites.	In Control	Subsoil stripping and placement is undertaken as detailed.	
Progressive Rehabilitation	6.3.1	Rehabilitation of the emplacement surface will take place progressively as each section of embankment fill reaches the finished level. Completed sections of the emplacement will be trimmed to even grades, and spread with approximately 0.5 m of soil (including subsoil and topsoil).	In Control	Progressive rehabilitation is undertaken.	
Progressive Rehabilitation	6.3.1	Habitat reinstatement techniques such as transplanting dead stags, addition of habitat logs and woody debris, nest box use and installation reconstruction of rock outcrops will be undertaken as described.	In Control	Progressive rehabilitation is undertaken.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Landform Design	6.3.2	The surface of the emplacement will be reshaped in order to mimic micro-topographic features. Where possible, more natural concave slope profiles and slope angles will be used to limit the loss of sediment off the slope. The finished surface profile of the CWEA must be in accordance with the approved design contours (refer to Plan 2 and Plan 3).	In Control	Micro-topographic features are built in line with recommendations outlined in the Management Plan.  Verified in field on a quarterly basis.	
Translocation of Habitat and Soil	6.3.3.1	To facilitate successful long term plant growth it will be necessary to avoid capillary rise of potential saline seepage from the coal wash. In order to avoid the potential for saline seepage (which can prevent seed germination and retard plant growth), the emplacement will be fully encapsulated by soil horizons to a depth of typically 0.5m where appropriate.	In Control	There is no evidence of capillary rise in the CWEA.	
Translocation of Habitat and Soil	6.3.3.1	Subsoil horizons will first be spread over the allocated recipient sites on the Emplacement surface. Finally, the remaining 50 mm (topsoil) will be spread over on top.	In Control	Soil horizons are spread as required.	
Translocation of Habitat and Soil	6.3.3.2	All remaining stockpiles of rocks, logs and vegetation will then to be redistributed over the recipient site. Avoiding excessive soil compaction is crucial to maximising plant establishment and all traffic should be excluded from the translocated soil horizons once all materials have been spread on the surface. Habitat logs and coarse woody debris from the cleared vegetation will provide microhabitat for fauna and protection for emerging seedlings.	In Control	Stockpiles of rocks, logs and vegetation are spread as detailed.	



BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Translocation of Habitat and Soil	6.3.3.3	Large hollow bearing trees are numerous within areas proposed for clearing. Selected large hollow bearing trees within each clearance compartment will be transplanted to areas within the rehabilitating emplacement to become standing dead trees (stags). Provision of these dead stags will provide fauna habitat which may otherwise take decades to form. The quantity of dead stags transplanted to the emplacement will aim to mimic the numbers originally present within the cleared compartments.	In Control	Large stags are being identified during the pre-clearance inspections and placed within the rehabilitation areas.	
Translocation of Habitat and Soil	6.3.3.4	To provide suitable habitats for certain fauna species (especially reptiles), relocation of sandstone rock outcrops to the emplacement will be undertaken. The location of rock outcrops will account for the thermoregulatory requirements of reptile fauna by concentrating placement of boulders and exfoliating rocks on westerly aspects of the CWEA.	In Control	Rock outcrops are being constructed as required. Soil capping and habitats are currently being built over the western side of the stage 3 CWEA.  Pavers were installed in the rehabilitation areas to replicate habitat for the Broad-headed Snake and the Velvet Gecko in FY22.	
Translocation of Habitat and Soil	6.3.4	Seed mixes should resemble the local vegetation types (Exposed Sandstone Scribbly Gum Woodland (ESSW) and Sandstone Gully Peppermint Forest (SGPF)) to supplement rehabilitation of the emplacement and associated areas. Seed is harvested by contractors from areas of land within the regional locality, and will be spread over bare areas of the CWEA. Where required (i.e. in areas that remain without any, or poor, natural regeneration for a period longer than six months), supplementary planting of local provenance tubestock will be considered to ensure vegetation is progressively reinstated.	In Control	Seed is sourced from a contractor. It is not always possible to guarantee local seed due to availability in the local areas. Due to health and safety risks associated with seed collection on an active mine site, no seed is formally collected on the mine site and it hasn't been required due to seed being available elsewhere in the region. Supplementary planting has not been required to date.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Translocation of Habitat and Soil	6.3.4	A list of suitable plant species for collection, propagation and installation has been derived from the Species Impact Study species list and is included in Table 5.	In Control	Seed list has been provided to the seeding contractor. Monitoring results suggests revegetation is consistent with the listing provided.	
Weed and Pest Management	6.3.5.1	Weeds and vertebrate pests will be managed as detailed in Table 6.	In Control	<p>Regular slashing has continued as required. Weed spraying occurred throughout the rehabilitation areas during FY22.</p> <p>No pest management has been required in FY22.</p>	
Bushfire Management	6.3.5.2	Bushfire management at the site will be reviewed once the current <i>Persoonia hirsuta</i> research project findings are completed (which includes ecological burning). The updated bushfire management for the site will also consider the fire ecology of all threatened species at the site. Bushfire trials are being considered on the CWEA, in particular Stage 1 and Stage 2.	In Control	<p>A literature review of bushfire and rehabilitation was undertaken in FY21.</p> <p>Coal wash samples were collected in FY22. This process, and the receipt of sample results, was delayed due to wet weather and COVID-19.</p> <p>The implementation of a trial burn in rehabilitated areas will be investigated following completion of the bushfire research and implemented in FY23/24 if conditions are suitable.</p> <p>The <i>Persoonia</i> Research report was submitted to DAWE in June 2021.</p> <p>The Appin Mine Bushfire Management Plan was finalised in FY22.</p>	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Rehab Phases, indicators and Completion Criteria	6.3.6	The Appin Mine Mining Operations Plan (that also meets the requirements of Condition 33 of Schedule 4 of the Project Approval for the Appin Mine Rehabilitation Management Plan) summarises the rehabilitation processes for all surface facilities and sites associated with Appin Mine. Table 7 outlines the rehabilitation phases, indicators, objectives and completion criteria for the CWEA.	In Control	Progressive rehabilitation is undertaken to achieve the Completion Criteria.  The CWEA Annual Monitoring Report details progress towards meeting these criteria.  The MOP was replaced with a Rehabilitation Management Plan on 2 July 2022.	
<i>Persoonia hirsuta</i> management strategies	6.4	The Stage 4 conceptual staging plan will facilitate pollination vectors for <i>Persoonia hirsuta</i> across remnant bushland for Corridors 1 through 3 as shown in Plan 4.	N/A	Not yet triggered	Design plans to comply with this Condition
Water	7.1	Runoff from the active emplacement areas (or areas where the vegetation has not yet been spread) is directed to the emplacement water management system (i.e. Ponds P4, EP2, and EP3) for treatment prior to being gravity fed to BCD.	In Control	Inspections are undertaken to check effective operation of the water management system.	
Water	7.1	As the emplacement construction progresses, a subsurface drainage system is installed in the base of the cleared area. Emplacement under-drainage flows are generally clean. The emplacement under-drainage is pumped to the clean water diversion channel for release into BCD. If required (i.e. if the water is turbid), the underdrainage can be directed into the CWEA dirty water system. Overflow from the CWEA under-drainage system feeds directly to the CWEA water treatment system.	In Control	Underdrainage water quality is monitored monthly via grab samples.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Dust Control	7.2	<p>Dust impacts from emplacement operations will be mitigated by the coal wash material containing moisture from coal washing processes and being compacted once emplaced. Active emplacement areas will be vegetated as soon as is practical after emplacement and revegetated emplacement is typically stable. The following measures are in place to reduce dust emissions associated with emplacement operations:</p> <ul style="list-style-type: none"><li>• regular inspections are undertaken to identify the presence of dry windy conditions and appropriate dust suppression is implemented as necessary</li><li>• early warning weather alerts are received that predict adverse weather conditions and pre-emptive dust controls are implemented where required. A water cart is maintained on site and is used when the surface of the emplacement is dry and airborne dust can be created; and</li><li>• vehicle speed limits are followed to reduce the risk of dust emissions from unsealed roads due to vehicle movements.</li></ul> <p>Air quality around the CWEA will be monitored by:</p> <ul style="list-style-type: none"><li>• collection and measurement of dust samples from strategically placed dust deposition gauges;</li><li>• use of real-time air quality monitors; and</li><li>• dust emission surveys and spot checks using hand-held photometers (as required).</li></ul>	In Control	<p>Watercart is in use on the haul roads and stockpiles.</p> <p>Coal wash is compacted and covered as soon as practicable.</p> <p>Dust deposition gauges were decommissioned in FY21 following consultation with the EPA and DPIE.</p> <p>No specific dust impacts were identified in FY22.</p>	
--------------	-----	---	------------	---	--

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Noise Control	7.3	Noise generated on the CWEA is from coal wash haul trucks and earthmoving equipment. The noise impact from these operations is deemed to be minimal as noise is naturally mitigated by the emplacement being located in a valley and at a distance of 1.5 km to 2.5 km from the nearest residential development in Appin. This is confirmed by the quarterly noise monitoring program and the lack of complaints about noise from the site.	In Control	No noise complaints received.  No issues raised during quarterly noise monitoring.	
Noise Control	7.3	Noise complaints will continue to be recorded and if a notable increase is identified, IMC will undertake further investigations.	In Control	As per Noise MP.	
Visual Impact	7.4	The following measures will be undertaken to minimise impacts on visual amenity due to emplacement operations: <ul style="list-style-type: none"> <li>• the finished level of the CWEA will be in accordance with approval conditions;</li> <li>• the land area dedicated to active emplacement operations will be kept to a minimum (typically 18 ha, maximum 21 ha);</li> <li>• the finished surface of the emplacement will be of a shape which complements and blends, as much as possible, with the surrounding natural landform, as per the approved final landform plans; and</li> <li>• completed sections of the CWEA will be revegetated as soon as possible.</li> </ul>	In Control	The CWEA is constructed as per design.  Progressive rehabilitation is undertaken.	
Emplacement Rehabilitation Monitoring	8.1.1.5	Biometric assessments are required annually, starting at 1 year after translocation.	In Control	See last CWEA Monitoring Annual Report.	
Emplacement Rehabilitation Monitoring	8.1.1.5	Surveys at control sites only required once every three years and the benchmarks as presented in this report remain so for the ensuing three year period.	In Control	Control sites last monitored in Spring 2020.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Emplacement Rehabilitation Monitoring	8.1.1.5	Photo point monitoring is required annually and done in conjunction with the biometric assessment.	In Control	Photo points last monitored in 2020. See last CWEA Monitoring Annual Report.	
Emplacement Rehabilitation Monitoring	8.1.1.5	Meanders for threatened plants are undertaken every three years.	In Control	Threatened plant meander undertaken in Spring 2020.	
Emplacement Rehabilitation Monitoring	8.1.1.5	Fauna monitoring using camera traps is required annually, starting 5 years after translocation or as deemed appropriate depending on the maturity of the revegetation.	In Control	Fauna last monitored in Spring 202. See last CWEA Monitoring Annual Report.  Next round of Fauna monitoring to be undertaken Spring 2022.	
Emplacement Monitoring	8.2	Permanent survey control benchmarks are established on stable ground outside the perimeter of the CWEA from which the monitoring stations can be surveyed. Survey heights are taken regularly to determine the appropriate design heights.	In Control	Emplacement contractor achieves finished levels as follows; 1. At regular intervals depending upon the coal wash volumes (up to 6 times per year), a Surveyor provides positive proof of the current levels against the IMC approved design. 2. Check of coal wash levels at 500 mm below the finished plan undertaken (allowing for soil placement). 3. Clarification of the emplacement heights and displacement is obtained using InSAR satellite monitoring.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

<p>Emplacement Monitoring</p>	<p>8.3</p>	<p>Compaction testing is nominally carried out ten times per year. Each testing campaign must take at least five representative samples. Compaction testing will test for SMDD and the results will be compared with a compaction criterion of 95% Standard Compaction. If after testing the compaction results are less than 95% then the fail area must be reworked and re-tested. The fail area shall be isolated from normal emplacement operation until results of re-testing indicate 95% or better compaction.</p>	<p>In Control</p>	<p>Compaction testing completed as per plan.</p>	
<p>Emplacement Monitoring</p>	<p>8.4</p>	<p>Runoff from active emplacement areas or areas where vegetation is not established is directed to the CWEA water management system (i.e. Ponds P4A, EP2 and EP3) for treatment prior to being diverted to BCD. Emplacement under-drainage flows are generally clean but have the potential to be dirty during the first-flush period of a rainfall event, especially after a prolonged dry period. Any first flush flows that are dirty are directed to the CWEA water treatment system (i.e. Ponds P4A, EP2, and EP3). During clean subsurface flows, or once the dirty first flush flows have cleared, emplacement under-drainage is pumped to the clean water diversion channel for release into BCD. The water management system is explained in more detail in the Appin Mine Water Management Plan. Monthly water samples are taken to monitor the quality of the CWEA subsurface drainage.</p>	<p>In Control</p>	<p>Monthly samples collected as required - refer to 14-day Report (Point 16) on South32 website.</p>	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

<p>Emplacement Monitoring</p>	<p>8.5</p>	<p>Erosion and sediment control structures will be regularly inspected to check they are operating satisfactorily and to perform any maintenance work and repairs that may be required. Regular maintenance will include:</p> <ul style="list-style-type: none"> <li>• sediment removal from drains and sediment basins;</li> <li>• installation, proper operation and routine maintenance of any flocculant dosing equipment;</li> <li>• replacement and or repair of sediment control structures as required; and</li> <li>• repair of areas that become unstable following periods of high flow.</li> </ul>	<p>In Control</p>	<p>Monitored as part of quarterly inspection regime by Specialist Environment. Last inspection completed in June 2022.</p>	
<p>Complaints and Non-compliance Management</p>	<p>9.1</p>	<p>Community complaints and enquiries may also be received in person by any employee of IMC, with details to be immediately shared with the Community Team for investigation. All CWEA complaints received in relation to Appin Mine will be managed in accordance with the Handling Community Complaints, Enquiries and Disputes Procedure.</p> <p>Upon receipt of a community complaint, preliminary investigations will commence as soon as practicable to determine the likely cause of the complaint. An initial response will be provided to the complainant within 24 hours of the complaint being made, with a follow up response being provided as soon as practicable once a more detailed investigation is complete.</p>	<p>In Control</p>	<p>No complaints regarding CWEA activities received in FY22.</p>	



BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Non-Compliance, Corrective Action and Preventative Action	9.2	Events, non-compliances, corrective actions and preventative actions are managed in accordance with the Reporting and Investigation Standard and Environmental Compliance/Conformance Assessment and Reporting Procedure. These procedures, which relate to all IMC operations, detail the processes to be utilised with respect to event and hazard reporting, investigation and corrective action identification.	In Control	No events or non-compliances relating to CWEA activities were identified in FY22.	
Notification of Pollution Incidents to Government Authorities and the Public	9.3	In accordance with Condition 7 of Schedule 6 of the Project Approval and Condition R2 of EPL 2504, IMC is to notify DPIE, EPA and other relevant agencies of any incident that has caused (or threatens to cause) material harm to the environment.	In Control	No pollution incidents relating to CWEA activities occurred in FY22.	
Reporting and Review	10.1.1	IMC will report on the performance of the CWEAMP in the Annual Review. The Annual Review is prepared in accordance with the requirement of Condition 4 of Schedule 6 of the Project Approval and is submitted to relevant agencies in September each year. Annual Reviews are made available to the general public via the South32 website.	In Control	Annual Review is submitted as required. Copies of previous Annual Reviews are available on the South32 website.	
Reporting and Review	10.1.2	The Emplacement Rehabilitation Monitoring Report is included as an appendix in the Annual Review.	In Control	Report was submitted to DAWE 11/08/2022.	
Reporting and Review	10.1.3	A summary of the CWEA monitoring results (where applicable), including details of exceedances and non-compliances (as determined in accordance with Section 9.2 of the CWEAMP), will be provided on the South32 website in the 14-day report.	In Control	Report is available on the South32 website.	

BULLI SEAM OPERATIONS

Coal Wash Emplacement Area Management Plan

WCPMP0019

Management Plan Version 5

Exceedance/non-compliance notifications	10.2	In the event that an exceedance or non-compliance of the relevant air quality, noise or water quality criteria is confirmed, a notification will be made.	In Control	No exceedances or non-compliances associated with the CWEA were identified in FY22.	
Review of CWEAMP	10.3	In accordance with Condition 5 of Schedule 6 of the Project Approval, the CWEAMP will be reviewed, and if necessary revised, within three months, of: <ul style="list-style-type: none"> <li>• the submission of an Annual Review;</li> <li>• the submission of an incident report;</li> <li>• the submission of an Independent Environmental Audit (IEA) report; or</li> <li>• any modification to the conditions of the Project Approval (unless the conditions require otherwise).</li> </ul>	In Control	Last reviewed and approved 12/12/2020 by State government, 28/01/2021 by Federal government.  Plan is reviewed post submission of the Annual Review and is currently being revised.	
Independent Environmental Audit	10.4.1	In accordance with Condition 9 of Schedule 6 of the Project Approval, and Condition 18 of the EPBC Approval, an IEA shall be commissioned every three years, that will include a review of the CWEAMP. The report is required to be submitted to the Secretary within six weeks of completion of the audit, in accordance with Condition 10 of Schedule 6.  The IEA Report is also required to be submitted to the Minister of DAWE in accordance with Condition 18 of the EPBC Approval within six weeks of completion of the IEA.	In Control	The last IEA was undertaken in 2019. The next IEA is scheduled in 2022.	
ISO 14001	10.4.2	External surveillance audits are undertaken on an annual basis, with recertification audits undertaken every three years.  Internal Governance Reviews of the CWEAMP are nominally undertaken on an annual basis.	In Control	The last re-certification audit was undertaken in June 2022.  The last Governance Review was undertaken in May 2022.	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

			Outcome	Comment & Evidence	Proposed Action
<b>AUDIT REVIEW</b>					
Section	MP Ref.	Requirement / Obligation			
Bulli Seam Operations Project Environmental Assessment	1.5	South32 has committed to clearing no more than 9 ha of SSTF over the life of the project.	In Control	This target has not been exceeded.	
Monitoring, Record Keeping & Reporting	3	Monitoring, record keeping and reporting will be conducted as per the BioBanking Agreement, Annexure D. This will include an Annual BioBank Report to include the information required under Annexure D, Condition 2.5.	In Control	Reports submitted as required	
Monitoring, Record Keeping & Reporting	3	A copy of the BioBank report will be included in the Annual Review as an appendix and be submitted to the Department of Agriculture, Water and Environment (DAWE) to satisfy the EPBC Approval conditions.	In Control	BioBank report is included as an Appendix in the Annual Review.	
Management Plan Review	4	In accordance with Condition 5A of EPBC Approval 2010/5350, Biobanking Agreement 215 is considered to be an Offset Management Plan for the purposes of Condition 4 and therefore approval from the Minister of the SSTF Offset Management Plan is not required for this, or future, revisions of the management plan.	In Control	Updated SSTF Management Plan provided to DAWE for information in July 2021.	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

BioBanking Agreement ID number: 215	Ref.	Requirement / Obligation			
Use of the biobank site General responsibilities	3.1	Except as otherwise permitted by this agreement, the landowner must not carry out any act or omit to carry out any act, or cause or permit any act to be carried out or any act not to be carried out which act or omission may harm biodiversity values on the biobank site, including but not limited to any native animals, native plants, threatened species, populations and ecological communities, and their habitats. NOTE: The clearing of native vegetation that is otherwise permissible in accordance with the NV Act (whether it is permissible under a PVP, routine agricultural management activity (as defined under the NV Act), or is otherwise permitted under Part 3 of that Act) can only be carried out on the biobank site to which this agreement applies if it is also permissible under this agreement. Item 5.1 of the management actions contained in Section 1 of Annexure C sets out the limited circumstances in which native vegetation can be cleared on the biobank site. Annexure C also contains limited exceptions in relation to when a landowner is not required to comply with the management actions contained in Annexure C.	In Control	As per Management Actions comments below.	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

<p>Use of the biobank site Cultural heritage</p>	<p>3.2</p>	<p>To avoid any doubt, nothing in this agreement is to be construed as authorising (including, but not limited to, by way of a consent, permit, approval or authorisation of any kind for the purposes of Part 6 of the NPW Act) any person to damage or to cause or permit damage to an Aboriginal object or Aboriginal place in, on or under the biobank site.</p>	<p>In Control</p>	<p>As per Management Actions comments below.</p>	
<p>Use of the biobank site Obtaining of consents, permits and authorisations</p>	<p>3.3</p>	<p>The landowner is responsible for obtaining all necessary licences, consents, authorisations, permits or approvals in order to lawfully comply with and carry out its obligations under this agreement or to undertake or enable any other identified matter under clause 3.5 and/or clause 3.6</p>	<p>In Control</p>		
<p>Use of the biobank site Development</p>	<p>3.4.1</p>	<p>The landowner must not carry out, or cause or permit to be carried out, any development (as defined under clause 1 above) on the biobank site, unless the development:</p> <p>3.4.1 - is permitted or required under Annexure C, or</p> <p>3.4.2 - is identified in the table entitled 'Permissible development on the biobank site' contained in clause 3.5 or identified in the table entitled 'Permissible human activities on the biobank site' contained in clause 3.6</p>	<p>In Control</p>	<p>As per Management Actions comments below.</p>	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

<p>Use of the biobank site Permissible development</p>	<p>3.5</p>	<p>The landowner shall be permitted to carry out, or cause or permit to be carried out, the development specified in the following table in the management zone specified in the table:</p> <p>* All Management zones - Any development within the meaning of section 127 (1) of the Act reasonably considered necessary to remove or reduce an imminent risk of serious personal injury or damage to property.</p>	<p>In Control</p>	<p>As per Management Actions comments below.</p>	
<p>Use of the biobank site Permissible development</p>	<p>3.5</p>	<p>The landowner shall be permitted to carry out, or cause or permit to be carried out, the development specified in the following table in the management zone specified in the table:</p> <p>* All Management Zones - Any development permitted or required as part of a management action under Annexure C, including but not limited to maintaining existing access tracks on the biobank site, building shed/s to store weed control chemicals or other pesticides on the biobank site, building fences to manage stock on the biobank site and building structures to restore natural water flow regimes.</p>	<p>In Control</p>	<p>As per Management Actions comments below.</p>	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

<p>Use of the biobank site Permissible development</p>	<p>3.5</p>	<p>The landowner shall be permitted to carry out, or cause or permit to be carried out, the development specified in the following table in the management zone specified in the table:</p> <p>* All Management Zones - Construction of fencing to prevent stock incursion.</p>	<p>In Control</p>	<p>Signage and fencing as per the BBA are in good working order.</p> <p>There has been minor damage to the top strand of the boundary fence with the neighbour to the south from falling branches during high wind. A contractor has been sourced to make repairs in Aug/Sept 2022. However, there has been no known incursion of stock onto the site since the previous reporting period.</p> <p>The 2020 annual audit by BCT occurred on 3 August 2020. The 2021 annual audit did not take place due to COVID19 concerns. The Next Audit is scheduled for after August 2022.</p>	
<p>Use of biobank site Permissible human activities</p>	<p>3.6</p>	<p>Notwithstanding clause 3.1, the landowner may carry out or cause or permit to be carried out any human activities specified in the following table, in the management zone specified in the table:</p> <p>* All Management Zones - Any human activity reasonably considered necessary to remove or reduce an imminent risk of serious personal injury or damage to property.</p>	<p>In Control</p>	<p>As per Management Actions comments below.</p>	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Use of biobank site Permissible human activities	3.6	Notwithstanding clause 3.1, the landowner may carry out or cause or permit to be carried out any human activities specified in the following table, in the management zone specified in the table:  * All Management Zones - Any activity or any development permitted or required as part of a management action under Annexure C, including but not limited to mustering stock or feral herbivores including with mechanised vehicles, spraying or mechanically removing weeds, planting tube stock or sowing seeds of native vegetation, using drip torches, thinning native vegetation, disturbing soil temporarily to control erosion, encouraging regeneration, controlling nutrients or restoring natural flow regimes, laying baits, trapping or otherwise controlling vertebrate pests and feral herbivores and overabundant native herbivores.	In Control	As per Management Actions comments below.	
---	-----	--	------------	---	--



BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Use of biobank site Permissible human activities	3.6	<p>Notwithstanding clause 3.1, the landowner may carry out or cause or permit to be carried out any human activities specified in the following table, in the management zone specified in the table:</p> <p>* All Management Zones - Passive recreation, with the exception of overnight stays and/or camp fires, is permissible on the land to the extent that the condition of vegetation on site is not degraded. Passive recreation can include but is not limited to activities such as walking and bird watching.</p>	In Control	As per Management Actions comments below.	
Use of biobank site Permissible human activities	3.6	<p>Notwithstanding clause 3.1, the landowner may carry out or cause or permit to be carried out any human activities specified in the following table, in the management zone specified in the table:</p> <p>* All Management Zones - Any activity required to undertake permissible development</p>	In Control	As per Management Actions comments below.	
Management actions and management plans	4.1	<p>The landowner must carry out or procure the carrying out of the management actions in accordance with the timing, manner and requirements of Annexure C.</p>	In Control	As per Management Actions comments below.	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Management actions and management plans	4.2	<p>The landowner must:</p> <p>i) implement or procure the implementation of; and</p> <p>ii) comply or procure the compliance with</p> <p>the management plans in accordance with the timing, manner and requirements of Annexure C</p> <p>NOTE: The management actions listed in Annexure C include requirements to take certain action and requirements to refrain from taking certain action.</p>	In Control	As per Management Actions comments below.	
Management actions and management plans	4.3	<p>Unless otherwise indicated by Annexure C, the landowner must ensure that;</p> <p>i) the management actions to be carried out in accordance with clause 4.1; and</p> <p>ii) the management plans to be implemented and complied with in accordance with clause 4.2</p>	In Control	As per Management Actions comments below.	
Monitoring, record keeping and reporting	7.1	The landowner must comply with the monitoring and record keeping requirements as set out in Annexure D.	In Control	As per Management Actions comments below.	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Monitoring, record keeping and reporting	7.2	The landowner must submit an annual report complying with the requirements set out in Annexure D to the Chief Executive within the timeframe specified in Annexure D.	In Control	Reports submitted as required.	
Monitoring, record keeping and reporting	7.3	<p>The landowner must notify the Chief Executive in writing as soon as practicable after becoming aware of any failure to comply with this agreement or any other incident at the biobank site (or surrounds) which results or may result in a sudden or significant decline of biodiversity values at the biobank site. In particular, the landowner must notify the Chief Executive of:</p> <p>7.3.1 - the nature, location and time of the incident</p> <p>7.3.2 - the impact of the incident on biodiversity values</p> <p>7.3.3 - the measures that have been taken or will be taken in response to the incident</p> <p>7.3.4 - any provision of this agreement which may have been breached</p> <p>7.3.5 - the extent of any damage</p>	In Control	Trespass and unauthorised removal of trees in August 2019. Incident report was provided to the Biodiversity Conservation Trust as required by this condition. BCT satisfied with the report and actions taken by South32.	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Use of the land by servants, agents, leases or licensees	8	The landowner must incorporate all relevant requirements of this agreement in any lease or licence issued for the biobank site, and must at all times ensure that any servant, contractor, consultant, agent, lessee or licensee occupying the biobank site area shall be aware of, and not undertake any act inconsistent with, the landowner's obligations under this agreement.	In Control	Landcare have been provided a copy of the agreement as required.	
Change of land ownership of subdivision of land	9.1	<p>The landowner must notify the Chief executive in writing of any change of:</p> <p>9.1.1 - ownership of the biobank site, or any part thereof, within seven (7) days after the change of ownership of the biobank site; or</p> <p>9.1.2 - lessee of the biobank site, or any part thereof, within twenty-eight (28) days after the change of lessee or licensee of the biobank site.</p> <p>The notice must include the name and address and other relevant contact details of the new landowner, lessee or licensee.</p>	N/A	Not triggered	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Change of land ownership of subdivision of land	9.2	The landowner must provide a copy of this agreement, including a copy of each management plan and a copy of all records required to be kept under the record keeping requirements, to the transferee before completion of the assignment, transfer, disposal or sale of any interest in the biobank site.	N/A	Not triggered	
Change of land ownership of subdivision of land	9.3	The landowner must notify the Chief Executive in writing no less than 14 days before the biobank site is subdivided.	N/A	Not triggered	
Change of land ownership of subdivision of land	9.4	The landowner cannot assign, transfer, dispose of or sell its rights, title or interest in part of the land containing any area of the biobank site unless the landowner and the Minister have first agreed to vary the agreement to apportion the obligations and rights under the agreement in respect of that part of the biobank site that will be assigned, transferred, disposed of or sold.	N/A	Not triggered	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Right to enter biobank site for research and monitoring	10.1	The landowner must permit access to the biobank site at any time to the Minister, the Chief Executive, an authorised officer or an officer of OEH for the purpose of carrying out research or monitoring in relation to the biodiversity values on the biobank site for which biodiversity credits have been created under this agreement, but only where the person has given reasonable notice to the landowner and the landowner's agent, lessee or licensee, of the intention to enter the biobank site for that purpose and the nature of the research or monitoring that will be conducted. In exercising its right of access under this clause, the Minister, the Chief Executive, an authorised officer or an officer of OEH must ensure that such access does not: 10.1.1 - result in physical or radio interference which obstructs, interrupts or impedes the use or operation of any telecommunications network and telecommunications service of a lessee or licensee of a part of the land; or 10.1.2 - interfere with the electricity supply separate from the landowner's electricity supply to any part of the land occupied by a lessee or licensee.	In Control	BCT have been given access as required for the purpose of the annual audit.	
---	------	--	------------	---	--

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Right to enter biobank site for research and monitoring	10.2	The Minister, Chief Executive, an authorised officer or an officer of OEH may make a written request to the landowner to consent to any other person specified in the written request to enter the biobank site for the purpose of carrying out the research or monitoring referred to in clause 10.2, whether or not that person will accompany the Minister, Chief Executive, an authorised officer or an officer of OEH. The landowner will not unreasonably withhold consent.	In Control	Not triggered	
Ownership of the land and registration of this agreement	13.4	If the landowner elects to identify the exact boundaries of the biobank site on the Deposited Plan for the land, the landowner must bear any additional costs of registration.	N/A	Not triggered	
Variation and termination	14.1	Subject to clause 14.2, this agreement can only be varied or terminated in accordance with the Act.	N/A	Not triggered	
Dispute resolution	16.1	Where there is a dispute, difference or claim (dispute), the party raising the dispute must notify the other party in writing of the nature of the dispute, including the factual and legal basis of the dispute.	N/A	Not triggered	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Dispute resolution	16.2	Within 14 days of the written notice, the Chief Executive and the landowner, or nominated senior representatives of the parties, must confer to attempt to resolve the dispute, and if the dispute cannot be resolved within twenty-one (21) days of the written notice, the Chief Executive and the landowner will refer the matter to mediation.	N/A	Not triggered	
Dispute resolution	16.3	The parties will agree on the terms of appointment of the mediator and the terms of the mediation in writing within twenty-eight (28) days, failing which the mediation will be at an end and either party may commence court proceedings in respect of the dispute, difference or claim.	N/A	Not triggered	
Dispute resolution	16.4	If the matter has not been resolved within 28 days of the appointment of the mediator, the mediation process will be at an end and either part may commence court proceedings in respect of the dispute, difference or claim.	N/A	Not triggered	



BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Notices	21.1.	Any notice, consent, information, application or request that must or may be given or made to a party is only given or made if it is in writing and delivered or posted to that party as its address set out (in the agreement), or faxed to that party at its fax number set out (in the agreement).	N/A	Not triggered	
<b>Annexure A: Maps of biobank sites</b>	<b>Ref.</b>	<b>Requirement / Obligation</b>			
Maps of Biobank site	Map A	Map A - Biobank site boundary map dated 01/03/2016.	In Control		
Maps of Biobank site	Map B	Map B - Vegetation zones, management zones and photo points map dated 16/05/2016.	In Control		
Maps of Biobank site	Map C	Map C - <i>Grevillea parviflora</i> subsp. <i>Parviflora</i> locations dated 09/05/2016.	In Control		
Maps of Biobank site	Map D	Map D - <i>Epacris purpurascens</i> var. <i>Purpurascens</i> locations dated 10/05/2016.	In Control		
Maps of Biobank site	Map E	Map E - Koala habitat polygon dated 13/05/2016	In Control		
<b>Annexure C: Management actions and management plans</b>	<b>Ref.</b>	<b>Requirement / Obligation</b>			

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Standard Management Actions Grazing</p>	<p>Section 1</p>	<p>Stock must not be permitted to graze in any area, remove stock immediately - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Quarterly site visits for this reporting period, include: 20 Oct 2021, 16 Feb 2022, 17 Jun 2022, 13 Jul 2022, 04 Aug 2022.</p> <p>No stock observed in all management zones on each site visit. There has been minor damage to the top strand of the boundary fence with the neighbour to the south from falling branches during high wind. A contractor has been sourced to make repairs in Aug/Sept 2022.</p> <p>Grazing by stock animals has ceased on the property to the south since the change in ownership and there has been no known incursion into the site since the previous reporting period.</p>	
--	----------------------	--	-------------------	---	--

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Standard Management Actions Weed Control</p>	<p>Section 1</p>	<p>Comply with Weed MP - Section 3 - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Weed control at MZ1, MZ2, MZ3 and Transmission Line (TL) easement and edges of MZ6 and MZ7 adjoining easement on each site visit using herbicide spot spraying, with a quick spray™ unit (in the TL) and hand-pulling of weed species listed in BioBanking Agreement (BBA) 215. Pls note: There is currently limited access to MZ3 due to the ongoing above average rainfall. Without vehicle access there is limited capacity to spray this area with a quick spray unit and all weed control must be done by walking to the site with 15-20kg knapsacks.</p> <p>Maintenance sweeps for key weed threats through MZ6 and MZ7. No access permitted to MZ4 and MZ5 due to the high cliffs and gorges, however no weeds observed in adjoining management zones during maintenance sweeps.</p> <p>Herbicides have been used on the BioBanking site during site visits to undertake management actions (i.e. weed control) in each respective management zone as listed in the BBA. A list of herbicides used at each visit is available (if required).</p> <p>Slashing in the TL was planned for July 2022 however this has been deferred until August/September 2022 subject to more favourable weather conditions</p>	
---	----------------------	---	-------------------	---	--

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Standard Management Actions Weed Control	Section 1	Review Weed Management Plan every 4 -6 years. Notify Chief Executive in writing within 14 days of commencement of review. Findings of the review must be submitted to Chief Executive within 3 months of commencing the review. Chief executive to determine if update is required. Landowner must submit updated plan within 3 months of this request. Update must cover matters as per 2.2. of Section 1. - Ongoing from first payment date	N/A	BioBanking Agreement 215 only made on 1/2/17. The review on the Management plan will occur before the end of the 6th year since commencement - February 2023.	
Standard Management Actions Fire	Section 1	Comply with Fire MP - Ongoing from first payment date	In Control	Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.  No ecological burns are planned in any zone until at least 2026 and then the site will be reconsidered for future ecological burns in a mosaic pattern across the site.	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Standard Management Actions Fire	Section 1	Review Fire Management Plan every 4 - 6 years. Notify Chief Executive in writing within 14 days of commencement of review. Findings of the review must be submitted to Chief Executive within 3 months of commencing the review. Chief executive to determine if update is required. Landowner must submit updated plan within 3 months of this request. Update must cover matters as per 3.2. of Section 1. - Ongoing from first payment date	N/A	BioBanking Agreement 215 only made on 1/2/17. The review on the Management plan will occur before the end of the 6th year since commencement - February 2023.	
Standard Management Actions Fire	Section 1	Do not light fires on the Biobank site other than for purposes of ecological burning of if permitted as a permissible activity as per Item 4, Clause 3.6. - Ongoing from commencement date	In Control	No ecological burns are planned in any zone until at least 2026 and then the site will be reconsidered for future ecological burns in a mosaic pattern across the site. Monitoring observations report no evidence of recent fire activity during site visit (Management report suggests last burn was in 2004).  Acacia spp. in MZ 2 and MZ 7 continue to exhibit senescence. Fuel loads approx. 25 tonnes per hectare on average.  No evidence of recent fire activity during all six site visits (BBA suggests last burn/wildfire was in 2004).	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Standard Management Actions Human Disturbance</p>	<p>Section 1</p>	<p>No activities that will adversely effect biodiversity must be carried out except those permitted under Clause 3.6          - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>In August 2019, a breach report was prepared and submitted to the BCT in regard to trespass and damage to the boundary fence and the illegal felling of CPW species including Ironbark species.</p> <p>Comments as per the South32 Appin BioBanking Agreement Annual Report 2022:</p> <p>Signage and fencing as per the BBA are in good working order.</p> <p>There has been minor damage to the top strand of the boundary fence with the neighbour to the south from falling branches during high wind. A contractor has been sourced to make repairs in Aug/Sept 2022.</p> <p>No additional waste has been observed on the site during the site visits this year.</p>	
<p>Standard Management Actions Human Disturbance</p>	<p>Section 1</p>	<p>Human activities that have negative effect on biodiversity are permitted if they are listed under Clause 6 or if they are undertaken as part of the management plans          - Ongoing from commencement date</p>	<p>In Control</p>	<p>Trespass and unauthorised removal of trees in August 2019. Report was provided to the Biodiversity Conservation Trust as required.</p>	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Standard Management Actions Human Disturbance	Section 1	Must not store or dispose of waste - Ongoing from commencement date	In Control	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Action Completed Satisfactorily - No stored waste observed during site inspection.</p> <p>No evidence of additional or new waste was observed during the site 6 monthly visits (inspected 16 February and 4 August 2022).</p>	
Standard Management Actions Human Disturbance	Section 1	Must take all reasonable steps to remove waste deposited by others, or which is otherwise present on the site - Ongoing from first payment date	In Control	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>No waste has been observed on the site during quarterly site visits this year.</p> <p>Action Completed Satisfactorily - No stored waste observed during site inspection.</p>	
Standard Management Actions Human Disturbance	Section 1	Signage must be installed and maintained to deter human disturbance including dumping. Signage must be the biobanking signs available by OEH - Within 3 months of first payment date	In Control	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Signage and fencing as per the BBA have been installed and are in good working order.</p> <p>Action Completed Satisfactorily - New BSA signs have been installed.</p>	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

<p>Standard Management Actions Human Disturbance</p>	<p>Section 1</p>	<p>Fencing of 3 km of the site. \$4500 allocated every three years to maintain fencing. Single sign to be installed at each of the two locked gates - Within 3 months of first payment date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Signage and fencing as per the BBA have been installed and are in good working order.</p> <p>Action Completed Satisfactorily</p>	
<p>Standard Management Actions Human Disturbance</p>	<p>Section 1</p>	<p>Retain the management access track on the Cataract River side - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Existing access track retained.</p>	
<p>Standard Management Actions Retention of regrowth and remnant Veg</p>	<p>Section 1</p>	<p>Native veg must not be cut down, felled, thinned, logged, killed, destroyed, poisoned, ringbarked, uprooted, burnt etc. Except in accordance with Fire Management Plan or Permissible Development under Clause 3.5 - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Several CPW canopy species were illegally felled in MZ1 in August 2019. Some sections of the trees were removed from the site, no other evidence of vegetation being killed, destroyed or poisoned onsite occurred during this reporting period. No evidence or observation of recent ringbarking or tree felling onsite (except for the reported incident) since commencement of the BBA).</p> <p>Action Completed Satisfactorily - No evidence of recent disturbance to native vegetation observed. Previously disturbed area recovering well.</p> <p>No evidence of fire activity.</p>	



BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

<p>Standard Management Actions Replanting or supp planting</p>	<p>Section 1</p>	<p>Planting required in the 0.5 Ha Management Zone 3 - 250 plants. Record date of planting - commencing from first payment date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>As per the Section 6.6 of the BBA, a planting program has been implemented as a "local planting day", with preparation on 15/05/18 and planting on 22/05/18 for the species listed in the planting schedule.</p> <p>Action Completed Satisfactorily</p>	
<p>Standard Management Actions Replanting or supp planting</p>	<p>Section 1</p>	<p>Protect plants from grazing for two years or until 50cm high. Record the date when the plant height requirements are met. - commencing from first payment date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>Plant guards have been maintained around plantings.</p> <p>Action Completed Satisfactorily</p>	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

<p>Standard Management Actions Replanting or supp planting</p>	<p>Section 1</p>	<p>Survey the plants for success - Conduct first survey 24 months after completion of planting, then every 12 months for 5 years</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Currently there is a 90% success rate in survivability of the canopy species planted. However, the seedlings are being significantly grazed by native and non-native herbivores on the site.</p> <p>Action Completed Satisfactorily.</p> <p>Comments as per Annual Report (submitted August 2022):</p> <p>Survivability of the canopy species planted since the drought has declined. Forty-five seedlings planted (of the 250 originally planted) have survived as of 4 August 2022. This is likely attributed to the drought experienced in the first 18 months after planting. The seedlings continue to be significantly grazed by native and non-native herbivores on the site.</p>	
<p>Standard Management Actions Replanting or supp planting</p>	<p>Section 1</p>	<p>Seeds and plants used for planting must be obtained from locally collected provenances, unless reasons to do otherwise. - Conduct first survey 24 months after completion of planting, then every 12 months for 5 years</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Illawarra Landcare confirmed by email on 26/9/19 that all plantings were sourced from Western and South Western Sydney.</p> <p>Action Completed Satisfactorily.</p>	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Standard Management Actions Retention of Dead Timber</p>	<p>Section 1</p>	<p>Don't remove dead timber except for firewood for one household (landowner) or fencing repairs. - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Quarterly site visits. Specific site visit for illegal timber felling in MZ1 On 9 Aug 2019. CPW canopy species were illegally removed. Observations made during maintenance sweeps for all zones during annual and quarterly sites visits.</p> <p>No evidence of dead timber removal observed during inspection.</p> <p>Action Completed Satisfactorily</p>	
<p>Standard Management Actions Retention of Dead Timber</p>	<p>Section 1</p>	<p>Timber brought from outside must be documented - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The Next Audit is scheduled for after August 2022.</p> <p>No additional timber has been introduced to the site since commencement of the BBA. Observations made during maintenance sweeps for all zones during annual and quarterly sites visits.</p> <p>No evidence of dead timber removal observed during inspection.</p> <p>Action Completed Satisfactorily</p>	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Standard Management Actions Erosion Control	Section 1	Take reasonable steps to prevent, control erosion - Ongoing from commencement date	In Control	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>No areas identified across the site which currently require any supplementary erosion control or stabilisation. Observations made during maintenance sweeps for all zones during annual and quarterly sites visits.</p> <p>No evidence or erosion observed during site inspection.</p> <p>Action Completed Satisfactorily</p>	
Standard Management Actions Erosion Control	Section 1	Don't remove rocks from the site - Ongoing from commencement date	In Control	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>No rock removal has occurred on the site since the commencement of the BBA.</p> <p>No evidence of rock removal observed during inspection.</p> <p>Action Completed Satisfactorily</p>	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Standard Management Actions Erosion Control</p>	<p>Section 1</p>	<p>Can bring rocks from outside the site but once onsite cant be removed. - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>No rock removal has occurred on the site since the commencement of the BBA.</p> <p>No evidence of rock removal observed during inspection.</p> <p>Action Completed Satisfactorily</p>	
<p>Additional Management Actions Control of Feral and Overabundant Native Herbivores</p>	<p>Section 2</p>	<p>Comply with the Management Plan - Ongoing from first payment date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Negligible feral or overabundant native herbivory in all areas except MZ3. Grazing in MZ3 is likely by wallabies, kangaroos and goats (no goat scats observed onsite to date). In accordance with the BBA annual inspection required for species traces. Opportunistic observations made during weed control and maintenance sweeps for all zones during either the annual and/or quarterly site visits.</p> <p>Action Completed Satisfactorily.</p>	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Additional Management Actions          Control of Feral and Overabundant Native Herbivores</p>	<p>Section 2</p>	<p>Review Management Plan every 4 -6 years.          Notify Chief Executive in writing within 14 days of commencement of review.          Findings of the review must be submitted to Chief Executive within 3 months of commencing the review.          Chief executive to determine if update is required.          Landowner must submit updated plan within 3 months of this request.          Update must cover matters as per 3.2. of Section 1.          - Ongoing from first payment date</p>	<p>N/A</p>	<p>BioBanking Agreement 215 only made on 1/2/17.          The review on the Management plan will occur before the end of the 6th year since commencement - February 2023.</p> <p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The Next Audit is scheduled for after August 2022.</p> <p>Funding for this action will be included in the next management payment. BCT considers that the existing management plan remains fit for purpose and no update is required at this time. It is recommended that this funding will be reallocated by the landowner to other management actions e.g. weed control.</p>	
---	------------------	---	------------	---	--

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

<p>Additional Management Actions Vert Pest Management</p>	<p>Section 2</p>	<p>Comply with Vertebrate Pest MP - Ongoing from first payment date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Minimal rabbit scratching/scat mounds observed in transmission easement. No rabbit burrow/warrens found on property. Numerous (generally inactive) wombat burrows also did not show signs of rabbits in residence. Fox scats were observed in the transmission line easement (29 April 2019, 6 August 2020). No goat scats have been observed during quarterly site visits. However, there is potential for goats to access the site (and graze in MZ3) as goats have been be sighted in the same gorge at another site serviced by Landcare Australia at Douglas Park. Liaison with Greater Sydney Region LLS is currently in progress to include the site in the regions upcoming Spring and Autumn fox baiting program due the presence of fox scats at the site.</p> <p>Action Completed Satisfactorily</p>	
---	------------------	---	-------------------	--	--

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

<p>Additional Management Actions Vert Pest Management</p>	<p>Section 2</p>	<p>Review Pest Management Plan every 4-6 years. Notify Chief Executive in writing within 14 days of commencement of review. Findings of the review must be submitted to Chief Executive within 3 months of commencing the review. Chief executive to determine if update is required. Landowner must submit updated plan within 3 months of this request. Update must cover matters as per 3.2. of Section 1. - Ongoing from first payment date</p>	<p>N/A</p>	<p>BioBanking Agreement 215 only made on 1/2/17. The review of the Management Plan will occur before the end of the 6th year since commencement - February 2023.  Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:  Funding for this action will be included in the next management payment. BCT considers that the existing management plan remains fit for purpose and no update is required at this time. It is recommended that this funding will be reallocated by the landowner to other management actions e.g. weed control.</p>	
<p>Additional Management Actions Nutrient control</p>	<p>Section 2</p>	<p>Fertilisers or pesticides not to be used except for weed or pest control - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:  No fertilizers have been used on the site since the commencement of the BBA. No evidence of fertiliser or pesticide use observed during site inspection. Herbicide use appears to be appropriate for implementation of management actions.  Action Completed Satisfactorily</p>	
<p>Additional Management Actions Control of exotic fish</p>	<p>Section 2</p>	<p>Not relevant to this site - Ongoing from first payment date</p>	<p>N/A</p>	<p>Not relevant to this site</p>	



BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Additional Management Actions          Maintenance or reintroduction of natural flow regimes</p>	<p>Section 2</p>	<p>Don't impede natural flow regimes          - Ongoing from commencement date</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>No evidence of artificial structures being constructed to impede natural flow regimes observed during site inspection.</p> <p>No artificial structures installed to impede the natural flow regimes on the site. Natural flow regimes are maintained on the site in accordance with the BBA</p> <p>Action Completed Satisfactorily</p>	
---	------------------	--	-------------------	---	--

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

<p>Standard Management Plan Weed Management Plan</p>	<p>Section 3</p>	<p>Spray/Slashing in Management Zones - Spray/Slashing 4 times per year (MZ1-3). Some moment zones only required once per year (MZ4, 5 &amp; 6)</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>Level and type of weed control reported by landowner is consistent with agreement.</p> <p>2022 weed management activities:</p> <ul style="list-style-type: none"> <li>- MZ1, MZ2, MZ3 and transmission line (TL): Ongoing treatment of Paterson's curse, African Lovegrass, Spear Thistle, Bridal Creeper and Stinking Roger. The TL was planned to be slashed in July 2022 to improve efficiency of weed treatment in this zone, however this has been postponed until there are more favourable weather conditions. Hand pulling of weeds inside tree guards at MZ3</li> <li>- MZ4 and MZ5: Management zone not visited: no access due to high-risk cliffs. No weeds observed in adjacent management zones.</li> <li>- MZ 6 and 7: Quarterly maintenance weed sweeps ongoing. Occasional spot spraying of African Lovegrass in these zones.</li> </ul> <p>Action Completed Satisfactorily</p>	
<p>Standard Management Plan Weed Management Plan</p>	<p>Section 3</p>	<p>Site inspections as weed treatments applied. Annual inspection and Monitoring Report - Annually from first payment date</p>	<p>In Control</p>	<p>Included in South32 BioBanking Agreement Annual Report. 2022 report due 19 August.</p>	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Standard Management Plan Fire for Conservation	Section 3	Fires intervals between 7 and 30 years - Once every 12 to 30 years	In Control	Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:  No planned burning in any zones until 2026.  Action Completed Satisfactorily	
Standard Management Plan Fire for Conservation	Section 3	Exclude fire until 2026. Unplanned fires permitted. Must not burn >25% of the site at any one time. - Once every 12 to 30 years	In Control	Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The Next Audit is scheduled for after August 2022.  No planned burning in any zones until 2026.  Action Completed Satisfactorily	
Standard Management Plan Fire for Conservation	Section 3	In MZ5 totally exclude fire other than wildfire - Once every 12 to 30 years	In Control	Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The Next Audit is scheduled for after August 2022:  No evidence of recent fire activity during site visits (BBA suggest last burn/wildfire was in 2004). No evidence of recent fire activity observed during inspection.  Action Completed Satisfactorily	
Standard Management Plan Fire for Conservation	Section 3	Visual monitoring in 2026 as per MP table - 2026	N/A	Not required until 2026	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Standard Management Plan Fire for Conservation	Section 3	Monitoring prior to and after burning as per table - 2026 or following a wildfire	In Control	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>No evidence of recent fire activity during all visits (BBA suggest last burn/wildfire was in 2004).          No evidence of recent fire activity observed during inspection.</p> <p>Action Completed Satisfactorily</p>	
Standard Management Plan Fire for Conservation	Section 3	Periodic trittering along fence lines is permitted but must not affect canopy or mid storey - Every 5 years	N/A	<p>BioBanking Agreement 215 only made on 1/2/17.          The review on the Management plan will occur before the end of the 6th year since commencement - February 2023.</p>	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Standard Management Plan Control of Feral and Overabundant Native Herbivores</p>	<p>Section 3</p>	<p>Monitoring of number and impacts on annual basis - No or negligible occurrence on the site</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>No control required due to no or negligible impacts and no or low levels of occurrence. Tubestock planted in MZ3 to be protected with tree guards.</p> <p>Annual inspections of species traces and potential impacts by suitably qualified restoration ecologist or environmental scientist.</p> <p>Minimal rabbit activity observed. Heavy grazing of plantings (above tree guards) in MZ3 due to kangaroos and possibly goats – although goats haven't been observed on the site.</p> <p>Action Completed Satisfactorily</p>	
<p>Standard Management Plan Control of Feral and Overabundant Native Herbivores</p>	<p>Section 3</p>	<p>Protect MZ3 Planting - Review annually</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>No control required due to no or negligible impacts and no or low levels of occurrence. Tubestock planted in MZ3 protected with tree guards.</p> <p>Annual inspections of species traces and potential impacts by suitably qualified restoration ecologist or environmental scientist.</p> <p>Action Completed Satisfactorily</p>	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Standard Management Plan          Control of Feral and Overabundant Native Herbivores</p>	<p>Section          3</p>	<p>Species traces and potential impacts          - Annually</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>No control required due to no or negligible impacts and no or low levels of occurrence.          Tubestock planted in MZ3 protected with tree guards.</p> <p>Annual inspections of species traces and potential impacts by suitably qualified restoration ecologist or environmental scientist.</p> <p>2022 Monitoring observations:          Negligible feral or overabundant native herbivory in all areas except MZ3. Grazing in MZ3 is likely by wallabies, kangaroos and goats (no goat scats observed onsite to date). In accordance with the BBA annual inspection required for species traces. Opportunistic observations made during weed control and maintenance sweeps for all zones during either the annual and/or quarterly site visits.</p> <p>Action Completed Satisfactorily</p>	
--	-------------------------------	---	-------------------	--	--

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

<p>Standard Management Plan Vertebrate Pest Management Plan</p>	<p>Section 3</p>	<p>1080 baiting - If warranted (Consult OEH/LLS)</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>Annual monitoring for traces and scats to record date, location and estimated number of pest species identified. 1080 baiting program for fox/dogs/rabbits to be implemented if required, in consultation with LLS.</p> <p>No evidence of vertebrate pest activity observed during site inspection. Monitoring identified some fox activity in MZ1, MZ2 and in the TL. No Goat scats have been observed during site visits.</p> <p>Following liaison with Greater Sydney Region Local Land Services the site is currently included in the regional Spring and Autumn fox baiting program due to the presence of fox scats and observations at the site.</p> <p>Action Completed Satisfactorily</p>	<p>BCT Recommendation: Liaise with Local Land Services regarding the likely effectiveness of undertaking a fox baiting program on the site. Fox baiting.</p> <p>Action completed in Spring 2020.</p>
<p>Standard Management Plan Vertebrate Pest Management Plan</p>	<p>Section 3</p>	<p>Den fumigation or habitat removal - If warranted</p>	<p>In Control</p>	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:</p> <p>Annual monitoring for traces and scats to record date, location and estimated number of pest species identified. 1080 baiting program for fox/dogs/rabbits to be implemented if required, in consultation with LLS.</p> <p>No evidence of vertebrate pest activity observed during site inspection. Monitoring identified some fox activity.</p> <p>Action Completed Satisfactorily</p>	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Standard Management Plan Vertebrate Pest Management Plan	Section 3	Qualitative observation for traces and scats - Annually	<b>In Control</b>	Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022:  Annual monitoring for traces and scats to record date, location and estimated number of pest species identified. 1080 baiting program for fox/dogs/rabbits to be implemented if required, in consultation with LLS. No evidence of vertebrate pest activity observed during site inspection. Monitoring identified some fox activity.  Action Completed Satisfactorily	
<b>Annexure D: Monitoring, reporting and record keeping requirements</b>	<b>Ref.</b>	<b>Requirement / Obligation</b>			



BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Monitoring	1.3	<p>Photo Points</p> <p>- Within 12 months or commencement date and every 12 months thereafter</p>	In Control	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>The landowner must ensure that photographs are taken at photo-points at each of the locations and in the direction identified in the table titled 'Locations of photo points' shown in section 1.2, Annexure D of the biobanking agreement, within 12 months of the commencement date and then at least every 12 months thereafter.</p> <p>No photos were taken from PP10 for WHS reasons due its location in a steep gully. This is an acceptable minor variation.</p> <p>Action Completed Satisfactorily</p>	
Monitoring	1.3	<p>Percentage of ground cover present on the biobank site</p> <p>- Annually</p>	In Control	<p>Comments as per last annual audit by BCT (site visit 3/9/20). The 2021 annual audit did not take place due to COVID19 concerns. The next audit is scheduled for after August 2022.</p> <p>Quarterly site visits for this reporting period, include 20 October 2021, 16 February 2022, 17 June 2022, 13 July 2022, 04 August 2022. No stock incursion has allowed groundcover to be maintained and/or increase in density across the site over the previous 5 years due to the installation of the exclusion fencing (refer to photopoints for further detail) heavy rainfall in the region in 2021 and 2022 has significantly increased growth of existing groundcover (and weed species due the weed bank in the soils within the disturbed areas of the site).</p> <p>Action Completed Satisfactorily</p>	

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Monitoring	1.3	Number of stock and dates when stock have entered - Quarterly	In Control	<p>As per South32 Appin West Biobanking Agreement Annual Report 2022.</p> <p>No stock observed in all management zones on each site visit. There has been minor damage to the top strand of the boundary fence with the neighbour to the south from falling branches during high wind. A contractor has been sourced to make repairs in Aug/Sept 2022.</p> <p>Grazing by stock animals has ceased on the property to the south since the change in ownership and there has been no known incursion into the site since the previous reporting period.</p>	
------------	-----	--	------------	---	--

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Monitoring	1.3	<p>Physical condition of fencing</p> <ul style="list-style-type: none"> <li>- control of stock</li> <li>- control of humans</li> <li>- control of ferals and overabundant herbivores</li> <li>- control of vertebrates pests</li> </ul> <p>- Quarterly</p>	In Control	<p>As per South32 Appin BioBanking Agreement Annual Report 2022.</p> <p>Access for management purposes includes South32 and Landcare Australia (land management contractor) staff.</p> <p>There is no ability for stock or unauthorized motor vehicles to access the site with the current exclusion fencing in place.</p> <p>Routine inspections conducted at each site visit to ensure fencing is secure and that there have been no incursions. Any incursions and associated impacts would be reported to South32 and the BCT as per BBA</p> <p>There has been minor damage to the top strand of the boundary fence with the neighbour to the south from falling branches during high wind. A contractor has been sourced to make repairs in Aug/Sept 2022.</p> <p>In August 2019, a breach report was prepared and submitted to the BCT in regard to trespass and damage to the boundary fence and the illegal felling of CPW species including, Ironbark species.</p>	
------------	-----	--	------------	---	--

BULLI SEAM OPERATIONS  
 Shale Sandstone Transition Forest Offset Management Plan  
 APNMP0118  
 Version 1

Monitoring	1.3	Records of human disturbance - Bi-annually	In Control	<p>As per South32 Appin BioBanking Agreement Annual Report 2022.</p> <p>Access for management purposes includes South32 and Landcare Australia (land management contractor) staff.</p> <p>There is no ability for stock or unauthorized motor vehicles to access the site with the current exclusion fencing in place.</p> <p>Routine inspections conducted at each site visit to ensure fencing is secure and that there have been no incursions. Any incursions and associated impacts would be reported to South32 and the BCT as per BBA</p> <p>There has been minor damage to the top strand of the boundary fence with the neighbour to the south from falling branches during high wind. A contractor has been sourced to make repairs in Aug/Sept 2022.</p> <p>In August 2019, a breach report was prepared and submitted to the BCT in regard to trespass and damage to the boundary fence and the illegal felling of CPW species including, Ironbark species.</p>	
Monitoring	1.3	Evidence of erosion - Bi-annually	In Control	<p>As per South32 Appin BioBanking Agreement Annual Report 2022.</p> <p>There are no identified areas across all Management Zones as currently requiring any supplementary erosion control or stabilisation (inspected 16 February and 4 August 2022).</p>	

BULLI SEAM OPERATIONS

Shale Sandstone Transition Forest Offset Management Plan

APNMP0118

Version 1

Monitoring	1.3	Evidence of waste - Bi-annually	In Control	As per South32 Appin BioBanking Agreement Annual Report 2022.  No evidence of additional or new waste was observed during the site visits (inspected 16 February and 4 August 2022).	
Reporting	2	Landowner must complete and submit and annual report to the Chief Executive for approval using the annual reporting template.	In Control	Previous report submitted on 19 August 2021.  2022 Report due for submission on 19 August 2022.	



---

**Appendix 15: WaterNSW Special and Controlled Areas Consent (F2020/1545) -  
Annual Statement of Compliance**

## Schedule 6 – Annual Statement of Compliance with Consent Conditions

### Consent Holder

Illawarra Coal Holdings Pty Ltd

### Consent Number

F2020/1545

### Reporting Period

1 July 2021 to 30 June 2022

### Compliance with Consent Conditions

1. Were all the following documents complied with during the reporting period? (tick a box)

Consent/Approval	Yes	No
a. Conditions of this Consent;	✓	
b. All Statutory Approvals;	✓	
c. Any environmental management plans, rehabilitation plans, revegetation plans, soil and water management plans, water monitoring plans or other plans required by Water NSW.	✓	

2. If you answered "No" to any part of Question 1, please supply the name of the non-compliance / incident and the date the written report was provided to Water NSW, in the table below:

Non Compliance / Incident (one line)	Date written report provided to Water NSW

3. How many pages have you attached?

(Each attached page must be initialled by the person(s) who signs Section 4 of this Statement of Compliance)

The Statement of Compliance has been attached as an Appendix to the:

- Dendrobium Mine and Cordeaux Colliery Annual Review FY22 (Appendix 9)
- Appin Mine Annual Review FY22 (Appendix 15).

These Annual Reviews meet the requirement of Condition 4.3.1 of Consent F2020/1545, for an annual report to be submitted by 30 September for the reporting period.

4. Signature and certification

The Statement of Compliance must only be signed by a person(s) with legal authority to sign it as set out below:

- By affixing the common seal in accordance with *Corporations Act 2001*, or
- By 2 directors, or
- By a director and a company secretary, or
- By a person delegated to sign on the company's behalf in accordance with the *Corporations Act 2001* and approved in writing by Water NSW to sign on the company's behalf.

Signature. 

Name: Chris Schultz  
(printed)

Position Superintendent Environment (signed under Power of Attorney dated 10 February 2021)

Date: 26 September 2022

Signature:

Name:

(printed)

Position

Date:

SEAL (if signing under seal)

The Consent Holder can request Water NSW approval for the compliance requirements of this Consent be linked to and built into other compliance reporting that may be required under approvals issued under the EP&A Act.