



## **ATTACHMENT 10**

Summary of Mitigation Measures

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## A10 SUMMARY OF MITIGATION MEASURES

In accordance with the Secretary's Environmental Assessment Requirements (SEARs), Attachment 10 provides a consolidated summary of Illawarra Coal Holdings Pty Ltd's (Illawarra Metallurgical Coal [IMC's]) commitments in relation to mitigation, management and monitoring activities for the Dendrobium Mine Extension Project (the Project).

References to Sections 1 to 10 in this Attachment are references to Sections in the Main Report of the Environmental Impact Statement (EIS).

References to Appendices A to S in this Attachment are references to Appendices of the EIS. Internal references within this Attachment are prefixed with "A10".

### A10.1 PROJECT ENVIRONMENTAL MANAGEMENT

Section 7 outlines proposed environmental mitigation, adaptive management, monitoring and offset measures for the Project.

These measures have been developed in consideration of key stakeholder feedback, previous experience at the Dendrobium Mine and expert specialist input to the EIS, and represent industry best practice feasible mitigation measures.

These include measures relating to subsidence, groundwater, surface water, land resources, terrestrial ecology, noise, air quality, visual character, Aboriginal cultural heritage, historic heritage, road transport, economic effects, social impact, greenhouse gas emissions and hazards.

Attachment 9 of the EIS describes the approach to rehabilitation, and how surface disturbance areas (including those disturbed by Project subsidence impacts) would be rehabilitated and remediated for the Project. The Biodiversity Offset Strategy for the Project is described in Section 7.

The approved Dendrobium Mine operates in accordance with an Environmental Management Strategy (EMS), which comprises a number of monitoring and management plans for underground and surface operations. These existing monitoring and management plans will be reviewed accordingly to address the Project activities.

Subsidence performance measures and mining constraints will be detailed in Extraction Plans for the Project, along with monitoring, mitigation, adaptive management and contingency measures.

Table A10-1 presents a proposed list of management plans for the Project. Management plans relating to potential impacts associated with underground operations will be included as part of Extraction Plans for the Project and will be progressively updated as mining progresses.

It is recognised that changes to the Project environmental mitigation, adaptive management, monitoring and reporting proposed in the EIS may be considered necessary during further consultation with Government agencies in the assessment and approval process of the Project, as well as incorporating adaptive management for the Extraction Plans for the Project.

Project environmental mitigation, adaptive management, monitoring and reporting will be conducted in accordance with the finalised Infrastructure Approval conditions and associated licences and approvals, with the final monitoring details (locations, parameters and frequencies) to be provided in the relevant management plans and monitoring programs for the Project.

### A10.2 KEY SPECIFIC ENVIRONMENTAL MITIGATION MEASURES

#### A10.2.1 Mine Design in Consideration of the Previous Application

IMC has reviewed the mine plan from the previous application and has adopted a significantly different mine design for the Project that:

- avoids mining beneath significant features (identified by IMC) that may be susceptible to subsidence;
- considers previous mining experience in Dendrobium Mine Area 3B; and
- responds to key stakeholder feedback (including the advice received from the Independent Planning Commission and the Independent Advisory Panel for Underground Mining on the previous application).

IMC has identified a number of key natural and built features in the vicinity of Consolidated Coal Lease (CCL) 768 that may be susceptible to subsidence impacts. These features would *not* be mined beneath and the Project has incorporated minimum setbacks from these features.

**Table A10-1**  
**Summary of Project Management, Monitoring and Reporting**

<b>Proposed Management, Monitoring and Reporting</b>	<b>Key EIS Sections and Appendices</b>
<b>Mining Area – Plan that may be Incorporated into Extraction Plans</b>	
Water Management Plan	Sections 7.5 and 7.6 and Appendices B and C
Watercourse Impact Monitoring, Management and Contingency Plan	Section 7.7
Swamp Impact Monitoring, Management and Contingency Plan	Section 7.8 and Appendix D
Biodiversity Management Plan	Sections 7.3, 7.7, 7.8 and 7.9 and Appendices A, D and E
Aboriginal Heritage Management Plan (AHMP)	Section 7.10 and Appendix F
WaterNSW Asset Management	Section 7.3
Monitoring, Management and Contingency Plans: <ul style="list-style-type: none"> <li>• Landscape.</li> <li>• Terrestrial Flora and Fauna.</li> <li>• Ecology.</li> </ul>	Sections 7.3 and 7.7 to 7.9
<b>Operations</b>	
Noise Management Plan	Section 7.13 to 7.16 and Appendix J
Air Quality and Greenhouse Gas Management Plan	Section 7.17 and Appendix I
Water Management Plan: <ul style="list-style-type: none"> <li>• Surface Water Monitoring Program.</li> <li>• Site Water Balance.</li> <li>• Surface and Groundwater Response Plan.</li> <li>• Erosion and Sediment Control Plan.</li> <li>• Permeate Discharge and Transfer Control and Monitoring Plan.</li> </ul>	Sections 7.5 and 7.6 and Appendices B and C
Rehabilitation Management Plan (previously referred to as a Landscape Management Plan or a Mining Operations Plan)	Attachment 9
Mine Closure Plan	Attachment 9
Bushfire Management Plan	Section 7.9 and Appendix D
Traffic Management Plan	Section 7.12 and Appendix H
Lighting Management Plan	Section 7.18
Waste Management Plan	Section 4.11
Conservation Management Plan	Section 7.11 and Appendix G
Pollution Incident Response Management Plan	Section 7.4
Koala Plan of Management	Appendix D
Biodiversity Offset Strategy	Sections 7.3, 7.7, 7.8 and 7.9 and Appendices A, D and E
Social Impact Management Plan	Section 7.20 and Appendix K
<b>Reporting Requirements</b>	
Annual Review	Section 6.4
Greenhouse Gas Reporting	Section 7.21
Dendrobium Community Consultative Committee (DCCC)	Section 6.4
Complaints Register	Section 6.4



The re-designed mine plan for the Project reduces the overall footprint by approximately 60 per cent (%), thereby reducing potential impacts (compared to the previous application) through:

- no predicted connective fracturing from the seam-to-surface when calculated using the Tammetta Equation;
- no longwall mining beneath 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> order (or above) streams;
- avoidance of longwall mining beneath identified key stream features (setback of 50 metres [m] when longwall mining will occur on one side of the “key stream feature” or 100 m when longwall mining will occur on more than one side);
- no longwall mining beneath previously identified high archaeological (scientific) significance Aboriginal heritage sites;
- longwall mining distance of at least 400 m from named watercourses (i.e. the Avon River, Cordeaux River and Donalds Castle Creek);
- minimum longwall mining setback distance of 300 m from the Full Supply Level (FSL) (i.e. maximum operating water level) of the Avon Dam;
- minimum longwall mining setback distance of 1,000 m from dam walls;
- avoidance of the “Area 4” swamp cluster; and
- minimisation of surface disturbance through use of existing infrastructure (namely the Dendrobium Pit Top, Kemira Valley Coal Loading Facility, Kemira Valley Rail Line, Dendrobium Coal Preparation Plant [CPP], No 1 Shaft, No 2 and 3 Shafts and the West Cliff Stage 3 Coal Wash Emplacement Area).

Final Project longwall layouts would be subject to review and approval as a component of future Extraction Plans developed in consultation with the relevant authorities and to the satisfaction of the Secretary of the Department of Planning and Environment (DPE).

#### A10.2.2 Key Environmental Management Measures

Key environmental mitigation measures and commitments to be implemented for the Project include:

- management of potential Project subsidence impacts and associated consequences to natural and built features, which will be included in Extraction Plans for the Project;
- offsets for predicted surface water losses from the Metropolitan Special Areas during and post-mining to result in a net benefit to Sydney’s drinking water supply (consistent with the agreement with Government for the previous application);
- appropriate licensing of water take (i.e. groundwater and surface water);
- funding of water quality improvement actions;
- biodiversity offsets for upland swamps and other listed threatened species and communities, consistent with Government policy; and
- reduction of Project Scopes 1 and 2 emissions as far as practicable, consistent with South32’s company-wide Climate Change Strategy, which was prepared in consideration of the *Paris Agreement*.

The key environmental management measures and commitments are described below in Tables A10-2 and A10-3, with reference to relevant sections of this EIS, where further detail is available.

The supporting studies to the EIS have been prepared by qualified experts in their relevant fields, who have developed a suite of mitigation and management measures. Mitigation and management measures for the Project are, therefore, considered industry-best practice.

#### A10.2.3 Adaptive Management

A summary of adaptive management measures for the Project is provided in Table A10-4.

**Table A10-2**  
**Summary of Mitigation Measures**

<b>Key Environmental Management Measures</b>	
<b>Subsidence</b> – Section 7.3 describes the subsidence mitigation and management measures. Key components of the proposed Project subsidence mitigation and management measures are described below.	
<b>Named Streams, Drainage Lines and Mapped Stream Features</b>	
<i>Avoidance</i>	<ul style="list-style-type: none"> <li>The longwall layout proposed for the Project does not directly mine beneath any 3<sup>rd</sup> order or above streams and has been designed by IMC to avoid directly mining beneath mapped key stream features to minimise the likelihood that the stream feature will be physically damaged by subsidence impacts.</li> </ul>
<i>Mitigation, Management and Remediation</i>	<ul style="list-style-type: none"> <li>Potential stream mitigation and remediation measures have been developed in consideration of previous mining experience in the Southern Coalfield and are discussed in Section 7.6.4.</li> <li>If physical damage to named streams and key stream features occurs due to the Project as a result of subsidence impacts, remediation techniques would be implemented to repair the damage, where practicable. Current mitigation and remediation methods for subsidence impacts on streams at the Dendrobium Mine are described within the <i>Dendrobium Area 3B Watercourse Impact, Monitoring, Management and Contingency Plan</i> (WIMMCP) (IMC, 2020a) (Attachment 9).</li> <li>The WIMMCP would be reviewed and updated accordingly for the Project, and it is proposed that similar remediation methods would be implemented for the Project as required, incorporating any learnings and experience from existing operations using an adaptive management approach (Attachment 9).</li> </ul>
<b>Cliffs, Rock Outcrops and Steep Slopes</b>	
<i>Mitigation, Management and Remediation</i>	<ul style="list-style-type: none"> <li>The mitigation, management and monitoring measures developed to manage potential subsidence impacts to cliffs, rock outcrops and steep slopes for the Project would be included as a component of future Extraction Plans for the Project.</li> <li>Remediation measures may be required for the Project to manage any potential subsidence impacts to rock outcrops and steep slopes, and if required, would include: <ul style="list-style-type: none"> <li>infilling of surface cracks with soil or other suitable materials;</li> <li>regrading and recompacting of the surface; and;</li> <li>implementation of erosion protection measures, such as planting of additional vegetation, where appropriate.</li> </ul> </li> </ul>
<b>State Conservation Areas</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>While a small portion of CCL 768 underlies the Upper Nepean State Conservation Area, there would be no longwall mining beneath the State Conservation Area for the Project.</li> </ul>
<b>Railway Infrastructure</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>IMC would undertake periodic visual inspections of the disused Maldon-Dombarton Railway Corridor during active subsidence and remediate any larger surface cracking if this were to occur as a result of the Project (Appendix A).</li> <li>If the railway were to be completed prior to active subsidence at the Project, a management plan for the Project, in consultation with the Australian Rail Track Corporation (ARTC) and Transport Asset Holding Entity, would be developed to manage subsidence impacts on the Maldon-Dombarton Rail Corridor.</li> </ul>

**Table A10-2**  
**Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Subsidence (Continued)</b> – Section 7.3 describes the subsidence mitigation and management measures. Key components of the proposed Project subsidence mitigation and management measures are described below.	
	<ul style="list-style-type: none"> <li>Any future track and associated infrastructure could be managed using strategies similar to those adopted for the Main Southern Railway at Appin and Tahmoor Collieries. The management strategies could include the installation of rail expansion switches and real-time rail stress monitoring during active subsidence (Appendix A).</li> </ul>
<b>Unsealed Roads and Tracks</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>Monitoring and maintenance of the unsealed roads and access tracks (e.g. fire trails) would be detailed in future Extraction Plans. It is anticipated that any subsidence-related impacts would be remediated in accordance with existing management strategies implemented at the Dendrobium Mine.</li> </ul>
<b>Water Supply Infrastructure</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>The longwall layout proposed for the Project has been designed by IMC to reflect the adoption of a number of longwall mine constraints to minimise potential impacts to WaterNSW infrastructure, with the Avon Dam wall located at a minimum 1,000 m from the Project longwalls (Section 4.5.3).</li> <li>IMC commits to achieving subsidence performance measures such that the safety and serviceability of the Avon Dam wall is always maintained.</li> <li>IMC would develop mitigation, management and monitoring measures for potential subsidence impacts to the Avon Dam and associated dam wall. These strategies may include the development of a detailed monitoring program and Trigger Action Response Plan (TARP). IMC's existing WaterNSW Asset Management Plan would, as relevant, be reviewed and revised for the Project.</li> <li>The development of TARPs and triggers would be informed by a risk assessment undertaken during the preparation of Extraction Plans, which would include input from an appropriately qualified Dams Engineer.</li> <li>IMC would comply with any Dams Safety NSW requirements or conditions relating to mining within the Avon Dam Notification Area for the Project.</li> </ul>
<b>Survey Control Marks</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>Survey control marks that are required for future use will be re-established after the completion of the proposed longwalls and after the ground has stabilised. This would be carried out in consultation with NSW Spatial Services.</li> </ul>
<b>Land Resources and Land Uses</b> – Section 7.4 describes the land resource and land use related mitigation and management measures. Key components of the proposed Project land resource and land use related mitigation and management measures are described below.	
<b>Land Use</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>Management measures to reduce the potential impacts of subsidence on built infrastructure are provided in Section 7.3.4 and described above.</li> <li>Surface works in the Metropolitan Special Area would be undertaken in consultation with WaterNSW and in accordance with existing Dendrobium Mine procedures, to avoid any significant adverse impacts on existing land use in the Metropolitan Special Area. Access to the Metropolitan Special Area would also continue to be undertaken in accordance with WaterNSW requirements.</li> </ul>

**Table A10-2**  
**Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Land Resources and Land Uses (Continued)</b> – Section 7.4 describes the land resource and land use related mitigation and management measures. Key components of the proposed Project land resource and land use related mitigation and management measures are described below.	
	<ul style="list-style-type: none"> <li>• Management and adaptive management measures with respect to potential impacts of the Project on surface water, aquatic ecology, upland swamps and terrestrial ecology within the Project area are provided in Sections 7.6 to 7.9, respectively.</li> <li>• Attachment 9 describes the rehabilitation principles for Project land disturbance areas, including those within the Metropolitan Special Area.</li> </ul>
<b>Soil and Erosion</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>• Erosion and sediment control strategies for the Project would be based on similar practices currently undertaken as part of the existing Erosion and Sediment Control Plan (part of the existing Water Management Plan) for the Dendrobium Mine, which would be reviewed and updated for the Project.</li> <li>• Mitigation measures to control erosion and sediment migration would include: <ul style="list-style-type: none"> <li>– minimising disturbance of land;</li> <li>– use of sediment retention storages to contain and treat runoff from surface facilities, where appropriate (e.g. sediment dams and Dendrobium Pit Top treatment plant);</li> <li>– installation of a dewatering borehole at the proposed ventilation shaft site to transfer site surface water to the underground workings and avoid surface discharges;</li> <li>– rehabilitation and revegetation of surface disturbance areas after the completion of construction works;</li> <li>– track rehabilitation works; and</li> <li>– installation of sediment traps and pits.</li> </ul> </li> <li>• Specific erosion and sediment control works and additional minor controls would be developed in consultation with WaterNSW as required over the Project life within the Metropolitan Special Area.</li> </ul>
<b>Land Contamination</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>• Measures to reduce the potential for contamination of land by the Project would be based on accepted practices currently undertaken at the Dendrobium Mine and would be further documented in relevant management plans for the Project.</li> <li>• General measures to reduce the potential for contamination of land include the following: <ul style="list-style-type: none"> <li>– the transportation, handling and storage of all dangerous goods for the Project would be undertaken in accordance with the requirements of the NSW <i>Work Health and Safety Regulation 2017</i> (or its latest version);</li> <li>– on-site fuel and lubricant storage areas would be designed with appropriate bunding;</li> <li>– emergency response procedures, would be enacted or required under the Dendrobium <i>Pollution Incident Response Management Plan</i> (IMC, 2021a), which would be updated for the Project as required; and</li> </ul> </li> </ul>



**Table A10-2**  
**Summary of Mitigation Measures (Continued)**

Key Environmental Management Measures	
<b>Land Resources and Land Uses (Continued)</b> – Section 7.4 describes the land resource and land use related mitigation and management measures. Key components of the proposed Project land resource and land use related mitigation and management measures are described below.	
	<ul style="list-style-type: none"> <li>– fuel and explosive storage areas would be regularly inspected and maintained.</li> <li>• Prior to commencing any potential works on the historical structures at the Dendrobium Pit Top, a hazardous materials survey would be undertaken to assess the potential for lead paints and asbestos-containing material within building structures to allow management/removal actions to be appropriately implemented.</li> <li>• Additional mitigation and management measures would be implemented during activities such as surface development works to reduce the potential for land contamination in the Metropolitan Special Areas in consultation with WaterNSW, where appropriate.</li> </ul>
<b>Groundwater</b> – Section 7.5 describes the groundwater mitigation and management measures. Key components of the proposed Project groundwater mitigation and management measures are described below.	
Water Licensing	<ul style="list-style-type: none"> <li>• Any additional licences required under the <i>Water Management Act 2000</i> for the Project would be sought and obtained in consultation with the Department of Planning and the Environment – Water (DPE-Water).</li> </ul>
Mitigation	<p><u>Predicted Surface Water Losses</u></p> <ul style="list-style-type: none"> <li>• IMC would provide offsets for predicted surface water losses.</li> <li>• IMC would seek to enter into a similar planning agreement to the previous application with the NSW Government to offset water quantity and quality impacts during and post-mining for the Project. The terms of the proposed planning agreement were outlined in the draft conditions of consent for the previous application and included: <ul style="list-style-type: none"> <li>– during mining – annual payments based on actual surface water loss taken (as modelled or estimated annually) due to the Project for each water year (annual payments priced at the actual IPART retail price for that water year and varied over time to reflect inflation and drought/non-drought year prices); and</li> <li>– post-mining – up-front payment made upon approval of the first Extraction Plan for the Project to account for predicted post-mining surface water losses (value of payment based on the present value of modelled post-mining losses and Independent Pricing and Regulatory Tribunal prices).</li> </ul> </li> <li>• IMC would also investigate the potential to divert a proportion of Project excess mine water to third-party industrial facilities for beneficial use; however, any such opportunities do not form part of the Project, and would be reliant on third party agreement and separate approval.</li> </ul>
Monitoring	<p><u>Groundwater Inflow</u></p> <ul style="list-style-type: none"> <li>• The continuous monitoring that supports the calculation of groundwater inflow to Dendrobium Mine would continue for the Project.</li> <li>• Analysis of water reporting to mine workings (e.g. water quality “finger-printing”) in Area 5 would also be conducted to inform the source of this water (e.g. overburden, surface water or upward flow from the underlying strata).</li> </ul> <p><u>Groundwater Levels</u></p> <ul style="list-style-type: none"> <li>• The extensive groundwater monitoring network currently in place at Area 5 would be continued for the Project. This includes monitoring of groundwater levels in the deep and shallow strata.</li> </ul>

**Table A10-2**  
**Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Groundwater (Continued)</b> – Section 7.5 describes the groundwater mitigation and management measures. Key components of the proposed Project groundwater mitigation and management measures are described below.	
	<ul style="list-style-type: none"> <li>Should the Project be approved, further review of the monitoring network would be conducted, including consideration of the IEPMC (2019) recommendations regarding the period of baseline data.</li> </ul>
	<u>Groundwater Quality</u> <ul style="list-style-type: none"> <li>Water quality sampling would be conducted for the Project, targeting electrical conductivity (EC) and pH (to confirm beneficial use categories) and tritium and other tracers (as indicators of the presence of modern water).</li> </ul>
<i>Model Review</i>	<u>Hydraulic Property Testing</u> <ul style="list-style-type: none"> <li>Hydraulic property testing would continue at Dendrobium Mine and for the Project, including permeability testing above longwalls prior, to and following, the completion of mining.</li> </ul>
	<u>Geological Feature Investigation</u> <ul style="list-style-type: none"> <li>The identification of geological structures has been undertaken using published data and surface-based exploration including boreholes, 2D seismic surveys and aerial magnetic surveys. These techniques identify the locations of geological structures, but do not necessarily identify their hydraulic characteristics.</li> <li>As per the recommendations of PSM (2022), exploration activities would be undertaken during mining (i.e. post-approval) to identify potential geological structures and their hydraulic characteristics (particularly those between the longwall areas and the reservoirs).</li> <li>Further surface-based exploration would also be undertaken along the FSLs of the Avon Dam and around the dam wall structures (Appendix P).</li> <li>Geological structures would be included in the IMC geological model as they are identified.</li> </ul>
	<u>Model Updates</u> <ul style="list-style-type: none"> <li>The groundwater model would be progressively updated over the life of the Project to account for additional monitoring data, hydraulic property testing and investigations into geological structures. Based on recent experience, this would generally conform with the schedule of Extraction Plans or Subsidence Management Plans.</li> </ul>
<b>Surface Water</b> – Section 7.6 describes the surface water mitigation and management measures. Key components of the proposed Project surface water mitigation and management measures are described below.	
<i>Management Measures</i>	<ul style="list-style-type: none"> <li>The existing and approved water management systems at the Dendrobium Mine would continue to be used for the Project.</li> <li>Additional surface water management requirements for the Project would include: <ul style="list-style-type: none"> <li>implementation of appropriate erosion and sediment controls associated with ancillary infrastructure, including the ETL and water supply infrastructure;</li> <li>management of surface runoff associated with Shaft Site No. 5A through the implementation of sediment dams and a site dewatering borehole; and</li> </ul> </li> </ul>

**Table A10-2  
Summary of Mitigation Measures (Continued)**

Key Environmental Management Measures	
<b>Surface Water (Continued)</b> – Section 7.6 describes the surface water mitigation and management measures. Key components of the proposed Project surface water mitigation and management measures are described below.	
	<ul style="list-style-type: none"> <li>– management of increased groundwater inflows to the underground mine workings, including the upgrade, replacement or duplication of the existing excess water pipeline following the Kemira Valley Rail Line to LDP5, if required.</li> </ul>
Mitigation Measures	<p><u>Surface Water Flows</u></p> <ul style="list-style-type: none"> <li>• Section 7.5.4 describes proposed mitigation measures for the negligible predicted reductions in catchment yields due to the Project (i.e. planning agreement with NSW Government to offset water quality during and post-mining to achieve a “net beneficial” effect to Sydney’s drinking water supplies). This would be in addition to appropriate licensing of predicted water take under the <i>Water Management Act 2000</i>.</li> </ul> <hr/> <p><u>Water Quality</u></p> <ul style="list-style-type: none"> <li>• Although the potential impacts on water quality as a result of the subsidence-related impacts from the Project are predicted to be localised and temporary, and notwithstanding the declaration of the Project as State Significant Infrastructure, the SEARs require the Project to demonstrate that the carrying out of the proposed development could have a neutral or beneficial effect on water quality (i.e. the NorBE Test).</li> <li>• Project sediment controls for surface disturbance activities would be designed consistent with <i>Managing Urban Stormwater Soils and Construction – Volume 2E – Mines and Quarries</i> (Commonwealth Department of Environment and Climate Change [DECC], 2008).</li> <li>• Controlled releases via LDP5 would be monitored to confirm Environment Protection Licence (EPL) water quality objectives are being achieved.</li> <li>• Water quality improvement actions are proposed as part of the Project, consistent with those proposed by the NSW Government and agreed to by IMC for the previous application (as outlined in the draft conditions of consent for the previous application).</li> <li>• These actions would provide offsets for the potential localised effects associated with subsidence-related impacts (e.g. pulses of iron and manganese) and demonstrate the Project would have a net neutral or beneficial effect on water quality.</li> <li>• These actions for the Project would be additional to those already proposed and funded by WaterNSW and would target reduced sedimentation in the Special Catchment Areas, and would include: <ol style="list-style-type: none"> <li>1. Transfer of 20 hectares (ha) of IMC-owned land within the Metropolitan Special Area to WaterNSW. <ul style="list-style-type: none"> <li>– This would enable WaterNSW to manage and protect this land in accordance with the Special Areas Strategic Plan of Management 2015, which does not cover privately-owned land in the Special Catchment Areas.</li> <li>– For example, access restrictions could be imposed on land transferred from IMC to WaterNSW, as access restrictions do not apply to privately-owned land in the Special Catchment Areas (WaterNSW and Office of Environment and Heritage [OEHL], 2015).</li> </ul> </li> </ol> </li> </ul>

**Table A10-2  
Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Surface Water (Continued)</b> – Section 7.6 describes the surface water mitigation and management measures. Key components of the proposed Project surface water mitigation and management measures are described below.	
	<p>2. Funding (to WaterNSW) to assist with implementation of water quality improvement works within the Special Catchment Areas, including:</p> <ul style="list-style-type: none"> <li>– fire management measures (e.g. slashing for fire breaks, hazard reduction burns) – up to \$371,500;</li> <li>– maintenance of unsealed road network – up to \$146,000; and</li> <li>– installation and maintenance of barriers and fences – up to \$100,000.</li> </ul> <ul style="list-style-type: none"> <li>• The additional works proposed for the Project would complement those planned by WaterNSW and undertaken annually</li> </ul>
<i>Remediation</i>	<ul style="list-style-type: none"> <li>• Where monitoring indicates that subsidence-related impacts have occurred to key stream features (i.e. named watercourses and key stream features), IMC would implement remediation measures to mitigate physical damage to the streams where it is practicable to do so.</li> <li>• An example of where it may not be practicable to implement remediation is where the works themselves may cause greater environmental impacts than the subsidence-related impact (e.g. if clearance is required to provide access for materials and equipment to the remediation site).</li> <li>• Attachment 9 provides details of techniques that have been successfully used to remediate subsidence-related impacts to streams.</li> </ul>
<i>Monitoring</i>	<ul style="list-style-type: none"> <li>• Surface water monitoring of water management systems would be undertaken in accordance with EPL 3241 for the Dendrobium Mine (and any other EPL required for the Project) targeting discharge locations and key water storages.</li> <li>• Hydro Engineering and Consulting Pty Ltd (2022) has provided recommendations for ongoing and additional surface water monitoring for the Project, which are summarised below. <ul style="list-style-type: none"> <li>– Flow Rates: <ul style="list-style-type: none"> <li>○ The existing Area 5 gauging station network would be expanded and augmented.</li> <li>○ The gauging stations would target low flow accuracy of <math>\pm 0.0025</math> megalitres per day (ML/day) resolution and <math>\pm 10\%</math> accuracy over the flow range 0.01 to 10 ML/day.</li> <li>○ Manual flow gauging would also be conducted to verify flow rating curves.</li> </ul> </li> <li>– Pool Water Levels <ul style="list-style-type: none"> <li>○ Continuous pool level data would be collected on a selection of key stream features, plus control pools.</li> <li>○ Manual water level monitoring would also be conducted to verify the continuous monitoring.</li> </ul> </li> <li>– Water Quality <ul style="list-style-type: none"> <li>○ The existing water quality monitoring network for Area 5 would be continued and expanded for the Project.</li> <li>○ Water quality monitoring would also continue in existing surface water storages and at LDP5 to confirm compliance with EPL water quality objectives. Water quality monitoring would also be conducted in new water management storages required for the Project (e.g. at Shaft Site No. 5A).</li> </ul> </li> </ul> </li> </ul>

**Table A10-2  
Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Surface Water (Continued)</b> – Section 7.6 describes the surface water mitigation and management measures. Key components of the proposed Project surface water mitigation and management measures are described below.	
	<ul style="list-style-type: none"> <li>– Observational and Photographic Monitoring <ul style="list-style-type: none"> <li>○ Observations and photographs along streams (e.g. at key stream features) would be undertaken before, during and following mining to identify any visual signs of impacts due to subsidence (e.g. cracking, erosion, iron staining).</li> </ul> </li> <li>– Monitoring of Water Transfers <ul style="list-style-type: none"> <li>○ Monitoring of water transfers between the underground and surface water management systems would continue for the Project.</li> </ul> </li> </ul>
<i>Model Review</i>	<ul style="list-style-type: none"> <li>• The site water balance would be reviewed over the life of the Project in consideration of monitoring data (e.g. water transfers) and updated predictions from the groundwater model.</li> </ul>
<b>Biodiversity</b> – Sections 7.7 to 7.9 describe the biodiversity related mitigation and management measures. Key components of the proposed Project biodiversity mitigation and management measures are described below. Additional mitigation and management measures for terrestrial ecology are provided in Table A10-3.	
<i>Avoidance</i>	<ul style="list-style-type: none"> <li>• IMC has proposed a Project design that includes avoidance of key surface features, which would reduce potential impacts to aquatic habitat, upland swamps and terrestrial ecology.</li> <li>• IMC has re-designed the Project to significantly reduce the mine plan extent (compared to the previous application) which includes: <ul style="list-style-type: none"> <li>– minimum longwall mining setback distance of 1,000 m from dam walls;</li> <li>– minimum longwall mining setback distance of 300 m from the FSL of the Avon Dam;</li> <li>– no longwall mining beneath 3rd, 4th and 5th order (or above) streams;</li> <li>– longwall mining at a distance of at least 400 m from named watercourses (i.e. the Avon River, Cordeaux River, Donalds Castle Creek and Wongawilli Creek);</li> <li>– no longwall mining beneath identified key stream features;</li> <li>– no longwall mining beneath “Area 4” swamp cluster; and</li> <li>– use of existing infrastructure (namely the Dendrobium Pit Top, Kemira Valley Coal Loading Facility, Kemira Valley Rail Line, Dendrobium CPP, No 1 Shaft, No 2 and 3 Shafts and the West Cliff Stage 3 Coal Wash Emplacement Area), which would reduce the requirement for additional surface disturbance.</li> </ul> </li> </ul> <p><u>Aquatic Ecology</u></p> <ul style="list-style-type: none"> <li>• Mitigation measures for streams, as described in Section A10.2.6, would also reduce potential impacts to aquatic ecology habitat. This includes: <ul style="list-style-type: none"> <li>– erosion and sediment control strategies; and</li> <li>– remediation of physical damage to key stream features due to Project subsidence, where practicable.</li> </ul> </li> </ul>



**Table A10-2  
Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Biodiversity (Continued)</b> – Sections 7.7 to 7.9 describe the biodiversity related mitigation and management measures. Key components of the proposed Project biodiversity mitigation and management measures are described below. Additional mitigation and management measures for terrestrial ecology are provided in Table A10-3.	
	<ul style="list-style-type: none"> <li>Mitigation and management measures for the potential proposed pumping station at Cordeaux River would include installation of appropriately sized mesh screening at the pump inlet to reduce potential impacts to aquatic species, and installation of erosion and sediment controls.</li> </ul>
	<p><u>Upland Swamps</u></p> <ul style="list-style-type: none"> <li>The Project has considered various measures to avoid and mitigate potential impacts to upland swamps, including the avoidance of direct disturbance of Coastal Upland Swamps threatened ecological communities (TECs) through the design of surface infrastructure locations that avoid upland swamps.</li> <li>Residual predicted impacts to upland swamps would be offset via the Project Biodiversity Offset Strategy, developed consistent with NSW and Commonwealth Government policy. This includes offsets for potential subsidence impacts to TECs associated with upland swamps, as well as offsets for threatened fauna species for which the upland swamps provide habitat.</li> <li>Current mitigation and remediation measures for subsidence impacts on upland swamps at the approved Dendrobium Mine are described within the SIMMCP (IMC, 2020b).</li> </ul>
	<p><u>Terrestrial Ecology</u></p> <ul style="list-style-type: none"> <li>Measures to mitigate impacts from the Project are outlined in detail in Table A10-3. IMC would implement other measures that are relevant to reducing potential indirect impacts on biodiversity, such as groundwater, surface water, noise and air quality.</li> <li>Prior to causing any subsidence, IMC would be required to prepare and submit an Extraction Plan for approval by the DPE. The Extraction Plans would include a Biodiversity Management Plan that would provide a detailed plan to monitor and mitigate any potential impacts to biodiversity due to subsidence.</li> </ul>
	<p><u>Project Biodiversity Offset Strategy</u></p> <ul style="list-style-type: none"> <li>The Biodiversity Offset Strategy has been developed to address the potential residual impacts on biodiversity values associated with the Project in accordance with the offset rules under the NSW Biodiversity Offsets Scheme (as required by the SEARs for the Project). The sub-sections below describe how the Biodiversity Offset Strategy addresses both Commonwealth and NSW biodiversity offset requirements.</li> </ul>
<b>Aboriginal Heritage</b> – Section 7.10 describes the Aboriginal heritage mitigation and management measures. Key components of the proposed Project Aboriginal heritage mitigation and management measures are described below. The mitigation and adaptive management measures detailed below have been developed in consultation with the registered Aboriginal parties, in consideration of the cultural archaeological significance of Aboriginal heritage sites identified within the Project underground mining area.	
<b>Aboriginal Heritage Management Plan</b>	<ul style="list-style-type: none"> <li>An AHMP would be developed for the Project in consultation with the registered Aboriginal parties and the relevant regulatory authorities. The AHMP would include: <ul style="list-style-type: none"> <li>Protocols for the involvement of the registered Aboriginal parties in cultural heritage works conducted under the AHMP. This protocol should focus on members of the registered Aboriginal parties identified during this ACHA.</li> <li>A communications protocol that describes clear methods of communication, including expectations of suitable notification and response time, between IMC and the registered Aboriginal parties.</li> </ul> </li> </ul>

**Table A10-2  
Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Aboriginal Heritage (Continued)</b> – Section 7.10 describes the Aboriginal heritage mitigation and management measures. Key components of the proposed Project Aboriginal heritage mitigation and management measures are described below. The mitigation and adaptive management measures detailed below have been developed in consultation with the registered Aboriginal parties, in consideration of the cultural archaeological significance of Aboriginal heritage sites identified within the Project underground mining area.	
	<ul style="list-style-type: none"> <li>- A protocol to allow for reasonable access to identified significant Aboriginal heritage sites associated with this Project (noting that access is also subject to the requirements of WaterNSW).</li> <li>- Procedures to establish, maintain and update a current GIS database of Aboriginal heritage sites identified in the vicinity of the Project and approved Dendrobium Mine (i.e. the Project Sites Database).</li> <li>- A protocol for the determination of the final location of ancillary infrastructure, including systematic survey of the relevant area(s) (in consultation with the registered Aboriginal parties) if the area has not already been surveyed.</li> <li>- A subsidence monitoring program to be implemented progressively over the life of the Project. The subsidence monitoring program should include monitoring of all Aboriginal cultural heritage sites associated with the Project area. The program should include (but not be limited to) the following: <ul style="list-style-type: none"> <li>o a schedule for undertaking the subsidence monitoring at the nominated sites;</li> <li>o appropriately detailed baseline and archival site recordings, including high resolution digital photographs; and</li> <li>o an impact TARP specific to each of the sites being monitored.</li> </ul> </li> <li>- A protocol for the discovery and management of any human remains, including stop work provisions and notification protocols.</li> <li>- Procedures for the management and reporting of previously unknown Aboriginal heritage sites that may be identified during the life of the Project.</li> <li>- Heritage awareness training to be incorporated into site inductions for employees and contractors who may be conducting works that have the potential to impact on any Aboriginal heritage sites. Consideration should be given to involving the registered Aboriginal parties in the development and presentation of cultural awareness training.</li> <li>- A regular review process for the AHMP.</li> <li>- AHIMS site cards to be submitted for newly recorded sites.</li> <li>• Copies of the final report should be made available to each registered Aboriginal party, DPE and Heritage NSW.</li> <li>• If the Project is approved, IMC would continue to undertake further engagement with Aboriginal stakeholders who may hold knowledge regarding cultural values in the vicinity of the Project.</li> </ul>
<i>Subsidence Monitoring</i>	<ul style="list-style-type: none"> <li>• Monitoring of potential impacts to Aboriginal heritage items would be conducted prior to and following subsidence from longwall mining. This would include detailed baseline and archival site recordings of Aboriginal cultural heritage sites prior to the commencement of mining operations to ensure appropriate documentation of sites. The details of the subsidence monitoring program would be outlined in the AHMP and detailed in Extraction Plans for the Project.</li> </ul>

**Table A10-2**  
**Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Non-Aboriginal Heritage</b> – Section 7.11 describes the non-Aboriginal heritage mitigation and management measures. Key components of the proposed Project non-Aboriginal heritage mitigation and management measures are described below.	
<i>Mitigation and Management Measures</i>	<ul style="list-style-type: none"> <li>• A Conservation Management Plan would be developed for the Project, which would provide guidance for management of heritage items during the detailed design, construction and operational phases of the Project.</li> <li>• The proposed upgrades and construction of additional structures at the Dendrobium Pit Top would be designed to reduce potential physical impacts to the values and significance of the Nebo Colliery, the Kembla Heights Mining Village Heritage Conservation Area and the Site of Pioneer Kerosene Works, and would consider construction techniques that would limit sub-surface excavations (Appendix G).</li> <li>• Any significant heritage items not previously identified would be recorded if they are subject to potential damage or demolition.</li> </ul>
<b>Road Transport</b> – Section 7.12 describes the road transport mitigation and management measures. Key components of the proposed Project road transport mitigation and management measures are described below.	
<i>Mitigation and Management Measures</i>	<ul style="list-style-type: none"> <li>• Although the Project is not predicted to significantly alter the proportion of approved Dendrobium Mine contribution to traffic on the majority of the public road network, IMC's existing Traffic Management Plan would be reviewed for the Project and updated accordingly.</li> <li>• The following mitigation measures would continue to be implemented as a component of the Traffic Management Plan for the Project: <ul style="list-style-type: none"> <li>- use of signage and physical structures to notify and control drivers to maintain correct driver behaviour;</li> <li>- self-imposed restrictions for road use at the Dendrobium Pit Top, consistent with the Dendrobium Mine Drivers' Code of Conduct (i.e. vehicle access restrictions during night-time hours and during peak traffic periods during the day);</li> <li>- control of materials being transported on the road network consistent with the Australian Code for Transport of Dangerous Goods by Road and Rail (National Transport Commission, 2020);</li> <li>- encouragement of the Project construction and operational workforce as well as contractors to use "car-pooling" to minimise related light vehicle movements to site; and</li> <li>- notification of relevant stakeholders when large loads are required, or road closures are to occur along relevant road networks.</li> </ul> </li> <li>• Where new carparking facilities are to be developed for the Project, these would be designed and constructed in accordance with Australian Standards and in consultation with the relevant authorities and local stakeholders.</li> <li>• The volumes of traffic associated with activities in the Metropolitan Special Area and the Illawarra Escarpment Conservation Area would increase; however, they would remain low, and access to these areas would be in accordance with relevant landholder requirements (e.g. conditions of entry, speed limits, etc.). No additional specific traffic management measures are considered to be required for these activities.</li> </ul>

**Table A10-2  
Summary of Mitigation Measures (Continued)**

Key Environmental Management Measures	
<b>Road Transport (Continued)</b> – Section 7.12 describes the road transport mitigation and management measures. Key components of the proposed Project road transport mitigation and management measures are described below.	
	<p><u>Drivers' Code of Conduct</u></p> <ul style="list-style-type: none"> <li>IMC currently implements a Drivers' Code of Conduct at the approved Dendrobium Mine. The purpose of this document is to specify requirements to minimise potential impacts of traffic on the wider community, and maintain road safety, including allowable travel times to and from Dendrobium Mine surface facilities.</li> <li>IMC employees, as well as contractor staff, would be required to continue to observe the Drivers' Code of Conduct as a component of the Project.</li> </ul> <p><u>Construction Water Transportation</u></p> <ul style="list-style-type: none"> <li>If required, the temporary transportation of construction water supply to Shaft Site No. 5A via the intersection of Picton Road and the Cordeaux Dam Access Road would be restricted to between 8.00 am and 5.00 pm (Monday to Saturday) to avoid the peak morning traffic on Picton Road.</li> <li>The Transport Planning Partnership (2022) identified no specific management or mitigation measures would be required to manage these movements at the intersection should this option be required (Appendix H).</li> </ul> <p><u>Carpark Extension Intersection</u></p> <ul style="list-style-type: none"> <li>The intersection between the Dendrobium Pit Top Carpark Extension and Cordeaux Road would be designed and constructed consistent with Council Standards to maintain a satisfactory Level of Service.</li> </ul>
<b>Noise</b> – Sections 7.13 to 7.15 describes the noise related mitigation and management measures. Key components of the proposed Project noise related mitigation and management measures are described below.	
<b>Operational Noise</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>Noise mitigation and management measures for the existing Dendrobium Mine are described in the Noise Management Plan (Section 7.13.7) and would continue to be implemented for the Project. This plan would be reviewed and updated to address the Project where appropriate.</li> <li>IMC's existing Noise Management Plan would, as relevant, be revised for the Project to include the following: <ul style="list-style-type: none"> <li>applicable Infrastructure Approval noise criteria;</li> <li>a summary of relevant Project noise mitigation/management measures;</li> <li>procedures to be followed in the event of an exceedance of applicable noise criteria, should this occur; and</li> <li>updated complaint response protocols, where applicable.</li> </ul> </li> </ul>

**Table A10-2**  
**Summary of Mitigation Measures (Continued)**

Key Environmental Management Measures	
<b>Noise (Continued)</b> – Sections 7.13 to 7.15 describes the noise related mitigation and management measures. Key components of the proposed Project noise related mitigation and management measures are described below.	
<b>Construction Noise</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>Noise mitigation and management measures for the existing Dendrobium Mine are described in the Noise Management Plan (Section 7.13.7) and would continue to be implemented for the Project. This plan would be reviewed and updated to address the Project where appropriate.</li> <li>Construction activities for the Project would be temporary in nature, and general construction noise management measures would be implemented to minimise noise levels at the nearest private receptors, where applicable.</li> </ul>
<b>Rail Transport Noise</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>Noise mitigation and management measures for the existing Dendrobium Mine are described in the Noise Management Plan (Section 7.13.7) and would continue to be implemented for the Project. This plan would be reviewed and updated to address the Project where appropriate.</li> <li>Rail noise mitigation measures for the Project would include, but would not necessarily be limited to: <ul style="list-style-type: none"> <li>continuation of restricted rail haulage operating hours for the Kemira Valley Rail Line to between 6:00 am and 11:00 pm (i.e. no rail haulage occurs after 11:00 pm at night or before 6:00 am in the morning);</li> <li>regular track walks to identify defects in the rail infrastructure that may contribute to rail noise; and</li> <li>continued implementation of the track maintenance program.</li> </ul> </li> <li>IMC would continue to investigate and implement reasonable and feasible rail noise mitigation measures, consistent with industry best-practice, over the life of the Project. This would include ongoing consultation with the Rail Noise Working Group to address rail noise through the below objectives: <ul style="list-style-type: none"> <li>reviewing noise results and identifying rail noise mitigation options;</li> <li>improving track maintenance; and</li> <li>developing strategies for positive proactive community engagement.</li> </ul> </li> </ul>
<i>Monitoring</i>	<ul style="list-style-type: none"> <li>Periodic rail noise monitoring and, where necessary, investigations and trials to address any further brake or wheel squeal issues that arise would be undertaken.</li> </ul>



**Table A10-2  
Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Noise (Continued)</b> – Sections 7.13 to 7.15 describes the noise related mitigation and management measures. Key components of the proposed Project noise related mitigation and management measures are described below.	
<b>Transport Noise</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>Noise mitigation and management measures for the existing Dendrobium Mine are described in the Noise Management Plan (Section 7.13.7) and would continue to be implemented for the Project. Notwithstanding that the Project is not predicted to significantly alter existing off-site road transport noise on the public road network, this plan would be reviewed and updated to address the Project where appropriate.</li> <li>Traffic movements to and from the Dendrobium Pit Top would continue to be controlled by IMC via the Dendrobium Mine Drivers' Code of Conduct (i.e. vehicle access restrictions during night-time hours and during peak traffic periods during the day).</li> <li>IMC would also continue to encourage construction workers and operational workers to carpool to reduce employment-related traffic movements in and out of the Dendrobium Mine surface facilities.</li> </ul>
<b>Blasting</b> – Section 7.16 describes the blasting mitigation and management measures. Key components of the proposed Project blasting mitigation and management measures are described below.	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>Underground mine blasting would only be required for the Project under circumstances where geological structures are encountered. Notwithstanding, in the event that blasting is required for the management of particular geological structures underground, IMC would design conservative blast parameters to meet the applicable criteria at the nearest sensitive receptors or any infrastructure that overlies the blast location.</li> <li>It is also acknowledged that some blasting could potentially be required at the surface during construction activities, subject to detailed engineering design and/or collection of site-specific geotechnical data (e.g. for the construction of the proposed ventilation shaft).</li> <li>In the unlikely event that some limited surface blasting is required in support of the Project upgrades, IMC would employ a blast maximum instantaneous charge that provides a high margin of conservatism for compliance with the criteria in Section 7.16 at the nearest private receptors, and applicable structural criteria for any proximal infrastructure, such as ETLs.</li> <li>The locations of Aboriginal and non-Aboriginal heritage sites would also be considered in blasting design, with blasts designed accordingly to avoid any potential damage, and would be detailed in the Blast Management Plan for the Project.</li> </ul>
<b>Air Quality</b> – Section 7.17 describes the air quality mitigation and management measures. Key components of the proposed Project air quality mitigation and management measures are described below.	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>IMC would review and update the Air Quality and Greenhouse Gas Management Plan, where appropriate, to reflect the mitigation and management measures, complaint response protocols and reporting requirements for the Project.</li> <li>Air quality management measures currently implemented at Dendrobium Mine would continue to be implemented for the Project, including: <ul style="list-style-type: none"> <li>wind shielding for conveyors and scrapers to clean the return conveyor;</li> <li>reduced drop height (rill tower) and water sprays for loading the Kemira Valley Coal Loading Facility stockpile;</li> </ul> </li> </ul>

**Table A10-2  
Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Air Quality (Continued)</b> – Section 7.17 describes the air quality mitigation and management measures. Key components of the proposed Project air quality mitigation and management measures are described below.	
	<ul style="list-style-type: none"> <li>- enclosure of the coal sizer with mechanical extraction and control;</li> <li>- automated dust suppression system on the Kemira Valley Coal Loading Facility stockpile;</li> <li>- sealed travel routes at the Dendrobium Pit Top and regular operation of a road sweeper;</li> <li>- automated fixed water spray system on the mine portal access road;</li> <li>- enclosed train loading and profiling of the load;</li> <li>- maintaining moisture content of ROM coal in rail wagons above the Dust Extinction Moisture (DEM) level;</li> <li>- restricted train speeds to minimise fugitive emissions;</li> <li>- wind shielding for conveyors and water sprays on transfer points at the CPP;</li> <li>- water trucks operating at the CPP stockpile areas; and</li> <li>- water truck operating on internal travel routes at the CPP.</li> </ul>
<b>Visual Character</b> – Section 7.18 describes the mitigation and management measures related to visual character. Key components of the proposed Project mitigation and management measures related to visual character are described below.	
<b>Proposed Ventilation Shaft Site</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>• Construction activities associated with the proposed ventilation shaft site would be short-term, after which potential visual impacts would be low. In addition, the proposed ventilation shaft site and associated infrastructure that has the potential to be visible from the Cordeaux Dam wall would be largely constructed from materials coloured similar to the surrounding vegetation.</li> </ul>
<b>Night-lighting and Flaring</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>• A Lighting Management Plan is currently implemented at the approved Dendrobium Mine. Although night-lighting arrangements are not expected to change materially as a result of the Project, IMC would review and update the Lighting Management Plan, where appropriate, to reflect the mitigation and management measures for the Project.</li> <li>• Flares are located remote from potential receivers and would be enclosed to minimise visibility and fire risk, and would be designed in accordance with the relevant design and safety standards and guidelines.</li> </ul>
<b>Other Short-term Surface Activities</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>• Surface disturbance areas associated with any short-term surface activities would be rehabilitated progressively (Attachment 9).</li> </ul>

**Table A10-2  
Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Visual Character (Continued)</b> – Section 7.18 describes the mitigation and management measures related to visual character. Key components of the proposed Project mitigation and management measures related to visual character are described below.	
<b>Impacts to Streams and Key Stream Features</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>The Project underground mining layout has been designed to reduce subsidence effects on rivers and named streams and key stream features identified by IMC.</li> <li>Mitigation measures and management for potential impacts to key stream features are described in Section 7. Remediation measures would be developed as part of relevant Extraction Plans for the Project, where applicable.</li> </ul>
<b>Impacts to Cliffs, Other Rock Features and Steep Slopes</b>	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>No specific visual remediation measures are proposed for isolated rock falls that may occur as a result of the Project. Such events occur naturally within the sandstone landscape, and exposed rock surfaces weather over time and any disturbed vegetation re-establishes naturally.</li> </ul>
<b>Socio-Economic</b> – Sections 7.19 and 7.20 describe the mitigation and management measures related to socio-economics. Key components of the proposed Project mitigation and management measures related to socio-economics are described below.	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>IMC would develop a Mine Closure Plan for the Project approximately five years prior to closure that would be developed in consultation with the Wollongong City Council, Wollondilly and Wingecarribee Shire Councils, the DPE and the local community. The Mine Closure Plan would include consideration of amelioration of potential adverse socio-economic effects due to the reduction in employment at Project closure (Attachment 9).</li> <li>IMC would continue to work with local Governments and the local community to minimise potential social impacts of the Project and maximise potential opportunities.</li> <li>A number of mitigation and management strategies have been identified and would be implemented by IMC, including: <ul style="list-style-type: none"> <li>identifying and engaging with Indigenous businesses;</li> <li>providing ongoing community engagement;</li> <li>providing access to particulate monitoring for concerned households in Mount Kembla and Cordeaux Heights, to provide reassurance about the potential for health issues due to coal dust;</li> <li>providing clear, accessible and independently sourced information to the local community about management and monitoring of subsidence and groundwater impacts in the lead-up to Project execution;</li> <li>establishing goals for female representation and Indigenous participation in the Project workforce;</li> <li>implementing standard construction noise management techniques and consult with nearby neighbours for the duration of construction activities;</li> <li>continuing to implement the Dendrobium Mine Drivers' Code of Conduct;</li> <li>maintaining rail noise mitigation initiatives (e.g. installation of modified brake shoes) throughout the life of the Project;</li> </ul> </li> </ul>

**Table A10-2**  
**Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Socio-Economic (Continued)</b> – Sections 7.19 and 7.20 describe the mitigation and management measures related to socio-economics. Key components of the proposed Project mitigation and management measures related to socio-economics are described below.	
	<ul style="list-style-type: none"> <li>- continuing IMC's existing employment, contracting and training strategies for the Project, including continuation of existing apprenticeship and graduate traineeship programs;</li> <li>- implementing IMC's Diversity and Inclusion policy;</li> <li>- entering an agreement with the NSW Government to offset water quantity and quality impacts during and post-mining of the Project;</li> <li>- establishing strategies to achieve Indigenous participation in the Project's workforce and supply chains, supporting the key objective of improving Indigenous community well-being through greater economic participation;</li> <li>- supporting Indigenous community and economic well-being initiatives that benefit the communities in which the Dendrobium Mine operates; and</li> <li>- maintaining the Dendrobium Community Enhancement Program (DCEP) for the life of the Project.</li> </ul>
<b>Greenhouse Gas</b> – Section 7.21 describes the greenhouse gas emission mitigation and management measures. Key components of the proposed Project greenhouse gas emission mitigation and management measures are described below.	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>• Greenhouse gas management at Dendrobium Mine is currently undertaken in accordance with the Air Quality and Greenhouse Gas Management Plan (IMC, 2021b).</li> <li>• The Air Quality and Greenhouse Gas Management Plan describes a number of greenhouse gas abatement measures and efficiency improvement projects, including: <ul style="list-style-type: none"> <li>- maintaining plant and equipment to optimise reliability and efficiency;</li> <li>- upgrading equipment and processes to optimise efficiency and reduce energy consumption, if opportunities arise; and</li> <li>- operational practices (e.g. optimising the utilisation of available plant and personnel operating at any given time).</li> </ul> </li> <li>• Energy use (electricity consumption and diesel usage) for the Project would continue to be recorded through direct measurement and/or invoicing in accordance with the Commonwealth Government's National Greenhouse and Energy Reporting Act 2007 (NGER Act).</li> <li>• Greenhouse gas and energy data would continue to be accounted for and reported in compliance with legislative and other requirements.</li> <li>• The existing Air Quality and Greenhouse Gas Management Plan would be reviewed and updated accordingly to address the Project. IMC would continue to assess and implement energy and greenhouse gas management initiatives during the life of the Project.</li> </ul>
<i>Greenhouse Gas Emission Minimisation</i>	<ul style="list-style-type: none"> <li>• The key greenhouse gas minimisation measure for Project Scope 1 emissions is the flaring of pre- and post-drainage gas to the greatest extent practicable, to convert methane to carbon dioxide (i.e. as methane has a Global Warming Potential 28 times that of carbon dioxide).</li> <li>• Analysis and modelling of potential gas liberation as mining occurs in Area 5 indicated that gas volumes and methane content are such that the Project gas drainage program (and associated flaring) is required to facilitate safe mining.</li> </ul>

**Table A10-2  
Summary of Mitigation Measures (Continued)**

Key Environmental Management Measures	
<b>Greenhouse Gas (Continued)</b> – Section 7.21 describes the greenhouse gas emission mitigation and management measures. Key components of the proposed Project greenhouse gas emission mitigation and management measures are described below.	
	<ul style="list-style-type: none"> <li>While the proposed pre- and post-gas drainage is consistent with industry best practice, IMC is committed to investigating methods to increase gas drainage efficiencies, such as targeting additional coal seams for pre-drainage, as well as goaf capture.</li> <li>IMC has investigated the potential for capture of pre- and post-drainage gas and use to generate electricity, rather than flaring. However, the volume and methane content of gas associated with the target resource is highly variable. To effectively use a gas stream with such a variable methane content to generate electricity, gas enrichment would be required (e.g. supplementing the stream with gas sourced from the state gas network).</li> <li>While this method is viable at Appin Mine, it would not be feasible for the Project, as it is located within the Metropolitan Special Area and would require dedicated gas infrastructure to be installed.</li> <li>IMC is currently completing a pilot plant scale trial of CSIRO's "VAMMIT" technology at the Appin Mine - a technology that aims to improve capture and recovery of ventilation air methane. As the full scale VAMMIT trial at Appin Mine will not be completed for a number of years, and proven, safe ventilation air methane abatement technologies are not available "off the shelf", this technology is not considered viable for the Project. South32 supports the objectives of the <i>Paris Agreement</i> and is committed to achieving these goals through its company-wide Climate Change Strategy.</li> </ul>
<b>Hazard and Risk</b> – Section 7.22 describes the hazard and risk mitigation and management measures. Key components of the proposed Project hazard and risk mitigation and management measures are described below.	
Mitigation and Management	<ul style="list-style-type: none"> <li>IMC implements a safety management system at the Dendrobium Mine to manage risks to health and safety in accordance with the requirements of the <i>Work Health and Safety (Mines and Petroleum Sites) Act 2013</i> and the <i>Work Health and Safety (Mines and Petroleum Sites) Regulation 2014</i>. IMC would continue to meet these obligations for the Project.</li> <li>In addition, a number of hazard control and mitigative measures are currently in place. These measures are described in the Dendrobium Mine management plans relevant to the Project, including: <ul style="list-style-type: none"> <li>- Subsidence Management Plan;</li> <li>- Water Management Plan;</li> <li>- Landscape Management Plan;</li> <li>- Mining Operations Plan;</li> <li>- Pollution Incident Response Management Plan;</li> <li>- Air Quality and Greenhouse Gas Management Plan;</li> <li>- Noise Management Plan;</li> <li>- Traffic Management Plan;</li> </ul> </li> </ul>



**Table A10-2**  
**Summary of Mitigation Measures (Continued)**

Key Environmental Management Measures	
<b>Hazard and Risk (Continued)</b> – Section 7.22 describes the hazard and risk mitigation and management measures. Key components of the proposed Project hazard and risk mitigation and management measures are described below.	
	<ul style="list-style-type: none"> <li>- Bushfire Management Plan;</li> <li>- Waste Management Plan; and</li> <li>- Lighting Management Plan.</li> </ul> <ul style="list-style-type: none"> <li>• The management plans would be revised or replaced where necessary to address mitigation measures, monitoring, reporting and review requirements for the Project.</li> <li>• The following hazard control and/or mitigation measures would be adopted by IMC to reduce the likelihood and/or consequences of potentially hazardous incidents associated with the Project: <ul style="list-style-type: none"> <li>- <b>Maintenance</b> – Ongoing and timely maintenance of all mobile and fixed plant equipment in accordance with the recommended maintenance schedule of the original equipment manufacturer, and consistent with maintenance schemes required by relevant legislation.</li> <li>- <b>Staff Training</b> – Equipment operators and drivers would be trained and (where appropriate) licensed for their positions. Only personnel who are appropriately licensed to undertake skilled and potentially hazardous work would be permitted to do so.</li> <li>- <b>Engineering Structures</b> – Mining and civil engineering structures would be constructed in accordance with the applicable Australian Standards, codes and guidelines. Where applicable, IMC would obtain the necessary licences and permits for the construction of engineering structures.</li> <li>- <b>Contractor Management</b> – All contractors employed by IMC would be required to operate in accordance with the relevant Australian Standards and NSW legislation.</li> <li>- <b>Water Management</b> – As reported in Appendix C, water management structures would be constructed to generally separate runoff from disturbed areas and undisturbed areas.</li> <li>- <b>Coal Stockpile Management</b> – Coal stockpiles would be monitored and managed to reduce the potential for spontaneous combustion.</li> <li>- <b>Storage Facilities</b> – Storage and usage procedures for potentially hazardous materials (e.g. hydrocarbons, chemicals and explosives) would be followed. The storage and usage procedures would continue to be consistent with Australian Standards and relevant legislation. A register would be kept up-to-date with the chemicals and dangerous goods stored on-site.</li> <li>- <b>Emergency Response</b> – Emergency response procedures systems and manuals would continue to be implemented.</li> <li>- <b>Waste Management System</b> – Waste would continue to be managed in consideration of general waste management principles (reduce, re-use, recycle). Waste disposal measures and a waste monitoring program are described in the Waste Management Plan.</li> </ul> </li> </ul>

**Table A10-2**  
**Summary of Mitigation Measures (Continued)**

<b>Key Environmental Management Measures</b>	
<b>Hazard and Risk (Continued)</b> – Section 7.22 describes the hazard and risk mitigation and management measures. Key components of the proposed Project hazard and risk mitigation and management measures are described below.	
<i>Bushfire Risk Management Measures</i>	<ul style="list-style-type: none"> <li>• Bushfire risk management measures currently employed at the Dendrobium Mine as part of the existing Bushfire Management Plan would continue for the Project. Specific mitigation and management measures to reduce bushfire risk could include: <ul style="list-style-type: none"> <li>- Fire awareness and fire safety training would continue to be included in the induction of appropriate IMC staff and contractors.</li> <li>- Mitigation measures that would be implemented by IMC to reduce bushfire risk would focus on education and training, reducing bushfire hazard (principally fuel levels), minimising and controlling ignition sources (e.g. by appropriate engineering design, where relevant) and developing appropriate responses and evacuation strategies.</li> <li>- IMC has implemented a number of management and mitigation measures to reduce the potential risk of bushfire, including hazard treatment and mitigation measures (as described in Section 7.22), fire management plans and emergency response to bushfires and evacuation procedures.</li> <li>- Suitable firebreaks and/or radiation zones would be established to reduce bushfire hazards, where required. Firebreaks have been established around the existing surface facility locations, including Dendrobium Pit Top and the Kemira Valley Coal Loading Facility, and extensive firefighting water pipelines and booster pump facilities are available around the Dendrobium Pit Top.</li> <li>- IMC would continue to regularly inspect bushfire management controls on its properties. Bushfire risk management works would be undertaken on an as required basis and would include clearing of excessive growth within property fire protection boundaries.</li> </ul> </li> <li>• IMC would continue to consult with WaterNSW with respect to management of bushfire risk activities within the Metropolitan Special Areas.</li> </ul>
<b>Rehabilitation and Mine Closure</b> – Attachment 9 describes the rehabilitation strategy and mine closure planning for the Project. Key components are summarised below.	
<i>Mitigation and Management</i>	<ul style="list-style-type: none"> <li>• Where relevant, existing rehabilitation objectives for the Dendrobium Mine and Cordeaux Colliery would be augmented or built upon for the Project (Attachment 9).</li> <li>• A RMP would be developed to address Project operations at the Dendrobium Mine and the Cordeaux Colliery. Preparation of this RMP would occur in consultation with the relevant government agencies, and in accordance with the rehabilitation and closure standards and guidelines.</li> <li>• Over the life of the Project, rehabilitation completion criteria would, periodically, be updated and refined in consultation with relevant regulatory authorities and stakeholders to reflect evolving mine site rehabilitation practices and standards.</li> <li>• A Mine Closure Plan specific to the Project would be developed in consultation with relevant regulatory authorities and community stakeholders. The Mine Closure Plan would be reviewed and updated over the Project life, with more detailed measures developed closer to Project completion.</li> <li>• The Mine Closure Plan would include consideration of amelioration of potential adverse socio-economic effects due to the reduction in employment at Project closure.</li> </ul>

**Table A10-3**  
**Measures to Mitigate and Manage Potential Impacts to Biodiversity**

Potential Impacts	Mitigation Measures	Techniques	Time/Frequency
Native vegetation and habitat impacts outside of Biodiversity Assessment Development Footprint during construction and operation	Demarcation of direct impact area	Demarcation of clearance areas and installation of relevant signage for areas outside of the Biodiversity Assessment Development Footprint.  Inform contractors of no-go zones.	Prior to and during clearance of native vegetation.
Loss/injury of fauna during vegetation clearing	Staged vegetation clearance process	<p>A vegetation clearance protocol would be incorporated into management plans and would include the following:</p> <ul style="list-style-type: none"> <li>Prior to clearing of native vegetation, ecologists are to survey for ground-dwelling fauna and to remove any fauna/fauna habitat (nests or hollow logs) to adjacent habitat that would not be further disturbed.</li> <li>Prior to clearing all hollow-bearing trees are to be marked. Underscrubbing would then take place within the vegetation surrounding the hollow-bearing trees.</li> <li>After a 24-hour period, in the presence of an ecologist, the hollow-bearing trees would be gently felled.</li> <li>Any fauna displaced during clearing would be captured if required to protect the animal from harm and relocated to previously identified, safe areas (fauna to be captured and handled only by personnel trained to do so), or otherwise promoted to move into adjoining areas outside the Biodiversity Assessment Development Footprint.</li> </ul> <p>In an event that any fauna are injured during clearance, the NSW Wildlife Information, Rescue and Education Service would be contacted for appropriate care.</p>	Prior to and during clearance of native vegetation.
Noise levels impact on fauna in vicinity of the Project	Standard hours of operation	<p>The majority of noise sources at the surface facilities for the Project would effectively be unchanged from the existing operations of the existing Dendrobium Mine, with the exception of the proposed surface infrastructure to support underground mining operations. These sites are surrounded by bushland and are isolated from privately-owned receivers.</p> <p>Surface construction activities would generally only occur during the daytime at all surface facilities (excluding ventilation shaft site). Night-time construction activities would not occur at any of the existing or proposed surface facilities, with the exception of Shaft Site No. 5A, which may occur 24 hours per day, seven days per week (i.e. with a skeleton drilling crew during the night-time period).</p> <p>All construction activities would be temporary in nature and would be managed to minimise construction noise impacts.</p>	During construction and operation of the Project.

**Table A10-3 (Continued)**  
**Measures to Mitigate and Manage Potential Impacts to Biodiversity**

Potential Impacts	Mitigation Measures	Techniques	Time/Frequency
Sedimentation from construction and operation impacting surrounding habitat	Installation of sediment controls	<p>Placement of sediment controls in place during the construction and operation to limit the erosion and sedimentation and deposition of soil particulates in drainage lines and vegetation surrounding the surface infrastructure.</p> <p>Regular checks and replacement of sediment controls.</p> <p>Dewatering borehole on ventilation shaft site is planned to discharge sediment basin and process water to mine workings in order to avoid surface water discharges from site.</p> <p>Work restrictions during period of wet weather imposed.</p>	During construction and operation of the Project.
Vehicle fauna strikes during construction and operation	Vehicle speeds, training and contractor awareness	<p>Impacts to fauna from vehicles during the construction and operation of the surface infrastructure are anticipated to be low.</p> <p>The speed limit within land controlled by WaterNSW (e.g. Metropolitan Special Area) on unsealed fire trails is 40 kilometres per hour in unsealed areas.</p> <p>Night construction at ventilation shaft site restricted to a skeleton drilling crew.</p> <p>Maintain vehicle/fauna interaction log and amend speed limits if required to avoid incidents.</p>	During access of the site during construction and operation of the Project.
Potential for fire ignition during construction and operation	Safety gear, training and contractor awareness	<p>During construction and operation there is potential for equipment to trigger a fire ignition event. Mitigation measures include catchment closures during Fire Ban days (controlled by WaterNSW), fire extinguishers in vehicles, spill kits, IMC hot work permit process, etc.</p> <p>Contractors provided with sufficient training.</p>	During construction and operation of the Project.
Potential bushfire risks	Bushfire risk management measures	Bushfire risk management measures currently employed at Dendrobium Mine as part of the existing Bushfire Management Plan would continue for the Project. Specific mitigation and management measures to reduce bushfire risk are detailed in Section 7.22 and Appendix R.	During construction and operation of the Project.
Impacts to threatened flora during ETL pole placement and pipeline placement	Installation supervised by ecologist in the vicinity of threatened flora	Ecologist to supervise the ETL pole placement and pipeline placement in the vicinity of threatened flora to ensure no threatened flora impacted.	During installation of surface infrastructure for the ETL and water pipeline in the vicinity of threatened flora.
Weed establishment adjacent to Biodiversity Assessment Development Footprint	Weed control measures, training and contractor awareness	<p>Vehicle inspections and washdown to limit spread of introduced species.</p> <p>Weed control immediately surrounding the Biodiversity Assessment Development Footprint in accordance with management plans.</p>	During construction and operation of the Project.

**Table A10-3 (Continued)**  
**Measures to Mitigate and Manage Potential Impacts to Biodiversity**

Potential Impacts	Mitigation Measures	Techniques	Time/Frequency
Threatened amphibians	Biodiversity monitoring program for Littlejohn's Tree Frog and Giant Burrowing Frog	Implement monitoring program targeting threatened amphibians. Monitoring program for amphibians, including both impact and control sites, to consider the distinction between mining impacts and wider regional population changes or natural fluctuations (e.g. drought conditions).	Collection of baseline data prior to secondary extraction for the Project with monitoring during the Project and at least two years following completion of longwall mining.
Coastal Upland Swamps	Biodiversity monitoring program for Coastal Upland Swamps	Implement monitoring program to understand the extent and condition of Coastal Upland Swamps within the Subject Land and surrounds. Monitoring program for the Coastal Upland Swamps, including both impact and control sites, to consider the distinction between mining impacts and wider regional population changes or natural fluctuations (e.g. drought conditions).	Collection of baseline data prior to secondary extraction with monitoring during the Project and at least two years following completion of longwall mining.
Giant Dragonfly	Biodiversity Monitoring Program for Giant Dragonfly	Implement research into the Giant Dragonfly to understand the extent of habitat in the Subject Land and surrounds and monitor impacts from subsidence. Research program to consider the distinction between mining impacts and wider regional population changes or natural fluctuations (e.g. drought conditions).	Collection of baseline data prior to secondary extraction for the Project with monitoring during the Project and at least two years following completion of longwall mining.



**Table A10-4**  
**Summary of Adaptive Management Measures**

<b>Adaptive Management Measures</b>	
<b>Subsidence</b>	
<ul style="list-style-type: none"> <li>Subsidence performance measures and mining constraints would be detailed in Extraction Plans for the Project, along with monitoring, mitigation, adaptive management and contingency measures.</li> <li>Where relevant, performance measures, monitoring locations/methods, TARPs and contingency measures would be developed in consultation with relevant asset owners and government agencies.</li> <li>Should monitoring data indicate that impacts are exceeding trigger levels, adaptive management would be implemented. This would include the implementation of additional contingency measures as required.</li> </ul>	
<b>Groundwater and Surface Water</b>	
<ul style="list-style-type: none"> <li>Monitoring locations, methods, trigger levels and contingencies relating to groundwater and surface water would be detailed in Extraction Plans for the Project.</li> <li>If monitoring data indicates that the Project longwalls are resulting in trigger exceedances then adaptive management measures would be implemented.</li> <li>Potential contingency measures for greater than expected groundwater and surface water impacts could include: <ul style="list-style-type: none"> <li>obtaining additional water licences;</li> <li>increased annual payments to the NSW Government for estimated water take;</li> <li>remediation of any surface cracks or physical damage to key stream features (i.e. to minimise diversion of surface flows to the groundwater system) (Attachment 9); and</li> <li>mine plan review</li> </ul> </li> </ul>	
<b>Biodiversity</b>	
<b>Aquatic Ecology</b>	
<ul style="list-style-type: none"> <li>IMC would continue to conduct aquatic ecology monitoring within the Project underground mining area throughout the Project life, consistent with the methods outlined in the WIMMCP (IMC, 2020a), as amended for the Project.</li> <li>The Project-specific aquatic ecology monitoring plan would be detailed in Extraction Plans to be prepared for the Project, along with performance measures, triggers and contingency measures.</li> <li>Consistent with the recommendations of the Aquatic Ecology Assessment (Appendix E), the Project-specific monitoring plan would include monitoring at sites both upstream and downstream of the proposed longwalls for the following indicators: <ul style="list-style-type: none"> <li>aquatic habitat;</li> <li>in-situ water quality;</li> <li>aquatic macrophytes;</li> </ul> </li> </ul>	

**Table A10-4**  
**Summary of Adaptive Management Measures (Continued)**

<b>Adaptive Management Measures</b>	
<b>Biodiversity (Continued)</b>	
<ul style="list-style-type: none"> <li>- aquatic macroinvertebrates; and</li> <li>- fish.</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring specific to aquatic ecology would be undertaken in addition to the groundwater and surface water monitoring detailed in Sections 7.5 and 7.6.</li> <li>• In the event that monitoring identifies impacts to aquatic ecology greater than those predicted, IMC would consider implementing contingency measures such as further stream remediation, further erosion and sediment control measures and review of the mine layout with respect to watercourses. Stream remediation techniques are detailed in Section 7.6.3.</li> </ul>
<b>Upland Swamps</b>	
<ul style="list-style-type: none"> <li>• The Swamp Offset Policy states groundwater level as the most certain indicator of potential impacts to upland swamp ecological communities (OEH, 2016).</li> <li>• Baseline surface water and groundwater monitoring (including shallow piezometers and soil moisture probes) of upland swamps within 400 m of the proposed longwalls would be undertaken to refine the maximum predicted offset liability.</li> <li>• Monitoring would be detailed in the Extraction Plans for the Project, and would include subsidence, surface water, groundwater and vegetation composition.</li> <li>• In accordance with the Swamp Offset Policy, should monitoring indicate impacts greater or less than those predicted, the ultimate offset liability would be increased or decreased accordingly.</li> </ul>	
<b>Terrestrial Ecology</b>	
<ul style="list-style-type: none"> <li>• Monitoring of potential subsidence impacts on TECs, threatened fauna habitat and threatened flora would occur in accordance with the Biodiversity Management Plan prepared under the Extraction Plan process.</li> <li>• In the event that significant environmental consequences are observed as a result of subsidence, IMC would implement remediation measures and/or additional compensatory measures in accordance with approved contingency plans.</li> </ul>	
<b>Aboriginal Heritage</b>	
<ul style="list-style-type: none"> <li>• IMC would avoid disturbance of known Aboriginal heritage sites where practicable during development of surface infrastructure for the Project. In addition, depending on the Aboriginal heritage site type and nature of proposed surface development works, further management measures would be undertaken prior to any potential disturbance of Aboriginal heritage sites, in consultation with registered Aboriginal parties (e.g. additional archival recording and the implementation of fencing to isolate the site).</li> <li>• The location of the previously identified Aboriginal heritage sites proximal to any surface development works would also be considered prior to any surface development works.</li> <li>• IMC would also provide notification in accordance with section 89A of the <i>National Parks and Wildlife Act 1974</i> if any previously unidentified Aboriginal heritage sites are identified during the life of the Project.</li> </ul>	

**Table A10-4  
Summary of Adaptive Management Measures (Continued)**

<b>Adaptive Management Measures</b>	
<b>Non-Aboriginal Heritage</b>	
<ul style="list-style-type: none"> <li>In the unlikely event that previously unidentified historical archaeological relics were to be discovered during ground disturbance for the Project, work in the immediate area would cease and a suitably qualified archaeologist would be engaged to assess the condition, extent and likely significance of the remains. If required, the Heritage Council of NSW would be notified of the discovery in accordance with section 146 of the <i>Heritage Act 1977</i>.</li> </ul>	
<b>Noise and Blasting</b>	
<b>Operational and Construction Noise</b>	
<ul style="list-style-type: none"> <li>IMC would continue to conduct Dendrobium Mine operational noise monitoring in accordance with the Noise Management Plan (as amended for the Project).</li> <li>In addition, IMC would utilise the real-time directional noise monitoring system at the Dendrobium Pit Top to proactively modify operations, as required to reduce noise levels.</li> <li>In addition to mitigation measures already incorporated, Project noise adaptive management measures would include: <ul style="list-style-type: none"> <li>response to any community issues of concern or complaints including discussions with relevant landowners (including ongoing consultation with relevant receivers currently under a grievance process with IMC);</li> <li>refinement of on-site noise mitigation measures and mine operating procedures, where practicable; and</li> <li>if necessary (i.e. as informed by operational noise monitoring results) implementation of feasible and reasonable mitigation at relevant private receivers, in accordance with the Voluntary Land Acquisition and Mitigation Policy.</li> </ul> </li> </ul>	
<b>Rail Transport Noise</b>	
<ul style="list-style-type: none"> <li>Rail noise monitoring would continue to be undertaken in accordance with the Noise Management Plan.</li> <li>IMC would also continue to investigate and, where reasonable and feasible, implement further progressive rail noise mitigation measures over the life of the Project. This would include addressing any further rail brake or wheel squeal issues that may arise during the life of the Project from landholder complaints, or if material deterioration of rail noise performance is identified by rail noise monitoring in accordance with the Noise Management Plan.</li> </ul>	
<b>Air Quality</b>	
<ul style="list-style-type: none"> <li>IMC would continue to conduct the approved Dendrobium Mine air quality monitoring in accordance with the Air Quality and Greenhouse Gas Management Plan (as amended for the Project).</li> <li>As a component of the Project, IMC would operate PM10 and PM2.5 real-time monitoring equipment (optical photometers) to monitor and evaluate the emissions of the Project against contemporary particulate matter criteria at the Dendrobium Pit Top and the Kemira Valley Coal Loading Facility.</li> <li>Project air quality adaptive management measures would include response to any community issues of concern or complaints, including discussions with relevant landowners and/or refinement of on-site air quality mitigation measures and mine operating procedures.</li> <li>While no odour impacts are predicted from the Project (Appendix I), in the event of an issue or complaint arising with respect to odour, suitable complaint response and management measures would be implemented.</li> </ul>	

**Table A10-4  
Summary of Adaptive Management Measures (Continued)**

<b>Adaptive Management Measures</b>	
<b>Socio-Economic</b>	
<ul style="list-style-type: none"> <li>Performance measures and monitoring and reporting requirements for each management and mitigation action are provided in Appendix K.</li> <li>A number of adaptive management strategies have been identified and would be implemented by IMC, including: <ul style="list-style-type: none"> <li>collecting, monitoring and reporting mitigation performance data, at least six-monthly during the first five years after Project execution and at intervals determined in consultation with the DCCC thereafter;</li> <li>monitoring of social indicators that may change how Project impacts and benefits are experienced;</li> <li>engaging with stakeholders who should benefit from mitigations, to ensure their opinions are identified and considered in review of mitigation and performance outcomes;</li> <li>reviewing (annually) the delivery of mitigation strategies, performance outcomes, any unexpected impacts or benefits and the status of social indicators, conducted in consultation with the DCCC; and</li> <li>identifying and implementing required changes to mitigation and enhancement strategies.</li> </ul> </li> <li>A Social Impact Management Plan would also be developed by IMC for the Project, if required (Appendix K).</li> </ul>	
<b>Greenhouse Gas and Climate Change</b>	
<ul style="list-style-type: none"> <li>IMC would implement an adaptive management approach to climate change impacts throughout the life of the Project, consistent with South32's sustainability policy.</li> <li>This would include investigating further opportunities to maximise gas capture via pre-drainage of the underlying Wongawilli Seam and management of goaf gas, with additional measures implemented if technically feasible and commercially viable.</li> <li>IMC would continue the ongoing management of its contribution to Australian greenhouse gas emissions inventories through participation in the scheme under the NGER Act, as well as any other Government initiatives implemented to manage emissions at the national level.</li> <li>Under the NGER Act, relevant sources of greenhouse gas emissions and energy consumption must be measured and reported on an annual basis, allowing major sources and trends in emissions/energy consumption to be identified (which in turn may inform the approach to adaptive management).</li> <li>IMC has considered the key potential climate change risks to the Project (namely increased frequency of bushfires, water reliability during dry periods and storm surges) in the design of the Project. IMC would continue to assess climate change risks on an ongoing basis via implementation of an adaptive management approach.</li> <li>This would include conducting climate change risk assessments in the consideration of the DPE's <i>Climate Risk Ready NSW Guide</i> (DPIE, 2020) and implementing appropriate risk treatment strategies. Potential climate change risks to be assessed would include the example risks provided in the Climate Risk Assessment tool described in Appendix C of the DPE's <i>Climate Risk Ready NSW Guide</i> (DPIE, 2020).</li> </ul>	
<b>Rehabilitation and Mine Closure</b>	
<ul style="list-style-type: none"> <li>Rehabilitation progress of the Project and rehabilitation techniques and materials would be regularly evaluated. The results would inform future rehabilitation initiatives and refinement/amendment of the practices and measures described below through adaptive management.</li> </ul>	

### **A10.3 REPORTING**

The following subsections describe the expected reporting requirements for the Project (based on requirements at the time of preparation of this EIS). IMC would adjust its reporting requirements should they change in the future.

#### **A10.3.1 Incident Reporting**

Consistent with existing reporting requirements of the Dendrobium Mine Development Consent DA 60-03-2001, IMC would notify the DPE within 24 hours following the occurrence of an environmental incident, and prepare a report outlining the nature of the incident and mitigation measures undertaken.

Consistent with existing reporting requirements for EPL 3241 for the Dendrobium Mine (and any other EPL required for the Project), IMC would notify the NSW Environment Protection Authority (EPA) within seven days of any incident that would require reporting.

#### **A10.3.2 Annual Review**

Consistent with existing reporting requirements of the Dendrobium Mine Development Consent DA 60-03-2001, IMC would produce an Annual Review to describe the environmental performance of the Project for a 12-month reporting period. Copies of the Annual Review will be made available on the South32 website.

Environmental monitoring results would be compared against relevant statutory requirements, monitoring results of previous years and relevant predictions of this EIS.

Biodiversity management, proposed development and rehabilitation, as well as environmental performance improvement measures proposed for the next 12 months, will also be discussed in the Annual Review.

Consistent with existing reporting requirements of the Dendrobium Mine Development Consent DA 60-03-2001, IMC would report the management of coal wash in the Annual Environmental Management Report (AEMR) for the West Cliff Stage 3 Coal Wash Emplacement Area.

#### **A10.3.3 Infrastructure Approval Requirements**

IMC would provide regular reporting of environmental performance of the Project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of the Infrastructure Approval and associated licences and approvals.

#### **A10.3.4 Independent Environmental Auditing**

IMC would commission an independent environmental audit of the Project every three years or at an alternative interval as required by any Infrastructure Approval for the Project.

Upon completion of the independent environmental audit, IMC will submit a copy of the audit and its responses to the DPE.

#### **A10.3.5 Other Reporting**

##### ***Annual Return***

A summary of monitoring required by an EPL for the Project (including the recording of complaints) and a Statement of Compliance will be reported in Annual Returns and submitted to the EPA.

##### ***EPBC Act Approval – Annual Reporting***

IMC would prepare annual reports as required, assessing compliance with relevant conditions of an EPBC Act approval for the Project.

##### ***Greenhouse Gas Reporting***

IMC would continue the ongoing management of its contribution to Australian greenhouse gas emissions inventories through participation in the scheme under the NGER Act. Greenhouse gas and energy data would continue to be accounted for and reported in compliance with legislative and other requirements.

##### ***NPI Reporting***

IMC will continue to provide annual National Pollutant Inventory (NPI) reports to the EPA (as Dendrobium Coal Pty Ltd). Emissions data for the Project will be made publicly available on the Federal Government's NPI website ([www.npi.gov.au](http://www.npi.gov.au)) and will also be reported in the Annual Review.

### Community Complaints Register

A community complaints register is maintained as part of the Dendrobium Mine, which would continue for the Project. Complaints and subsequent actions undertaken will be reported in the Annual Review and on the South32 website.

### A10.4 REFERENCES

Department of Environment and Climate Change (2008). *Managing Urban Stormwater Soils and Construction – Volume 2E – Mines and Quarries*.

Department of Planning, Industry and Environment (2020). *Climate Risk Ready NSW Guide*.

Hydro Engineering and Consulting Pty Ltd (2022). *Dendrobium Mine Extension Project – Surface Water Assessment*.

Illawarra Metallurgical Coal (2020a). *Dendrobium Area 3B Watercourse Impact Monitoring, Management and Contingency Plan*.

Illawarra Metallurgical Coal (2020b). *Dendrobium Area 3B Swamp Impact Monitoring, Management and Contingency Plan*.

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