

2019 ANNUAL REVIEW

Integra Underground

Prepared for:

HV Coking Coal Pty Ltd
PO Box 534
Singleton NSW 2330

SLR Ref: 630.12983-R01
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PREPARED BY

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BASIS OF REPORT

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
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APPENDIX

Appendix A	TEOM Exceedances
Appendix B	HVAS Exceedances
Appendix C	Independent Environmental Audit Actions

Name of operation	Integra Underground Mine
Name of operator	HV Coking Coal Pty Limited
Project approval #	PA 08_0101
Name of project approval	Integra Underground Project
Mining lease #	CL 382, ML 1437, ML 1518, ML 1525, ML 1551, ML 1676, ML1786
Name of holder of mining lease	HV Coking Coal Pty Limited
Water licence #	WAL 484, WAL 485, WAL 960, WAL 961, WAL 1172, WAL 1173, WAL 1242, 20BL169862, 20BL169864, 20BL172505, 20BL172506, 20BL167917, 20BL169571, 20BL169573, 20BL169574, 20BL171707, 20BL171708, 20BL171710, 20BL171813, 20BL171870, 20BL172277, 20BL172278 20BL172279.
Name of holder of water licence	HV Coking Coal Pty Limited
MOP start date	1 November 2018
MOP end date	31 December 2023
Annual review start date	1 January 2019
Annual review end date	31 December 2019
<p>I, Chloe Piggford, certify that this audit report is a true and accurate record of the compliance status of Glencore Integra Underground Mine for the period 1 January 2019 to 31 December 2019, and that I am authorised to make this statement on behalf of Integra Underground Mine.</p> <p><i>Note.</i></p> <p><i>a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</i></p> <p><i>b) 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).</i></p>	
Name of authorised reporting officer	CHLOE PIGGFORD
Title of authorised reporting officer	ENVIRONMENT AND COMMUNITY MANAGER
Signature of authorised reporting officer	
Date	05/06/2020

1 Statement of Compliance

Integra Underground Mine (Integra Underground) operates in accordance with Project Approval (PA) 08_0101, Environmental Protection Licence (EPL) 3390 and several mining tenements. A summary of compliance with these major approvals during 2018 is provided in **Table 1**.

Where non-compliances have been recognised, they are listed in **Table 2** and detailed in later sections of this Annual Review. **Table 3** presents the categories used to define the status of each non-compliance.

Table 1 Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes/No
PA 08_0101	Yes
EPL 3390	Yes
ML 1437	Yes
ML 1518	Yes
ML 1525	Yes
ML 1551	Yes
ML 1676	Yes
ML 1786	Yes
CL 382	Yes

Table 2 Non Compliances During 2019

Relevant Approval/Licence	Condition	Condition Summary	Compliance Status	Comment	Date	Where Addressed
Nil						

Table 3 Compliance Status Categories

Risk Level	Colour Code	Description
High	Non-Compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-Compliant	Non-compliance with potential for serious environmental consequences, but is unlikely to occur; or potential for moderate environmental consequences, but is likely to occur
Low	Non-Compliant	Non-compliance with potential for moderate environmental consequences, but is unlikely to occur; or potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non-Compliant	Non-compliance which does not result in any risk of environmental harm

2 Introduction

2.1 Background

Integra Underground is located approximately 12 km north-west of Singleton, in the Singleton Local Government Area (LGA) (refer **Figure 1**).

Underground mining operations are approved at a maximum extraction rate of 4.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 31 December 2035 under PA 08_0101. This approval allows longwall mining of the Hebden, Barrett and Middle Liddell seams to produce high quality, semi-hard coking coal for export. The approved underground mine layout in the Middle Liddell Seam is shown in **Figure 2**.

Integra Underground was placed under care and maintenance in May 2014, during this time environmental management of the site was maintained under a Care and Maintenance Environmental Management System. Operations recommenced in 2017, with infrastructure development and early workings resuming in February 2017 and longwall extraction resuming in May 2017. The reporting period (2019) is therefore the second full year of mining operations since being placed under care and maintenance.

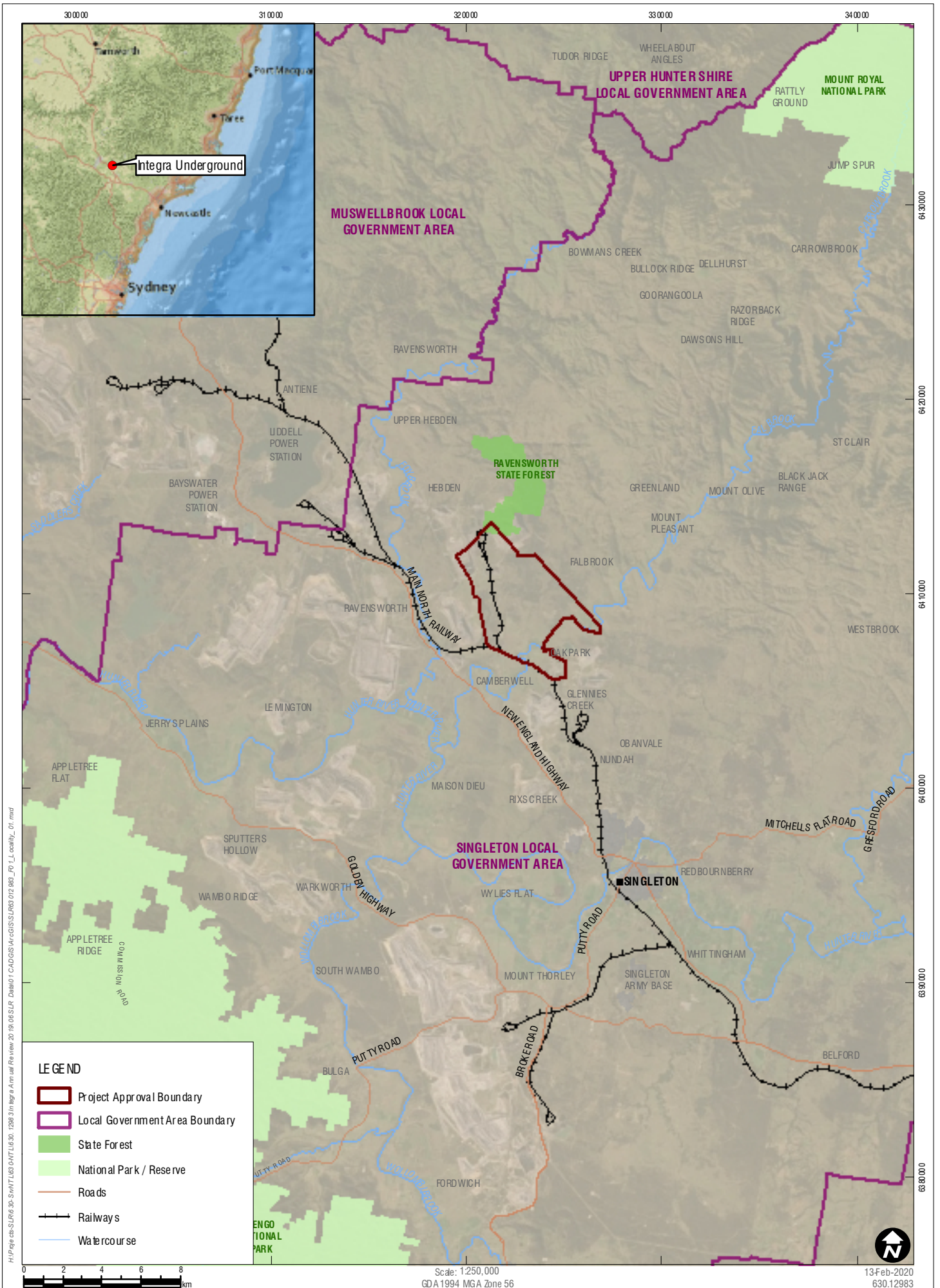
Integra Underground completed secondary extraction of Longwall 14 in August 2019 and Longwall 15 commenced in September 2019. Development of first workings for Longwall 16 continued in 2019, with secondary extraction of Longwall 16 due to commence in mid 2020. Development of first workings for Longwall 17 is due to be completed in 2020. Moreover, development of first workings for Longwall 18 is due to commence in 2020.

2.2 History of Operations

Development Consent (DA 105/90) for Glennies Creek Colliery was granted on 1 November 1991 and was modified on six occasions to allow further surface facility development and increased production. An environmental assessment for mining within the Middle Liddell Seam beyond 2012 and in the Hebden and Barrett seams was submitted in July 2009 with the application (PA 08_0101) being approved in late 2010 by the former Department of Planning. To date, coal has been mined from the Middle Liddell Seam with approval also covering the Hebden and Barrett seams. This includes a drift to the Hebden Seam that has not progressed to development.

Camberwell Coal Joint Venture (CCJV) was granted Development Consent (DA 86/2889) for mining operation on 21 March 1990. Development commenced with the construction of the CHPP and rail loop facilities and the first coal was mined in the area known as the North Pit on 1 March 1991. Ten modifications have been granted, which related to matters such as increased production and surface infrastructure changes and upgrades. An application (PA 08_0102) for open cut mining operations within the Northern and Western Extension mining areas was approved in late 2010 by the former Department of Planning (now Department of Planning, Industry and Environment [DPIE]).

CCJV and Glennies Creek Joint Venture (GCJV) were integrated on 4 August 2006 to form the Integra Coal Joint Venture (ICJV). AMCI Holdings Australia, part owner of ICJV, was bought by Brazil's Companhia Vale do Rio Doce (CVRD) on the 20 April 2007. CVRD changed the company name to Vale on 29 November 2007 and on 11 February 2008 renamed CVRD Australia Pty Ltd as Vale Australia Pty Ltd. In December 2014, Vale Australia (GC) Pty Ltd, a subsidiary of Vale Australia Pty Ltd, acquired 3.6% from POS-GC Pty Ltd, increasing its stake to 36%.



The Integra Complex was operated as an unincorporated joint venture, with Integra Coal Operations Pty Limited being the management company responsible for all operations at both sites on behalf of the joint venture owners. Due to falling coal prices and increased operational costs at the Integra Complex, a decision was made by the Joint Ventures to place the Integra Complex under care and maintenance. Integra Underground and Integra Open Cut (IOC) were placed under care and maintenance on 28 July 2014 and 15 August 2014, respectively.

On 18 December 2015, HV Coking Coal Pty Limited (HVCC) (a 100% Glencore-owned company) purchased the Integra Complex. Bloomfield Collieries Pty Limited (Bloomfield) subsequently purchased from Glencore the IOC, coal handling preparation plant (CHPP), train loading infrastructure and the rail loop.

EPL 3390 was applicable to the Integra Complex until 21 December 2015. At this time the EPL was varied to cover Integra Underground only, with the existing Rix's Creek EPL (3391) varied to also cover Rix's Creek North (previously IOC).

Prior to HVCC's purchase of Integra Underground, the Integra Complex operated under a single project approval which combined the PA 08_0101 (Integra Underground) PA 08_0102 (IOC). Following the respective sales of the underground and open cut mines in December 2015, approval was sought to separate the combined project approval.

This separation of the combined project approval was granted through Modification (Mod) 5 on 23 August 2016. Until this modification was approved, an agreement between Bloomfield and HVCC outlined the separation of responsibilities under the Project Approval and EPL.

HVCC recommenced underground operations in 2017, with infrastructure development and early workings resuming in February 2017 and longwall extraction resuming in May 2017 in accordance with the Extraction Plan as required under Condition 20 of Schedule 3 of PA 08_0101.

An application for Modification 8 (Mod 8) to PA 08_0101 and accompanying EA was lodged with the DPIE in November 2017. The purpose of Mod 8 was to seek approval to continue longwall mining of the Middle Liddell Seam further to the north of the previously approved longwall panels, and construction and operation of ancillary surface infrastructure required to support the proposed mining activities. Subsequently, approval was granted by DPIE on 16 April 2018. The construction of these ancillary surface infrastructure commenced in February 2019.

2.3 Purpose

This Annual Review has been prepared for the reporting period of 1 January 2019 to 31 December 2019 (herein referred to as the reporting period).

This Annual Review has been prepared in accordance with:

- The DPIE publication *Post Approval Requirements for State Significant Mining Developments – Annual Review Guideline* (NSW Government 2015);
- The environmental management and compliance reporting requirements contained in relevant mining tenements (CL 382, ML 1437, ML 1518, ML 1525, ML 1551, ML 1676 and ML 1786);
- Schedule 5, Condition 11 of PA 08_0101;
- Commitments in the approved Mining Operations Plan (MOP);
- Commitments contained within the Integra Environmental Management System (EMS); and

- Outcomes of the 2018 Annual Review.

A summary of relevant requirements relating to this Annual Review is provided in **Table 4**.

Table 4 Relevant Annual Review Requirements

Condition	Section Addressed
PA 08_0101	
Schedule 5, Condition 11	
By the end of March each year, or other timing as may be agreed by the Secretary, the Proponent must submit a report to the Department reviewing the environmental performance of the project to the satisfaction of the Secretary. The review must:	Sections 4, 8 and 12
a) describe the works (including any rehabilitation) that were carried out during the previous calendar year, and the works that are proposed to be carried out over the current calendar year;	
b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the: <ul style="list-style-type: none"> • relevant statutory requirements, limits or performance measures/criteria; • monitoring results of previous years; and • relevant predictions in the documents referred to in Condition 2 of Schedule 2; 	Sections 6, 7 and 9.4
c) identify any non-compliance over the previous calendar year, and describe what actions were (or are being) taken to ensure compliance;	Sections 1 and 11
d) identify any trends in monitoring data over the life of the project;	Sections 7.5.4 and 7.6.4
e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and	Sections 6 and 7
f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the project.	Sections 6, 7 and 8
Schedule 3, Condition 36	
The proponent must report on waste management and minimisation in the Annual Review, to the satisfaction of the Secretary.	Section 6.7
ML 1437, ML 1518, ML 1525, ML 1551, ML 1676	
3. Annual Rehabilitation Report (f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must: <ul style="list-style-type: none"> (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP; (ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and (iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website. 	Section 8
Bore Licence 20BL172505 and 20BL172506	
The licence holder must submit an Annual Groundwater Report to the NSW Office of Water (now DOI - Water) each year.	Separate Annual Groundwater Report

Condition	Section Addressed
Mining Operations Plan	
Section 2.3.1 Exploration All exploration within a mining lease will be reported in the Integra Underground Annual Review.	Section 4.2
Section 3.2.1.11 Air Quality The results of air quality monitoring will be assessed against the relevant criteria from the Integra Underground Project Approval and EPL. Results will be provided in the Annual Review and EPL Annual Return.	Section 6.2
Section 8.1.1 Rehabilitation Monitoring Annual reviews will be conducted of rehabilitation monitoring data to assess trends and monitoring programme effectiveness. The rehabilitation monitoring results, along with any remedial works required, will be summarised in the Annual Review.	Section 8
Section 10.1 Annual Review An Annual Review report is required to be prepared for Integra Underground as per Schedule 5, Condition 11 of the Project Approval. The Annual Review includes a summary of rehabilitation monitoring and reporting and is sent to RR, DPIE, OEH and other relevant stakeholders.	Section 8
Section 10.2 Incident Reporting Non-compliances and incidents will be reported within the Annual Review and EPL Annual Return.	Sections 1 and 11

Copies of this Annual Review will be made available to the DPIE, the Department of Planning, Industry and Environment – Resources Regulator (DPIE - RR), Department of Planning, Industry and Environment - Water (DPIE Water), Department of Planning, Industry and Environment – Environment, Energy and Science (DPIE EES) and the Environment Protection Authority (EPA). Copies will also be provided to the members of the Community Consultative Committee (CCC) and a copy will be made available on the Integra Underground website, which can be found here: www.glencore.com.au/integraunderground.

2.4 Mine Contacts

Contact details for key personnel responsible for the environmental management at Integra Underground are provided in **Table 5**.

Table 5 Mine Contacts

Name	Position	Contact
Peter Ostermann	Operations Manager	(02) 6577 4200
Chloe Piggford	Environment and Community Manager	(02) 6577 4200
Evert Smit	Technical Services Manager	(02) 6577 4200

3 Approvals

Operations at Integra Underground are regulated by a range of leases, licences and approvals, which are summarised in the following sections.

3.1 Project Approval

PA 08_0101 (as modified) allows for the extraction, processing and transportation of up to 4.5 Mtpa until 31 December 2035. Eight modifications to PA 08_0101 have been approved. Details of the approval and subsequent modifications are provided in **Table 6**.

Table 6 PA 08_0101 and Modifications

Approval	Title	Date Granted	Expiry
PA 08_0101	Original approval	26 November 2010	31 December 2035
	Mod 1 - Extend the open cut dump and increase emplacements height	18 March 2012	
	Mod 2 - Amendments to consent wording	1 February 2013	
	Mod 3 - Extend timeframes for conditions	5 October 2012	
	Mod 4 - Modify biodiversity offset areas	24 February 2016	
	Mod 5 - Separate into two project approvals for IOC and Integra Underground	23 August 2016	
	Mod 6 - Approved to correct an administrative error which unintentionally altered the previously approved mine plan for the project	21 December 2016	
	Mod 7 - Construct a water pipeline from Integra Underground to the Mount Owen Complex	15 September 2017	
Mod 8 - Realignment of main headings, extension of approved longwalls, development of up to three additional longwalls to the northwest in the Middle Liddell Seam and changes to ancillary surface infrastructure and water management	16 April 2018		

3.2 Leases

The leases outlined in **Table 7** are applicable to the operations at Integra Underground.

Table 7 Integra Underground Leases

Title	Date Granted	Expiry
ML 1437	28 April 1999	27 March 2032
ML 1518	14 June 2004	27 March 2032
ML 1525 (shaft)	18 November 2002	17 November 2023
ML 1551	10 January 2006	27 March 2032
ML 1676	5 June 2013	4 January 2026
CL 382	12 November 1991	11 November 2033

Title	Date Granted	Expiry
ML 1786	28 May 2019	31 December 2031
ML 1694* (part)	22 October 2013	22 October 2034

* Sub-lease only. Full details to be reported by the Lease Holder (Mt Owen Pty Limited).

3.3 Licences

3.3.1 Environment Protection Licence

Integra Underground operates under EPL 3390, with an anniversary date of 31 August.

No variations have occurred during the 2019 reporting period.

3.3.2 Surface Water Licences

Integra Underground currently holds the surface water licences detailed in **Table 8**.

Table 8 Integra Underground Surface Water Licences

Licence No	Work Approval	Date Granted	Expiry	Share	Water Source
WAL 484	20CA200060	1 July 2004	Perpetuity	3	Hunter Regulated River - any part of Glennies Creek
WAL 485				99	Hunter Regulated River - Zone 3A of Glennies Creek
WAL 960	20WA201234			50	
WAL 961	20WA201236			150	
WAL 1172	20CA201763			3	
WAL 1173				303	
WAL 1242				13	

3.3.3 Groundwater Licences

Integra Underground currently holds the groundwater licences outlined in **Table 9**.

Table 9 Integra Underground Groundwater Licences

Licence No.	Date Granted	Expiry	Allocation (ML)	Type of Works
20BL169862	4 August 2015	25 September 2020	450	Bore - Groundwater extraction for dewatering purpose
20BL169864				
20BL172505	20 May 2011	19 May 2021	500	
20BL172506				
20BL167917	15 August 2000	Perpetuity	-	Monitoring Bore
20BL169571	7 March 2005			
20BL169573				
20BL169574				

Licence No.	Date Granted	Expiry	Allocation (ML)	Type of Works
20BL171707	17 August 2007			
20BL171708				
20BL171710				
20BL171813	3 April 2008			
20BL171870	15 May 2008			
20BL172277	15 September 2009	Perpetuity	-	Monitoring Bore
20BL172278				
20BL172279				

3.3.4 Sewerage Management

Integra Underground has approval to operate a system of sewage management under On-site Sewerage Management (OSSM) Approval Number 3969/2008. This approval was granted 25 January 2012. The approval was renewed on 1 July 2019 through to 30 June 2020. The approval will be renewed by Council after 30 June each year, unless Council becomes aware of problems with the operation of the on-site sewage management system requiring adjustment of approval conditions or prevention of system use.

3.4 Other Approvals

3.4.1 Mining Operations Plan

In November 2016, Glencore made a decision to recommence operations at Integra Underground. Integra Underground submitted a MOP to the RR in November 2016 which covered activities for the period 1 January 2017 to 31 December 2018. The MOP was approved on 30 November 2016, prior to commencement of first workings in February 2017. A new MOP was submitted to the RR in November 2018 following the approval of Mod 8 with a new completion date of 31 December 2023 (SLR, 2018). This MOP was approved 19 November 2018. This MOP then underwent an amendment (known as Amendment A) in late 2018, which was revised in mid 2019. Subsequently, MOP Amendment A (Version 2) was approved on 31 May 2019.

3.4.2 Extraction Plan

The Integra Underground *Longwalls 13 and 14 Extraction Plan* (EP 13-14) was prepared to seek approval for secondary extraction within these panels. The EP 13-14 was prepared in accordance with Schedule 3, Condition 20 of PA 08_0101 and was submitted to the DPIE on 27 January 2017. Conditional approval was granted on 6 April 2017, and following response to DPIE comments by Integra Underground on 6 June 2017, full approval was received from the DPIE on the 11 August 2017.

The Integra Underground *Longwalls 15 and 16 Extraction Plan* (EP 15-16) was prepared to seek approval for secondary extraction within these panels. The EP 15-16 was prepared in accordance with Schedule 3, Condition 20 of PA 08_0101 and was submitted to the DPIE on 3 June 2019. Approval was received from the DPIE on the 16 August 2019.

An Extraction Plan for Longwalls 17 to 20 is currently being prepared and is due to be submitted to DPIE in 2020.

4 Operations during the Reporting Period

4.1 Mining Operations

Integra Underground completed secondary extraction of Longwall 14 in August 2019 and Longwall 15 commenced in September 2019. Development of first workings for Longwall 16 continued in 2019, with secondary extraction of Longwall 16 due to commence in mid 2020. Coal extraction during 2019 is shown in **Figure 3**.

All ROM coal is sent to Rix's Creek North for processing, therefore tailings/rejects are not relevant to Integra Underground. The 2019 production summary is presented in **Table 10**.

Table 10 Production Summary

Material	Approved Limit (PA 08_0101)	2018 reporting period (actual)	2019 reporting period (actual)	2019 MOP Prediction	2020 reporting period (forecast)
Waste Rock/ Overburden (bcm)	N/A	N/A	N/A	N/A	N/A
ROM Coal (t)	4,500,000	2,219,076	2,629,615	2,960,403	2,960,681
Reject Material (Tailings) (t)	N/A	N/A	N/A	N/A	N/A
Saleable product (t)	N/A	1,453,451	1,637,317	1,987,775	1,980,683

4.2 Exploration

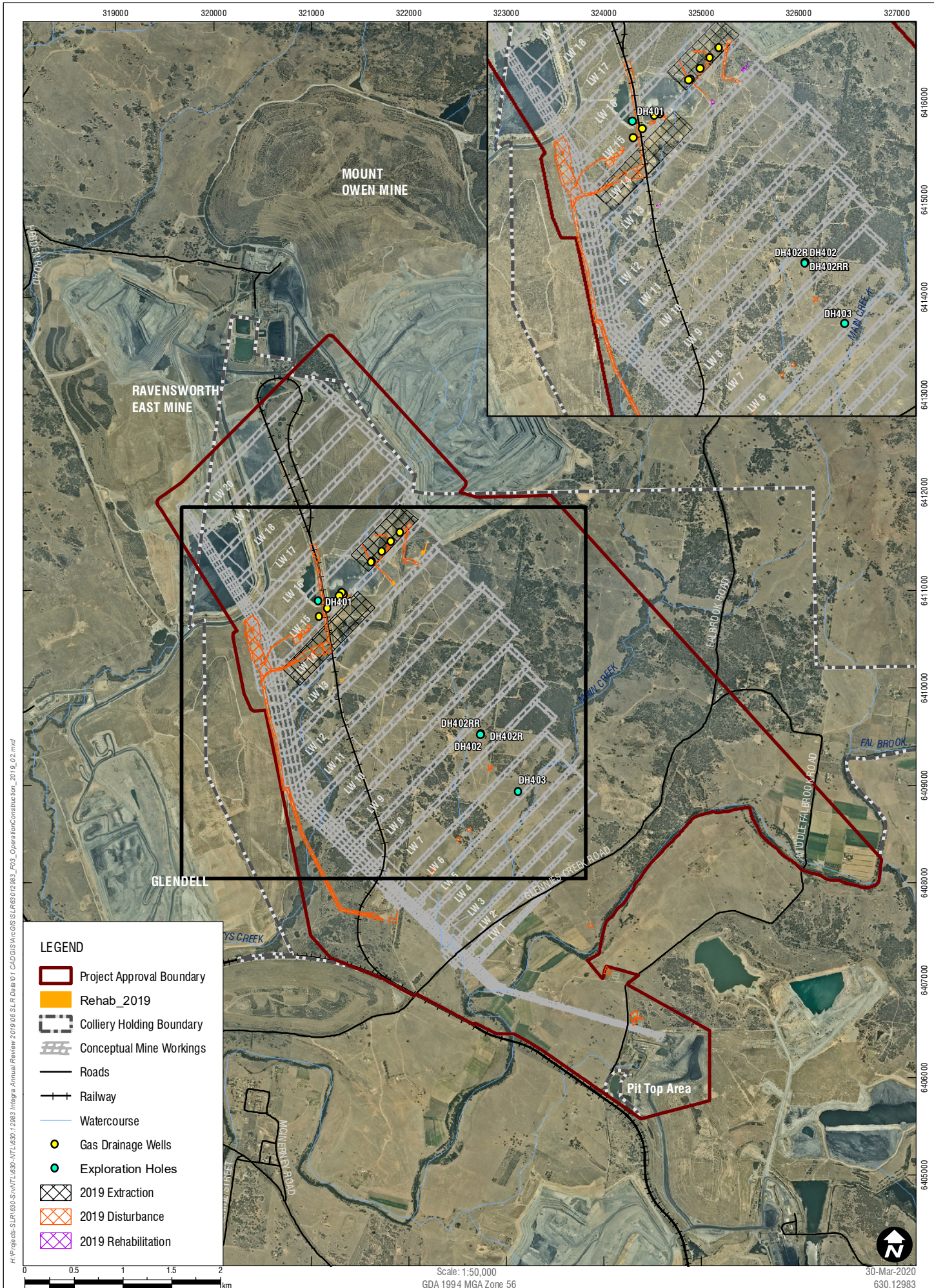
The following exploration was completed in 2019 and is shown on **Figure 3**.

Table 11 Exploration Summary 2019

Site Name (Hole Number)	Drilled Depth (m)	Start Date	Completed
EXP013 (DH401)	537.75	13 May 2019	20 June 2019
EXP03 (DH402)	404.45	27 June 2019	16 July 2019
EXP03 (DH402R)	406.00	17 July 2019	23 August 2019
EXP03 (DH402RR)	471.30	26 August 2019	29 September 2019
EXP05 (DH403)	436.92	5 August 2019	22 November 2019

4.3 Rehabilitation

Three gas wells and a small subsidence crack were rehabilitated during the reporting period. This is further detailed in **Section 8**.



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4.4 Other Operations

4.4.1 Coal Processing

All ROM coal was stockpiled by Integra Underground before being hauled along internal haul roads by Bloomfield operations to Rix's Creek North (owned by Bloomfield) CHPP for processing.

4.4.2 Construction

Ventilation Shaft 3 construction works began in 2019. Located above the main headings and near Longwall 16, this shaft is required to provide adequate ventilation and services to the underground mining operation.

Ventilation Shaft 3 construction works completed within the reporting period included:

- Clearing the site pad;
- Excavating and lining the dam;
- Majority of excavation of main ventilation shaft and shafts for supporting infrastructure;
- Construction of foundations and installation of supporting infrastructure
- Installation of 3.6km of 11kV power line.

Other construction activities completed within the reporting period included:

- Installation of new transportable office building; Construction of gas drainage infrastructure for Longwall 15, including surface gas wells and pipelines;
- Expansion of car park;
- Installation of new process water tanks within current pit top area;
- Demolition of brick building on site (former school master residence); and
- Demolition of house behind EDL plant following fire.

4.4.3 Mobile Plant and Equipment

The equipment used in 2019 was consistent with previous years and approved operations, with the majority of equipment used underground. **Table 12** details the type and quantity of vehicles used for operations at Integra Underground.

Table 12 Integra Underground Mobile Plant and Equipment

Equipment Type	Number Routinely in Operation	Function
Personnel transporters	13	Personnel movement
Load haul dump (LHD/FBL)	13	Materials movement
Grader	1	Underground road maintenance
Continuous miner	3	Mine development
Shuttle car	4	Mine development
Bobcat	2	Underground belt cleaning
Surface forklift	2	Surface and stores

Equipment Type	Number Routinely in Operation	Function
Longwall unit	1	Coal production
Light Vehicles	8	Surface transportation
Telehandlers	2	Surface and stores

4.4.4 Construction Traffic Management

A Construction Traffic Management Plan (CTMP) was developed to satisfy Schedule 3 Conditions 42 of PA 08_0101 for the construction activities included in MOD 8 to PA 08_0101 and was effective as of 10 September 2018.

During the 2019 reporting period, all traffic management was undertaken as outlined in the CTMP. Records of contractors assisting with the construction phase were retained, including start and finish times. Construction areas were inspected during the construction phase monthly by the Environment & Community Department with no construction traffic related issues observed. Access to construction areas was mainly via Glennies Creek Road, which was accessed using the New England Highway or Middle Falbrook Road. Integra Underground minimised traffic impacts during construction of surface infrastructure and traffic impacts did not to exceed predictions. No traffic complaints were received regarding construction traffic.

The construction traffic management measures set out in the CTMP are deemed effective. There were no construction traffic related incidents.

4.4.5 Land Subdivision & Ownership Transfers

In February 2017, HVCC submitted an application to subdivide a parcel of land currently owned by HVCC. The proposed subdivision is intended to allocate land parcels for underground (HVCC) and open cut (Bloomfield) coal mining operations, respectively.

The three land parcels relevant to the proposed subdivision include:

- Lot 710 in Deposited Plan (DP) 624852;
- Lot 1 DP in DP 1083482; and
- Lot 791 in DP 580967 (eastern and western portions).

The subdivision was approved, and subsequent subdivision certificate issued from Singleton Council in 2018.

Land subject to the 2018 subdivision was transferred from Integra to Bloomfield in February 2019.

4.5 Next Reporting Period

4.5.1 Mining

Integra Underground will undertake the following mining activities during 2020:

- Longwall development within the Middle Liddell Seam using continuous miners;
- Longwall mining within the Middle Liddell seam, including Longwalls 15 and 16;
- Extraction of a maximum 4.5 Mtpa of ROM coal;
- Subsidence monitoring and remediation as per the approved *Integra Underground Extraction Plan*;

- Storage of ROM coal at the pit top;
- Hauling and processing of coal from Integra Underground to be undertaken by Bloomfield Collieries and its Rix's Creek North CHPP;
- Operation of workshop and administration areas; and
- Construction of mine infrastructure, including services and ventilation facilities as detailed in **Section 4.4.3**.

4.5.2 Exploration

Table 13 details the planned exploration for 2020.

Table 13 Exploration 2020

Site ID	Easting	Northing	Estimated Depth (m)
EXP06	322251.00	6408156.00	400
EXP07	322511.42	6408946.02	470
EXP09	323415.71	6408209.86	360

Exploration activities will be completed in line with the current *Exploration Activities and Surface Infrastructure Management Plan* which is available on the Integra Underground website.

4.5.3 Construction

Gas drainage infrastructure will be constructed to facilitate future mining. This includes surface goaf wells and pipelines for Longwalls 15, 16 and onwards.

Construction works on the Ventilation Shaft 3 continue into the next reporting period.

At this stage the following Ventilation Shaft 3 construction works are planned for 2020:

- Installation of HV switchgear and diesel generator (including foundations);
- Installation of diesel dam pump (including foundation);
- Installation of two potable water tanks and infrastructure;
- Installation of two emulsion tanks and infrastructure;
- Installation of shedding for transformers, HV switchgear, diesel generator and compressor facility;
- Installation of two ventilation fans;
- Installation of concrete drophole foundation and facilities;
- Installation of ballast drophole foundation and facilities; and
- Installation of ballast storage facility.

4.5.4 Land Subdivision & Ownership Transfers

No land subdivisions or ownership transfers are currently proposed for 2020.

5 Actions Required from Previous Annual Review

5.1 2018 Annual Review

Following the submission of the 2018 Annual Review, the DPIE responded on 1 July 2019 requesting additional information. The revised Annual Review was then submitted to the DPIE on 30 July 2019. A letter was received from the DPIE on 15 August 2019 confirming acceptance of the amended 2018 Annual Review.

The RR did not provide any feedback in response to the 2018 Annual Review.

While all comments received from DPIE were addressed and the revised 2018 Annual Review approved, the feedback has also been addressed within this Annual Review. **Table 14** outlines feedback and where the information has been addressed in this report.

Table 14 DPIE Actions Required for 2018 Annual Review

Comment	Section Addressed
Analysis of monitoring results – in accordance with Schedule 5, Condition 11 (b), and Section 6 of the Department’s <i>Annual Review Guideline (2015)</i> , analysis of the current Annual Review period monitoring results should be extended to include comparison to previous years’ results for trend analysis (where appropriate and not already provided).	Section 6
24 Hour PM₁₀ exceedances – Table 19 details multiple exceedances of the 24hr PM ₁₀ criterion at all monitoring points. Please provide additional detail regarding calculation methodology for determining Integra Underground Mine’s contribution to the overall level for each exceedance instance.	Appendix A
TSP annual average exceedances – Table 20 details an exceedance of the annual TSP criterion at TSP 1. Please provide additional detail regarding calculation methodology for determining Integra Underground Mine’s contribution to the overall level.	Appendix B

5.2 2019 Annual Review

Following the submission of the 2019 Annual Review, the DPIE on 15 May 2020 requested additional information. The revised Annual Review (this document) is due to be submitted to DPIE by 5 June 2020 as required. **Table 15** outlines the requests and where the information has been provided in this amended report.

Table 15 DPIE Actions Required from 2019 Annual Review

Comment	Section(s) Addressed
Waste Management – please include a comparison of waste generated by the development in previous years to assist the identification of trends in waste generated, and report on waste minimisation measures implemented during the reporting period.	Section 6.7
Surface Water – please amend Figure 11 to identify all monitoring locations in the legend of the graph.	Section 7.5

Comment	Section(s) Addressed
Community Complaints – please include a comparison of complaints received in the previous reporting periods, including an assessment of any trends in the subject, timing or location of complaints.	Section 9.4
Independent Audit – please include a brief discussion of progress made in implementing the Action Plan which was developed in the most recent audit. Where all actions have been addressed in previous reporting years, please include a brief statement indicating that this is the case.	Section 10

6 Environmental Performance

This chapter provides a summary of environmental monitoring and management undertaken during the 2019 report period. In accordance with the *Post Approval Requirements for State Significant Mining Developments – Annual Review Guideline* (NSW Government 2015) this report contains a summary of environmental monitoring data where it is required to explain trends or environmental performance during the report period.

6.1 Meteorology

The Glendell Meteorological Station was operated in accordance with Schedule 3, Condition 16 of PA 08_0101. The weather station records rainfall, relative humidity, wind speed, wind direction and sigma theta at 10 minute intervals and temperature at two minute intervals. The data is transferred by a telemetry link to the weather display and is used to evaluate weather conditions. The weather station achieved good data recovery during the reporting period with no extended malfunctions for the measured parameters. A summary of conditions recorded in 2019 is provided in **Table 16**.

Table 16 Summary of 2019 Data from Glendell Meteorological Station

Date	Temperature (°C)			Wind Speed (m/s)		Humidity (%)	Rainfall (mm)
	Min	Av.	Max	Av.	Max	Av.	Total
January	18.1	28.5	43.2	2.1	4.2	64.1	44.8
February	12.6	24.4	40.7	3.2	5.5	64.3	30.4
March	11.9	23.1	36.8	2.5	5.8	70.5	156.4
April	7.2	18.9	32.5	1.8	3.9	74.7	8.4
May	4.5	15.0	27.8	2.7	10.8	71.6	24.6
June	-1.0	12.1	25.3	1.7	4.7	77.2	22.2
July	0.8	12.5	23.5	3.4	8.4	68.7	11.2
August	0.9	13.0	25.8	3.4	9.8	59.1	31.4
September	4.5	16.3	32.2	2.6	10.8	61.5	42.4
October	6.0	20.1	37.5	2.4	8.2	56.0	4.6
November	8.5	23.2	39.9	3.1	7.3	50.9	19.8
December	12.0	25.3	44.2	3.7	10.0	53.1	0.2

6.1.1 Rainfall

A total of 396.4 mm of rainfall was recorded during 2019. This is a decrease of 108.8 mm from the 505.2 mm recorded during 2018. Monthly rainfall totals exceeded 50 mm only once during the reporting period (March), compared with four occasions in 2018. **Figure 4** provides a comparison of monthly rainfall between 2017, 2018 and 2019.

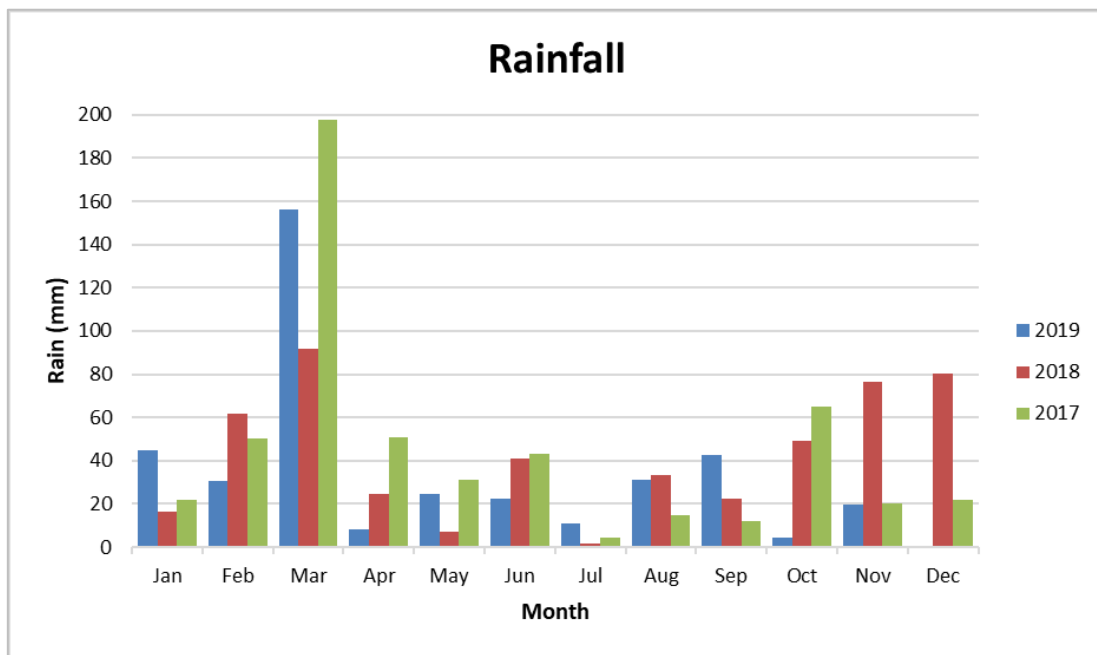


Figure 4 Rainfall (mm)

6.1.2 Temperature

Figure 5 illustrates the monthly maximum and minimum temperatures for 2017 to 2019. Results show similar trends across the three-year period. The maximum temperature in 2019 was 43.2°C, observed in January. This is the same as the last reporting period, which also had a maximum observed temperature of 43.2°C in January 2018. The minimum temperature in 2019 was -1.0°C, observed in June. This minimum temperature was only slightly higher than 2018, where a low of -1.5°C, observed in July.

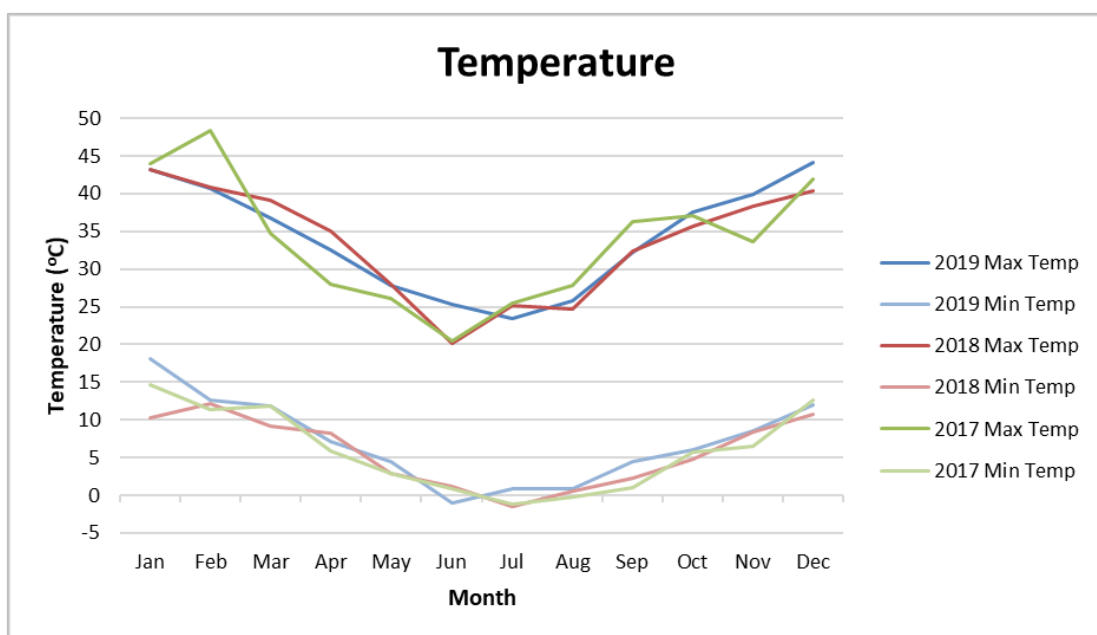


Figure 5 Monthly Temperature

6.1.3 Wind Speed and Direction

The wind distribution pattern during the reporting period shows winds generally follow a north-west to south-east axis, with some winds also coming from the south and north. Maximum wind speed in 2019 was 10.8 m/s, recorded in both May and September, down from the 2018 maximum of 17.7 m/s recorded during October 2018. These wind distribution patterns are consistent with observations in 2017 and 2018 and are typical of the Hunter Valley region. Annual wind rose data is shown in **Figure 6**.

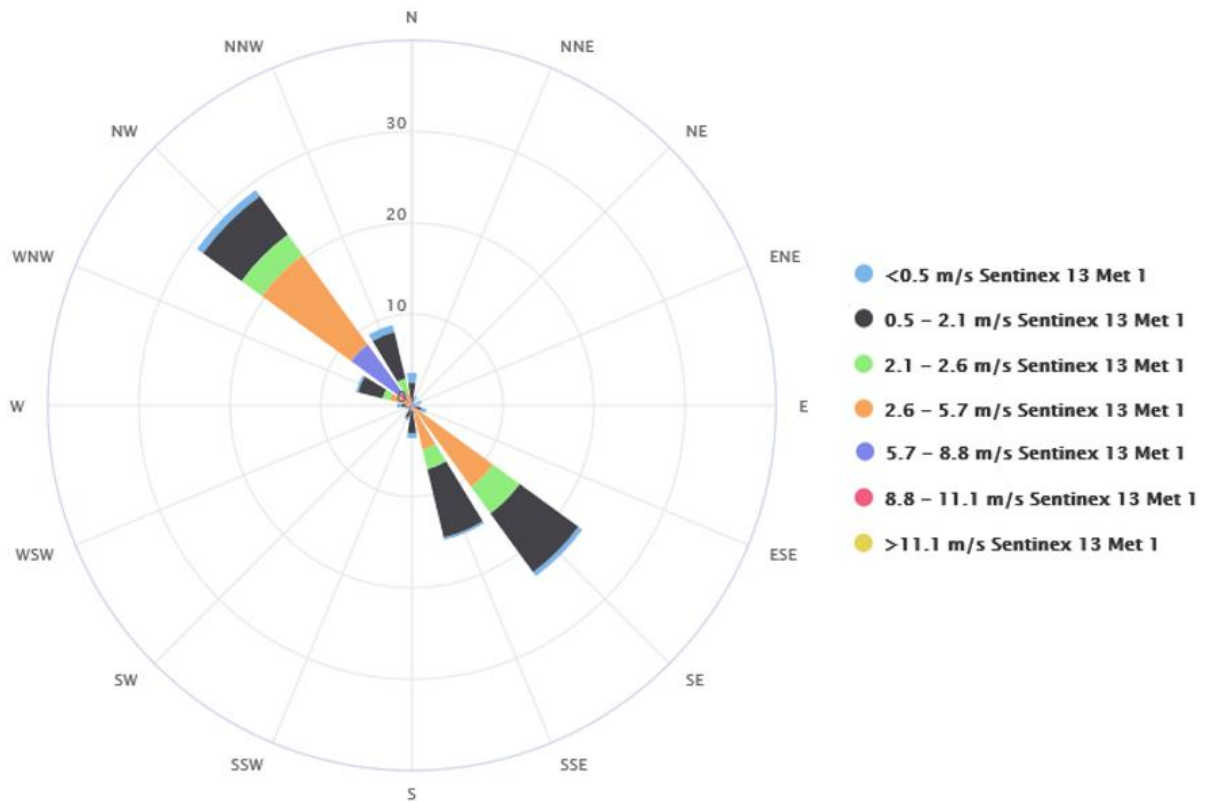


Figure 6 Annual Wind Rose

6.2 Air Quality

The *Air Quality and Greenhouse Gas Management Plan* is one of a series of environmental management plans that together form the Environmental Management System (EMS) for the Integra Underground. A copy of the latest *Air Quality and Greenhouse Gas Management Plan* is available on the Integra Underground website, which was updated in June 2019.

Air quality in the vicinity of Integra Underground’s operations is managed via a combination of:

- Ambient air quality monitoring;
- Meteorological monitoring; and
- Site management measures.

Air quality monitoring is currently being conducted at the locations identified in **Figure 7** and includes:

- Three Tapered Element Oscillating Microbalance (TEOM) continuous air quality monitors that measure the concentration of particulate matter less than ten microns in diameter (PM₁₀);
- Seven Depositional Dust Gauges used for monitoring of larger dust particles (typically >50µm); and
- One High Volume Air Sampler (HVAS) that monitors Total Suspended Particulates (TSP) over a 24 hour period every sixth day.

The following 66 days were declared an extraordinary event during 2019 regarding air quality, as confirmed by DPIE:

- 16th and 17th January;
- 13th and 19th February;
- 6th and 31st March;
- 26th April;
- 8th and 9th August;
- 6th September;
- 7th, 8th, 18th, 19th and 24th to 31st October;
- 1st, 2nd, 7th, 8th, 12th, 16th, 17th, 19th to 23rd and 26th to 30th November; and
- 1st to 23rd and 27th to 31st December.

Schedule 3 Condition 12 of PA 08_0101 stipulates the criteria for PM₁₀, TSP and deposited dust, as presented in **Table 17**.

Table 17 PA 08_0101 Air Quality Criteria

Pollutant	Criterion *	Averaging Period
TSP	90 µg/m ³ (Cumulative impact - increase in concentrations due to the project plus background concentrations due to all other sources)	Annual
PM ₁₀	50 µg/m ³ (Incremental impact - incremental increase in concentrations due to the project on its own)	24-hour

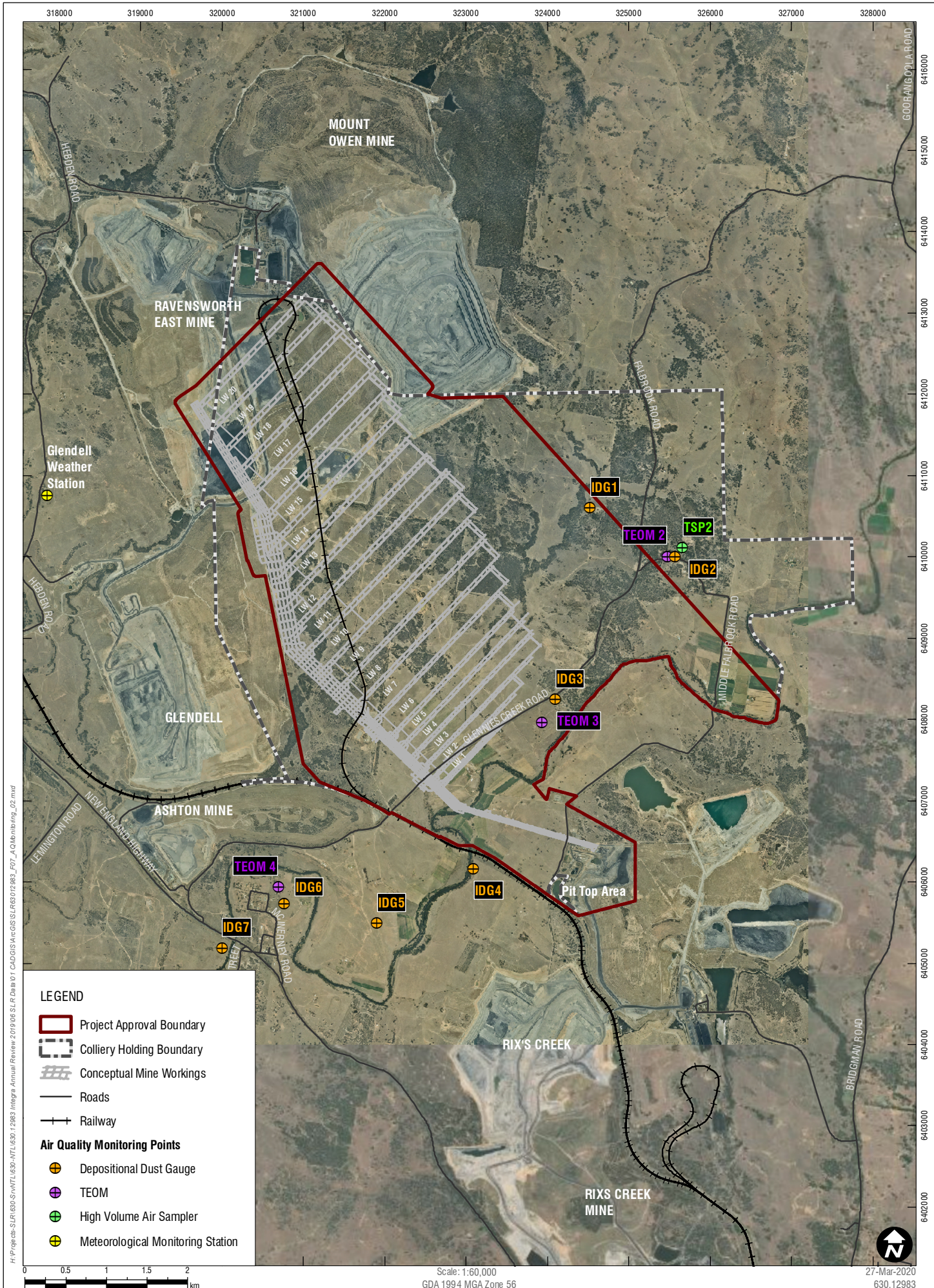
Pollutant	Criterion *	Averaging Period
	30 µg/m ³ (Cumulative impact - increase in concentrations due to the project plus background concentrations due to all other sources)	Annual
Deposited Dust	4 g/m ² /month (Cumulative impact - increase in concentrations due to the project plus background concentrations due to all other sources)	Annual
	2 g/m ² /month (Incremental impact - incremental increase in concentrations due to the project on its own)	Annual

*Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity which has been endorsed by the EPA and then agreed to by the Secretary.

Management and Mitigation Measures

Management measures include:

- Coal handling areas, stockpiles, roads and trafficked area will be maintained in a moist condition using water carts and/or water sprays to minimise wind-blown and traffic-generated dust;
- Restricting vehicle speeds on unsealed roads that have not been treated with water or chemical stabilisers;
- Minimisation of disturbance areas;
- Obsolete roads are ripped and re-vegetated;
- Development of minor roads is limited and the locations of these is clearly defined;
- Minimise double handling of material; and
- Dust generated underground will be minimised by the application of water and/or use of dust suppressants.



LEGEND

- Project Approval Boundary
- Colliery Holding Boundary
- Conceptual Mine Workings
- Roads
- Railway

Air Quality Monitoring Points

- ⊕ Depositional Dust Gauge
- ⊕ TEOM
- ⊕ High Volume Air Sampler
- ⊕ Meteorological Monitoring Station

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6.2.1 Environmental Monitoring Results

Depositional Dust Gauges

Depositional dust gauge data collected during the reporting period is available on the Integra Underground website and is summarised in **Table 18**. The data presented is corrected for contamination of samples (by bird droppings or insects) and presents annual average deposition rate of insoluble solids as g/m²/month.

Table 18 Depositional Dust Gauges

Gauge	No. of Samples Collected	No. of Valid Samples	2019 Insoluble Matter Deposited (g/m ² /month)	Project Approval Criteria (g/m ² /month)
IDG1	12	10	5.6	4.0
IDG2	12	11	3.3	
IDG3	12	8	1.7	
IDG4	12	11	3.1	
IDG5	12	10	2.2	
IDG6	11*	10	2.7	
IDG7	12	11	4.7	

*No sample was collected in February due to broken sample bottle.

During 2019, the annual average depositional dust results were above the 4 g/m²/month criteria at monitoring locations IDG1 and IDG7. IDG1 is located between Mt Owen Mine and Falbrook Road. IDG7 is located southwest of Camberwell Village, on the south side of the New England Highway. Further investigation of these results were carried out. Integra Underground was estimated to have contributed up to 0.7 g/m²/month to the measured 5.6 g/m²/month at IDG1, and up to 0.1 g/m²/month to the measured 4.7 g/m²/month at IDG7. These results demonstrate compliance with the “incremental impact” criteria from the Project Approval (that is, 2 g/m²/month). In addition, the data do not indicate that Integra Underground was the cause of exceedances of the “total impact” criteria (4 g/m²/month) at IDG1 or IDG7, given that the measured annual averages at these two locations would have been above 4 g/m²/month in the absence of the calculated contributions from Integra Underground (Jacobs, 2020).

In the last two previous reporting periods, all monitoring locations were below the criteria, as shown in **Table 19**.

Table 19 Depositional Dust Gauges Trends (2017-2019)

Gauge	Insoluble Matter Deposited (g/m ² /month)			Consent Criteria (g/m ² /month)
	2017	2018	2019	
IDG1	3.9	3.9	5.6	4.0
IDG2	2.7	3.1	3.3	
IDG3	1.8	2.1	1.7	
IDG4	2.4	2.4	3.1	
IDG5	2.0	1.9	2.2	
IDG6	2.2	2.6	2.7	
IDG7	2.7	3.9	4.7	

A full review of the 2019 Air Quality monitoring data was completed which in summary concluded that Integra Underground was in compliance with its Project Approval in terms of total and incremental dust deposition impacts at all reportable monitoring sites for data collected in 2019 (Jacobs, 2020).

TEOM (PM₁₀)

TEOM results for PM₁₀ concentrations are available in the Environmental Monitoring Reports on the Integra Underground website. TEOM results excluding data from days declared as extraordinary events are summarised in **Tables 20** and **20**. Trends showing the last 3 years of TEOM results for PM₁₀ concentrations have been shown in **Tables 21** and **23**.

Table 20 TEOM Monitoring Results – Annual Averages

Gauge	No. Samples Collected	2019 Annual Average (µg/m ³)	Project Approval Criteria (µg/m ³)
TEOM 2	357	26.12	30
TEOM 3	365	22.61	
TEOM 4	365	27.39	

Table 21 TEOM Monitoring Trend – Annual Averages (2017-2019)

Gauge	Annual Average (µg/m ³)			Project Approval Criteria (µg/m ³)
	2017	2018	2019	
TEOM 1*	26.6	29.14	-	30
TEOM 2	19.8	25.57	26.12	
TEOM 3	20.2	22.32	22.61	
TEOM 4	23.7	29.43	27.39	

* Monitoring at TEOM 1 is no longer required, as per the current Air Quality and Greenhouse Gas Management Plan

As shown in **Table 20**, annual averages at all monitoring sites were below the 30 µg/m³ annual average criteria. In the last two previous reporting periods, all monitoring locations were also below the criteria, as shown in **Table 21**. The highest reading was recorded as 115 µg/m³ on the 11th July 2019 (excluding declared extraordinary event). This reading is 95 µg/m³ lower than the 2018 highest reading of 210 µg/m³ and 10.7 µg/m³ higher than the 2017 highest reading of 104.3 µg/m³.

Table 22 TEOM Monitoring Results – 24 Hour Averages and Number of Exceedances

Gauge	24 Hour Average (µg/m ³)	Number of days above criteria	Consent Criteria (µg/m ³)
TEOM 2	26.12	20	50
TEOM 3	22.61	11	
TEOM 4	27.39	23	

Table 23 TEOM Monitoring Trends – Number of Exceedances (2017-2019)

Gauge	Number of days above criteria			Consent Criteria ($\mu\text{g}/\text{m}^3$)
	2017	2018	2019	
TEOM 1*	26	34	-	50
TEOM 2	5	27	20	
TEOM 3	2	12	11	
TEOM 4	6	37	23	

* Monitoring at TEOM 1 is no longer required, as per the current Air Quality and Greenhouse Gas Management Plan

As shown in **Table 22**, there were some days above the 24 hour average criteria for TEOMs during 2019 across all three gauges. The number of days was greater than in 2017 and similar to 2018, with 71 more in 2018 compared to 2017, and 56 fewer in 2019 compared to 2018 (noting one less gauge in 2019). Investigations of these days above the 24 hour average criteria concluded that none of these were exceedances attributable to Integra Underground. Further investigation has been provided in **Appendix B**.

A full review of the 2019 Air Quality monitoring data was completed which in summary concluded that Integra Underground was in compliance with its Project Approval in terms of total PM_{10} impacts at all reportable monitoring sites for data collected in 2019 (Jacobs, 2020).

Integra Underground investigations have concluded that in all cases the monitoring results were not attributed to Integra Underground operations. This is based on the dominant wind direction during the monitoring period and minimal surface activities being carried out by Integra Underground upwind of monitoring locations during the reporting period. Moreover, numerous accounts of nearby bushfires and regional dust storm events during 2019 also contributed to regional air quality. Accordingly, Integra Underground were compliant with Schedule 3, Condition 12 of PA 08_0101.

HVAS (TSP)

HVAS results for TSP concentrations are available on the Integra Underground website and are summarised in **Table 24**, excluding data from days declared as extraordinary events. Trends showing the last 3 years of HVAS results for TSP concentrations are shown in **Table 25**.

Table 24 HVAS Monitoring Results – Annual Average

Monitoring Point	2019 Annual Average ($\mu\text{g}/\text{m}^3$)	Consent Criteria ($\mu\text{g}/\text{m}^3$)
HVAS - TSP 1*	99.4	90
HVAS - TSP 2	75.7	

* TSP 1 monitoring ceased 18 August 2019 as it was removed from latest Air Quality and Greenhouse Gas Management Plan.

Table 25 HVAS Monitoring Results – Annual Average

Monitoring Point	Annual Average ($\mu\text{g}/\text{m}^3$)			Consent Criteria ($\mu\text{g}/\text{m}^3$)
	2017	2018	2019	
HVAS - TSP 1*	88	114.9	99.4	90
HVAS - TSP 2	73 [^]	77.9	75.7	

* TSP 1 monitoring ceased 18 August 2019 as it was removed from latest Air Quality and Greenhouse Gas Management Plan.

[^] Total Suspended Particulates (TSP) results for TSP 2 in 2017 was measured in December only

During the reporting period, the annual average at TSP 1 exceeded the criteria of 90 µg/m³. There were numerous events during the reporting period where higher TSP records contributed to the exceedance of the annual average criteria. Meteorological data at the time of these events were reporting predominantly from directions upwind of Integra Underground. Integra Underground considers its operations did not contribute to these higher levels. Daily exceedances that would have contributed to this high annual average have been investigated further in **Appendix B**.

Monitoring at TSP 1 ceased on 18 August 2019 in accordance with the changes to the *Air Quality and Greenhouse Gas Management Plan* and monitoring of a new site known as TSP 2 begun being monitored in 2019. As stated in the approved *Air Quality and Greenhouse Gas Management Plan* across 2017 and 2018 Integra Underground investigated high recorded levels at TEOM 1 and TSP 1 and identified these levels to not be attributable to Integra Underground. TEOM 1 and TSP 1 are located to the north east of Integra Underground operations and not within prevailing winds range. Subsequently, Integra Underground reviewed the air quality monitoring network in 2018 resulting in the removal of TEOM 1 and TSP 1 from the network. Other TEOM locations remain in the network within prevailing wind range. TSP 2 was added to the air quality monitoring network as it was identified to be more representative of Integra Underground operations.

A full review of the 2019 Air Quality monitoring data was completed which in summary concluded that Integra Underground was in compliance with its Project Approval in terms of total TSP impacts at all reportable monitoring sites for data collected in 2019 (Jacobs, 2020).

6.2.2 Comparison with Predictions

Integra Underground operates in close proximity to a number of mining operations including: Ashton Coal, Rix's Creek North, Rix's Creek and the Mount Owen Glendell Operations which are potential sources of additional atmospheric emissions. Other potential sources of emissions in the locality include road and rail vehicle movements, vehicle exhaust emissions, windblown dust from exposed soils, bushfires and agricultural activities. During 2019 the region also experienced drought conditions, which have impacted air quality in a way not predicted.

The predictions made in the 2009 *Air Quality Assessment* (AQA) (ERM), Mod 2 *Air Quality Impact Assessment* (AQIA) (PAE Holmes 2012) and the 2017 *Air Quality and Greenhouse Gas Assessment* (AQGGA) prepared by Jacobs as part of Mod 8 to PA 08_0101, have been assessed against air quality monitoring results for the reporting period. It should also be noted that the predictions made in the AQA and the AQIA were based on operations occurring at the Integra Complex at the time (i.e. both open cut and underground operations).

The 2009 AQA predicts the concentrations of depositional dust, PM₁₀ and TSP for multiple scenarios. Scenario 4 was chosen as it represents Year 8 of operations i.e. 2017, which was the most representative scenario for 2019 operations. **Table 26** outlines the predictions made in the AQA (ERM 2009) and the results for the 2019 reporting period.

Table 26 Comparison of 2019 Air Quality Data Against the Predictions

Sites	2009 Predictions (Scenario 4)	2019 Actual
Depositional Dust (g/m²/month)		
IDG1	5	5.6
IDG2		3.3
IDG3		1.7
IDG4		3.1

Sites	2009 Predictions (Scenario 4)	2019 Actual
IDG5		2.2
IDG6		2.7
IDG7		4.7
PM₁₀ (µg/m³)		
TEOM 2	58	26.12
TEOM 3		22.61
TEOM 4		27.39
TSP (µg/m³)		
HVAS - TSP 2	119	75.7

As shown in **Table 26**, during 2019 the particulate emission predictions made in the AQA (ERM 2009) for depositional dust, PM₁₀ and TSP were much higher than results recorded during the reporting period in most instances, except for depositional dust at site IDG1.

The AQIA (PAE Holmes 2012) was prepared to support the application for PA 08_0101 Mod 2. This assessed the impact of the Western Extension (approved and commenced under PA 08_0102 for IOC) and the Integra Complex. The AQIA predicted the impacts of dust deposition, TSP and PM₁₀ on 171 sensitive receptors during years 3, 4 and 6 of operations. During 2019 depositional dust recordings at monitoring site IDG1 (5.6 g/m²/month) was slightly higher than predicted (5 g/m²/month), however all other monitoring sites were lower than predicted.

The AQGGA predicts the total mass of emissions based on assumed emission rates from different operational activities, such as transport of coal via conveyor and operation of dozers. These predictions were made to identify key operational activities that contribute to particulate emissions and whether Mod 8 was likely to increase the mine's air quality impacts. Jacobs (2017) state that historical and current monitoring data shows that air quality concentrations are at acceptable levels. The AQGGA concluded that "the modification would not cause any adverse air quality impacts".

Air quality impacts for the mine are measured in terms of particulate concentrations rather than total mass. A direct comparison between the annual particulate emissions predicted in the AQGGA and air quality results recorded during the reporting period is not feasible.

6.2.3 Comparison with Long Term Data

As outlined in Sections 2 and 3, in November 2016 Glencore made a decision to recommence operations at Integra Underground with first workings recommencing in February 2017. Therefore site data prior to 2017 can assist in showing the difference in environmental performance between when the site was in care and maintenance and Glencore operational.

Site *TSP2 – Middle Fallbrook* was sampled for PM₁₀ concentrations between April 2006 and January 2018, with the results shown in **Table 27**. Sampling of TSP at *TSP2 – Middle Fallbrook* commenced from December 2017 (until present).

Annual averages for PM₁₀ concentrations at *TSP2 – Middle Fallbrook* ranged from 17.8µg/m³ in 2016 to 24.9µg/m³ in 2017. 2007 and 2008 saw similar results to 2018, recording 24.2 and 24.0 annual averages respectively. With the exception of 2015 and 2016, most annual results ranged from 20.1 µg/m³ to 24.9µg/m³.

High maximum results can be the outcome of external sources including long periods of drought or bushfires. 2018 data included January samples only and being a summer month, external causes such as heat, dry weather and bushfires increased dust levels.

Table 27 Long term annual PM₁₀ concentrations recorded at TSP2 – Middle Fallbrook (2006-2018)

Year	Minimum annual PM ₁₀ (µg/m ³)	Maximum annual PM ₁₀ (µg/m ³)	Average annual PM ₁₀ (µg/m ³)	Current Consent Criteria (µg/m ³)
2006*	4.0	63.0	20.1	30
2007	2.0	103.0	24.2	
2008	1.0	79.0	24.0	
2009	2.0	61.0	22.4	
2010	2.0	68.0	21.0	
2011	4.0	65.0	20.2	
2012	3.0	94.0	23.0	
2013	3.0	68.0	21.7	
2014	4.0	49.0	20.5	
2015	1.0	55.0	19.3	
2016	1.0	48.0	17.8	
2017	1.0	90.0	24.9	
January 2018 only*	18.0	46.0	35.8	

* Data was analysed between April 2006 and January 2018, inclusive

6.2.4 Key Performance and/or Management Issues

The *Air Quality and Greenhouse Gas Management Plan* was revised during 2019. The Plan concluded that across 2017 and 2018, Integra Underground investigated high recorded levels at TEOM 1 and TSP 1 and identified these levels to not be attributable to Integra Underground. TEOM 1 and TSP 1 are located to the north east of Integra Underground operations and not within the range of prevailing winds. Subsequently, Integra Underground reviewed the air quality monitoring network in 2018 be more representative of Integra Underground operations. This review included the removal of TEOM 1 from 10 September 2018. The review also indicated that TSP 1 should be removed, and TSP 2 should be added to the air quality monitoring network.

There were no community complaints relating to air quality in 2019.

6.2.5 Proposed Actions for 2020

Integra Underground will continue to manage air quality in accordance with the *Air Quality and Greenhouse Gas Management Plan*.

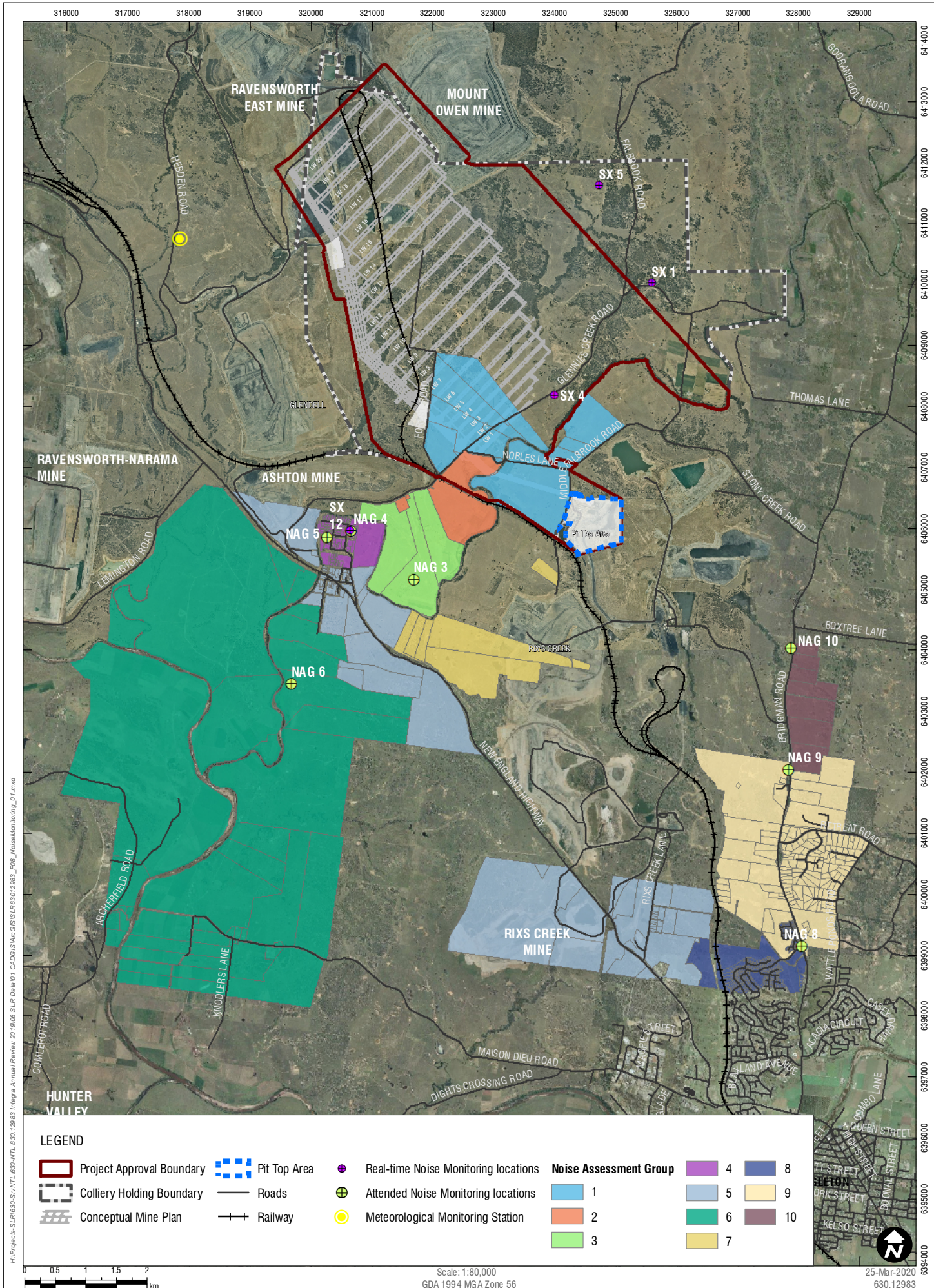
6.3 Noise

The current *Noise Management Plan* was updated during the 2019 reporting period. The *Noise Management Plan* details the general controls implemented at Integra Underground to minimise noise emissions and establishes a noise monitoring program to assess noise impacts on surrounding sensitive receivers. A copy of the *Noise Management Plan* is available on the Integra Underground website.

Noise monitoring consists of both attended and unattended monitoring to meet the requirements of PA 08_0101 and EPL 3390. Monitoring includes:

- Quarterly night-time attended monitoring to assess compliance with regulatory limits, frequency increased to monthly when construction is undertaken during night time periods; and
- Real-time unattended monitoring stations at the nearby Mount Owen Glendell Operations which surrounds the Integra Underground operations. Integra Underground access this data to supplement the attended noise monitoring program.

The noise monitoring locations are illustrated in **Figure 8**.



LEGEND

- | | | | | | |
|---------------------------|--------------|--------------------------------------|-------------------------------|---|----|
| Project Approval Boundary | Pit Top Area | Real-time Noise Monitoring locations | Noise Assessment Group | 4 | 8 |
| Colliery Holding Boundary | Roads | Attended Noise Monitoring locations | 1 | 5 | 9 |
| Conceptual Mine Plan | Railway | Meteorological Monitoring Station | 2 | 6 | 10 |
| | | | 3 | 7 | |

Noise Monitoring Locations
FIGURE 8

25-Mar-2020
 630.12983

Noise Assessment Group Criteria

PA 08_0101 and EPL 3390 noise assessment group (NAG) criteria are provided in **Table 28**. NAGs 1 to 10 represent the noise monitoring locations for attended noise monitoring undertaken on a quarterly basis at Integra Underground. Noise emissions from Integra Underground must not exceed the project specific noise criteria at any residence on privately owned land or on more than 25 percent of any privately owned land.

Table 28 Project Specific Noise Criteria (dB (A))

Location	Day	Evening	Night	Sleep Disturbance	
	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{Aeq} (15 minute)	L _{A1} (1minute)	
NAG 1*	All privately-owned land	38	38	36	46
NAG 2*	All privately-owned land	39	39	37	47
NAG 3	87	42	42	42	49
	106	39	39	39	49
	All other privately-owned land	40	40	39	49
NAG 4	88, 91, 95, 99, 100, 105, 161	35	35	35	47
	All other privately-owned land	42	42	37	47
NAG 5	111	37	37	37	52
	112	36	36	36	52
	118	39	39	39	52
	154	36	36	36	52
	103, 104, 121, 139	35	35	35	48
	All other privately-owned land	50	46	42	52
NAG 6	132, 133, 137	35	35	35	48
	All other privately-owned land	41	41	38	48
NAG 7	110	38	38	38	49
	All other privately-owned land	41	41	38	48
NAG 8*	142	35	35	35	45
	All other privately-owned land	42	42	35	45
NAG 9*	2, 3, 4, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152	35	35	35	48
	All other privately-owned land	40	40	38	48
NAG 10*	10	42	42	42	47
	9	41	41	41	47
	11, 13	40	40	40	47
	8	38	38	38	47
	6	36	36	36	47
	5	35	35	35	47

*These sites are not included as a noise limit locations within the EPL, however they are included as noise limit locations within PA 08_0101.

Construction Noise Criteria

PA 08_0101 (Schedule 3, 2A) indicated that Integra Underground must manage noise from construction activities associated with the water pipeline infrastructure and Modification 8, in accordance with the noise management levels defined in **Table 2** of the *Interim Construction Noise Guideline*. During this construction, Integra Underground must ensure that combined operational and construction noise from the development does not exceed a level of 5 dB(A) above the daytime operational $L_{Aeq(15min)}$ noise criteria in **Table 29** during Standard Construction Hours (7 am to 6 pm, Monday to Friday; and 8 am to 1 pm on Saturdays) and does not exceed the evening or night time operational $L_{Aeq(15min)}$ noise criteria in the previous **Table 28**.

Table 29 Noise Acquisition Criteria (dB (A))

Location	Day $L_{Aeq(15\text{ minute})}$	Evening $L_{Aeq(15\text{ minute})}$	Night $L_{Aeq(15\text{ minute})}$
All privately-owned land in NAG 1	44	44	42
All privately-owned land in NAG 2	45	45	43
All privately-owned land in NAG 3	46	46	45
All privately-owned land in NAG 4	48	48	43
All privately-owned land in NAG 5	56	52	48
All privately-owned land in NAG 6	47	47	44
All privately-owned land in NAG 7	51	48	45
All privately-owned land in NAG 8	48	48	41
All privately-owned land in NAG 9	46	46	44
All privately-owned land in NAG 10	45	45	43
All privately-owned land in NAG 11	47	47	45
All privately-owned land in NAG 12	44	44	41
All privately-owned land in NAG A	45	45	42
All privately-owned land in NAG B	43	43	41
All privately-owned land in NAG C	43	43	41
All privately-owned land in NAG D	46	46	44
All privately-owned land in NAG F	46	46	46
All privately-owned land in NAG G	47	47	45
All other privately-owned land	41	41	41

Cumulative Noise Criteria

PA 08_0101 cumulative criteria for privately owned land are outlined in **Table 30**.

Table 30 Cumulative Noise Criteria ((dB (A) L_{Aeq} (period))

Location	Day	Evening	Night
NAGs 4, 5, 8 and 9	55	45	40
All other privately - owned land	50	45	40

Integra Underground implements all reasonable and feasible mitigation measures to ensure that noise emissions from its operations and other surrounding mines do not exceed the criteria at any residence on privately owned-land or on more of 25 percent of any privately owned-land.

Management and Mitigation Measures

In addition to conducting noise monitoring, Integra Underground implements a number of mitigation measures to minimise potential noise impact on nearby receivers, and to comply with the conditions of consent. Mitigation measures are completed as per the *Noise Management Plan* and include:

- Most operations are below the ground surface or in the portal;
- Significant distance between residences and ventilation fan sites;
- Controlling mine noise at the source through the use of equipment with appropriate sound attenuation fitted, where practical;
- Sound power level testing upon procurement of relevant plant and equipment, and annual sound power level testing to ensure ongoing compliance with relevant sound power level specifications;
- Restricting operations where possible in elevated/out of portal areas, especially during the night time and adverse meteorological conditions;
- Where practicable, evening and night-time surface operations will be restricted to areas that support a minimisation of mine contributed noise at privately owned residences surrounding Integra Underground; and
- Using broadband reversing alarms on mine equipment, light vehicles and contract vehicles.

6.3.1 Environmental Monitoring Results

Attended noise monitoring was undertaken on a quarterly basis in accordance with PA 08_0101. The quarterly monitoring results are shown in **Table 31** and **Table 32**. The Integra Underground contribution results were the same as the previous two reporting periods. Attended noise monitoring was undertaken monthly when construction activities associated with the Ventilation Shaft 3 project. The monthly monitoring results are shown in **Table 33** and **Table 34**.

Operator attended noise monitoring has shown that Integra Underground operations were inaudible throughout most monitoring periods and below criteria when audible, demonstrating compliance with noise criteria.

Table 31 Quarterly Attended Noise Monitoring Results - LAeq (15minute)

Location	Criteria	Total Site Noise Monitoring Results				Integra Underground Contribution			
		Q1 [^]	Q2 [^]	Q3 [^]	Q4 [^]	Q1 ^{1^}	Q2 ^{1^}	Q3 ^{1^}	Q4 ^{1^}
NAG 1	36	37.0	41.5	41.3	44.8	< 35.0	< 35.0	< 34.0	< 35.0
NAG 3	39	41.0	42.4	40.7	38.9	< 35.0	< 35.0	0 ²	0 ²
NAG 4	35	42.0	44.4	44.7	44.3	0 ²	26.0	0 ²	0 ²
NAG 5	35	45.5	49.5	50.0	46.4	0 ²	0 ²	0 ²	0 ²
NAG 6	35	38.0	39.5	35.7	35.3	0 ²	0 ²	0 ²	0 ²
NAG 7	38	48.0	48.8	49.3	48.1	0 ²	0 ²	0 ²	0 ²
NAG 8	35	48.5	47.1	46.0	43.7	0 ²	0 ²	0 ²	0 ²
NAG 9	35	40.5	46.3	56.7	40.3	0 ²	0 ²	0 ²	0 ²
NAG 10	35	55.0	45.2	44.7	37.4	0 ²	0 ²	0 ²	0 ²

¹ Estimated Integra Underground contribution, as assessed by the operator during the monitoring session

² Not audible

[^] If multiple results were measured for the quarter, then the average of multiple results has been used to gain a better understanding of the noise omitted

Table 32 Quarterly Attended Noise Monitoring Results - LAeq (1minute)

Location	Criteria	Total Site Noise Monitoring Results				Integra Underground Contribution			
		Q1 [^]	Q2 [^]	Q3 [^]	Q4 [^]	Q1 ^{1^}	Q2 ^{1^}	Q3 ^{1^}	Q4 ^{1^}
NAG 1	46	43.5	51.5	58.0	63.8	< 35.0	42	< 35.0	41
NAG 3	49	49.0	51.9	52.3	50.9	< 35.0	40	0 ²	0 ²
NAG 4	47	53.5	54.5	55.3	57.1	0 ²	0 ²	0 ²	0 ²
NAG 5	52	56.0	60.2	61.3	56.3	0 ²	0 ²	0 ²	0 ²
NAG 6	48	50.0	48.2	47.3	45.7	0 ²	0 ²	0 ²	0 ²
NAG 7	48	61.5	60.7	60.0	60.3	0 ²	0 ²	0 ²	0 ²
NAG 8	45	67.0	66.2	65.0	60.8	0 ²	0 ²	0 ²	0 ²
NAG 9	48	57.5	55.9	77.7	53.4	0 ²	0 ²	0 ²	0 ²
NAG 10	47	74.0	63.3	61.7	55.6	0 ²	0 ²	0 ²	0 ²

¹ Estimated Integra Underground contribution, as assessed by the operator during the monitoring session

² Not audible

[^] If multiple results were measured for the quarter, then the average of multiple results has been used to gain a better understanding of the noise omitted

Table 33 Monthly Attended Noise Monitoring Results During Construction - LAeq (15minute)

Location	Criteria	Total Site Noise Monitoring Results										Integra Underground Contribution									
		Feb	Mar	Apr	May	Jul	Aug	Sep	Oct	Nov	Dec	Feb	Mar	Apr	May	Jul	Aug	Sep	Oct	Nov	Dec
NAG 1	36	37.0	37.0	39.0	43.6	48.0	38.0	38.0	50.0	75.0	41.0	< 35	< 35	< 35	0 ²	0 ²	0 ²	< 34	34	< 35	0 ²
NAG 3	39	40.0	42.0	41.0	40.7	41.0	39.0	42.0	52.0	51.0	40.0	0 ²	< 35	< 35	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 4	35	41.0	43.0	43.0	47.1	48.0	47.0	39.0	56.0	54.0	46.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 5	35	44.0	47.0	52.0	48.5	52.0	52.0	46.0	55.0	56.0	48.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 6	35	39.0	37.0	40.0	40.6	33.0	35.0	39.0	50.0	45.0	34.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 7	38	48.0	48.0	49.0	47.4	45.0	52.0	51.0	58.0	61.0	48.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 8	35	48.0	49.0	44.0	45.3	55.0	44.0	39.0	66.0	58.0	44.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 9	35	31.0	50.0	57.0	43.8	57.0	56.0	57.0	49.0	43.0	56.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 10	35	53.0	57.0	52.0	47.7	50.0	36.0	48.0	45.0	64.0	39.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²

¹ Estimated Integra Underground contribution, as assessed by the operator during the monitoring session

² Not audible

[^] If multiple results were measured for the quarter, then the average of multiple results has been used to gain a better understanding of the noise omitted

Table 34 Monthly Attended Noise Monitoring Results During Construction - LAeq (1minute)

Location	Criteria	Total Site Noise Monitoring Results										Integra Underground Contribution									
		Feb	Mar	Apr	May	Jul	Aug	Sep	Oct	Nov	Dec	Feb	Mar	Apr	May	Jul	Aug	Sep	Oct	Nov	Dec
NAG 1	46	44.0	44.0	50.0	52.5	71.0	58.0	45.4	35.0	38.0	55.0	< 35	< 35	42	0 ²	0 ²	0 ²	< 35	41	< 35	0 ²
NAG 3	49	46.0	46.0	51.0	52.6	45.0	57.0	54.8	32.0	34.0	50.0	0 ²	< 35	< 40	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 4	47	50.0	50.0	50.0	58.6	57.0	58.0	51.0	33.0	40.0	65.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 5	52	55.0	55.0	62.0	59.5	65.0	62.0	57.0	34.0	41.0	58.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 6	48	56.0	56.0	52.0	47.7	38.0	53.0	51.0	30.0	32.0	43.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 7	48	59.0	59.0	58.0	60.2	56.0	63.0	61.0	38.0	34.0	61.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 8	45	67.0	67.0	66.0	62.7	71.0	65.0	59.0	28.0	36.0	61.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 9	48	41.0	41.0	75.0	48.6	77.0	76.0	80.0	24.0	36.0	79.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²
NAG 10	47	71.0	71.0	75.0	70.9	71.0	42.0	72.0	23.0	34.0	49.0	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²	0 ²

¹ Estimated Integra Underground contribution, as assessed by the operator during the monitoring session

² Not audible

[^] If multiple results were measured for the quarter, then the average of multiple results has been used to gain a better understanding of the noise omitted

6.3.2 Comparison with Predictions

A comprehensive review of background noise levels in the region was undertaken as part of the *Noise Impact Assessment* (EMM 2012) prepared to support the application for PA 08_0101 Mod 2. This review was undertaken to assess cumulative noise from neighbouring operations including Rix's Creek, Glennies Creek, Glendell, Mount Owen, Camberwell and Ravensworth East Mines, and the influence of the Main Northern Rail Line and the New England Highway on the ambient noise environment. The *Noise Impact Assessment* also assessed the impact of the operational changes associated with the approved Western Extension and the Integra Complex. Further to this, an acoustics report was prepared to support the Integra Underground Mod 8 Environmental Assessment (Bridges, 2017).

During 2019, Integra Underground contributions to noise were below the criteria across all locations for both quarterly and monthly construction noise emissions. Approved criteria for the site was developed using past noise impact assessments, therefore Integra Underground being below criteria (or inaudible) suggests that the site is below noise predictions.

These results are consistent with the previous reporting period where all quarterly noise monitoring recorded inaudible results.

6.3.3 Key Performance and/or Management Issues

There were no key performance or management issues regarding noise during 2019.

6.3.4 Proposed Actions for 2020

Due to the construction related to Mod 8 planned to continue in 2020, monthly attended noise monitoring will continue to be undertaken during the construction phase when construction is undertaken during night periods. Actual measured levels will be assessed against the "noise affected level" of 40 LAeq 15 minute as prescribed by the Interim Construction Noise Guideline (DECC, 2009) rather than against the predicted noise levels.

6.4 Biodiversity

Biodiversity is managed in accordance with the *Biodiversity Management Plan* which was updated and approved in September 2019. A copy of the *Biodiversity Management Plan* is available on the Integra Underground website.

6.4.1 Environmental Monitoring Results

The *Biodiversity Management Plan* (BMP) committed to the collection of baseline ecological data within the surface area of Longwalls 13 to 20 to statistically test for impacts from subsidence.

In 2017 SLR Consulting (SLR) established two monitoring sites within the predicted subsidence zone of Longwalls 13 and 14, and three control sites within equivalent vegetation communities inside the study area, but outside of the predicted subsidence zone. Baseline monitoring was completed in 2017 using plot and transect surveys across all five sites in accordance with the BioBanking Assessment Methodology (BBAM) (OEH, 2014). The data collected at both monitoring and control sites allowed the vegetation condition, species composition and evidence of subsidence within the predicted subsidence zone to be effectively monitored as mining progressed.

Since 2017, monitoring has been repeated on the 22 October 2018 (monitoring event 1) and 23 and 29 July 2019 (monitoring event 2). During the latest monitoring event SLR established a new monitoring site (SG03), and relocated another (SB01 to SB01B) due to predicted clearing impacts on the original site by Mount Owen Glendell Complex. In late 2019 SLR also provided a Biodiversity Review of Longwalls 15 to 20 advising management that whilst the area may provide some (*albeit* limited) foraging habitat for more mobile threatened species and that biobanking monitoring of the area is achievable, there was limited biodiversity values within the area and there was no strict requirement to monitor these areas as part of the BMP.

Field data from the latest monitoring event is summarised below.

Vegetation Types

The study area has been considerably disturbed due to land clearing and grazing activities and as such, most of the study area is cleared of native vegetation. Notwithstanding this fact, a total of seven native plant communities were identified within the study area during the baseline field survey in 2017. These communities are as follows:

- Central Hunter Ironbark-Spotted Gum-Grey Box Forest;
- Central Hunter Bulloak Forest;
- Central Hunter Swamp Oak Forest;
- Hunter Valley River Oak Forest;
- Grassland;
- Regenerating Native Woodland/Shrubland; and
- Revegetation.

Of the above listed vegetation types, three were verified as present within the monitoring plots established for this study:

1. Central Hunter Ironbark-Spotted Gum-Grey Box Forest;
2. Central Hunter Bulloak Forest; and
3. Grassland.

The identified vegetation communities and their conservation status under the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are listed in **Table 35**.

Table 35 Vegetation Types Recorded at Monitoring Sites

Vegetation Type	Regional Significance	BC Act Status	EPBC Act Status
Central Hunter Ironbark-Spotted Gum-Grey Box Forest (planted and regrowth)	High	Endangered	Critically endangered
Central Hunter Bull Oak Forest	None	Not listed	Not listed
Modified Grassland	None	Not listed	Not listed

The results of BBAM surveys (Baseline, Monitoring Event 1, Monitoring Event 2) are summarised below:

- Both control sites have consistently contained higher species richness when compared to their impact site counterparts. The only exception was B02 which was slightly lower than its respective impact site in 2018. Compared to 2017 baseline surveys all sites have experienced a decline in species richness, this is consistent between both control and impact sites, suggesting that the decline may be the result of local climatic conditions, such as the region's dry period, rather than just longwall mining.
- The canopy cover data indicates a gradual increase in canopy cover for all sites since the 2017 baseline surveys.
- Native mid-storey cover has remained absent or negligible within all monitoring sites originally surveyed in the 2017 baseline surveys. However, SLR did record a small level of native mid-storey cover within the newly established monitoring plot SB03.
- Native ground cover (shrubs) was absent at all monitoring sites and only a very low cover of shrub species was recorded in a few of the 20 m X 20 m plots. There has been no change in native ground cover (shrubs) since baseline surveys were conducted in 2017.
- Native ground cover (grasses) has declined across all monitoring sites (control and impact) since the 2017 baseline surveys, with the exception of the grassland site G01. The most significant decline in grass cover was recorded within the Bulloak impact site B01 which fell from 28% cover in 2017 to 0% in 2018, where it has remained. The decline in native grass cover could be attributed to both the drier climate conditions and the increasing percentage of canopy cover.
- The cover of non-grass species (i.e. 'native groundcover (other)') has decreased significantly at all sites since the baseline monitoring event.
- Exotic plant cover has decreased significantly across all sites.
- The total length of fallen logs has increased at all sites since baseline surveys in 2017, with the exception of the Bulloak control site B02 which has remained stable from 18.5 in 2017 to 17.5 m in 2019. The increase in fallen logs since baseline surveys may be due to the placement of felled trees or fallen logs from other areas into the monitoring sites, as was recommended by the baseline report.
- No hollow bearing trees were recorded within any of the monitoring sites.

The results presented in the 2019 *Longwall 13 and Longwall 14 Biodiversity Monitoring Report 2* demonstrate a change in the data collected from baseline monitoring in May 2017 and during monitoring event 1 in November 2018. There is generally a lower abundance and diversity of groundcovers at all sites, which could be attributed to the difference in the season of the survey, the consistency of the canopy and the continuation of the region's prolonged dry period. The grassland monitoring site (G01) contains a mix of native and exotic pasture grasses, forbs and herbs, which is typical for grazing land within the Hunter Valley region. Due to the climate conditions and seasonal difference it is unclear whether the decrease in the abundance and diversity of flora at the monitoring locations can be attributed to mining impacts (SLR 2019). However, as both the control and impact sites have recorded declines in measured biodiversity values, environmental conditions are likely to be a major contribution to the results observed.

Modification 8 Predicted Biodiversity Impacts

Despite the impacts of previous disturbance and its location within a fragmented landscape, Modification 8 will require the clearing of some native vegetation that provides suitable habitat for some threatened flora and fauna species (Cumberland Ecology, 2017).

Within the Assessment Boundary, approximately 5.40 ha of native vegetation will be cleared for the installation of powerline corridors and the Goaf Dewatering Site, which includes 2.02 ha of Central Hunter Swamp Oak Forest, 1.80 ha of Central Hunter Bulloak Forest regeneration and 1.59 ha of rehabilitation. Some additional areas of surface infrastructure will require clearing of Low Diversity Derived Native Grassland/Exotic Pasture, and potentially some small areas of native vegetation where avoidance is not possible (although CEEC/EEC vegetation will be completely avoided) (Cumberland Ecology, 2017).

No threatened flora or fauna species have been recorded within the Assessment Boundary; however a number of species have been recorded within the adjoining areas and in the locality and are considered as having the potential to occur. None of these species are considered to rely upon the habitats to be cleared for the Modification (Cumberland Ecology, 2017).

Indirect impacts may include:

- The potential for additional subsidence, beyond levels predicted as part of the approved mining operations; and
- Increased groundwater draw-down experienced in Bettys Creek, Main Creek and Glennies Creek, however, the changes are expected to be undetectable in the alluvium and baseflows will remain unchanged (Cumberland Ecology, 2017).

The above indirect impacts are not expected to significantly impact on riparian vegetation, which is classified as a GDE. Surface cracking and strains are not expected to lead to impacts to CEEC/EEC vegetation, such that the local occurrence would be placed at risk of extinction. Stygofauna detected Glennies Creek alluvium are considered unlikely to be significantly impacted based on the limited drawdown predicted to occur within the Quaternary alluvium (Cumberland Ecology, 2017).

Management Controls

A number of short, medium and long term measures have been identified within the *Biodiversity Management Plan* including:

- Short term measures:
 - establish baseline subsidence monitoring plots over longwall panels LW13, LW14, and appropriate reference sites (complete - refer to Section 4.1);
 - establish baseline subsidence monitoring plots over longwall panels LW 15 – LW 20;
 - implement weed and pest management controls where required in the project area, as described in Section 3.2, such as along the diverted channel of Bettys Creek and adjacent vegetation; and
 - continue to adopt management strategies to ensure cattle and other livestock are excluded from the diverted Bettys Creek riparian zone.
- Medium term measures:
 - continue to undertake ongoing rehabilitation of completed exploration borehole sites and minor surface disturbance, and implement maintenance works as required along the riparian zone of the diverted channel of Bettys Creek;
 - undertake subsidence monitoring as mining progresses (in accordance with the Integra Underground Extraction Plan);
 - implement weed control to manage new weed incursions;
 - undertake annual monitoring of revegetation success;

- for the Integra Underground to Mt Owen pipeline and MOD 8 construction, plant and maintain, until established, 10 like-for-like trees for every established tree removed during construction of the water pipeline infrastructure that is associated with the following flora communities:
 - Central Hunter Ironbark — Spotted Gum — Grey Box Forest EEC;
 - Central Hunter Swamp Oak Forest;
 - Hunter Valley River Oak Forest;
 - Central Hunter Bulloak Forest. (see Section 4.3); and
- Planting of like-for-like trees will be undertaken to compensate for the removal of established trees due to construction of surface facilities approved by MOD 8 only (i.e. not including areas that are approved to be disturbed by the Mt Owen Complex).
- Long term measures:
 - rehabilitate disturbed exploration, minor surface disturbance areas and the Integra Underground to Mt Owen Complex pipeline areas in accordance with final landform/land use design; and
 - long term ongoing monitoring of revegetated areas along the Bettys Creek diversion to inform revisions to the management plans and any required alterations to management practices.

6.4.2 Key Performance and/or Management Issues

There were no issues with biodiversity during 2019.

6.4.3 Proposed Actions for 2020

There are no specific proposed actions for 2020 in regards to biodiversity.

6.5 Aboriginal Heritage

The management of Aboriginal heritage in 2019 was undertaken in accordance with the *Aboriginal Heritage Management Plan* (AHMP). A copy of the AHMP is available on the Integra Underground website.

6.5.1 Environmental Monitoring Results

An *Aboriginal and Historic Heritage Impact Assessment* was undertaken by OzArk in November 2017 to support the application for PA 08_0101 Mod 8, which sought approval to continue longwall mining of the Middle Liddell Seam further to the north of the previously approved longwall panels, as well as the construction and operation of ancillary surface infrastructure required to support the proposed mining activities. The impact assessment discovered five valid sites are located within the Assessment Boundary. The locations of all five sites were visited during the assessment and while surface artefacts were not visible at any of the site locations, all sites are regarded as remaining extant within the landscape (OzArk, 2017).

In efforts to preserve these sites, Integra Underground managed these areas in accordance with the AHMP. The protection measures implemented included:

- Fencing;
- Land management;
- Recording;
- Interpretation; and

- Monitoring.

An *Aboriginal Due Diligence Archaeological Assessment* was undertaken by OzArk in November 2018 to assess the additional disturbance areas for 66kV power line and access road construction at Integra (OzArk, 2018). This due diligence concluded that although the proposal will have an impact on the ground surface, no Aboriginal objects or intact archaeological deposits will be harmed by the proposed works.

An *Aboriginal Due Diligence Archaeological Assessment* was undertaken by OzArk in February 2019 to assess the potential impacts associated with coal extraction from Integra's Longwall 15 (OzArk, 2019a). This due diligence concluded that although works will have an impact on the ground surface, with appropriate management no Aboriginal objects or intact archaeological deposits will be harmed by the proposed works.

Aboriginal Cultural Heritage Monitoring was undertaken by OzArk in February 2019 (OzArk, 2019b). In summary, 19 sites, out of a total of 47, located in quadrant 3 were inspected, with 10 sites identified as requiring further action, all of which have now been completed.

6.5.2 Key Performance and/or Management Issues

Two Aboriginal Cultural Heritage Working Group meetings were held on 15 May 2019 and 18 September 2019 with representatives present from Integra Underground, Mount Owen Glendell Operations and Wanaruah Local Aboriginal Lands Council. Items discussed in the meetings relevant to Integra Underground included an overview of Integra Underground operations, and upcoming mining tenements.

6.5.3 Proposed Actions for 2020

Integra Underground will continue to manage Aboriginal heritage as per the AHMP.

6.6 Historical Heritage

Historical heritage is managed at Integra Underground in accordance with the *Historical Heritage Management Plan* (HHMP). A copy of the HHMP is available on the Integra Underground website, which was updated and effective from September 2018. The HHMP states that no additional historical heritage sites/items have been identified within the Integra Underground project approval area during the heritage assessment completed for Mod 8. It is not anticipated that Integra Underground's mining operations will have any impact on the remaining historical heritage sites identified within the Integra Underground project area, and the potential for historical archaeological items to be present is considered to be very low, therefore, no specific monitoring measures are required.

In November 2018, Umwelt completed a Heritage Assessment of the two buildings proposed for removal in the Integra Underground Pit Top Area. The heritage assessment of the 'Oak Park School House' and 'Residence' was required to assess potential heritage significance and to determine whether or not they can be demolished in accordance with PA 08_0101. It was concluded that both of the buildings can be removed without further assessment or investigation, in accordance with PA 08_0101, Historic Heritage Management Plan and Mining Operations Plan.

6.6.1 Unexpected Finds Protocol

An Unexpected Finds Protocol is outlined in the HHMP in the event that an unexpected find is encountered during surface disturbance activities in the future.

6.6.2 Key Performance and/or Management Issues

There were no issues or unexpected finds relating to historical heritage during 2019.

6.6.3 Proposed Actions for 2020

There are no specific proposed actions for 2020 in regards to Historic Heritage.

6.7 Waste

The current waste management program utilises licensed waste contractors to incorporate recycling, in addition to the disposal of wastes in accordance with the waste provisions of the *Protection of the Environment Operations (Waste) Regulation 2014*.

6.7.1 Environmental Monitoring Results

There were no changes to the waste management system at Integra Underground during the reporting period. In accordance with Schedule 3, Condition 36 of PA 08_0101, Integra Underground are required to minimise and monitor waste generated by the operation and ensure that waste generated by Integra Underground is appropriately stored, handled and disposed. During the 2019 reporting period, Integra Underground undertook the process of removing legacy debris around the site which included recycling of drill casings, the removal of old farming related waste, and removal of old equipment from laydown areas. **Table 36** outlines the volumes of waste disposed of or recycled during the report period.

Table 36 Summary of Waste 2019

Waste	Tonnes	Percentage (%)
Total waste disposed offsite to landfill	548.83	36.99
Total waste recycled	934.75	63.01
Total waste generated onsite	1483.58	100

Table 37 compares the volumes of waste disposed of or recycled across the last three years, with all three years indicating an increased volume of recycling compared to disposal. An increase in waste generation over the last three years is due to increased operations and production levels at Integra Underground. Production at Integra Underground increased 42.95% from 2017 to 2018. In the same period waste generation increased 23.51%, resulting in less waste generated per ROM tonne mined. Production increased a further 15.61% from 2018 to 2019, with an increase in waste generation of 16.11%. During 2019 an increase of waste produced was due to removal of legacy items as discussed above, waste associated with construction of Mod 8 construction activities (Ventilation Shaft 3) and the demolition of two buildings. Recycling rates increased from 54% in 2017 to 63% in both 2018 and 2019.

Table 37 Waste Trends (2017-2019)

Waste	Tonnes [Percentage (%)]		
	2017*	2018	2019
Total waste disposed offsite to landfill	378.84 [45.75]	398.86 [36.84]	548.83 [36.99]
Total waste recycled	449.29 [54.25]	683.85 [63.16]	934.75 [63.01]
Total waste generated onsite	828.13 [100]	1082.71 [100]	1483.58 [100]

* 2017 was not a full year of production, with secondary extraction occurring from May 2017 after a care and maintenance period

Waste minimisation measures that were implemented by Integra Underground during the reporting period included:

- Conducting a review workshop which identified opportunities to reduce waste on site during 2020;
- Undertaking a project to recycle old legacy metal to aid in increasing recycling undertaken on site; and
- Implementing a project to better characterise sump waste in order to identify when hazardous waste disposal is required.

6.7.2 Sewerage Treatment

Integra Underground has an on-site sewage treatment system (OSSM Approval Number 3969/2008), which includes a primary aeration tank with a secondary maturation pond and a package sewage treatment plant. Wastewater from the system is dispersed by irrigation sprays on dedicated irrigation areas.

As required by Condition M2.2 of EPL 3390, monitoring was undertaken of the sewage waste for pH and faecal coliforms. Sewage monitoring and maintenance has been undertaken on quarterly basis and relevant approvals have been retained.

6.7.3 Key Performance and/or Management Issues

There were no issues or community complaints relating to waste during 2019.

6.7.4 Proposed Actions for 2020

Integra Underground will continue to monitor waste quantities and sewage waste parameters throughout 2020.

6.8 Weed and Pests

6.8.1 Environmental Monitoring Results

During 2019, Enright Land Management conducted weed control works on the Integra Underground mining lease and production areas, targeting biosecurity priority weeds and environmental weeds. A 2019 *Completed Weed Works Report* (Enright Land Management, 2020) was prepared to provide information on the weed works carried out on site, the locations of the works and an indication of the weed areas treated. Of particular note, observation was made on *Acacia Saligna* (also known as Golden Wreath Wattle) which is classed as a Serious Environmental Weed and falls under General Biosecurity Duty regulations in all of NSW. The approximate infestation area treated was 3 hectares (plus isolated trees) with areas of high infestation treated on the rehabilitation areas east of the main infrastructure. The main method of treatment has been cut and paint (Glyphosate) which can be used all year round. Basal bark spraying has been carried out on some youth active growth. *Acacia Saligna* has a relatively strong presence in areas with disturbed soil on site. Monitoring and follow up may be required for regrowth or seed germination.

Additionally, Enright Land Management also carried out the vertebrate pest management works across areas shared by Integra Underground and Mount Owen Glendell Complex, including the 'Autumn 1080 Wild Dog & Fox Baiting Program' and 'Spring 1080 Wild Dog & Fox Baiting Program'.

The *Weed and Pest Annual Management Plan* details an annual treatment plan for the ongoing management of noxious weeds identified on site.

6.8.2 Key Performance and/or Management Issues

There were no issues or community complaints relating to weeds and pests during 2019.

6.8.3 Proposed Actions for 2020

There are no specific proposed actions for 2020 in regards to weed and pest management. Weed and pests will be monitored and managed during 2020 as per the management strategies in the BMP.

6.9 Bushfire

Bushfire management is undertaken in accordance with the *Bushfire Management Plan* which has been prepared to assess and manage bushfire risks on site. The *Bushfire Management Plan* details prevention and management measures to reduce the impact of bushfire, if it was to occur at Integra Underground. These include:

Ignition Management

- Smoking onsite, with there being a requirement for no smoking at Integra Underground;
- Procedures for hot works and other higher risk activities (i.e. GCAA-625378177-10041 Hot Work (Surface) Permit and INTUG-793190785-680 Hot Work Standard);
- Procedures for management of the gas flare site and other gas management infrastructure;
- Works with ignition potential (i.e. Hot-works, slashing or clearing of vegetation, track works, drilling etc) are not permitted during total fire bans days, unless in hard stand (i.e. workshop areas);
- Limit high risk activities (i.e. works with ignition potential) in areas proximal to hazards (fuel, vegetation) during very high/severe/extreme/catastrophic fire danger days or accompany with a suppression resource;
- Maintenance of housekeeping by mine management;
- All workshops and offices are required to have an appropriate firefighting equipment and their location will be indicated by signs compliant with Australian Standards;
- Equipment will not be stored on uncleared ground; and
- Vehicular access will be maintained around all areas of mining-related activities which will aid in observation and response.

Fuel Management

- Vegetative fuels:
 - Maintain APZs around vulnerable assets as per Section 6.1.1 to minimise the potential impact of bushfire; and
 - Maintain SFAZs as per Section 6.1.2.
- Anthropogenic fuels:
 - All fuel and oil is stored within defined storages which meet the relevant Australian Standards and are regularly maintained;
 - All fuel tanks on-site will be fully or self-bunded so that in the event of a leak or rupture, fuel is restricted from escaping. Each bunded area will have the capacity of at least 110% of the largest tank. Bunds may be integrated, (i.e.. form part of the tank structure) or be external;

- Undertake refuelling within designated fuel bays or within cleared areas of the mine site where possible; and
- Manage explosives materials according to the relevant Australian Standards.

Other management strategies include maintaining widely available access across the site, availability of water supply in the event of a bushfire, communication and availability of the *Bushfire Management Plan* to all relevant persons and protection of life strategies such as postponing non-essential works within bushfire prone areas on days of declared Total Fire Ban.

6.9.1 Key Performance and/or Management Issues

In 2019, mowing and trimming was completed around fan sites and powerlines in accordance with the *Bushfire Management Plan*. There was one fire recorded at Integra Underground Mine in 2019, where site assisted first responders in controlling the fire. Asbestos containing material needed to be removed and clearance given post fire. Regional fires and ongoing drought throughout 2019 was another key management issue.

6.9.2 Proposed Actions for 2020

The controls and mitigation measures within the *Bushfire Management Plan* will continue to be implemented in 2020, particularly in preparation for the bushfire season.

6.10 Greenhouse Gas

Greenhouse gas management is undertaken in accordance with the *Air Quality and Greenhouse Gas Management Plan*. A copy of the plan is available on the Integra Underground website, which was updated and effective from July 2019. Annual emissions and abatement strategies are reported as part of the internal environmental reporting and National Greenhouse and Energy Reporting (NGER) obligations.

The methane emitted from Integra Underground is discharged via goaf gas drainage boreholes to either EDL's Power Station or the flare site on Forest Road, and through mine ventilation. A number of goaf gas drainage boreholes are connected to the EDL Power Station, which utilises the methane to generate electricity for distribution in the NSW power grid. Integra Underground record the methane sent to the EDL Power Station on a monthly basis with the annual total reported in **Table 38**.

Additionally, energy efficiency opportunities and greenhouse gas management strategies are implemented at Integra Underground in accordance with the *Air Quality and Greenhouse Gas Management Plan*.

6.10.1 Environmental Monitoring Results

Greenhouse gas emissions for Integra Underground during the reporting period, as well as the previous two reporting periods (for comparison), are shown in **Table 38**. The emissions have been estimated using the methods specified in the former Department of the Environment, Water, Heritage and the Arts (DEWHA) (now Department of the Environment and Energy) *National Greenhouse and Energy Reporting (Measurement) Determination 2008* and the publication, *National Greenhouse Accounts Factors July 2018*.

Table 38 Greenhouse Gas Data

Emission Source	2017 Quantity (t CO ₂ -e)	2018 Quantity (t CO ₂ -e)	2019 Quantity (t CO ₂ -e)
Electricity consumption (grid)	23,544	36,101	41,517

Emission Source	2017 Quantity (t CO ₂ -e)	2018 Quantity (t CO ₂ -e)	2019 Quantity (t CO ₂ -e)
Fuel Combustion (diesel)	1,628	2,604	4,760
Fugitive emissions from ROM coal	21,524	37,724	44,703
Sub-total	46,969	76,427	90,980
Vented	379,383	514,618	485,972
Flared	2,739	67,009	79,739
Power Generation	0	0	0
Sub-total	382,122	581,627	565,711
Total	429,091	658,054	656,691
Total sent to a third party (not an Integra emission)	342,247	41,198	426,643

6.10.2 Comparison with Predictions

An *Air Quality and Greenhouse Gas Assessment* was prepared by Jacobs (2017) as a component of the Mod 8 Environmental Assessment. Jacobs (2017) predicted that total greenhouse gas emissions from Integra Underground would be 878,493 tCO₂-e. As outlined in **Table 38**, total emissions during 2019 were 656,691 tCO₂-e which is an improvement upon the predicted emissions.

6.10.3 Key Performance and/or Management Issues

There were no issues or community complaints relating to greenhouse gas emissions during 2019.

6.10.4 Proposed Actions for 2020

There are no specific proposed actions for 2020 in regards to Greenhouse Gas. Greenhouse Gas management during 2020 is to be undertaken in accordance with the *Air Quality and Greenhouse Gas Management Plan*.

6.11 Hydrocarbon Management

Bulk fuel facilities are managed in accordance with *AS1940-2004 The Storage and Handling of Flammable and Combustible Liquids*. All permanent fuel facilities are fully bunded, with emergency measures in place to manage any minor spills.

Hydrocarbon spills which occur are reported via the site's incident reporting system and investigations carried out as required. When spills occur they are managed with spill kits available onsite or treated through oil-water separators.

6.11.1 Environmental Monitoring Results

During the reporting period five minor hydrocarbon spills occurred and were all reported internally.

All spill incidents were managed in accordance with the Spill Response Procedure in the *Emergency Response Manual*.

6.11.2 Key Performance and/or Management Issues

There were no key performance and/or management issues relating to hydrocarbon management in 2019.

6.11.3 Proposed Actions for 2020

Integra Underground will continue to prevent hydrocarbon spills in 2020 as well as respond to and investigate any spills which may occur to prevent recurrence.

6.12 Public Safety

Public safety is managed in accordance with the *Longwalls 15 and 16 Extraction Plan Public Safety Management Plan*.

Integra Underground is committed to preventing risks to public safety resulting from operations at the mine. Ongoing reviews of potential public safety issues are undertaken on a regular basis around the mine area and associated public roads.

Integra Underground's general approach to public safety management is outlined below:

- **Baseline Monitoring and Inspections** – Establishing baseline data for the Extraction Plan area by completing inspections and subsidence monitoring. Liaison with key stakeholders;
- **Mitigation Measures Prior to Mining** – Fences and gates have been used to minimise the potential for public access to the Extraction Plan Area. Mitigation measures where appropriate for the rail line and engineering modifications to the Bettys Creek bridge;
- **Monitoring and Inspections During Mining** – Continue inspections and monitoring as mining progresses. Liaison with key stakeholders;
- **Assessment and Interpretation of Impacts** – Monitoring and inspection data is analysed to identify variations from subsidence predictions. Assessment of impacts/risks to public safety. Liaison with key stakeholders;
- **Implement Remediation Measures** – Implement actions to effectively manage any risks to public safety. Liaison with key stakeholders; and
- **Re-assessing Impacts and Review of Effectiveness of Remediation Measures** – Re-assessment of impacts through inspection and monitoring. Review of the effectiveness of remedial measures. Liaison with key stakeholders.

Day-to-day monitoring of public safety at Integra Underground is undertaken through the use of a variety of methods, including:

- All site visitors are directed to the main office and are required to report and log on to an electronic visitors system;
- Implementation of a security system to ensure public and employee safety is maintained in accordance with the relevant requirements under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*, *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*, *Mining Act 1992* and the mining tenements;
- Signage advising of subsidence areas;
- Security fencing surround the perimeter of the pit top and surface infrastructure;

- Security patrols; and
- Employee and contractor inductions regarding mine safety and environmental management issues prior to commencement of work at the site.

One community complaint received by Integra Underground during the reporting period has been discussed in **Section 9.4**.

6.12.1 Environmental Monitoring Results

Public safety monitoring is undertaken as part of the weekly subsidence inspections. Minor subsidence cracking was identified during 2019 across both Longwalls 13 and 14, however this did not cause any potential impacts to public safety as these areas are inaccessible to the public.

6.12.2 Key Performance and/or Management Issues

There were no public safety incidents, performance or management issues in 2019.

6.12.3 Proposed Actions for 2020

A new Extraction Plan will be submitted to the DPIE in 2020. This Extraction Plan will seek approval to undertake secondary extraction within Longwalls 17 to 20. This will include a *Longwall 17-20 Public Safety Management Plan*.

6.13 Subsidence

Subsidence is managed in accordance with the *Longwalls 15 and 16 Extraction Plan*, which is available on the Integra Underground website. The *Longwalls 15 and 16 Subsidence Monitoring Program* was prepared as a component of the Extraction Plan and details the ongoing monitoring program to manage subsidence. This includes:

- Weekly visual inspections within the subsidence impact zone;
- Bi-monthly subsidence impact reporting; and
- Six-monthly reporting with a comprehensive summary of all impacts and environmental monitoring results.

6.13.1 Environmental Monitoring Results

SCT Operations (SCT) was engaged to review and analyse the Longwalls 14 and 15 subsidence monitoring data (undertaken bimonthly during the 2019 reporting period), as well as a six monthly review from December 2018 to May 2019 for Longwall 14 and June 2019 to November 2019 for Longwalls 14 and 15. Subsidence effects measured along the Mount Owen Railway and at the Bettys Creek bridges are generally less than those predicted in the asset management plan for this infrastructure. The minor impacts experienced are being effectively monitored and managed to avoid operating restrictions and maintain these built features in a safe and serviceable condition.

SCT (2019a & 2019b) concluded:

- The subsidence impacts observed are expected to be compliant with the subsidence performance measures outlined in Schedule 3, Condition 17 of PA 08_0101, notwithstanding the input of other specialists; and
- The subsidence effects and impacts, observed and expected, are likely to be compliant with the performance indicators within the management plans for the Extraction Plan.

6.13.2 Comparison with Predictions

A Subsidence Impact Assessment was undertaken by SCT (2017) to support the *Longwalls 13 and 14 Extraction Plan* and by SCT (2018) to support the *Longwalls 15 and 16 Extraction Plan*. The assessment predicted the proposed extraction would be compliant with the subsidence performance measures in Schedule 3, Condition 17 of PA 08_0101.

For Longwall 14 mining, the maximum vertical subsidence measured is less than 0.75 m, tilt is less than 12 mm/m (but typically less than 4mm/m) and strains are less than 4 mm/m in tension and 4 mm/m in compression. This compares to forecast values of 1.4 m for subsidence, 14 mm/m for tilt and 7 mm/m and 10 mm/m for tensile and compressive strain respectively (SCT 2020; SCT 2017).

Table 39 shows that measured values of the primary subsidence parameters – vertical subsidence, tilt and strains – are less than conventional subsidence forecast in both SCT assessments for the Longwalls 13 – 14 Extraction Plans. The lower than forecast subsidence applies to natural ground surfaces and areas of disturbed ground with waste rock fill material.

Table 39 Comparison of Subsidence Parameters: Forecast and Measured for Longwall 14

	Longwall Panel	Subsidence (m)	Tilt (mm/m)	Tensile Strain (mm/m)	Compressive Strain (mm/m)
Forecast Maximum	14	1.4	14	7	10
Measured Maximum	14	<0.75	<12	<4	<4

The subsidence measured over Longwall 14 is expected to increase as Longwall 15 is mined and other subsidence parameters may also increase (SCT, 2017; SCT, 2018).

Subsidence behaviour and impacts observed in the vicinity of Longwall 14 are consistent with expectations outlined in the Longwalls 13 and 14 Extraction Plan at the completion of Longwall 14 and less than those presented in SCT (2020).

SCT (2020) states the only subsidence impact observed is minor cracking of the surface, generally within the panel footprint and areas of minor ponding. Minor impacts to built features such as the Mt Owen Railway Line, Bettys Creek Bridges was recorded and were as predicted. All impacts are consistent with predictions and expectations, and are less than the maxima forecast (SCT, 2020).

6.13.3 Key Performance and/or Management Issues

Minor subsidence cracking was identified during 2019 across both Longwalls 13 and 14, however this did not cause any potential impacts to public safety or the environment.

6.13.4 Proposed Actions for 2020

Integra Underground will continue to rehabilitate cracks, as per the *Mine Operations Plan* and *Extraction Plan*, identified during 2020 above Longwalls 14 and 15.

An Extraction Plan, including a Subsidence Impact Assessment, will be prepared for Longwalls 17 to 20 in 2020.

7 Water Management

Integra Underground operates a water management system which includes underground mine dewatering systems, mine water storages, sediment dams and dirty water collection drains, and mine water pumping and pipeline systems.

Integra Underground is situated within the catchments of Glennies Creek, Main Creek and Bettys Creek. Glennies Creek flows to the south where it discharges into the Hunter River, while Bettys Creek flows to Bowmans Creek, which similarly flows to the south before discharging into the Hunter River.

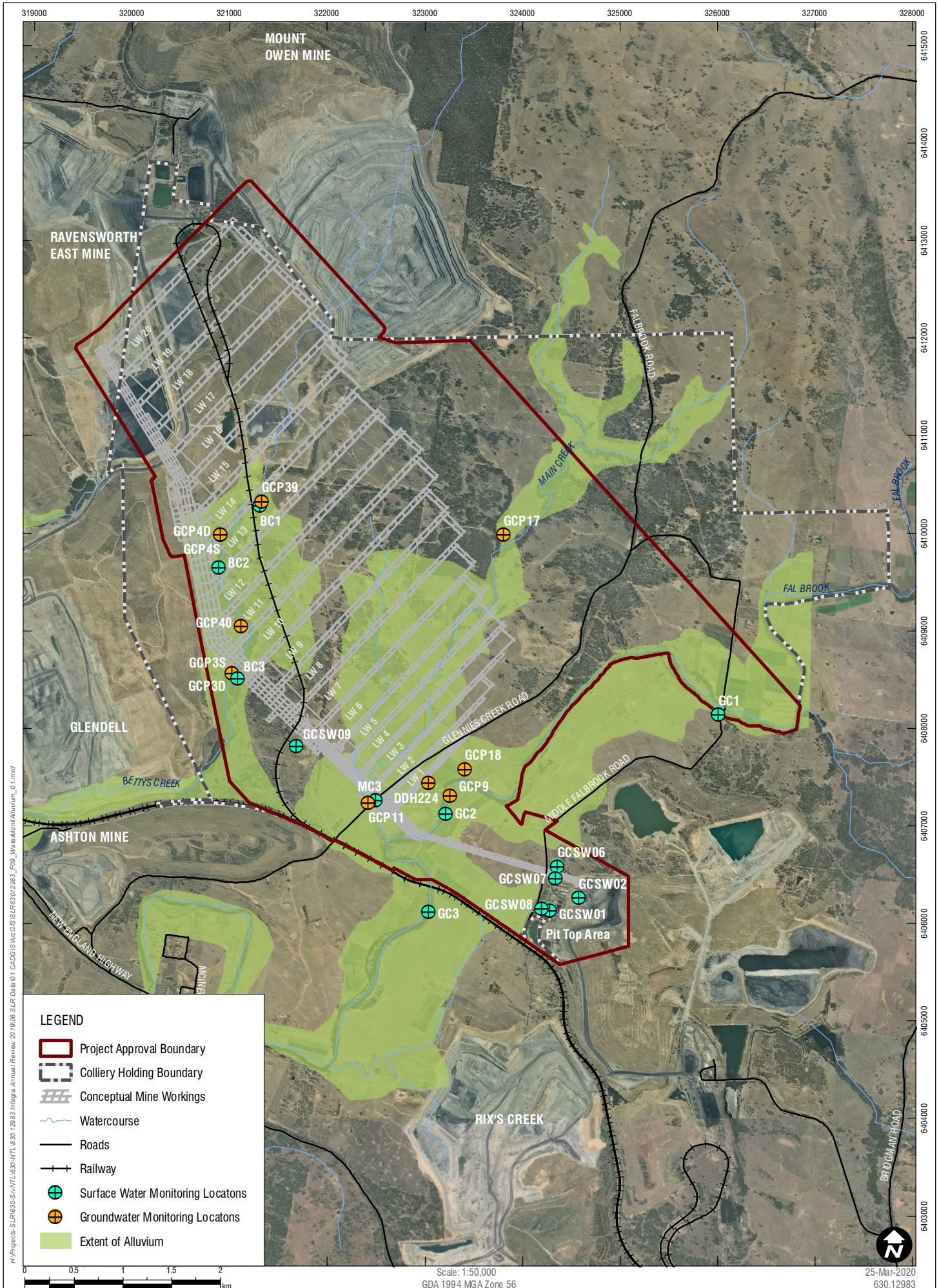
The Integra Underground water management system adopts a water management approach categorising water into three classes and managing each via a segregated system. The three categories of water are:

- Clean water:
 - Runoff from areas undisturbed by mining activities, established rehabilitation or local water sources (creeks, rivers or alluvial aquifers).
- Dirty water:
 - Runoff from unestablished rehabilitation and disturbed areas (hardstand, laydown areas and unsealed roads).
- Mine water
 - Runoff from haul roads, rehabilitated overburden dumps, workshop areas, vehicle wash-down bays and storage yards; and
 - Dewatering of underground workings.

An important aspect of the Integra Underground water management system is the water sharing agreement in place with Bloomfield (operators of Rix's Creek North) and the Mount Owen Glendell Complex. Construction of a water transfer pipeline from Integra Underground to Mount Owen Glendell Complex was completed during the last reporting period. The pipeline transfers mine water from Integra Underground to the Mount Owen Glendell Complex.

During the reporting period, water management was undertaken in accordance with the *Integra Complex Water Management Plan (WMP)* (prepared by Vale and covering Integra Underground and IOC) and the *Integra Underground Water Management Plan*. The *Integra Underground Water Management Plan* was approved in September 2019 and is available on the Integra Underground website. Water monitoring sites and extent of alluvium at Integra Underground are shown on **Figure 9**.

In accordance with Section 9.1 of the Integra Complex WMP (2014) and Section 8.1.3 of the Integra Underground WMP (2018), a review of surface water and groundwater monitoring data for this Annual Review was conducted. An Annual Groundwater Report will be completed and submitted to relevant stakeholders.



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Water Monitoring Locations and Alluvium Mapping
FIGURE 9

7.1 Water Balance

The mine water management system at Integra Underground achieves a net neutral water balance through integrated water management practices with the neighbouring open cut mining operation at Rix's Creek North, and the Integra Underground to Mount Owen Glendell Complex mine water pipeline which operates under the Greater Ravensworth Area Water Sharing Scheme.

Mine water associated with Integra Underground is generated from:

- Dewatering of underground workings;
- Rainfall runoff from the Portal Sump, administration and laydown areas (via overflows from Process Dams); and
- Seepage from former overburden dump (Rix's Creek North).

Integra Underground engaged Engeny Water Management (Engeny) to review the site water balance for the reporting period (1 January 2019 – 31 December 2019), using the existing GoldSim model. The 2019 water balance, along with the previous 2017 and 2018 balances for comparison, is presented in **Table 40**.

The increase in the inputs and outputs from 2018 to 2019 is largely due to the pumped transfer from Rix's Creek to the Portal Sump and associated increased in the volume pumped to the Mt Owen Complex.

Table 40 Water Balance 2019

Aspect	2017 Volume (ML)	2018 Volume (ML)	2019 Volume (ML)
Inputs			
Imported clean water for operational use	220.2	341.2	496.8
Imported potable water	7.8	11.8	15.2
Groundwater ingress	225.8	148.0	131.9
Dewatering from Integra Underground workings		225.8	636.6
Seepage into Portal Sump from Rix's Creek North overburden emplacement	110.3	539.0	496.4
Rainfall-runoff	134.5	64.6	65.3
Total Inputs	698.57	1,104.6	1,842.3
Outputs			
Operational uses (dust suppression etc.)	18.3	27.8	34.0
Evaporation	69.0	23.8	35.0
Potable water use	7.8	11.8	15.2
Transfers to Rix's Creek Mine	507.8	14.0	0.0
Transfers to Mount Owen Glendell Operations	69.3	957.1	1685.3
Moisture loss to Vented Air		68.0	58.5
Total Output	672.17	1,102.5	1,828.0
Inflow – Outflow	26.5	2.1	14.3
Recorded Volume Stored on Site at start of Annual Review period	34.84	40.2	28.2

Aspect	2017 Volume (ML)	2018 Volume (ML)	2019 Volume (ML)
Recorded Volume Stored on Site at end of Annual Review period	59.17	39.3	30.4
Recorded Change in Storage	24.32	0.9	2.2
Error	<1%	<1%	<1%

7.2 Water Take

Water taken by Integra Underground during the previous water year (1 July 2018 to 30 June 2019) has been summarised in **Table 41**.

Table 41 Water Take 2018 – 2019

Water Licence #	Water sharing plan, source and management zone (as applicable)	Entitlement (ML)	Allocation Used (ML)
Waterways			
WAL 484	Hunter Regulated River - any part of Glennies Creek	3	0
WAL 485	Hunter Regulated River - Zone 3A of Glennies Creek	99	0
WAL 960	Hunter Regulated River - Zone 3A of Glennies Creek	50	0
WAL 961	Hunter Regulated River - Zone 3A of Glennies Creek	150	0
WAL 1172	Hunter Regulated River - Zone 3A of Glennies Creek	3	0
WAL 1173	Hunter Regulated River - Zone 3A of Glennies Creek	303	84.9
WAL 1242	Hunter Regulated River - Zone 3A of Glennies Creek	13	0
Groundwater			
20BL169862	Bore: Sydney Basin - Hunter Porous Rock Aquifer	450	93.2
20BL169864			
20BL172505	Bore: Sydney Basin - Hunter Porous Rock Aquifer	500	
20BL172506			

7.3 Changes to Licences

A temporary transfer occurred of the remainder of the previous financial year's (1 July 2018 to 30 June 2019) water allocation for WAL 961 to Mount Owen Glendell Operations.

A temporary transfer is being sought for the remainder of the current financial year (1 July 2019 to 30 June 2020) water allocation for WAL 484, WAL 485, WAL 960 and WAL 961 to Mt Owen Glendell Operations.

7.4 Discharges

Integra Underground is a closed system and there are no discharges of water offsite.

7.5 Surface Water

7.5.1 Environmental Monitoring Results

Surface water quality was monitored onsite at Integra Underground and in the surrounding waterways during the reporting period. Surface water monitoring locations are shown on **Figure 9** and comprise nine sites which are sampled monthly for pH, Electrical Conductivity (EC), total suspended solids (TSS) and total dissolved solids (TDS). Sampling of Bettys Creek and Main Creek is also completed on a quarterly basis.

The pH and EC monitoring results for the reporting period have been summarised in **Table 42**.

Table 42 Surface Water Monitoring Results – pH and EC

Monitoring Location	pH Results					EC Results (µS/cm)			
	Min	Ave	Max	Lower Criteria	Upper Criteria	Min	Ave	Max	Criteria
Monthly Monitoring Sites									
GCSW01 Process Dam	7.5	8.3	8.8	-	-	221	283	328	-
GCSW02 Portal Sump	7.7	8.2	8.6	-	-	6030	6927	8180	-
GCSW06 Sewerage Pond	7.3	8.0	10.1	-	-	369	477	613	-
GCSW07 Potable Water Supply	7.4	7.9	8.1	-	-	196	265	321	-
GCSW08 Runoff Pond	7.7	8.4	9.3	-	-	402	576	792	-
GCSW09 Ventilation Shaft Dam ^	8.4	8.5	8.6	-	-	3190	5130	7350	-
GC1 Glennies Creek	7.6	7.9	8.2	7.6	7.9	199	271	368	555
GC2/W4 Nobles Crossing	7.7	7.9	8.2	7.5	7.9	201	272	360	466
GC3 Glennies Creek	7.8	7.9	8.2	7.6	7.9	203	272	349	519
Quarterly Monitoring Sites									
BC1 Bettys Creek *	-	-	-	6.9 - 7.8 (flow) 6.9 - 8.1 (no flow)		-	-	-	540 (flow)
BC2 Bettys Creek *	-	-	-			-	-	-	6,350 (no flow)
BC3 Bettys Creek *	-	-	-			-	-	-	
MC3 Main Creek # ()	7.7	7.8	7.8			198	236	274	680 (flow) 1,220 (no flow)

* Dry during all sampling events

^ Three monthly samples received, dry all other months

Only two samples collected as it was dry in Q1 and Q4

Average pH results were at upper criteria levels at GC1, GC2/W4 , GC3 Glennies Creek and MC3 Main Creek. All EC results were under the listed criteria. In accordance with the *Water Management Plan*, investigations were undertaken in response to these pH limits. The investigations determined that monitoring results at the locations were not attributable to Integra Underground. The monitoring results were within historic pH ranges which have been observed since February 2009. Additionally, the locations of these monitoring points are outside the predicted subsidence impact zone. It is considered that these results are not attributable to Integra Underground.

Total dissolved solids (TDS) and total suspended solids (TSS) were sampled at the locations summarised in **Table 43**. In accordance with the *Water Management Plan*, these locations are monitored to align with the requirements of Suite 2 (GCSW01) which requires the monitoring of TDS, and Suite 7 which requires the monitoring of TDS and TSS.

Table 43 Surface Water Monitoring Results – TSS and TDS

Monitoring Location	TSS Results (mg/L)				TDS Results (mg/L)			
	Min	Ave	Max	Criteria	Min	Ave	Max	Criteria
Monthly Monitoring Sites								
GCSW01 Process Dam	NR	NR	NR	NR	156	175	212	-
GCSW02 Portal Sump	NR	NR	NR	NR	3100	3725	4420	-
GCSW06 Sewerage Pond	30	62	132	50**	248	298	398	-
GCSW08 Runoff Pond	NR	NR	NR	NR	310	370	532	-
GC1 Glennies Creek	8	12	14	50**	142	151	165	-
GC2/W4 Nobles Crossing	6	13	18		142	153	166	-
GC3 Glennies Creek	5	12	22		142	180	350	-
Quarterly Monitoring Sites								
BC1 Bettys Creek*	-	-	-	50**	-	-	-	-
BC2 Bettys Creek*	-	-	-		-	-	-	-
BC3 Bettys Creek*	-	-	-		-	-	-	-
MC3 Main Creek [^]	9	11	12	50**	180	187	194	-

* Dry during all sampling events

** ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality

NR: Not required

[^] Only two samples collected as it was dry in Q1 and Q4

TSS levels during the reporting period ranged from 5 mg/L to 132 mg/L, with an average of 22 mg/L. TDS levels during the reporting period ranged from 142 mg/L to 4420 mg/L, with an average of 655 mg/L. Exceedances of TSS criteria were recorded in September, October and December at GCSW06 Sewerage Pond.

Elevated TSS levels appear to be due to low flow, and higher than average temperatures. Integra Underground will continue to monitor in 2019.

7.5.2 Stream Health and Channel Stability

The results of the annual Bettys Creek diversion channel stability and stream health monitoring indicated that the diversion has not significantly changed from what was observed during the 2018 survey, however some evidence of minor erosion progression was observed at some of the monitoring points (SLR, 2019c & 2019d). One additional erosion point was documented in the diversion during the May 2019 assessment based on observations made during the site inspection.

Comparison of recent and historical aerial photographs indicates that no significant lateral shifts of the diversion have occurred in the 7 months during the period between when the photographs were taken. Sufficiently accurate historical contour data was not available to allow a detailed comparison to be made.

The diversion stability fluctuates over different sections of the creek and the stream health of the diversion is still poor to very poor (SLR, 2019c & 2019d). The very poor stream health is predominantly a result of the long history of mining and grazing practices in the area. Canopy cover (where it exists) is primarily limited to the diversion/creek with adjacent grassland. In addition, debris which can be used as habitat (i.e. leaf litter, standing dead trees, hollow-bearing trees, fallen logs etc) located around the diversion were minimal. It must be noted that increases in debris were identified at a number of sites. However, when assessed against habitat scored in the 'Good' range, habitat features especially fallen logs and habitat trees remain minimal. The health of the rehabilitated riparian areas is expected to improve over time as the canopy cover increases provided that stock access and mining impacts to these areas are minimised (SLR, 2019c & 2019d). This anticipated improvement is expected to occur slowly. Monitoring results from May 2018 to October 2019 indicate improvement is occurring gradually at most sites primarily a product of increased canopy species regeneration.

The monitoring identified that some sections of the diversion are currently eroding and are vulnerable to further erosion with areas of significant erosion observed. These areas are generally associated with exposed dispersive sub-soils, which hamper vegetation establishment by the development of a hard surface crust when the soil is dry, and the 'melting' nature of the soil when wet. The diversion is generally stable in most areas but some rill/gully erosion is occurring in some areas where the banks are bare (predominately between monitoring points MBD04 and MBD05). A number of cracks running parallel to the diversion were observed near the top of the left bank in the reach of the diversion between monitoring points MBD02 and MBD04. It is not clear what caused these cracks however, it may have been caused by slumping following construction of the channel or historical mining activity (SLR, 2019c & 2019d).

7.5.3 Comparison with Predictions

A Surface Water Assessment was undertaken by WRM Water and Environment (2009) as part of the Integra Underground Coal Project EIS. The assessment concluded that "Impacts from the current proposal will be limited to Bettys Creek, Main Creek and their local drainage network. Mine planning has ensured that Glennies Creek and its associated alluvium lie outside the subsidence footprint from the proposed underground mining and hence no surface water impacts are expected" (WRM, 2009).

A Surface Water Assessment was undertaken by Hansen Bailey (2017) to support the Mod 8 Environmental Assessment. This assessment stated that:

- The existing monitoring program will be expanded to include the Modification Underground Extraction Area and ancillary infrastructure;
- The proponent will undertake routine inspections as necessary to monitor the potential impacts of the Modification;

- Additional annual inspection sites will be established in response to any erosion or sediment control issues identified through the routine monitoring program; and
- The monitoring program will continue to be reviewed on an annual basis.

The results presented in **Tables 42** and **43** support that Integra Underground is not having any impacts upon surface water quality.

7.5.4 Long Term Trend Analysis

Figures 10 and **11** show long-term results for pH and EC, respectively. Although pH and EC levels resulted in some levels outside of trigger criteria, these levels are within the historic pH and EC that has been observed since February 2009 (ERM 2009). The location of all monitoring sites is beyond the limit of predicted subsidence and therefore operations at Integra Underground are not considered a contributing factor to these triggers.

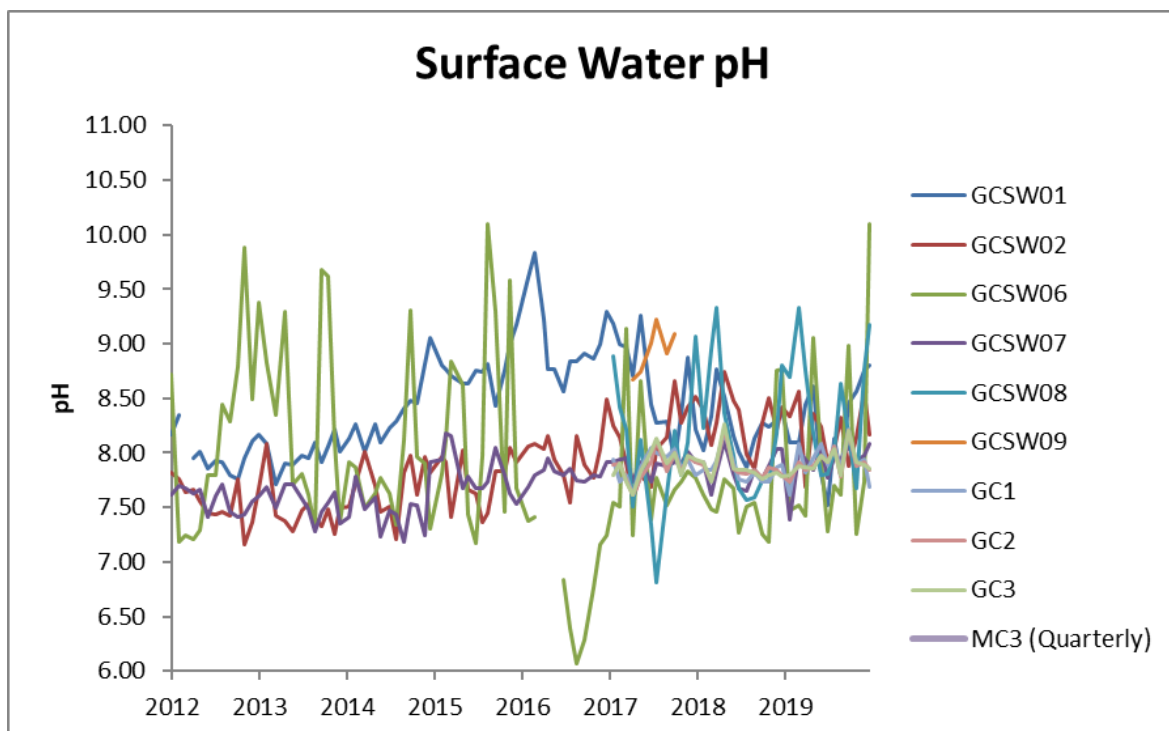


Figure 10 Long Term Surface Water pH Results

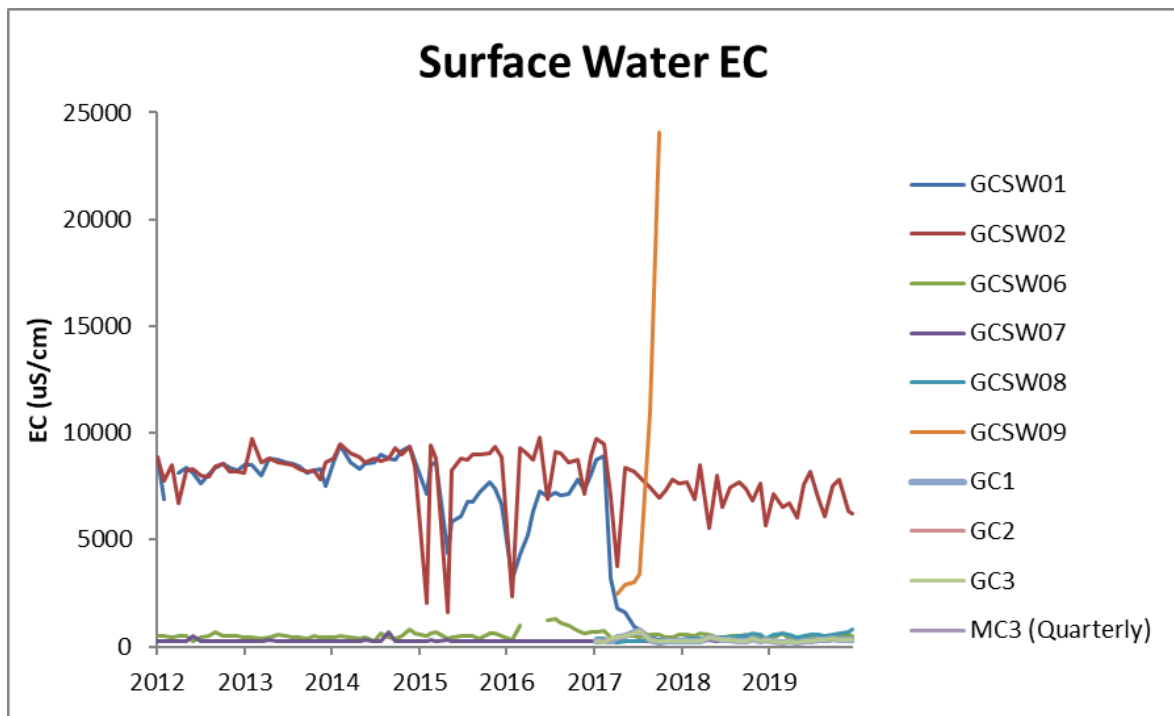


Figure 11 Long Term Surface Water EC Results

7.5.5 Key Performance and/or Management Issues

Average pH results were at upper criteria levels at GC1, GC2/W4, GC3 Glennies Creek and MC3 Main Creek. All EC results were under the listed criteria. In accordance with the *Water Management Plan*, investigations were undertaken in response to these pH limits. The investigations determined that monitoring results at the locations were not attributable to Integra Underground.

TSS levels during the reporting period ranged from 5 mg/L to 132 mg/L, with an average of 22 mg/L. TDS levels during the reporting period ranged from 142 mg/L to 4420 mg/L, with an average of 655 mg/L. Exceedances of TSS criteria were recorded in September, October and December at GCSW06 Sewerage Pond.

Elevated TSS levels appear to be due to low flow, and higher than average temperatures. Integra Underground will continue to monitor in 2020.

7.5.6 Proposed Actions for 2020

There are no specific proposed actions for 2020 in regards to Surface Water Management.

7.6 Groundwater

7.6.1 Environmental Monitoring Results

Groundwater was monitored onsite at Integra Underground during the reporting period. Groundwater monitoring locations are shown on **Figure 9** and comprises of eleven sites which are sampled bimonthly for pH, EC and depth (m). **Table 44** summarises the pH, EC and depth monitoring results for the reporting period.

During 2019, trigger limits were reached on the following occasions for pH levels, EC and groundwater level (GL):

- 31 January: EC at GCP4S, GCP4D, GCP9, GCP17; GL at GCP3S, GCP3D, GCP4S, GCP9, GCP11, GCP17, GCP18, GCP39 (dry), GCP40 (dry);
- 29 March: pH at GCP3D, GCP17; EC at GCP4S, GCP4D, GCP17, GCP18; GL at GCP3S, GCP3D, GCP4S, GCP9, GCP11, GCP17, GCP18, GCP39 (dry), GCP40 (dry);
- 21 May: pH at GCP3D, GCP4S; EC at GCP4S, GCP4D, GCP17, GCP18; GL at GCP3S, GCP3D, GCP4S, GCP9, GCP11, GCP17, GCP18, GCP39 (dry), GCP40 (dry);
- 30 July: EC at GCP3D, GCP4S, GCP4D, GCP9, GCP18; GL at GCP3S (dry), GCP3D, GCP4S, GCP9, GCP11, GCP17, GCP18, GCP39 (dry), GCP40 (dry);
- 25 September: pH at GCP4S; EC at GCP4S, GCP4D; GCP9, GCP18; GL at GL at GCP3S (dry), GCP3D, GCP4S, GCP9, GCP11, GCP17, GCP18, GCP39 (dry), GCP40 (dry); and
- 15 November: EC at GCP3D, GCP4D; GCP18; GL at GL at GCP3S (dry), GCP3D, GCP4S, GCP9, GCP11, GCP17, GCP18, GCP39 (dry), GCP40 (dry).

Integra Underground engaged GeoTerra to undertake an investigation of these results during the reporting period. In regards to pH, the report outlined that the exceedances are within the historic pH ranges of GCP3S since April 2005, within a gradual acidification trend observed in GCP3D and GCP4D that has been observed since late 2015 and only just outside the outlined trigger value for GCP9, 11, 17 and 18 and is within their historic range since August 2006. None of the TARP pH trigger criteria exceedances are considered significant, and they are not directly due to influences from activities or operations within the Integra Underground (GeoTerra, 2019). In regards to salinity, the report outlined that exceedances are within the historic EC ranges of GCP4D since April 2005, GCP18 since November 2009 and GCP40 since July 2008. GCP4S and GCP18 were fresher or less acidic compared with the specified criteria. A notable increase ion salinity has occurred since June 2018 in GCP3S, however the reason for this is not known. None of the TARP EC trigger criteria exceedances are considered significant, and are not directly due to influences from activities or operations within the Integra Underground, however, ongoing monitoring results should be observed to assess if the salinisation trend continues (GeoTerra, 2019). In regards to groundwater levels, the technical “exceedances” are within the historic range of the piezometers since January 2002. Most sites have been outside the water level range for 2-3 years, during the recent drought period. None of the TARP groundwater level trigger criteria exceedances are considered significant, and are not currently due to influences from recent activities or operations within the Integra Underground, however, ongoing monitoring results should be observed to assess the long term water level trends in association with rainfall (GeoTerra, 2019).

Although trigger limits were reached on several occasions, investigations conclude that these are not considered to be exceedances and as such Integra Underground was compliant with PA 08_0101.

Table 44 Groundwater Monitoring Results

Monitoring Location	pH Results					EC Results (µS/cm)					Groundwater Level (mbgl)				
	Min	Ave	Max	Lower Criteria	Upper Criteria	Min	Ave	Max	Lower Criteria	Upper Criteria	Min	Ave	Max	Lower Criteria	Upper Criteria
GCP3S*	-	-	-	6.9	7.2	-	-	-	14,900	16,200	-	-	-	3.6	4.5
GCP3D	7.2	7.3	7.3	7.3	7.5	9040	10297	12000	5,140	10,700	44.0	43.2	41.9		92.14 #
GCP4S	7.1	7.3	7.6	7.3	7.8	13620	13910	14500	7,230	10,200	5.5	5.2	5.1	3.5	4.6
GCP4D	6.8	7.0	7.2	7.0	7.7	15040	15945	17700	4,570	12,900	15.1	14.7	14.4		73.69 #
GCP9	6.8	6.9	7.0	6.8	7.1	462	479	495	395	475	6.1	5.9	5.8	4.5	4.2
GCP11	7.1	7.2	7.3	7.1	7.5	3250	3380	3510	1,740	4,510	9.6	9.4	9.2	8.4	9.3
GCP17	6.8	6.9	7.1	6.8	7.0	15520	15967	16410	17,100	18,000	8.2	8.0	7.9	7.3	7.5
GCP18	6.8	7.0	7.3	6.8	7.3	707	742	787	760	1,180	8.0	8.0	7.9		-68.73 #
GCP39*	-	-	-	6.0	6.9	-	-	-	210	4,310	-	-	-	3.3	4.4
GCP40*	-	-	-	6.6	6.9	-	-	-	33,000	40,800	-	-	-	4.6	5.2
DDH224	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Dry during all sampling events

Coal Measure Maximum Drawdown Level Triggers

7.6.2 Alluvium Interception

In accordance with Condition 3 of groundwater licences 20BL169862 and 20BL169864, **Figure 9** shows the extent of mining activities and the unconsolidated alluvium associated with Glennies Creek, Bettys Creek and Main Creek.

7.6.3 Comparison with Predictions

The Integra Underground *Water Management Plan* (2019) contains groundwater quality impact assessment criteria. These criteria take the form of site specific trigger values, based on acceptable limits of variation in water level and water quality and have been developed using quarterly groundwater sampling data collected between 2009 and 2016, with reference to the ANZECC/ARMCANZ (2000) guidelines. The trigger levels established in the Water Management Plan are presented in **Table 44**.

Groundwater levels in the alluvial aquifers generally varied by less than 0.5 m over 2019, with greater levels seen at GCP3D. Most alluvial piezometers showed slightly higher groundwater levels compared to 2018 and 2017.

Similarly to both 2017 and 2018, groundwater quality recorded in the alluvial aquifers showed significant variability over 2019, which is likely due to the grab sampling method employed by Integra Underground rather than any real changes in the aquifer water quality. Because of this variability, there were numerous exceedances of relevant water quality trigger values for the alluvial aquifers. However, all 2019 pH monitoring results were within the ANZECC (2000) Guideline ranges for lowland river aquatic ecosystems, as were the full year of EC results at several of the piezometers. Where EC results were in excess of the Guideline values, the results were sufficiently high enough to suggest that groundwater at these locations naturally exceeds the Guideline values.

7.6.4 Long Term Trend Analysis

Figures 12 to 14 show long-term results for pH, EC and depth, respectively. Although there were multiple exceedances of criteria in 2019 (refer **Section 7.6.1**), these levels are within the historic ranges of the piezometers (GeoTerra 2019).

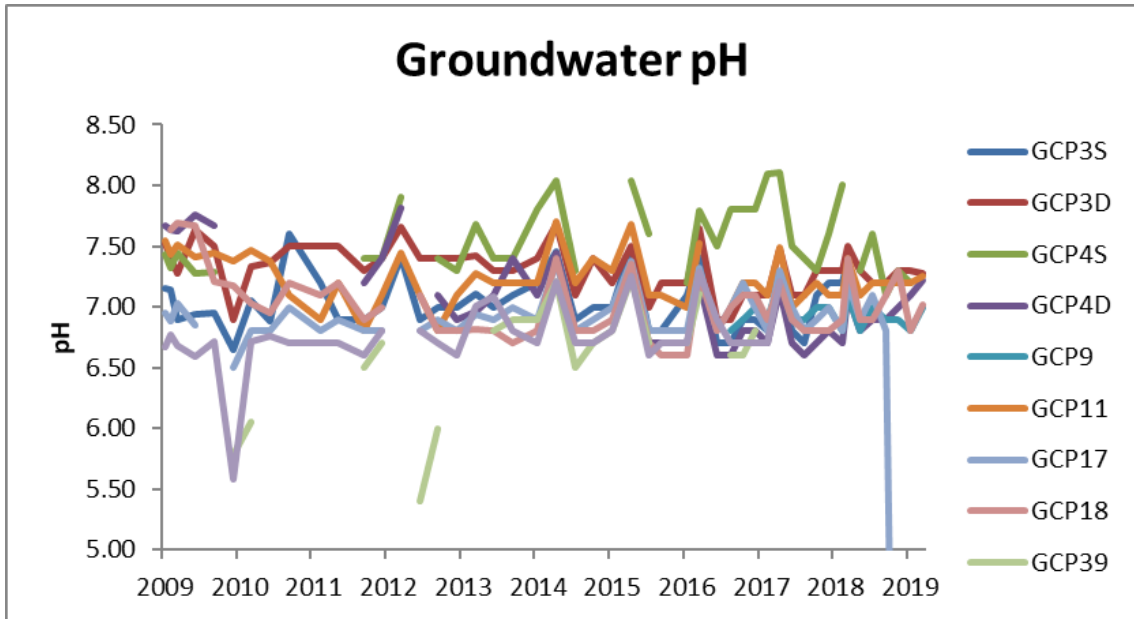


Figure 12 Long Term Groundwater pH Results

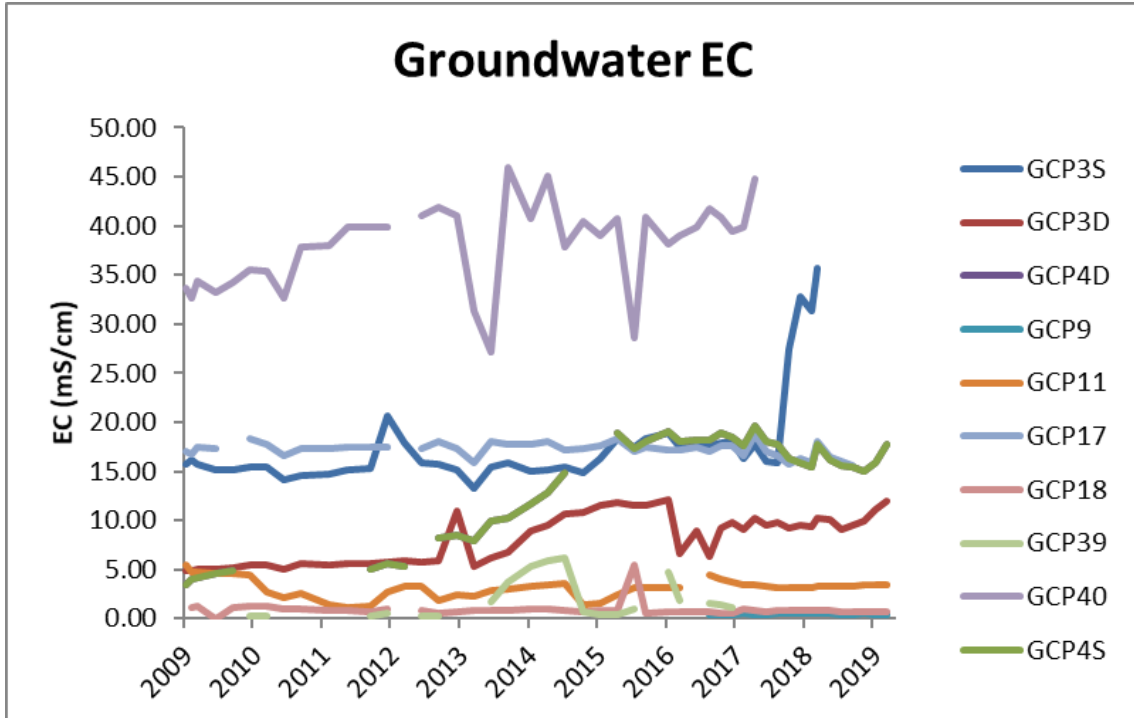


Figure 13 Long Term Groundwater EC Results

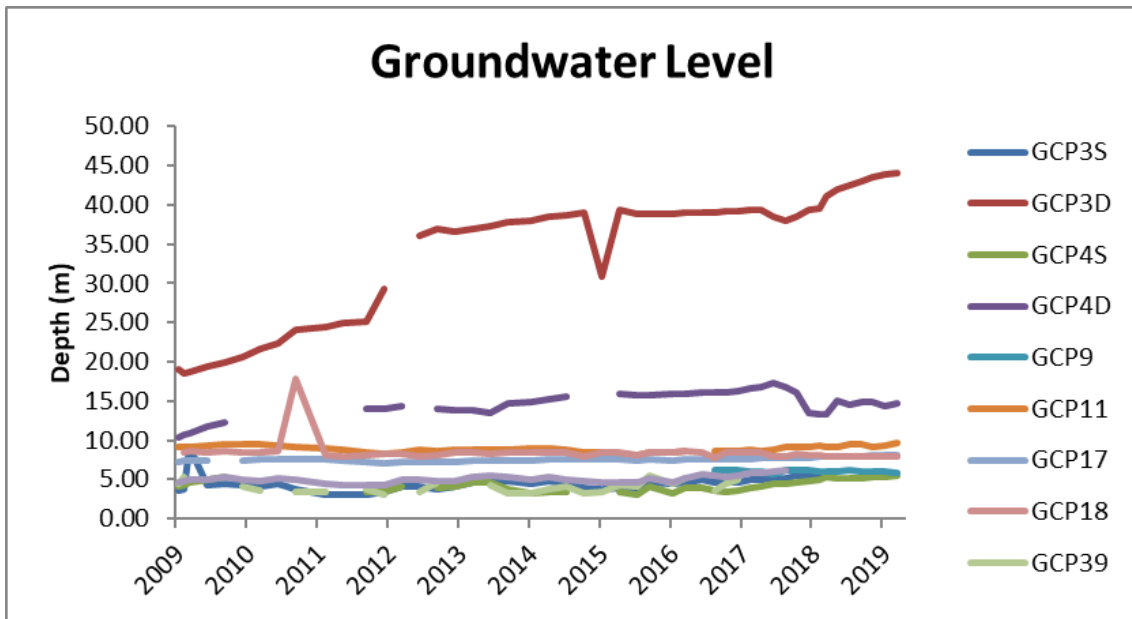


Figure 14 Long Term Groundwater Level Results

7.6.5 Key Performance and/or Management Issues

There were no groundwater incidents, performance or management issues in 2019. Exceedances are managed as per the *Water Management Plan* (2019).

7.6.6 Proposed Actions for 2020

There are no specific proposed actions for 2020 in regards to groundwater.

8 Rehabilitation

Rehabilitation objectives at Integra Underground are in accordance with the approved MOP. Rehabilitation is undertaken progressively as outlined in the Environmental Assessments, PA 08_0101, the approved MOP and the *Biodiversity Management Plan*. The rehabilitation of the final landform features will be integrated across the underground and surrounding natural landforms.

8.1 Rehabilitation Outcomes and Objectives

Integra Underground is committed to achieving a post mining land use outcome which is safe, stable and sustainable and meets the requirements of key stakeholders. In general and where practicable the final landscape will be returned to as close as possible to the pre-mining land use configuration. The rehabilitation objectives for the site, is to achieve an agreed post mining land use that is safe, stable, non-polluting and sustainable.

Regular monitoring of rehabilitated areas is undertaken during the initial vegetation establishment period and beyond to demonstrate that the objectives of the rehabilitation strategy are being achieved, and that a sustainable, stable landform has been created. Depending on the outcomes of the monitoring, rehabilitation maintenance to repair any areas may be undertaken where required. This may include, but not be limited to, the repair of diversion drains and banks, and the reseeded or fertilising of areas that may have failed to establish.

The monitoring results of rehabilitated areas will be compared to the reference sites established as part of the baseline monitoring program to allow a comparison of the development and success of the rehabilitation against remnant vegetation. Reference sites indicate the condition of surrounding undisturbed areas and allow comparisons to be made between the rehabilitated sites and the undisturbed areas.

Additionally, Schedule 3, Condition 38 of PA 08_0101 sets out the rehabilitation objectives for Integra Underground. These are replicated in **Table 45**.

Table 45 PA 08_0101 Rehabilitation Objectives

Area/Domain	Rehabilitation Objective
Site (as a whole)	Safe, stable and non-polluting.
Surface Infrastructure	To be decommissioned and removed, unless DRG agrees otherwise.
Other land affected by the project	Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: <ul style="list-style-type: none"> Local native plant species (unless DRG agrees otherwise); and A landform consistent with the surrounding environment.
Glencore Mt Owen Bettys Creek Diversions	Rehabilitate to the same or better geotechnical, geomorphic and ecological condition as prior to mining, unless the owner agrees otherwise.
Sections of Bettys Creek and Main Creek to be Diversions	Hydraulically and geomorphologically stable, with diverse habitats and ecology.
Creek Diversions	Hydraulically and geomorphologically stable, with diverse habitats and ecology.

Area/Domain	Rehabilitation Objective
Built features	Repair to pre-mining condition or equivalent unless: <ul style="list-style-type: none"> • The owner agrees otherwise; or • The damage is fully restored, repaired or compensated for under the <i>Mine Subsidence Compensation Act 1961</i>.
Community	<ul style="list-style-type: none"> • Ensure public safety; and • Minimise the adverse socio-economic effects associated with mine closure.

8.2 Status of Mining and Rehabilitation

The operational status of mining and rehabilitation is shown in **Figure 15**. All rehabilitation works were undertaken in accordance with the MOP. A copy of the MOP is found on the Integra Underground website. Currently 10.37 ha of land is under active rehabilitation. A detailed summary of the rehabilitation undertaken at Integra Underground is shown in **Table 46**.

The increase to total active disturbance in 2019 was associated with the construction and operation of gas drainage wells, with supporting pipelines and access roads.

Rehabilitation was completed at gas wells GW14/1, GW14/3 and GW13/11, as shown in **Photos 1-4**. A small 10m crack was also rehabilitated north-east of Longwall 13.



Photo 1 Rehabilitation of Gas Well Site GW13/11



Photo 2 Rehabilitation of Gas Well Site GW14/1



Photo 3 Rehabilitation of Gas Well Site GW14/3 (Prior to Seeding)



Photo 4 Rehabilitation at Gas Well Site GW14/3 (Post Rehabilitation)

Table 46 Rehabilitation Status

Mine Area Type	Previous Reporting Period (Actual) (Ha)	This Reporting Period (Actual) (Ha)	Next Reporting Period (Forecast) (Ha)
A. Total mine footprint	111.14	119.47	123.97
B. Total active disturbance	95.66	109.1	113.1
C. Land being prepared for rehabilitation	0	0	0
D. Land under active rehabilitation	8.12	10.37	10.37*
E. Completed rehabilitation	0	0	0

* Integra Underground review the gas wells each quarter to determine the operational need for each gas well. When a gas well is deemed to be no longer required for future operations it will be rehabilitated. This quarterly review process is used to schedule rehabilitation of wells through the year.

8.3 Comparison against MOP Predictions

During 2019 Integra Underground generally operated in accordance with the approved MOP. A comparison of 2019 rehabilitation against the predictions made in the MOP have been presented in **Table 47** and shown in **Figure 15**.

Table 47 Rehabilitation Progress Compared to MOP Predictions

Predicted/Actual	Total Disturbance Area (ha)	Total Rehabilitation Area (ha) (per MOP Year)	Cumulative Rehabilitation Area (During MOP term)
2019 Data	109.1	2.25	10.37
End of MOP Cumulative Rehabilitation Target	26.8*	3.1^	11.2^

* Prediction from MOP

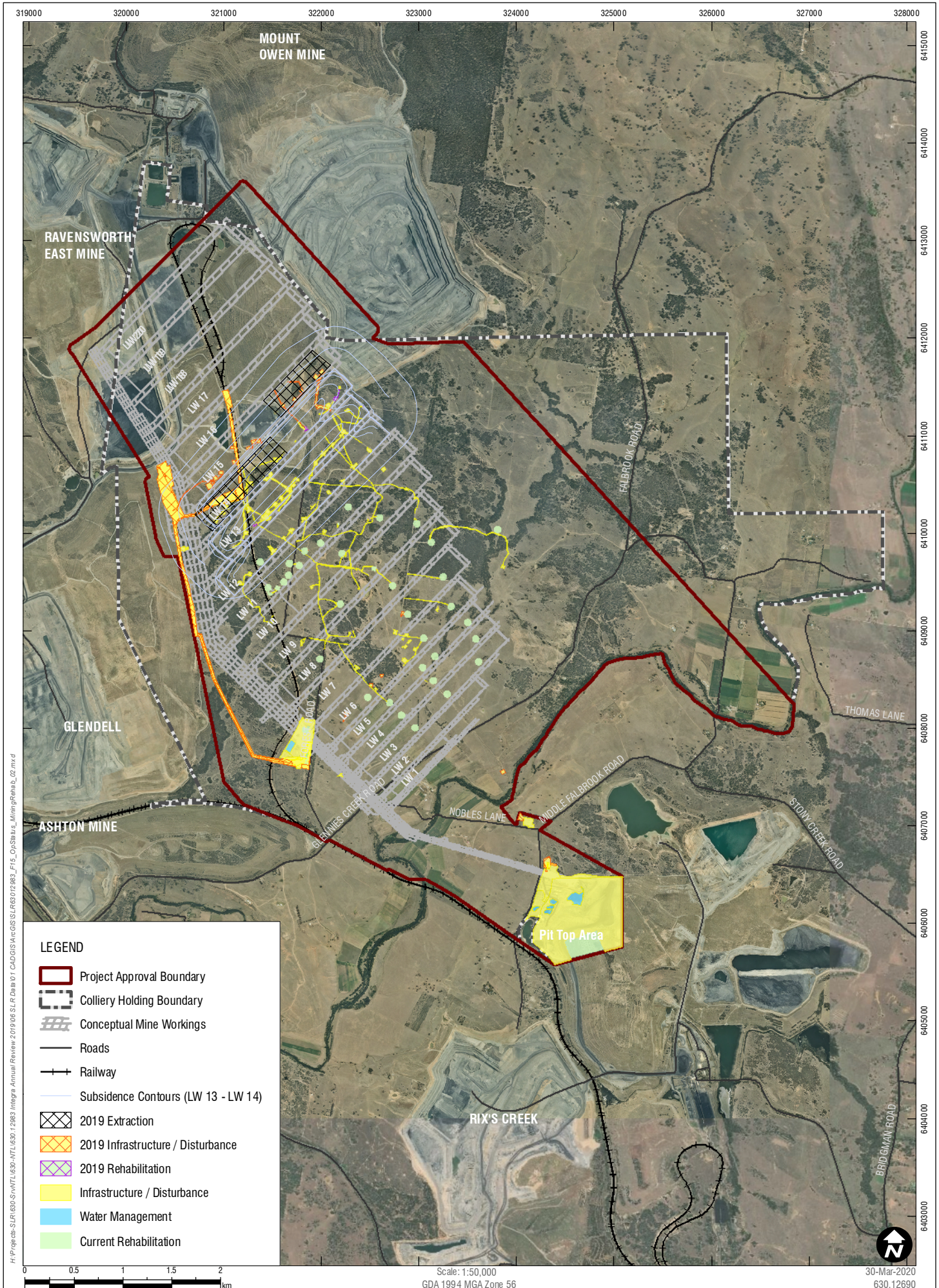
^ Predictions made by site on an annual basis as these were not detailed within the MOP

As seen in **Table 47**, Integra Underground did not complete the rehabilitation target in respect to the MOP forecast, with the total cumulative rehabilitation area being less than the MOP prediction. The predicted total disturbance area is slightly higher than predicted in the MOP. Refinements to the site GIS have identified that rehabilitation is less than predicted in the MOP, this will be aligned in future updates to the MOP. Section 2.3.9 for the MOP also indicated that during the term of this MOP, it is planned that eight gas wells at Integra Underground will be rehabilitated. Three of these sites were completed in 2019.

8.4 Post Rehabilitation Land Use

As outlined in the MOP, Integra Underground is committed to achieving a post mining land use outcome which is safe, stable and sustainable, and meets the requirements of key stakeholders. In general and where practicable the final landscape will be returned to as close as possible to the pre-mining land use configuration.

The majority of mining and pit top infrastructure will be removed, with the majority of the areas rehabilitated to pasture. Only 7.2 ha of rehabilitation will be woodland/pasture. All surface cracks due to subsidence will be identified and remediated appropriately.



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- LEGEND**
- Project Approval Boundary
 - Colliery Holding Boundary
 - Conceptual Mine Workings
 - Roads
 - Railway
 - Subsidence Contours (LW 13 - LW 14)
 - 2019 Extraction
 - 2019 Infrastructure / Disturbance
 - 2019 Rehabilitation
 - Infrastructure / Disturbance
 - Water Management
 - Current Rehabilitation

8.5 Key Issues that May Affect Rehabilitation

Issues that cannot be predicted but may present risks to Integra Underground rehabilitation include:

- Climate change;
- Bushfire;
- Drought;
- Flood;
- Dam failure;
- Major landform deformation due to geotechnical instability;
- Changes to regulatory requirements;
- Infestations of destructive species; and/or
- Malicious damage.

An event such as those listed above could have substantial consequences for rehabilitation value and are likely to require effective recovery practices to limit the harm, control the risks and to rebuild the rehabilitation to achieve satisfactory performance criteria within a reasonable timeframe to achieve relinquishment. The effect on rehabilitation could occur at any time during the life of mine, during care and maintenance and post closure.

The probability of any of the events listed above occurring are very low based on industry evidence throughout Australia and the exact geo-political location for Integra Underground. Some events may occur suddenly, such as an act of damage by a vandal whereas other such as the impacts of climate change can be monitored through progressive changes against average weather patterns and the severity of those events. The likelihood of a bushfire affecting the site is cyclical with conditions such as higher risk seasons and increasing fuel loads of vegetation in areas that have dense undergrowth and no grazing or clearing.

8.6 Rehabilitation Monitoring

8.6.1 2019 Rehabilitation Monitoring Summary

A *2019 Annual Rehabilitation Monitoring Report* was prepared by Umwelt (2019). Monitoring was undertaken by two ecologists over three days from 3 September to 5 September 2019. The program included the assessment of 35 rehabilitated gas well sites (see **Photo 5**), three pasture analogue sites, two woodland rehabilitation sites and two engineered creek-crossing sites.



Photo 5 Gas Well Rehabilitation Site, LW03_GW01 (Umwelt, 2019)

Three general types of rehabilitation works have been completed across Integra Underground to date. These are:

- Woodland rehabilitation areas: these are in the rehabilitation overburden emplacement area (7.2 hectares), which have been reshaped, topsoil applied and seeded/planted with native trees, shrubs and groundcover species.
- Gas well rehabilitation sites: former gas well sites would have originally had no greater disturbance size than approximately 20 metres by 20 metres. This area would have included a small actual drill hole, with the remaining area slashed for vehicle and equipment laydown areas. After cessation of the need for the gas well site, these locations were backfilled and left to naturally recover, with some follow-up weed management works. The rehabilitation of these sites aimed for consistency with surrounding vegetation (predominantly cattle grazed grassland).
- Creek Crossings: these works were across existing natural creek lines and were enhanced to allow the following;
 - Main Creek: Integra to Mt Owen Mine Water Pipeline was installed running horizontally to the creek and required excavation; and
 - Bettys Creek: rehabilitation was required for the installation of the Mt Owen Mine Water Pipeline and a gas drainage pipeline.

Rehabilitation monitoring results and subsequent data analysis and interpretation showed that rehabilitation condition across the gas well sites was also variable:

- 16 of the 37 monitored gas well sites achieved a satisfactory performance (classified as ‘monitor’ or ‘acceptable’) typically with a satisfactory protective ground cover dominated by desirable and suitable pasture species. Monitoring of the five sites achieving an ‘acceptable’ performance can be temporarily suspended, whilst the monitoring frequency of the 11 sites classified as ‘monitor’ can be decreased;
- 16 of the 37 gas well sites were assessed as requiring minor maintenance works, as well as four other rehabilitation site, typically in relation to required localised weed control; and
- Five of the 37 gas well sites had rehabilitation which returned a very poor performance. The establishment of a suitable pasture vegetation community has failed and some sites are showing sunken areas (which will require in-filling). These sites were classified as needing re-work and regular monitoring will need to be continued (Umwelt, 2019).

2019 results differed compared with 2018, where more sites required minor maintenance. However, one less site returned a very poor performance in 2018 (four) compared with 2019 (five). 2017 saw the best results, with 19 of the 31 monitored sites achieve a satisfactory performance, which is indicative of the effect the meteorological conditions are having on rehabilitation success.

8.7 Rehabilitation Trials

There were no rehabilitation trials undertaken at Integra Underground during the 2019 Annual Review period.

8.8 Removal of Buildings

Two buildings were removed during 2019, as discussed in **Section 6.6**.

8.9 Proposed Actions for 2020

Integra Underground propose the following actions during 2020:

- Continue additional works recommended in the *Rehabilitation Monitoring 2019* report (Umwelt 2019);
- Integra Underground will continue to rehabilitate cracks, as per the *Mine Operations Plan* and *Extraction Plan*, identified during 2020 above Longwalls 14 and 15 (where necessary); and
- Re-work and regular monitoring for the five gas well rehabilitation sites that returned a very poor performance in 2019.

9 Community

9.1 Overview

A number of consultation tools are used at Integra Underground to consult with relevant stakeholders. These include:

- A 24-hour community response line: This service aims to promptly and effectively address community concerns;
- Community Consultative Committee (CCC): The Integra Underground CCC is held with the Mount Owen Glendell Complex CCC. This committee currently meets two times per year to discuss environmental management and any matters raised by members on behalf of the community;
- Integra Underground website: Includes updates on current and future operations, including environmental monitoring results; and
- Glencore Greater Ravensworth Area newsletters: These are prepared bi-annually and circulated to disseminate information on Glencore operations in the area, including Integra Underground.

9.2 Community Consultative Committee

The Integra Underground and Mount Owen Glendell Operations CCC comprise of:

- Community members;
- Representatives of Singleton Council; and
- Managers from Mount Owen Mine, Glendell Mine and Integra Underground.

Two CCC meetings were held during the reporting period:

- April 2019; and
- October 2019.

These meetings provided updates on operations, including mine closure planning, subsidence management, environmental monitoring results, community complaints, environmental incidents, and summaries of rehabilitation activities. CCC meeting minutes are available on the Integra Underground website.

9.3 Community Contributions, Donations and Sponsorship

Integra Underground recommenced the community investment program during 2017, following a period of minimal investments due to Integra Underground being under care and maintenance. Integra Underground is committed to supporting the local community in which it operates. To reflect this commitment, Integra Underground supported the following community initiatives, making donations to the total value of \$19,729.77 in 2019:

- Greta Playgroup for the purchase of equipment;
- Singleton Shire Council Mobile Preschool for the purchase of educational and sensory resources;
- Mount Pleasant Public School for the purchase of a defibrillator (see **Photo 6**);
- Singleton Fire Station, NSW Fire and Rescue for the purchase of smoke alarms (see **Photo 7**); ; and

- Newcastle & Districts Rugby League for the replacement of general “on-field” stocks of water bottles, water carriers and medical supplies. Their representative and pathways program covers the area within the boundary of Belmont, Toronto, Cessnock, Maitland and Nelson Bay.



Photo 6 Mount Pleasant Public School’s New Defibrillator



Photo 7 Singleton Fire and Rescue 444 team receives donation from Glencore (The Singleton Argus, 2019)

9.4 Community Complaints

One community complaint was received during the 2019 reporting period in regard to property damage ascertained from a private vehicle. Integra Underground successfully worked with the landowner to repair the damaged paddock fence and gate.

Historic community complaints related to PA 08_0101 underground operations are presented in **Table 48**.

Table 48 Historic complaints relating to PA 08_0101 Underground Operations

Year	Nature of Complaint					Total
	Traffic	Noise	Lighting	Dust	Land Access	
2019	1	-	-	-	-	1
2018	-	-	-	-	-	0
2017	-	-	-	-	-	0
2016	-	-	-	-	-	0
2015	-	-	-	-	-	0
2014	-	-	-	-	-	0
2013	-	-	-	-	-	0
2012	-	-	-	-	-	0
2011	-	1	-	1	-	2
2010	1	1	-	-	-	2
2009	-	5	1	-	1	7

There were no community complaints relating to the underground operations between 2012 and 2018. The highest number of community complaints recorded was in 2009 following approval of PA 08_0101. The number of community complaints declined to two complaints each year in 2010 and 2011. HVCC purchased Integra Underground in December 2015 and the mine was managed by other Mine Operators in the previous years. The number of community complaints received in 2019 is in line with historical patterns.

10 Independent Audit

In accordance with Condition 3, Schedule 5 of PA 08_0101, an Independent Environmental Audit is required every three years. An audit was undertaken in 2017. All actions for the audit were completed, as reported in the 2018 Annual Review. The audit period ranged between 5 December 2014 and 28 November 2017.

WSP (2018) determined there to be five non-compliances and six conditions were not verified. Some of the non-compliances noted in the audit related to the same issue which were duplicated between consent documents and management plans.

A basic risk assessment was conducted for all non-compliances resulting in Low/Medium/High risk levels, as well as administrative non-compliances. Of the five non-compliances, four were administrative non-compliances and one was a low risk. No medium or high risks were identified during the audit.

A copy of the Independent Environmental Audit and action plan to address non-compliances can be viewed on the Integra Underground website. All of the actions within the Independent Environmental Audit have now been closed out, as shown in **Appendix C**. The previous two Integra Underground Annual Reviews (2017 and 2018) outlined the progress made in each reporting year to have these items addressed and closed.

The next independent environmental audit will be undertaken in 2020.

11 Incidents and Non-Compliances

11.1 Air Quality

Jacobs completed a full review of the 2019 Air Quality Monitoring Data (2020) which in summary concluded that HV Coking Coal Pty Limited was in compliance with its Project Approval in terms of total PM₁₀ and TSP impacts, and total and incremental dust deposition impacts at all reportable monitoring sites for data collected in 2019. Refer to **Section 6.2** for further details on Air Quality.

12 Activities to be Completed in the Next Reporting Period

The activities listed in **Table 49** have been/will be completed in 2020.

Table 49 Proposed Activities in 2020

Topic	Proposed Activity	By When
Exploration	Undertake planned exploration program as outlined in Section 4.4.2.	Ongoing
Longwall mining	Undertake longwall development within the Middle Liddell seam using continuous miners, and longwall mining within the Middle Liddell seam in Longwalls 15 and 16.	Ongoing
Construction	Construction of mine infrastructure, including service and ventilation facilities as outlined in Section 4.4.3.	Ongoing
Rehabilitation	Progressive rehabilitation of gas drainage infrastructure.	Ongoing
Management Plans	Prepare and submit Longwalls 17 to 20 Extraction Plan.	August 2020

13 References

- ANZECC (2010) *Australian and New Zealand Environment and Conservation Council Water Quality Guidelines*
- Bridges (2017) *Integra Longwall Extension Modification – Acoustics.*
- EMM (2012) *Integra Mine Complex Modification 2 Environmental Assessment.*
- Enright Land Management (2020) *2019 Completed Weed Works Report.*
- Cumberland Ecology (2017) *Integra Underground. Longwall Extension Modification Ecological Impact Assessment.*
- Geoterra (2019) *Discussion on TARP trigger exceedance at Integra Underground.*
- Hanson Bailey (2017) *Integra to Mount Owen Complex Water Pipeline Modification Environmental Assessment.*
- Integra (2017) *Longwalls 13 and 14 Public Safety Management Plan.*
- Integra (2019) *Longwalls 15 and 16 Public Safety Management Plan.*
- Jacobs (2020) *Review of 2019 Air Quality Monitoring Data Data*
- NSW Government (2015) *Post Approval Requirements for State Significant Mining Developments – Annual Review Guideline.*
- OEH (2014) *BioBanking Assessment Methodology 2014.* State of NSW and Office of Environment and Heritage, Sydney.
- OzArk EHM (2017) *Aboriginal and Historic Heritage Impact Assessment, Longwall Extension Modification, Integra Underground Mine, Singleton LGA.*
- OzArk EHM (2018) *Aboriginal Due Diligence Archaeological Assessment, Additional Disturbance Areas for 66 kV Power Line and Access Road Construction, Integra Underground Mine, Singleton LGA.*
- OzArk EHM (2019a) *Aboriginal Due Diligence Archaeological Assessment, Potential Impacts Associated with Coal Extraction from Longwall 15, Integra Underground Mine, Singleton LGA.*
- OzArk EHM (2019b) *Aboriginal Cultural Heritage Monitoring Report, Mount Owen Complex.*
- SCT (2017) *Integra Underground Mine: Subsidence Assessment for LW13 and LW14 Extraction Plan.*
- SCT (2018) *Integra Underground Mine: Subsidence Assessment for LW15 and LW16 Extraction Plan.*
- SCT (2019a) *Integra Underground Mine: Six-monthly Subsidence Report for Longwall 14.*
- SCT (2019b) *Integra Underground Mine: Six-monthly Subsidence Report for Longwalls 14 and 15.*
- SLR (2017) *Integra Underground Coal Project, Biodiversity Management Plan, Baseline Monitoring Report.*
- SLR (2018) *Mining Operations Plan, Integra Underground, November 2018 – December 2023.*
- SLR (2019) *Integra Underground Mine Biodiversity Review - LW 15 to 20.*

SLR (2019b) *Integra Underground Longwalls 13 to 15 Biodiversity Monitoring August 2019.*

SLR (2019c) *May 2018 Integra Bettys Creek Monitoring Report.*

SLR (2019d) *October 2018 Integra Bettys Creek Monitoring Report.*

The Singleton Argus (2019) *Singleton Fire and Rescue 444 team receives donation from Glencore (31 October 2019)*

Umwelt (2018) *Heritage Assessment of Two Buildings Proposed for Removal, Integra Underground Pit Top Area, Glennies Creek.*

Umwelt (2019) *Integra Underground 2019 Annual Rehabilitation Monitoring Report.*

WSP (2018) *Integra Underground Project PA 08_0101 Independent Environmental Audit 2017.*

APPENDIX A

TEOM Exceedances

Table 50 Full list of TEOM Exceedances

Date Sampled	Sample Site	PM10 - 24Hr mean ($\mu\text{g}/\text{m}^3$)	Exceedance Reasoning
19/01/2019	TEOM 3	57.9	Temperature reached a maximum of 40.1°C; wind direction was predominantly South South-East; wind direction would not contribute to results at both TEOMs; no Integra Underground operations were undertaken on 19/01 as part of operations.
	TEOM 4	57.9	
10/02/2019	TEOM 2	55.4	Temperature reached a maximum of 30°C; wind direction was predominantly south; minimal surface activities undertaken on 10/02 as part of operations; regional dust event in Hunter Valley.
	TEOM 3	56.6	
	TEOM 4	53.0	
12/02/2019	TEOM 2	64.0	Temperature reached 30°C; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 12/02 as part of operations; regional dust event in Hunter Valley.
	TEOM 3	53.1	
	TEOM 4	57.1	
11/03/2019	TEOM 2	60.9	Wind direction was predominantly south; wind direction would not contribute to results at all TEOMs; minimal surface activities undertaken on 11/03 as part of operations; regional dust event in Hunter Valley.
	TEOM 3	52.7	
	TEOM 4	56.1	
26/05/2019	TEOM 2	55.4	Wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 26/05 as part of operations.
27/05/2019	TEOM 2	66.0	Wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 27/05 as part of operations; regional dust event in Hunter Valley.
	TEOM 4	62.9	
07/06/2019	TEOM 2	64.1	Minimal surface activities undertaken on 7/06 as part of operations.
11/07/2019	TEOM 4	115.0	Wind speed reached 14m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 11/07 as part of operations.
20/07/2019	TEOM 2	56.8	Wind speed reached 3.5m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 20/07 as part of operations.
21/07/2019	TEOM 2	51.3	Wind speed reached 10.6m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 21/07 as part of operations.
23/07/2019	TEOM 2	62.3	Wind speed reached 9.3m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 23/07 as part of operations.
03/08/2019	TEOM 4	53.2	Measurement taken on weekend; wind direction is opposite to that which operations would contribute to result.
07/08/2019	TEOM 2	54.2	Wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 7/08 as part of operations.
	TEOM 3	53.5	

Date Sampled	Sample Site	PM10 - 24Hr mean ($\mu\text{g}/\text{m}^3$)	Exceedance Reasoning
15/08/2019	TEOM 2	59.6	Wind speed reached 9.1m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 15/08 as part of operations;
16/08/2019	TEOM 2	67.7	Wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 16/08 as part of operations.
	TEOM 3	53.0	
19/08/2019	TEOM 2	63.0	Wind direction would not contribute to results at all TEOMs; minimal surface activities undertaken on 19/08 as part of operations.
	TEOM 3	57.1	
	TEOM 4	55.4	
20/08/2019	TEOM 4	56.9	Wind speed reached 11.6m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 20/08 as part of operations;
21/08/2019	TEOM 4	57.4	Wind speed reached 17.3m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 21/08 as part of operations.
24/08/2019	TEOM 2	79.2	Wind direction would not contribute to results at all TEOMs; minimal surface activities undertaken on 24/08 as part of operations; regional dust event in Hunter Valley.
	TEOM 3	56.6	
	TEOM 4	60.4	
12/09/2019	TEOM 2	52.0	Wind speed reached 11.6m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 12/09 as part of operations.
	TEOM 4	60.0	
13/09/2019	TEOM 3	51.4	Wind speed reached 5.4m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 13/09 as part of operations.
	TEOM 4	57.7	
16/09/2019	TEOM 2	54.7	Wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 16/09 as part of operations.
	TEOM 4	55.0	
27/09/2019	TEOM 4	58.8	Wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 27/09 as part of operations.
28/09/2019	TEOM 4	54.1	Wind speed reached 9.9m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 28/09 as part of operations.
04/10/2019	TEOM 2	68.2	Wind speed reached 10.3m/s and temperature 32.7°C; minimal surface activities undertaken on 4/10 as part of operations.
	TEOM 3	61.3	
	TEOM 4	61.9	
17/10/2019	TEOM 2	57.0	Wind speed reached 13.5m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 17/10 as part of operations.
	TEOM 4	66.8	
03/11/2019	TEOM 2	55.7	

Date Sampled	Sample Site	PM10 - 24Hr mean ($\mu\text{g}/\text{m}^3$)	Exceedance Reasoning
	TEOM 4	66.1	Minimal surface activities undertaken on 3/11 as part of operations; bushfire smoke haze was present and could be smelt in the area with elevated regional results.
14/11/2019	TEOM 4	56.1	Wind speed reached 7.9m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 14/11 as part of operations.
15/11/2019	TEOM 2	64.8	Wind speed reached 11.5m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 15/11 as part of operations; elevated regional results.
	TEOM 3	57.0	
	TEOM 4	67.1	
18/11/2019	TEOM 4	67.9	Wind speed reached 6.6m/s; wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 18/11 as part of operations; elevated regional results.

* Excludes exceedances recorded on days declared extraordinary event

APPENDIX B

HVAS Exceedances

Table 51 List of TSP exceedances contributing to a high annual average

Date Sampled	Sample Site	TSP ($\mu\text{g}/\text{m}^3$)	Exceedance Reasoning
26-01-2019	TSP2	137	Temperature reached a maximum of 43.2°C; wind speed reached 8 m/s; minimal surface activities undertaken on 26/01 as part of operations.
08-04-2019	TSP2	139	Temperature reached a maximum of 32°C; wind speed reached 7.2 m/s; minimal surface activities undertaken on 8/04 as part of operations.
01-06-2019	TSP2	193	Wind direction is opposite to that which operations would contribute to result; minimal surface activities undertaken on 1/06 as part of operations
07-06-2019	TSP2	116	Minimal surface activities undertaken on 7/06 as part of operations.
13-06-2019	TSP2	178	Wind speed reached 12.6 m/s; minimal surface activities undertaken on 13/06 as part of operations.
19-06-2019	TSP2	105	Wind speed reached 6.3 m/s; minimal surface activities undertaken on 19/06 as part of operations.
13-07-2019	TSP2	112	Wind speed reached 10.9 m/s; minimal surface activities undertaken on 13/07 as part of operations.
19-07-2019	TSP2	160	Wind speed reached 8.2 m/s; minimal surface activities undertaken on 19/07 as part of operations.
06-08-2019	TSP2	112	Wind speed reached 7.1 m/s; minimal surface activities undertaken on 6/08 as part of operations.
12-08-2019	TSP2	118	Wind speed reached 8.2 m/s; minimal surface activities undertaken on 12/08 as part of operations.
24-08-2019	TSP2	250	Minimal surface activities undertaken on 24/08 as part of operations; regional dust event in Hunter Valley.
11-09-2019	TSP2	99	Wind speed reached 7.1 m/s; minimal surface activities undertaken on 11/09 as part of operations.
17-10-2019	TSP2	148	Wind speed reached 13.5m/s; minimal surface activities undertaken on 17/10 as part of operations.
23-10-2019	TSP2	91	Temperature reached a maximum of 32.8°C; wind speed reached 6.9 m/s; minimal surface activities undertaken on 23/10 as part of operations.
10-11-2019	TSP2	139	Wind speed averaged 5.5 m/s (no maximum recorded); minimal surface activities undertaken on 10/11 as part of operations.

* Excludes exceedances recorded on days declared extraordinary events

APPENDIX C

Independent Environmental Audit Actions

Table 52 Independent Environmental Audit Actions

Reference	Audit Finding	Recommendation	Proponent Response	Status
Sch 3, CoA 16 (a) / PA 08_0101	Not Verified	Confirm if methodologies comply with Approved Methods for Sampling of Air Pollutants in New South Wales guideline in relation to the meteorological station and associated monitoring.	The meteorological monitoring methodologies comply with the Approved Methods for Sampling of Air Pollutants in New South Wales guideline. Calibration completed by Novecom Pty Limited in December 2016 and 2017.	Complete
Sch 3, CoA 16 (b) / PA 08_0101	Not Verified	Confirm if methodologies comply with NSW Industrial Noise Policy or as otherwise approved by the EPA in relation to real-time measurement of temperature.	The meteorological monitoring methodologies are consistent with the NSW Industrial Noise Policy. The methodology determines the atmospheric stability classes by calculation of sigma theta. Calibration completed by Novecom Pty Limited in December 2016 and 2017.	Complete
Sch 3, CoA 30, Table 11 Water Management Performance Measures (Mine Sediment Dams) / PA 08_0101	Not Verified	Undertake a technical assessment of Southern Sediment Dam (at fan site) to confirm it has been designed and installed generally in accordance with the series Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries.	The Southern Sediment Dam (at fan site) was installed generally in accordance with the Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries. This has been confirmed by an as-built survey to determine the dam volume.	Complete

Reference	Audit Finding	Recommendation	Proponent Response	Status
Sch 3, CoA 30, Table 11 Water Management Performance Measures (Mine Water Storages) / PA 08_0101	Not Verified	Undertake a technical assessment of Portal Sump (and other relevant mine water storage components) be undertaken to confirm it has been designed, installed and maintained in order to store a 100 year ARI 72 hour storm event and that the Portal Sump (and other relevant mine water storage components) are in compliance with the permeability standard of <math><1 \times 10^{-9}</math> m/s).	<p>The Portal Sump is an in-pit mine water storage. Water from the underground workings is transferred to the Portal Sump before being pumped to Mt Owen mine, or in some cases the Rix's Creek mine. The Portal Sump level is maintained by pumping infrastructure.</p> <p>If the Portal Sump were to overflow, it would do so to the underground mine workings. Therefore, a 100 year ARI 72 hour storm event would not impact upon the environment.</p> <p>The Portal Sump is not in proximity to alluvial aquifers. Below the Portal Sump is low permeability Permian basement rock. Therefore, the risk of transfer of mine water to the environment is low.</p>	Complete
Sch 3, CoA 32D and Sch 5, CoA 9 / PA 08_0101	Non-Compliance (Administrative Non-Compliance)	<p>Notify NSW Office of Environment and Heritage (OEH) of the disturbance to two (2) AHIMS and the results of the investigation into the disturbance of AHIMS sites. Revise the Aboriginal Heritage Management Plan to include the requirement to notify the OEH with respect to incidents relating to Aboriginal Heritage at the site.</p> <p>DPE was notified by HVCC/Glencore of the disturbance and results of investigation.</p>	<p>At the time of discovery, Integra Underground formed the view that DPE was the appropriate regulator to notify. This view was formed by following the notification requirements in the Integra Underground Aboriginal Heritage Management Plan (AHMP). Integra Underground did not consider Schedule 5 Condition 9 of Project Approval 08_0101 to be relevant in the circumstances. Integra Underground notified OEH of this matter on 16 February 2018 and provided all correspondence previously sent to DPE by Integra Underground.</p> <p>Revise AHMP to the requirement to notify the OEH with respect to incidents relating to Aboriginal Heritage at the site.</p>	<p>Complete</p> <p>Due 30 June 2018</p> <p>Complete. The AHMP was updated in June 2018</p>

Reference	Audit Finding	Recommendation	Proponent Response	Status
Sch 5, CoA 3 / PA 08_0101	Not Verified	<p>Management plans, monitoring programs, strategies, programs, protocols etc associated with activities during the care and maintenance phase of Integra Coal Complex/IUM were not available to the auditor as part of this audit (i.e. 2017 Independent Environmental Audit – Integra Underground).</p> <p>Where required, the auditor has relied on the following information sources to undertake compliance assessments for audit items during the care and maintenance phase (i.e. 5 December 2014 to 26 February 2017):</p> <ul style="list-style-type: none"> • Annual Review 2014 • Annual Review 2015 • Annual Review 2016 • EPL (3390) Annual Return 31 August 2014 to 30 August 2015 • EPL (3390) Annual Return 18 December 2015 to 30 August 2016 • EPL (3390) Annual Return 31 August 2016 to 30 August 2017. <p>No further action recommended.</p>	No action required.	Not applicable

Reference	Audit Finding	Recommendation	Proponent Response	Status
Sch 5, CoA 6(c) / PA 08_0101	Not Verified	<p>The auditor sighted the previous audit covering the period 03 December 2011 to 4 December 2014, titled "Independent Audit of the Integra Mine Complex" prepared by R.W. Corkery & Co. Pty. Limited, dated March 2015 (Ref No. 796/19). The 2011-2014 Audit covered the Integra Mine Complex, which included both open cut and underground mining operations and was undertaken when Vale was the mine operator.</p> <p>The previous audit report is dated March 2015. The auditor is unable to assess if the required review and if triggered, revisions of management plans (in place at the time) was undertaken.</p> <p>No further action recommended.</p>	No action required.	Not applicable
Sch 5, CoA 13 / PA 08_0101	Non-Compliance (Administrative Non-Compliance)	<p>The previous IEA (2014, for Vale) was submitted later than the 12 weeks' timeframe.</p> <p>No further action recommended.</p>	No action required.	Not applicable
Sch 5, CoA 14(a) / PA 08_0101	Non-Compliance (Administrative Non-Compliance)	Ensure that the previous EAs for the project as listed in Appendix 2 (of PA 08_0101) are made available via the project's web site.	<p>The previous EAs for the project are available on the Integra Underground public website.</p> <p>http://www.glencore.com.au/en/who-we-are/energy-products/integra/ems/Pages/approvals-licenses.aspx</p>	Complete

Reference	Audit Finding	Recommendation	Proponent Response	Status
Appendix 5, CoA 5 / PA 08_0101	Non-Compliance (Low)	Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the Glendell weather station (as per condition 16 of schedule 3). Amend future Environmental Noise Monitoring Reports to address this requirement.	Attended noise monitoring will determine meteorological conditions in accordance with the requirements of Appendix 5 Condition 5 of Project Approval 08_0101 and include this methodology in the monitoring reports.	Due 30 June 2018. Complete. This has been implemented for all noise monitoring reports following the Independent Environmental Audit.
4(a) / CL 382, ML 1437, ML 1518, ML 1525, ML 1551 and ML 1676	Non-Compliance (Administrative Non-Compliance)	The 2014 Annual Review prepared by the previous mine operator (Vale) did not include a specific compliance statement with respect to relevant Coal Lease and Mining Leases. No further action recommended.	No action required.	Not applicable
4(d)ii / CL382, ML 1437, ML 1518 ML 1525, ML 1551 and ML 1676	Not Verified	The Auditor did not sight evidence that would indicate that the previous tenement holder submitted an Annual Review with the transfer applications for the Coal Lease and Mining Leases. No further action recommended.	No action required.	Not applicable
Sch 2, CoA 14(b) / PA 08_0101	Improvement Opportunity	IUM to review activities associated with the oil-water separator at the portal service area with the aim of ensuring that the oil-water separator returns to normal operations	The oil-water separator has returned to normal operations. This improvement opportunity was identified during the site inspection component of the audit and investigated with relevant site personnel at the time.	Complete

Reference	Audit Finding	Recommendation	Proponent Response	Status
Sch 3, CoA 2 / PA 08_0101	Improvement Opportunity	The Statement of Compliance within Environmental Noise Monitoring Reports could be improved by identifying the applicable CoAs that relate to noise criteria and providing a comment against each as to whether compliance was determined based on the noise monitoring results and operator observations during attended monitoring.	<i>Table A3.1 Summary of Attended Noise Monitoring</i> in each Environmental Noise Monitoring Report includes the applicable criteria and states whether compliance was determined at each monitoring location based on the noise monitoring results and operator observations during attended monitoring.	Complete
Sch 3, CoA 8(a) / PA 08_0101	Improvement Opportunity	Undertake annual sound power level testing of plant/equipment in accordance with approved Noise Management Plan.	Sound power level testing was undertaken in January 2018.	Complete
Statement of Commitments (Greenhouse Gases) / PA 08_0101	Improvement Opportunity	Include details of methane (i.e. tonnages) provided to Glennies Creek Power Station as part of Annual Reviews. This information was provided for the 2014 and 2015 Annual Reviews.	Details of the gas provided to the Glennies Creek Power Station will be provided in the 2018 Annual Review and future Annual Reviews.	Due 31 March 2019. Complete. Details reported in 2018 and 2019 Annual Review as t CO ₂ -e.
Statement of Commitments (Socio Economic) / PA 08_0101	Improvement Opportunity	Identify parameters/metrics that can be monitored through the project life cycle to measure positive and negative social impacts e.g. employment statistics with breakdown, local/regional \$ spend, training \$ spend on workforce, apprenticeship support, pre-mine closure workforce support redundancies, lay-offs etc. This type of data may already be collected by other departments within IUM.	Glencore currently measures parameters of positive and negative social impacts, including: <ul style="list-style-type: none"> • Financial contributions to training and employment • Financial spend to local/ regional areas • Direct financial contributions to the community organisations <p>Further, Glencore undertakes regular surveys of communities in which Glencore operates, including Singleton LGA.</p>	Complete

Reference	Audit Finding	Recommendation	Proponent Response	Status
Response to DPE pre-audit consultation request to determine if monitored impacts on alluvial groundwater aquifers are consistent with the predicted impacts in the environmental assessment.	Groundwater Expert Recommendation	It is recommended that a technical assessment be undertaken of groundwater at GCP11 and GCP9 to assess historical and current groundwater levels against rainfall data and mining data (i.e. relevant longwall start and completion dates) so as to better understand the context and potential causes of groundwater level declines noted at these two locations.	Groundwater monitoring at GCP9 and GCP11 is undertaken in accordance with the Integra Underground Water Management Plan. A technical assessment of groundwater monitoring locations GCP9 and GCP11 will be undertaken to better understand the context and potential causes of groundwater level declines noted at these two locations.	Due 31 December 2018. Complete. This technical assessment was completed in 2018.
Response to DPE pre-audit consultation request to determine if subsidence impacts resulting from variable geotechnical conditions and reduced longwall panel lengths have resulted in changed hydrological connectivity between groundwater aquifers and the mine.	Groundwater Expert Recommendation	Of the recommendations made by the IEA Groundwater Expert, it is the opinion of the Auditor that a technical assessment of monitored mine water make associated with underground operations compared to groundwater / piezometric levels (alluvium and coal measures) and rainfall be undertaken in the first instance. This would assist in determining if the following two IEA Groundwater Expert recommendations need to be implemented: <ul style="list-style-type: none"> • Water chemistry and/or isotopes monitoring associated with the mine water, and which can be assessed and compared to water chemistry from overlying aquifers. • Long-term data from additional piezometers and vibrating wire piezometers. Only one vibrating wire array is operational (DDH224). The network would ideally have been needed to be established prior to mining in proximity to the network, to capture baseline data as well as any change as a result of mining. 	Groundwater monitoring is undertaken in accordance with the Integra Underground Water Management Plan. This includes monitoring of water chemistry. A technical assessment of the monitored mine water make associated with underground operations, compared to groundwater levels and rainfall, will be undertaken.	Due 31 December 2018. Complete. This technical assessment was completed in 2018.

Reference	Audit Finding	Recommendation	Proponent Response	Status
Response to DPE pre-audit consultation request to determine if monitored impacts on groundwater dependent ecosystems (GDEs) are consistent with the predictions in the environmental assessment.	Biodiversity Expert Recommendation	<p>The Biodiversity Management Plan currently only monitors the IUM project's potential impacts on terrestrial vegetation types not representative of any GDEs despite Section 1.2 (Purpose and Objectives) of the Biodiversity Management Plan stating "provide a series of mitigation measures to minimise impact to threatened species, including groundwater dependent ecosystems (GDEs)". The biodiversity management plan monitoring could therefore be improved by the incorporation of additional monitoring sites within the GDE vegetation types along Bettys, Main and/or Glennies Creek.</p> <p>It is recommended future annual reporting (i.e. annual reviews) includes specific GDE assessment regarding the monitoring results relevance to impact on GDEs.</p>	<p>As stated by the Biodiversity Expert, the project impacts on GDEs are currently in accordance with those assessed within the EA.</p> <p>To improve clarity of the monitoring of GDEs in future, the monitoring program within the Biodiversity Management Plan will be revised in relation to GDE vegetation types along Bettys, Main and/or Glennies Creek.</p> <p>The reporting of monitoring results will be undertaken in Annual Reviews in accordance with Schedule 5 Condition 11 of Project Approval 08_0101.</p>	<p>Due 30 June 2018. Complete. The BMP was revised in June 2018.</p> <p>Due 31 March 2019. Complete. Reported in the 2018 and 2019 Annual Reviews</p>
Response to SA NSW pre-audit consultation advice that as of 1 January 2017, the Coal Mine Subsidence Compensation Act 2017 will be enacted.	Opportunity for Improvement	HVCC (Glencore) to undertake a review of this pending legislative change and determine its likely effect on the operations.	Integra Underground (HVCC) has been included in a review undertaken by Glencore.	Complete

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