

# **Appendix D** – Management, mitigation and offsetting measures table

**Table D1 Management, mitigation and offsetting measures**

Aspect	Measure
Subsidence	<p>Subsidence monitoring, management and remediation will be undertaken throughout the life of the project in accordance with approved Extraction Plans and in consultation with DPIE – Planning and Assessment, land and infrastructure owners, and other relevant stakeholders. Key mitigation measures for specific built and natural surface features to be incorporated into the Extraction Plans are identified below.</p> <p><b>Streams</b></p> <p>Watercourse impact monitoring and management provisions will be developed for the streams within the study area, including periodic visual monitoring along Stony, Kilaben, Stockyard and Crooked Creeks during active subsidence and establishment of longitudinal ground monitoring lines across the second order sections of the creeks.</p> <p>If adverse or unacceptable impacts due to ponding or fracturing are anticipated along the streams, then partial extraction within the proposed panels could be carried out at these locations. Appropriate management measures will be developed as part of targeted monitoring and management plans as described in Section 6.5.5.</p> <p><b>Steep slopes</b></p> <p>Monitoring and management measures will be developed for steep slopes and rock outcrops within the study area. Periodic visual inspection will be carried out when mining directly beneath these features. Remediation, such as infilling or regrading, will be carried out on larger surface cracking which could result in increased erosion or restrict access along tracks. In some cases, erosion protection measures may be needed, such as the planting of additional vegetation in order to stabilise the slopes in the longer term.</p> <p><b>Main Northern Railway</b></p> <p>Centennial Newstan will appoint a Rail Technical Committee which will include representatives from the rail operator, the mine and specialist consultants. The Rail Technical Committee will consult with the Resources Regulator and the Office of the National Rail Safety Regulator to:</p> <ul style="list-style-type: none"> <li>• Identify potential impacts to the railway.</li> <li>• Apply a risk management approach, where identified risks are assessed and risk control measures are implemented.</li> <li>• Develop management measures that include mitigation and preventive works, monitoring plans, trigger action response plans (TARP) and communication plans.</li> </ul> <p>The Rail Technical Committee will implement robust management strategies to ensure that the railway remains safe and serviceable during and after the proposed mining. The strategies could include the following investigations and considerations:</p> <ul style="list-style-type: none"> <li>• Field investigations to explore the current status of goafing within the Teralba Conglomerate spanning areas and full extraction areas in the Great Northern Seam that lie adjacent to the Main Northern Railway.</li> <li>• Consideration of targeted grouting of large voids if discovered adjacent to the Main Northern Railway.</li> <li>• Intensive monitoring of ground movements and other instrumentation to detect rapid subsidence events, such as geophones and seismic sensors above early proposed panels that are located well away from the Main Northern Railway and during and after the extraction of the proposed panels adjacent to the railway.</li> <li>• Installation of a track expansion system to decouple the rail from potential mining-induced ground strains.</li> </ul>

Aspect	Measure
	<ul style="list-style-type: none"> <li>• Engineering assessment of the current condition of the railway track, overhead wiring and associated structures (the haul road overbridge, culverts, embankments and cuttings) and, if required, maintain the track and associated structures so that their condition is within operating tolerances prior to the influence of mining.</li> <li>• Regular monitoring of ground movements and visual inspections directly above the proposed panels during and after extraction adjacent to the railway.</li> <li>• Regular monitoring of ground movements and visual inspections along the railway corridor during and after the extraction of the proposed panels adjacent to the railway.</li> <li>• Regular monitoring of changes in rail stress and track geometry along the railway and changes in the condition of associated railway structures during and after the extraction of the proposed panels adjacent to the railway.</li> <li>• Installation of real-time monitoring with alarms if measured changes exceed trigger levels.</li> <li>• Implementation of procedures to immediately respond in the unlikely event of adverse movements or changes are observed to the track to ensure that the railway remains safe. The procedures would include the worst case but extremely low likelihood response to immediately stop trains and inspect the track for hazards before allowing train operations to recommence.</li> </ul> <p><b>Railway loop line (Ulan Rail Loop)</b></p> <p>A Technical Committee comprising specialists in mine subsidence, railway engineering and railway maintenance will be established to develop the appropriate management strategies for the railway loop line. Centennial Newstan will liaise with Sydney Trains and the owners of the Eraring Power Station in developing these strategies.</p> <p>Appropriate monitoring measures will be established, including monitoring visual, ground survey and rail stress. A TARP will be developed outlining the required trigger levels and actions so as to maintain the railway loop line in safe and serviceable condition at all times.</p> <p><b>Roads</b></p> <p>Management strategies will be developed for the mine haul road, private road and the other local roads, in consultation with their owners, so that adverse impacts can be identified and remediated, as required. Remediation will be carried out during active subsidence so that the roads can be maintained in safe and serviceable conditions throughout the mining period.</p> <p>Loose rocks and highly weathered sections of the cuttings along the local roads will be removed or stabilised before the panels are mined directly beneath them. The cuttings will be visually monitored during the active subsidence period, so that any loose rocks or spalling along the cutting faces can be removed.</p> <p><b>Bridges</b></p> <p>The predicted subsidence effects will be provided to infrastructure owners so that the bridges can be reviewed based on these predicted movements. Management strategies will be developed, in consultation with the bridge owners. The management strategies for the bridges located closest to the proposed mining area could include 3D monitoring points on the bridge structures, tell-tales across the expansion joints and periodic visual inspections during the mining of the proposed panels closest to them.</p> <p><b>Drainage culverts</b></p> <p>The drainage culverts located directly above the secondary extraction area will be periodically visually inspected during the active subsidence. Management and remediation measures will be developed in consultation with the infrastructure owners.</p>

Aspect	Measure
	<p><b><i>Electrical infrastructure</i></b></p> <p>The predicted subsidence effects for the substation will be provided to EnergyAustralia and the predicted subsidence effects for the 132 kV transmission lines and 33 kV powerlines will be provided to Ausgrid. Preventive and monitoring measures for the transmission lines and powerlines will be developed in consultation with Ausgrid.</p> <p>The 132 kV transmission lines and the 33 kV powerlines located above the secondary extraction areas within the proposed panels will be visually monitored during active subsidence, so that they are maintained in safe and serviceable conditions at all times.</p> <p><b><i>Telecommunications infrastructure</i></b></p> <p>The predicted subsidence effects for the optical fibre cable will be provided to AAPT so that the necessary management plans can be developed. A TARP will be developed for the cable so that, if necessary, preventive measures can be undertaken if the strains in the cable approach the allowable tolerances. The predicted movements for the GSM installation will be provided to the owner so that the infrastructure can be reviewed based on these movements.</p>
	<p><b><i>Eraring Power Station</i></b></p> <p>Detailed management strategies for the Eraring Power Station will be developed, through ongoing consultation with Origin Energy, as part of the development of a Built Features Management Plan, including:</p> <ul style="list-style-type: none"> <li>• The predictions for the power generation facility and major structures and plant enclosures will be provided to the structural engineer and machine manufacturers, so that the designs can be reviewed based on the predicted far-field movements.</li> <li>• Development of management strategies for the conveyor (north) and conveyor (east), including: <ul style="list-style-type: none"> <li>○ Assessment of the serviceability and structural integrity of the conveyors based on a detailed inspection and the predicted mine subsidence movements.</li> <li>○ Development of preventive measures, including the provision of the necessary adjustments to the conveyors, to maintain them in a safe and serviceable condition during mining.</li> </ul> </li> <li>• Development of management strategies for the larger tanks, weighbridges, pipelines and other services, so that they can be maintained in a safe and serviceable condition during mining.</li> <li>• Development of management strategies for the ash dam, which could include a detailed assessment of the integrity of the ash dam wall and base as a result of the proposed mining. If these assessments show that the ash dam cannot be maintained in a safe and serviceable condition, during the extraction of the proposed panels, it may be necessary to reduce the percentage of coal extracted (i.e. pillar recovery, extraction height, panel width) beneath the dam, to limit the mine subsidence movements in this location.</li> <li>• Development of a TARP, in consultation with Origin Energy, based on the outcomes of the detailed studies and the established preventive or remediation measures.</li> <li>• Development of the appropriate monitoring at the Eraring Power Station, where required, including major structures and infrastructure located directly above mining, or where these features may be sensitive to far-field movements.</li> <li>• The preventive or remediation measures, TARP and monitoring plan will be formalised in an agreed Built Features Management Plan for the facility.</li> </ul>

Aspect	Measure
	<p data-bbox="376 276 629 304"><b><i>Water storage dams</i></b></p> <p data-bbox="376 312 2024 405">Subject to consultation and agreement with the landowner, the water levels in the dams will be lowered during active subsidence. These dams will be visually monitored, as the proposed panels mine directly beneath them, such that any impacts can be identified and remediated accordingly.</p>
Hydrogeotechnical	<ul data-bbox="376 413 2040 1013" style="list-style-type: none"> <li data-bbox="376 413 2040 507">• No secondary extraction (i.e. total or partial extraction) will be carried out within a 35 degree angle of draw of the Western Saddle Embankment. The area of any first workings within a 35 degree angle of draw of the Western Saddle Embankment will be determined following the completion of detailed designs by Origin Energy and subject to approval from Dams Safety NSW.</li> <li data-bbox="376 515 2040 635">• To mitigate the impacts of secondary extraction and the associated fracture network impacting on the effectiveness of the void fill, no secondary extraction (i.e. total or partial extraction) will be carried out within a 26.5 degree angle of draw of any proposed void filling areas. The area of any first workings within a 26.5 degree angle of draw of any proposed void filling areas will be determined following the completion of detailed design by Origin Energy and subject to approval from Dams Safety NSW.</li> <li data-bbox="376 643 2040 730">• A program of field measurements will be undertaken in consultation with Origin Energy during and after the void filling program to confirm the effectiveness of void filling as a barrier to flow from the ash dam into Awaba Colliery and provide a base line against which to assess further impacts from mining within the West Borehole seam.</li> <li data-bbox="376 738 2040 802">• The height of depressurisation above an extracted panel will be monitored to confirm consistency with the estimates made by SCT Operations Pty Ltd (2019).</li> <li data-bbox="376 810 2040 874">• Inflow rates will be monitored on a panel by panel basis during extraction of the initial panels within the West Borehole seam to better estimate the likely inflow rates below the ash dam.</li> <li data-bbox="376 882 2040 946">• A Water Treatment Management Plan will be developed during detailed mine closure planning that accommodates potential interactions between Awaba Colliery, Newstan Colliery and the Eraring Ash Dam.</li> <li data-bbox="376 954 2040 1013">• A program of monitoring seismic energy released during subsidence will be undertaken to confirm that mine induced seismicity is less than natural background levels.</li> </ul> <p data-bbox="376 1021 2040 1082">Any mining beneath the existing Eraring Ash Dam will be subject to approval from the Dams Safety NSW and any secondary extraction will require an Extraction Plan approval.</p>
Groundwater	<ul data-bbox="376 1090 2040 1410" style="list-style-type: none"> <li data-bbox="376 1090 2040 1177">• No secondary extraction (i.e. total or partial extraction) will be carried out within a 35 degree angle of draw of the Western Saddle Embankment. The area of any first workings within a 35 degree angle of draw of the Western Saddle Embankment will be determined following the completion of detailed designs by Origin Energy and subject to approval from Dams Safety NSW.</li> <li data-bbox="376 1185 2040 1305">• To mitigate the impacts of secondary extraction and the associated fracture network impacting on the effectiveness of the void fill, no secondary extraction (i.e. total or partial extraction) will be carried out within a 26.5 degree angle of draw of any proposed void filling areas. The area of any first workings within a 26.5 degree angle of draw of any proposed void filling areas will be determined following the completion of detailed design by Origin Energy and subject to approval from Dams Safety NSW.</li> <li data-bbox="376 1313 2040 1410">• A program of field measurements will be undertaken in consultation with Origin Energy during and after the void filling program to confirm the effectiveness of void filling as a barrier to flow from the ash dam into Awaba Colliery and provide a base line against which to assess further impacts from mining within the West Borehole seam.</li> </ul>

Aspect	Measure
	<ul style="list-style-type: none"> <li>• A Water Treatment Management Plan will be developed during detailed mine closure planning that accommodates potential interactions between Awaba Colliery, Newstan Colliery and the Earing Ash Dam.</li> <li>• Ongoing measures will also include a range of monitoring to validate groundwater model predictions and provide observation data for future model calibration.</li> </ul>
Surface water	<p><b>Flow monitoring</b></p> <p>The existing flow monitoring program at Newstan Colliery and Awaba Colliery will be continued, in particular the continued monitoring of the discharges via Newstan LDP001 and LDP017 and extractions from the Fassifern underground storage. To improve confidence in the site water balance model, the following additional flow monitoring will be installed within 12 months of project approval:</p> <ul style="list-style-type: none"> <li>• Southern Reject Emplacement Area (SREA) decant pond: an automated water level sensor and data logger will be installed in the decant pond in order to provide a more accurate estimate of the flows into the Fassifern underground storage via the decant borehole.</li> <li>• SP5: an automated water level sensor and data logger will be installed at the existing V-notch weir at SP5. The sensor and data logger will be appropriately shielded to prevent interference from the overhead high voltage transmission lines. The purpose of this monitoring is to provide a continuous record of stream flow that can be used to investigate potential changes to surface infiltration to the Awaba underground void.</li> <li>• 10 South bore: a flow meter and data logger will be installed on dewatering line from the pump in the 10 South bore. The purpose of this monitoring is to provide a more accurate estimate of the extraction from the Awaba underground void.</li> <li>• Water levels in Awaba underground void: an automated pressure transducer and data logger will be installed in at least one groundwater monitoring bore to provide continuous record of water levels in the Awaba underground void. The purpose of this monitoring is to provide a continuous record of water levels that can be used to investigate potential changes to surface infiltration to the Awaba underground void.</li> <li>• 19 cut through and Fassifern dewatering bores: these existing flow meters will be recalibrated to improve confidence in the estimation and groundwater interception and surface infiltration.</li> <li>• Any new dewatering pumps installed in the Extension of Mining Area will have individual flow meters installed.</li> </ul> <p><b>Water quality</b></p> <p><b>Water quality monitoring</b></p> <p>The existing water quality monitoring sites detailed in Appendix K will continue to be monitored monthly during construction and operation of the project, with the following exceptions:</p> <ul style="list-style-type: none"> <li>• Monitoring will be discontinued at WMP32, as the site has been inaccessible since 2015 and the water quality results obtained have indicated the impacts of leachate from the Awaba Waste Management Facility, which would likely make the detection of potential impacts from surface deformations within the catchment difficult.</li> <li>• Monitoring at site WMP23 in the Lords Creek catchment will be discontinued, as the site has not contained sufficient water for sampling within the baseline monitoring period.</li> <li>• Monitoring at Awaba seepage site SP3 will be discontinued, as monitoring has not been undertaken since 2014 and is not required due to the likely similarity of the water quality at this location to that at nearby site SP2.</li> </ul>

Aspect	Measure
	<p>In addition to the existing monitoring sites, monthly monitoring will commence at the following three sites (refer to Appendix K):</p> <ul style="list-style-type: none"> <li>• WMP50 – located in the upper reaches of Lords Creek upstream of existing monitoring location WMP35.</li> <li>• WMP51 – located on Stony Creek downstream of existing monitoring location WMP29.</li> <li>• WMP52 – located on Stockyard Creek directly downstream of the Extension of Mining Area.</li> </ul> <p><b>Site-specific guideline values</b></p> <p>Site specific guideline values (SSGVs) will be derived in the water management plan (WMP) for the project and revised as necessary following the methodology recommended by ANZG (2018). These SSGVs will be defined for each of the catchments potentially affected by subsidence if sufficient data are available (at least 24 months of monthly data).</p> <p><b>Awaba Colliery Surface Site</b></p> <p>Water quality monitoring of the Pollution Control Dam will occur prior to any controlled discharges to ensure water quality is less than or within the concentration limits for Awaba LDP009.</p> <p>If settling does not, or is not expected to, occur within the required five day management period, management of suspended solids within the Pollution Control Dam may be undertaken if required (i.e. if total suspended solids is greater than 50 mg/L). The application of coagulating and/or flocculating agents, such as gypsum, polyacrylamides and alum, may be necessary to enhance sediment removal prior to discharge. The application rate is required to be sufficiently high enough to remove suspended solids and allow discharge of water within an acceptable time without polluting receiving waters with the coagulating/flocculating agent itself.</p> <p>Centennial Newstan undertake regular site inspections of the water management structures at the Awaba Colliery Surface Site. During operation of the project, site inspections will be completed weekly as a minimum as well as soon as practicable following rainfall events that exceed 40 mm over 24 hours. The Pollution Control Dam will be inspected for capacity, structural integrity and effectiveness. Sediment accumulated within the dam will be removed as required to maintain water storage capacity.</p> <p>In the unlikely event that water quality was not compliant, infrastructure would remain in place to transfer water to the Awaba underground void. All discharges via LDP009 will be compliant with EPL 443.</p> <p><b>Water and salt balance model</b></p> <p>The water and salt balance model will be reviewed and revised annually. The average predicted water balance for the project will be included in the water management plan and the results for each year will be reported in the Annual Review for the project.</p> <p><b>Management plans</b></p> <p><b>Water management plans</b></p> <p>Following approval of the project, the site-specific water management plan for Newstan Colliery and Awaba Colliery will be merged and updated to include the water management requirements of the project. TARPs are provided in the site-specific water management plans. Additional TARPs will be developed as required to provide guidance on the immediate actions that should be taken in response to any impacts of the project identified as part of the monitoring program.</p> <p>The Centennial Northern Operations Discharge Management Plan will also be reviewed and revised as required to update the necessary discharge management requirements of the project. These revised management plans will then be implemented.</p>

Aspect	Measure
	<p><b>Extraction plans</b> Extraction plans will be developed and implemented for each extraction area prior to mining. Each extraction plan for the project will include a water management plan to manage potential subsidence-related impacts to water resources.</p> <p><b>Sinkhole Rehabilitation Plan</b> The Sinkhole Rehabilitation Plan for Awaba Colliery was prepared in response to the formation of a number of sinkholes above the historical underground workings at Awaba Colliery. The plan outlines the methodology for the effective rehabilitation and maintenance of sinkholes. Following approval of the project, the Sinkhole Rehabilitation Plan will be updated or integrated into the relevant subsidence management plans for the project and may consider the emerging availability of technology for monitoring of subsidence, including drones fitted with LiDAR units.</p> <p><b>Erosion and sediment control plans</b> Erosion and sediment control will continue to be undertaken in accordance with the erosion and sediment control framework outlined in the Newstan Colliery Water Management Plan. All construction activities associated with the Project will have a detailed Erosion and Sediment Control Plan (ESCP) prepared based on specific construction methodologies.</p>
Flooding	<p>Targeted monitoring and management plans will be developed for watercourses with a moderate or high geomorphic risk rating. Regular visual inspections, and use of remote sensing technology where appropriate, will allow identification of problem areas and potential threats to nearby infrastructure, as well as development and implementation of appropriate stabilisation techniques as required. These measures would be captured as works associated with Extraction Plans.</p>
Terrestrial ecology	<p><b>Impacts requiring an offset</b></p> <p><b>Mining impacts</b> Extensive flora and fauna surveys have been undertaken for the project in line with the BAM, resulting in a comprehensive baseline dataset which can be utilised to inform the initial commencement of individual monitoring programs. In order to determine the occurrence of mining related impacts on threatened species or ecological communities, it is proposed that LIDAR be utilised to detect the potential impacts of the project (i.e. sinkholes, cracking and plug-failures). If impacts are detected, the extent of those impacts will be quantified by comparison to the baseline dataset. Where insufficient baseline data is available, presence of threatened species will be assumed if they are considered likely to occur and potentially impacted. Following potential impacts, an offset liability report will be prepared to both quantify the impacts and outline the offset strategy that will be adopted to address those impacts. The offset liability report will be prepared with reference to the BAM and provided within three months of any impacts being identified.</p> <p><b>Vegetation clearing impacts for infrastructure</b> The 0.35 ha of native vegetation to be cleared for ancillary facilities at Awaba Colliery Surface Site will be offset in accordance with the NSW Biodiversity Offset Scheme.</p> <p><b>Adaptive management strategy</b> In accordance with Section 9.4.2 of the BAM, an adaptive management plan is required where impacts are uncertain.</p>

Aspect	Measure
	<p>The project has the potential to lead to impacts to threatened plants and ecological communities from cracking, sinkholes, plug-failures and ponding. In order to effectively quantify the mining related impacts to the threatened flora and ecological communities, an area-based assessment will be undertaken with reference to areas where threatened species and ecological communities have been recorded or predicted to occur within the study area (refer to Figures 5 -11 of the BDAR (RPS, 2020a), provided in Appendix M).</p> <p>In the case of impacts occurring, adaptive management will occur via the review of monitoring programs and investigation of causation to ensure any future impacts can be readily identified and predicted. Where impacts are identified, they will be offset in accordance with State and federal policies. These monitoring measures and TARPs will be detailed within the BMP prepared as part of the Extraction Plan process post consent. The TARP contained within the BMP will contain a framework for adaptive management, which should include; mitigation, remediation and changes to the mine design.</p>
Aquatic ecology	<p><b>Licensed discharges</b></p> <p>Water quality monitoring and regular site inspections of the Pollution Control Dam will occur prior to any controlled discharges to ensure water quality is within the concentration limits for Awaba LDP009. The Proposed Sediment Control Dam upstream of the Pollution Control Dam will be designed and constructed in accordance with the Blue Book Volume 2E (Landcom, 2004).</p> <p><b>Aquatic ecology monitoring</b></p> <p>Continuation of the aquatic ecology monitoring program developed for this assessment will be undertaken following approval of the project. This monitoring will be undertaken twice a year, in autumn and spring AUSRIVAS seasons (Turak, Waddell, &amp; Johnstone, 2004). Reporting will be undertaken annually, and will assess water quality monitoring data collected by Centennial Newstan in addition to the water quality and sediment quality data collected during the aquatic ecology monitoring program.</p>
Air quality and greenhouse gas	<p><b>Air quality</b></p> <p>Construction phase air quality mitigation and management measures will be outlined in the CEMP for the project construction. Operational air quality mitigation and management measures will be implemented in accordance with the Air Quality and Greenhouse Gas Management Plan for Northern Region (AQGGMP). The AQGGMP will be updated to incorporate the operations at the Awaba Colliery Surface Site.</p> <p><b>Air quality monitoring</b></p> <p>Dust deposition monitoring and High Volume Air Sampling (PM<sub>10</sub>) is currently performed around the Awaba Colliery Surface Site. This monitoring is proposed to be continued during construction and operation of the project.</p> <p>The details of the monitoring program will be incorporated into the Northern Region Air Quality and Greenhouse Gas Management Plan (AQGHGMP), following project approval.</p> <p><b>Greenhouse gas</b></p> <p>The most significant measure proposed for the abatement of emissions from the project is the capture of Newstan ventilation air and redirection to a centralised gas drainage abatement and utilisation plant, including two new flares to be installed at the Awaba Colliery Surface Site. The gas flares will be installed and operational prior to the commencement of secondary extraction. Flaring CH<sub>4</sub> emissions from the ventilation system of Newstan Colliery through the Awaba Colliery Surface Site flaring system will result in considerable reductions in the project's total GHG emissions, saving an estimated 82% of total emissions or 3,629,819 t CO<sub>2-e</sub> across the life of the project.</p>

Aspect	Measure
Noise and vibration	<p>Construction phase noise mitigation measures will be outlined in the CEMP for the project construction.</p> <p>Operational noise emissions from the project will continue to be managed in accordance with the Northern Region Noise Management Plan (NMP). The NMP will be updated as necessary to account for the approved project.</p> <p>In addition, Centennial Newstan will undertake a noise monitoring program to validate the assumptions made in this assessment including the sound power level of on-site plant and equipment and off-site noise emissions.</p>
Traffic and transport	<p>The project-related construction and operational vehicle movements are not expected to have a significant impact on the assessed road network and key intersections. Therefore, no road improvements or upgrades are proposed as part of the project. The project-related workforce will be made aware of a number of traffic-related safety matters prior to commencement of their employment, including:</p> <ul style="list-style-type: none"> <li>• Heavy vehicles will avoid the Awaba township by accessing the Awaba Colliery Surface Site via Wilton Road.</li> <li>• Nearby schools and hours of school zone speed limit enforcement.</li> <li>• The level crossing location on Miller Road.</li> <li>• Varying speed limits along the assessed access routes.</li> <li>• General road safety rules and fatigue management measures.</li> </ul>
Soil and land resources	<p>Soils that are subject to surface disturbance for infrastructure or subsidence remediation will be managed in order to minimise impact and ensure appropriate rehabilitation of the disturbed areas can be undertaken.</p> <p>A CEMP will be prepared for the project prior to the commencement of any construction activities. The CEMP will include protocols for topsoil stripping, soil stockpile management and erosion and sediment control.</p>
Aboriginal heritage	<p>The following mitigation and management measures will be implemented for the project:</p> <ul style="list-style-type: none"> <li>• In the event that a previously unrecorded Aboriginal object is identified within the study area, it will be managed in accordance with the Centennial Coal Northern Region Aboriginal Cultural Heritage Management Plan protocols.</li> <li>• Centennial Newstan will ensure that all parties involved in the project are aware that it is an offence under Section 86 of the NPW Act to harm or desecrate an Aboriginal object unless that harm or desecration has been appropriately authorised under the Act.</li> <li>• The Centennial Coal Northern Region Aboriginal Cultural Heritage Management Plan will be updated where relevant to incorporate the findings and recommendations of the Aboriginal Cultural Heritage Assessment for the project.</li> <li>• Monitoring of Aboriginal heritage sites will occur in accordance with the Centennial Coal Northern Region Aboriginal Cultural Heritage Management Plan.</li> <li>• Based on discussions held in the field during the revisit of previously recorded AHIMS sites, a request will be made to the Heritage Branch (formerly OEH) to amend the site cards and change the status to 'not a site' for the three modified trees present over the study area (AHIMS 45-7-0324, 45-7-0318 and 45-7-0319).</li> </ul>

Aspect	Measure
Historic heritage	<p>The following management and mitigation strategies will be implemented for the listed and potential (unlisted) heritage items located within the study area:</p> <ul style="list-style-type: none"> <li>All staff, contractors and sub-consultants will be made aware of the heritage significance of the heritage items relevant to Newstan Colliery and Awaba Colliery and their statutory obligations for heritage under the <i>Heritage Act 1977</i> when working near items of heritage significance as part of any site inductions.</li> <li>Measures will be developed and implemented to ensure that adjacent fabric (physical material) of significance is not inadvertently impacted during construction and operation of the project. This includes the entirety of the core 1940s area at Awaba Colliery Surface Site as shown in Figure 6-17.</li> <li>In the unlikely event that unexpected historical (non-Aboriginal) archaeological remains are discovered during works within the study area they will be managed with reference to the standard protocols and procedures of Section 146 of the <i>Heritage Act 1977</i>.</li> </ul>
Visual amenity	<p>Where practicable, Centennial Newstan will position surface infrastructure in locations where visual screening can be provided by the topography or existing vegetation. Building heights will also be limited to minimise visual environmental impacts.</p>
Social	<p><b>Ongoing engagement</b></p> <p>Centennial Newstan is committed to maintaining meaningful relationships across the communities in which it operates. Centennial Newstan consultation and engagement reflects the diversity of each community's characteristics, including their values and aspirations. Centennial Newstan also recognises that their communities of interest are not just located proximate to operations, but now reflect a broader network of attitudes and opinions about the coal mining industry. Centennial Newstan acknowledges and understands that open communication and listening to stakeholders' concerns is of great value. The frequency and nature of this engagement is adapted to the needs of various stakeholder groups. For example, the Newstan-Awaba CCC operates with a genuine two-way open dialogue to provide information about Centennial Newstan activities and provide a forum for stakeholder feedback on Centennial Newstan operations. Centennial Newstan also regularly engages with industry groups, interest groups, local committees and regulators on matters of importance to the business and stakeholders.</p> <p>Stakeholder engagement is an integral component of Centennial's Environmental Management System Framework. Stakeholder engagement will be undertaken in a systematic manner consistent with the Environmental Management System Framework, taking into consideration government and community expectations.</p> <p>Centennial Newstan will continue to engage with key stakeholders in relation to mine closure planning. Centennial Newstan will also negotiate a VPA (or equivalent agreement) with Lake Macquarie City Council for the project. Financial contributions made through the VPA will be available for Lake Macquarie City Council to use for investing into future development.</p> <p>Ongoing community engagement and community relations building activities will include:</p> <ul style="list-style-type: none"> <li>Continued operation of the Newstan-Awaba CCC as a forum to provide information to community stakeholders and receive feedback of Centennial Newstan activities.</li> <li>Community sponsorships (financial and in-kind contributions).</li> <li>Active participation and support of a broad range of community organisations, activities and events.</li> <li>Maintenance of a dedicated phone line and community contact email for the project.</li> </ul>

Aspect	Measure
	<ul style="list-style-type: none"> <li>• Continued operation of the Northern Holdings Aboriginal Cultural Heritage Management Plan Committee.</li> <li>• Periodic community information days held at the Newstan Colliery Surface Site.</li> <li>• Regular and informal discussions and correspondence between Centennial Newstan representatives and external stakeholders including suppliers, residents, interest groups and facility and service providers.</li> </ul> <p><b>Performance monitoring</b></p> <p>The monitoring and evaluation of social impact management activities is important in understanding how programs are performing against expected outcomes and how successful these programs are at mitigating or managing identified impacts. Centennial Newstan will implement the following social performance monitoring measures for the project:</p> <ul style="list-style-type: none"> <li>• Conducting regular meetings for the Awaba-Newstan CCC.</li> <li>• Engagement with residents of the Project Application Area and interest groups in relation to the interactions of the project with the Eraring Ash Dam and Centennial Newstan's actions to minimise potential risks.</li> <li>• Community information and engagement with residents of the Project Application Area, Indigenous and non-Indigenous stakeholders and interest groups in relation to the findings of the EIS and proposed management measures.</li> <li>• Community information and engagement with residents of the Project Application Area in relation to the interactions of the project with the Eraring Ash Dam.</li> <li>• Undertaking pre-construction briefings with potential construction companies and ongoing regular communication with suppliers.</li> <li>• Engagement with Awaba residents in relation to the timing of construction activities.</li> <li>• Scheduling community open days for residents of nearby communities.</li> <li>• Communication with Fassifern Public School and Charlton Christian College families in relation to project activities.</li> <li>• Ongoing engagement with relevant Indigenous parties in relation to the management of cultural heritage, and access to traditional country.</li> <li>• Promoting operations phase employment opportunities locally.</li> <li>• Ensuring that the operations workforce is made aware of any traffic related safety matters prior to commencement of their employment.</li> </ul> <p><b>Mine closure SIA</b></p> <p>Centennial Newstan will undertake a mine closure SIA for the project approximately five years prior to the envisaged closure date. To assist in the mine closure process, Centennial Newstan will investigate, develop and incorporate social closure goals and impact management strategies within the mine closure plan/mine closure SIA. The mine closure SIA and associated strategies will involve engagement with Lake Macquarie City Council and other key partners to support future land use opportunities for the Lake Macquarie LGA. Once decommissioning and closure is underway, closure planning strategies and programs will be monitored to provide opportunities for adaptive management.</p>
Economic	Mitigation and management measures identified for the specific environmental impacts considered in the economic assessment are addressed within other sections throughout this EIS. Centennial Newstan will continue its programs of community consultation and engagement, with local and regional stakeholders.

Aspect	Measure
Hazard and risk	<p>Centennial Newstan will continue to employ the mitigation measures and management strategies currently adopted at Newstan Colliery for the storage, handling and disposal of dangerous goods to minimise the risk to human safety, the local environment and mine assets. Specific mitigation and management measures are set out in the following subsections.</p> <p><b>Emergency management system</b></p> <p>Newstan Colliery's Emergency management system and Pollution Incident Response Management Plan (PIRMP) will be reviewed and updated for the project. The review will take into consideration relevant requirements under the WHS (Mines and Petroleum Sites) Act, commitments made in this EIS, and all relevant SSD consent conditions.</p> <p><b>Training and awareness</b></p> <p>The updated Emergency management system and PIRMP will be used to train and inform employees and contractors of the appropriate emergency procedures. The following excerpts from the Emergency management system will be applied to hazardous chemicals awareness:</p> <ul style="list-style-type: none"> <li>• Employees will be provided with suitable training, education and/or information to gain or refresh the necessary skills and knowledge to competently perform their tasks and be aware of specific hazards to be managed. Refresher training will be provided to maintain an employee's skills and/or knowledge in a particular area, as appropriate.</li> <li>• All new employees and contractors, on commencing at the mine will be trained in the basic awareness of the hazards identified in the Emergency Management System.</li> <li>• Where appropriate the Coal Services Order 34 induction and training scheme will be used to guide development and implementation of the additional training requirements of the Emergency Management System.</li> </ul> <p><b>General</b></p> <ul style="list-style-type: none"> <li>• All hazardous chemicals will be transported to and from the Newstan Colliery Surface Site and Awaba Colliery Surface Site by a licensed contractor in accordance with the relevant Australian Standards and codes of practice.</li> <li>• All hazardous chemicals will be clearly labelled when delivered from the supplier and stored in suitable designated storage facilities in accordance with relevant Australian Standards and codes of practice.</li> <li>• All on-site hazardous chemical storage facilities will be regularly inspected and maintained to avoid leaks, spills and other faults.</li> <li>• Safety data sheets (SDSs) will be maintained for all chemicals and dangerous goods in a number of locations in both hard copy and electronically for ease of access by the entire workforce. The SDSs will be checked against first aid supplies to ensure all first aid requirements are available on site.</li> <li>• Spill kits will be provided and maintained on-site.</li> </ul>

Aspect	Measure
Bushfire	<p>Centennial Newstan will continue to employ the mitigation measures and management strategies currently adopted at the Newstan Colliery, as relevant to the project, to reduce the bushfire hazard and minimise the risk to human safety and assets.</p> <p>Industrial infrastructure is generally fire resilient, however the potential for component failure can be minimised via implementation of appropriate bushfire treatment options, which also provide a higher level of safety to personnel. The following specific mitigation measures and management strategies will be adopted.</p> <p><b>Emergency management system</b></p> <p>Newstan Colliery's emergency management system, including the bushfire management plan, will be reviewed and updated for the project.</p> <p><b>Life safety – emergency management</b></p> <p>The emergency response arrangement for the project will be detailed in the Emergency management system, including continual awareness and training in preparation for response to an emergency. Emergency evacuation procedures will include clarification of the main access road and alternative egress route (emergency safe route) and ensure an understanding of the extent/spread of fire is known prior to evacuating the site.</p> <p><b>Asset Protection Zones</b></p> <p>The existing APZs at the Newstan Colliery Surface Site and Awaba Colliery Surface Site will be maintained. These are considered acceptable to achieve the desired setbacks for flame and radiant heat protection. A minimum APZ of 45 metres will be established around the new infrastructure at the Awaba Colliery Surface Site. It will be established via perimeter roads, excavated walls and/or bushland management areas.</p> <p><b>Road access</b></p> <p>The access provisions to the Newstan Colliery Surface Site and Awaba Colliery Surface Site are considered suitable for evacuation and access purposes. These routes will continue to be detailed on an emergency operation map and integrated into the Emergency management system.</p> <p><b>Water supplies</b></p> <p>The existing water supplies at the Newstan Colliery Surface Site and Awaba Colliery Surface Site will continue to provide a reticulated supply, with hydrants sign-posted and spaced at desirable intervals.</p> <p><b>Communication</b></p> <p>The updated Emergency management system will be used to inform all personnel of the appropriate emergency procedures.</p> <p><b>Consultation</b></p> <p>For the purpose of bushfire safety, consultation with the NSW Rural Fire Service will be undertaken prior to and during the typical bushfire season each year between August and May. This consultation may include discussion of emergency procedures and the suitability of access roads, APZ areas and water supplies.</p> <p><b>Monitoring</b></p> <p>All asset protection actions will be monitored on an opportunistic basis or a frequency not exceeding 3 years.</p>
Rehabilitation and closure	Refer to the rehabilitation and closure strategy outlined in Section 6.19.