



VOLUME 1

Environmental Impact Statement - Main Report

Prepared for Tahmoor Coal

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Environmental Impact Statement

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Certification

Submission of Environmental Impact Statement

Prepared to support the application for Development Consent SSD 17_8445 as required under Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*.

In respect of:

Applicant and Land Details

Applicant	Tahmoor Coal Pty Ltd 2975 Remembrance Driveway, Bargo
Subject	Tahmoor Coal Pty Ltd is seeking approval for the Tahmoor South Project (SSD 17_8445) under Division 4.7, Part 4 of the <i>Environmental Planning and Assessment Act 1979</i> .
Project Summary	Tahmoor Coal Pty Ltd is seeking approval for the Tahmoor South Project (the proposed development), being the extension of underground coal mining at Tahmoor Mine, to the south of Tahmoor Coal's existing Surface Facilities Area. The proposed development would continue to be accessed via the existing surface facilities at Tahmoor Mine and would utilise the existing surface infrastructure at the Tahmoor Mine Surface Facilities Area. Some surface infrastructure upgrades are proposed to facilitate the extension, including expansion of the existing rejects emplacement area (REA), additions to the existing bathhouses and associated access ways, upgrades to the Coal Handling and Preparation Plant (CHPP), construction of new mine ventilation shafts, and upgrades to offsite service infrastructure.
Lot and DP	Refer Appendix B

Environmental Impact Statement

An Environmental Impact Statement (EIS) is attached. The EIS assesses the likely environmental impacts of the Project including the matters referred to in the Secretary's Environmental Assessment Requirements provided to the Applicant on 20 June 2018 under Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*.

Declaration

I certify that I have prepared the contents of this EIS in accordance with the requirements of the *Environmental Planning and Assessment Act 1979* and *Environmental Planning and Assessment Regulation 2000* and that, to the best of my knowledge, the information contained in this report is not false or misleading.

Signature:

Date: 21 December 2018

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Executive Summary

Tahmoor Coal Pty Ltd (Tahmoor Coal) owns and operates the Tahmoor Mine, an existing underground coal mine approximately 80 kilometres (km) south-west of Sydney in the Southern Coalfields of New South Wales (NSW) within the Wollondilly Local Government Area (LGA).

Tahmoor Coal produces up to three million tonnes per annum (Mtpa) of run of mine (ROM) coal from its existing operation at the Tahmoor Mine. The Tahmoor Mine was granted planning and environmental approvals to commence coal mining operations in the mid to late 1970s. Underground mining at the existing operation is anticipated to be completed by 2022, depending upon geological and mining conditions.

Tahmoor Coal is seeking approval for the Tahmoor South Project (the proposed development), being the extension of underground coal mining at Tahmoor Mine, to the south of Tahmoor Coal's existing Surface Facilities Area. The proposed development would continue to be accessed via the existing surface facilities at Tahmoor Mine and would utilise the existing surface infrastructure at the Tahmoor Mine Surface Facilities Area. Some surface infrastructure upgrades are proposed to facilitate the extension, including expansion of the existing rejects emplacement area (REA), additions to the existing bathhouses and associated access ways, upgrades to the Coal Handling and Preparation Plant (CHPP), construction of new mine ventilation shafts, and upgrades to offsite service infrastructure.

The proposed development would use longwall mining to extract coal from the Bulli seam within existing mining tenements; CCL 716 and CCL 747. Coal extraction of up to four (4) million tonnes (Mt) of Run of Mine (ROM) coal per annum is proposed as part of the development. Once the coal has been extracted and brought to the surface, it would be processed at Tahmoor Mine's existing CHPP, and then transported to customers via the existing rail loop, the Main Southern Railway and the Moss Vale to Unanderra Railway to Port Kembla for Australian and international markets. Product coal would also be transported via rail to Newcastle (Port Waratah) from time to time. Up to 200,000 tonnes per annum of either product coal or reject material is proposed to be transported to customers via road.

Tahmoor Mine has been operating for around 40 years, and in this time has developed extensive experience in successfully managing the impacts of mining operations, particularly the effects of subsidence on the built and natural environment using a range of management measures and communication tools. These management measures would continue to be used to communicate with the local community and effectively mitigate and manage the potential effects of the proposed development including subsidence and other issues.

The proposed development would prolong the life of the Tahmoor Mine to provide for the ongoing direct employment of approximately 390 employees and enable existing coal markets to be serviced. The Tahmoor South Project would provide ongoing significant local, regional and State economic benefits in the form of additional wages, royalties and flow-on positive economic effects, and would maximise recovery of the existing coal resource within coal lease areas.

Tahmoor Coal has undertaken extensive stakeholder and community consultation regarding the proposed development since 2012. The project design has subsequently undergone numerous revisions to avoid longwall mining directly under sensitive features such as the Metropolitan Special Area, bedrock rivers with standing pools, items of Aboriginal heritage and significant landscape features such as river gorges.

This Environmental Impact Statement (EIS) contains detailed studies into the potential environmental, social and adverse economic impacts of the proposed development. The scope of technical specialist assessments has been determined based on the preliminary environmental risk screening undertaken for the Preliminary Environmental Assessment (PEA), preparation of a social impact assessment scoping report, consultation with Government agencies, consideration of the Secretary's Environmental Assessment Requirements (SEARs) which were issued on 6 June 2017 and revised on 20 June 2018, and through the EIS and subsidence risk workshops undertaken for the proposed development. The key findings of the impact assessment for the proposed development are summarised in **Table 1**.

Table 1 Key Findings of the EIS

Key issue	Key findings	Relevant EIS section
Key Issues		
Subsidence	<p>As a result of stakeholder and community consultation and consideration of predicted subsidence impacts within the Subsidence Study Area (SSA), the Mine Plan has incorporated a number of changes to reduce predicted subsidence impacts on built and natural features.</p> <p>The Subsidence Impact Assessment (MSEC, 2018) for the proposed development predicts that the maximum subsidence levels would impact on some natural and built features within the SSA. The assessment of potential subsidence impacts determined that 55% of the houses within the SSA would be unaffected or require minor adjustments only. Far field horizontal movements are predicted to occur; however, impacts experienced at sensitive features are not expected to be significant or measureable (i.e. less than 0.3 mm/m).</p> <p>The overall findings of the assessment are that the levels of impact and damage to identified natural features and built infrastructure are manageable. Importantly, the extensive experience gained by Tahmoor Coal in successfully managing subsidence impacts from Tahmoor Mine to-date would be applied to the proposed development and the existing subsidence management framework would be employed at the Tahmoor South Project. Management measures would be documented in an Extraction Plan (EP), which would be developed and implemented in consultation with relevant stakeholders.</p> <p>EP sub-plans would be developed to manage potential impacts to specific features through consultation with infrastructure owners and approved by the relevant government agencies.</p>	Section 11.1, Appendix F
Geomorphology	<p>The Geomorphology Technical Report found that provided the proposed mitigation and management measure are implemented, the proposed development is not anticipated to present a significant risk to change in the geomorphic character of waterways in the Project Area. The qualitative assessment of geomorphology found that the overall risk of geomorphic change as a result of mining-induced subsidence was minor. As waterways are resilient and generally in good condition, changes that do occur as a result of the proposed development would be expected to recover.</p>	Section 11.2, Appendix H

Key issue	Key findings	Relevant EIS section
Groundwater	<p>The Groundwater assessment predicted annual average mine inflow rates of approximately 1,700 mega litres (ML) of water per annum over the life of the proposed developed. The peak annual flows are predicted to be between 2,850ML in 2029 and 2,600 ML of water in 2032. The existing groundwater entitlement held by Tahmoor Coal allows for 1,642 ML of water per annum and additional license(s) would be purchased in the open market to account for the additional inflows.</p> <p>The groundwater modelling indicates baseflow reductions at streams, however these reductions would be relatively minor in comparison to total flow. The modelling indicated that the percentage of mean flow reduction (as a result of baseflow changes) for all waterways would be less than 3.8% under the proposed development and less than 4.9% under the cumulative scenarios. It is noted that the reductions in baseflow would likely be most noticeable during periods of low flow.</p> <p>The Groundwater assessment predicted that up to 30 registered bores and three unregistered bores would experience drawdown of greater than 2 metres (m) as a result of the proposed development. The assessment found that mining-induced mixing of groundwater would result in minor changes to the salinity of the Hawkesbury Sandstone and Bulgo Sandstone, the two most commonly utilised aquifers. However, there are no anticipated risks of reduced beneficial uses of the Nepean Groundwater Management Area porous rock aquifer and the assessment indicates that risks to groundwater quality would decrease with distance from the active mining area. 'Make good' measures would be implemented by Tahmoor Coal at all impacted bores to account for drawdown and/ or groundwater quality impacts.</p> <p>Trigger action response plan (TARP) measures would be adopted to manage the impacts of the proposed development on groundwater to minimise impacts. Tahmoor Coal would continue to maintain its established regional groundwater monitoring network designed to monitor potential risks to existing ground water users and implement make good measures, as required.</p>	Section 11.3, Appendix I

Key issue	Key findings	Relevant EIS section
Surface Water and Hydrology	<p>The results of predictive modelling of the proposed water management system indicate that the proposed development would not result in additional water quality impacts due to releases and overflows from the site water management system compared to the existing situation.</p> <p>Subsidence predictions identified watercourses that lie directly over the longwalls are exposed to a greater range of subsidence impacts. However, based on subsidence predictions for the proposed development it is considered that while localised changes, diversions and ponding to surface water may occur, they would be minor. Management measures would include further baseline monitoring programs, monitoring during mining, and post-mining monitoring programs. TARPs would be prepared for the proposed development, focusing on water quality exceedances, unexpected flow loss, and unexpected loss of pool water holding capacity.</p> <p>The assessment of flooding identified that the upper reaches of catchments are more susceptible to flood inundation due to the flatter terrain and low capacity drainage channels in these areas, with minor localised increases of flooding predicted at Tea Tree Hollow (upstream).</p> <p>The results show that flooding is unlikely to be increased in the Bargo Township as a result of the proposed development, with the exception of minor localised flooding at Dymond Road and Wattle Street. This flooding extent would not impact surrounding residential developments. Given the minor nature of predicted flood impacts the project would have no impact on existing emergency management procedures.</p>	Section 11.4, Appendix J
Thirlmere Lakes	<p>The water balance model determined that the most significant outflow component from the Thirlmere Lakes is evaporation/evapotranspiration. Groundwater recharge comprises approximately a quarter of outflows. The Project would only affect the groundwater recharge component, albeit to a minor extent.</p> <p>It has been determined that the proposed development would have negligible groundwater and surface water impacts on the Thirlmere Lakes that would be comparable to levels of natural variability and would be imperceptible in many circumstances. Potential impacts to terrestrial and aquatic ecology within the Thirlmere Lakes were also determined to be minor to negligible.</p>	Section 11.5, Appendix I, Appendix J

Key issue	Key findings	Relevant EIS section
Other Issues		
Terrestrial ecology	<p>The Terrestrial Ecology Assessment undertaken for the proposed development identified that potential impacts to terrestrial vegetation throughout the study area are not anticipated to be significant as a result of subsidence. Riparian vegetation is more susceptible to subsidence impacts. However, impacts are considered to be manageable.</p> <p>Impacts to native vegetation (Including Shale Sandstone Transition Forest (SSTF) Endangered Ecological Community (EEC)) would occur as a result of clearing necessitated by the expansion of the REA and construction of other surface infrastructure. An Offset Strategy has been proposed to compensate for impacts to the SSTF EEC as impacts cannot be avoided.</p> <p>Impacts to threatened species within the study area would be mitigated and managed through the implementation of a Biodiversity Management Plan and an on-going monitoring program.</p>	Section 11.6, Appendix K
Aquatic ecology	<p>The Aquatic Ecology Assessment identified that aquatic habitats of streams within the SSA may be impacted by subsidence related impacts, including Tea Tree Hollow, Dog Trap Creek and downstream watercourses. Impacts at these waterways could include changes to stream beds, altering surface water flows and ponding, and changes to water quality. Significant subsidence movements are not predicted at the Nepean and Bargo Rivers and these rivers would not be directly undermined, indicating that the quality and quantity of available aquatic habitat in the area is unlikely to be impacted.</p> <p>Whilst stream bed changes as a result of subsidence have the potential to result in losses of habitat in sections of the streams, at a sub-catchment to catchment scale, changes to overall invertebrate assemblage and family richness were predicted to be minor. In addition, none of the waterways predicted to be impacted were considered likely to provide suitable habitat for threatened aquatic species and no threatened aquatic species were recorded during multiple site surveys.</p> <p>A range of measures would be implemented to mitigate impacts including: subsidence monitoring of macroinvertebrates to be conducted for a baseline period of two years prior to longwall extraction, a Before After Control Impact (BACI) designed monitoring program to compliment the baseline information collected and assess monitoring impacts in an adaptive management framework. Stream rehabilitation measures to remediate subsidence impacts, and the preparation and implementation of a Corrective Management Action Plans (CMAPs) and TARP for potential impacts to pools and other aquatic habitat features. The CMAP will draw upon the experience and remediation methodology developed by Tahmoor Coal from the implementation of the CMAPs for Myrtle Creek and Redbank Creek at Tahmoor North.</p>	Section 11.7, Appendix K

Key issue	Key findings	Relevant EIS section
Aboriginal heritage	<p>Majority of potential impacts on cultural heritage sites are limited to potential subsidence impacts. One archaeological site of low scientific significance falls within the footprint of a ventilation shaft and may be impacted directly</p> <p>A total of 40 sites were identified during the assessment (including previously recorded and newly recorded sites) including one cultural heritage site and 39 archaeological sites. Archaeological sites included a number of sandstone shelter sites with art primarily at Dog Trap Creek. Of the 39 archaeological sites, four are considered to be of high significance and two are considered to be of moderate significance (all six comprising sandstone shelter sites with art at Dog Trap Creek). Twenty six (26) archaeological sites have the potential to be impacted by subsidence impacts. One archaeological site has been identified as having potential to be directly impacted by the surface infrastructure.</p> <p>Notably, the mine plan has been designed to avoid direct undermining of the high significance archaeological heritage sites along Dog Trap Creek. Mitigation and management for potential impacts to cultural heritage includes the preparation and implementation of a Heritage Management Plan for the proposed development. Should monitoring detect the early development of potentially severe differential movements at these archaeological sites during the extraction of the early longwalls, adaptive management would be applied.</p> <p>During detailed design and construction planning care would be taken to site surface infrastructure to avoid disturbance of identified archaeological sites, as far as practicable. If direct impacts cannot be avoided in the location of surface infrastructure, further management would be undertaken in consultation with the RAPs and a suitably qualified archaeologist, as part of a Heritage Management Plan.</p>	Section 11.8, Appendix L
Non-Aboriginal heritage	<p>The Historic Heritage Assessment identified that potential impacts on heritage items are primarily limited to subsidence associated impacts.</p> <p>A total of 23 historical heritage items were identified during the assessment, with 19 located directly above the proposed longwall mining area. Of these items, only one State Heritage listed item was identified (the Wirrimbirra Sanctuary).</p> <p>The assessment concluded that there was nil to low likelihood of significant impacts to any of the built structures of heritage value identified in the project area. This included historic heritage items within the Wirrimbirra Sanctuary.</p> <p>Mitigation measures have been identified to manage potential impacts, including the preparation and implementation of a site specific Heritage Management Plan for each heritage site of local significance identified within the Project Area. Detailed site inspection would be undertaken at Wirrimbirra Sanctuary prior to the commencement of mining to confirm the condition and structural integrity of the historic items within the sanctuary and inform the preparation of the site-specific Heritage Management Plan for the site to manage subsidence related impacts.</p>	Section 11.9, Appendix L

Key issue	Key findings	Relevant EIS section
Noise and vibration	<p>The noise emissions from the proposed development are predicted to reduce compared to existing Tahmoor Mine operational noise emissions at almost all noise-sensitive receptors during the day and evening periods and, importantly, most significantly during the night-time period at all noise-sensitive receptors. During the day and evening periods mitigated operational noise is expected to be lower at all but two assessment locations, residences at 185 and 215 Charlies Point Road. Negotiations between Tahmoor Coal and the owners of the two residences have commenced, for the purpose of acquiring the two properties.</p> <p>Road traffic noise associated with construction and operation of the project is predicted to satisfy the requirements of the <i>Road Noise Policy 2011</i>. Hence, the project is not expected to generate significant road traffic noise impacts at the nearest potentially affected receivers.</p> <p>Construction noise levels are predicted to exceed the relevant noise management levels at some locations but would remain below the highly noise affected level for all works during standard construction hours at all assessment locations. Construction noise levels outside of standard hours are predicted to exceed the noise management levels at the two nearest sensitive receptors on Charlies Point Road. The maximum noise level is likely to be below the sleep disturbance screening criteria at all nearby assessment locations.</p> <p>Based on the safe working distances for construction related vibration from typical plant items and the location of surrounding sensitive receptors, it is unlikely that human response vibration criteria or cosmetic damage criteria will be exceeded. The exception to this is the residence at 185 Charlies Point Road, with whom negotiations have commenced for the purpose of acquiring the property. Vibration from operational activity is not expected to change, with ground-borne vibration from equipment operating at the pit-top not expected to be perceptible.</p> <p>Tahmoor Coal will continue to monitor and actively manage construction noise and vibration as part of the proposed development, and will continue to investigate options for further operational noise mitigation into the future.</p>	<p>Sections 11.10, Appendix M</p>

Key issue	Key findings	Relevant EIS section
Air quality	<p>Potential air quality impacts during the construction phase would be short term and temporary in nature. Notably, estimated PM₁₀ emissions from construction of the proposed development would be significantly less than the estimated emissions for operational mining activities.</p> <p>Operation of the proposed development is not predicted to result in exceedances of air quality criteria for annual average PM_{2.5}, annual average PM₁₀, annual average TSP or annual average deposited dust under the worst case scenario.</p> <p>No sensitive receptors are predicted to exceed the maximum 24-hour PM_{2.5} criterion of 25 µg/m³ as a result of the proposed development (project only contributions).</p> <p>One private receptor near the REA (R10) is predicted to experience maximum 24-hour average PM₁₀ concentrations above the relevant criterion of 50 µg/m³ due to the proposed development's operations alone on one day of the year only. With the incorporation of a TARP and other dust management practices, these exceedances would be well managed.</p>	Section 11.11, Appendix N
Greenhouse gas	<p>The proposed development would generate an annual average of 0.84 million tonnes CO₂-e of Scope 1 emissions, equating to approximately 13.5 million tonnes CO₂-e over its life. Importantly, average annual Scope 1 emissions would represent a very small portion of Australia's commitment under the Paris Agreement, at about 0.19%. In addition, the proposed development would generate approximately 1.5 million tonnes CO₂-e of Scope 2 emissions and approximately 104.5 million tonnes CO₂-e of Scope 3 emissions over its life. Management and mitigation measures would be incorporated into the proposed development to reduce Scope 1, 2 and 3 emissions where feasible and practical.</p>	Section 11.12, Appendix O
Traffic and transport	<p>The Traffic Impact Assessment for the proposed development identified existing and future traffic volumes on the local road network. While an increase in construction and operational traffic is anticipated as a result of the proposed development, given the capacity of the existing road network the impact of this increase is considered minor.</p> <p>The upgrade of the mine access intersection with Remembrance Driveway is expected to improve road safety at this intersection. The potential impacts of the proposed development would be managed through Construction Traffic Management Plans which would be prepared in consultation with both RMS and Wollondilly Shire Council.</p>	Section 11.13, Appendix P

Key issue	Key findings	Relevant EIS section
Social	<p>Social impacts of the proposed development have been assessed with consideration of the local and regional context of the Project Area. The proposed development is likely to continue to generate social impacts in line with those already experienced by the community.</p> <p>Ongoing community consultation and engagement procedures would be implemented to keep the community informed of mine activities, respond to complaints and concerns and seek feedback. In addition, Tahmoor Coal would implement a Social Involvement Policy to provide for mine closure planning and transitioning of employment to minimise the future impacts of mine closure.</p> <p>The proposed development would extend the life of the Tahmoor Mine enabling existing coal markets to continue to be serviced and importantly, allowing the ongoing direct employment for approximately 390 employees for an additional 13 years, as well as the employment of between 50 and 175 additional staff for the transition period. The proposed development would generate significant economic benefits including royalties and net income to the Wollondilly region and State. Additionally, the project would facilitate Tahmoor Coal's ongoing role in supporting the local community, through ongoing community contributions for a further 13 years.</p>	Section 11.15, Appendix Q
Economic	<p>In accordance with the NSW Treasury guidelines, a Cost Benefit Analysis and Local Effects Analysis was undertaken for the Tahmoor South Project comparing the proposed development central case to a baseline case of the proposed development not proceeding, to assess the net benefits to the NSW community. The economic assessment predicted a net benefit of around \$699.5 million to be generated by the proposed development over its life, of which up to \$132.0 million would flow through to the local Wollondilly region (in Net Present Value terms). Community benefits would be generated primarily through employment which would peak at 422 full time equivalent employees in the operational stages following development and construction phase of the proposed development. The proposed development is also expected to generate increased economic activity and employment within the wider NSW community, through wage spending and demand for downstream services and suppliers.</p>	Section 11.16, Appendix R
Visual landscape	<p>New visual elements associated with the proposed development would be minimal and would be limited to expansion of the REA, construction of two new ventilation shafts and upgrades to the Surface Facilities Area. The proposed development is not expected to create a visual impact on existing land use within and surrounding the Project Area.</p>	Section 11.17, Appendix S

Key issue	Key findings	Relevant EIS section
Soils and land capability	<p>There is no Biophysical Strategic Agricultural Land in the Project Area. The land in the project areas comprises land with a soil and land capability class of 4, 6 or 7 (moderate, low and very low capability land, respectively), with generally poor fertility soils. No land impacted by the proposed development is currently used for agricultural purposes. A total of 43 ha of bushland that is classified as potential agricultural land would be permanently removed as part of the REA expansion.</p> <p>Provided the existing mitigation measures and proposed rehabilitation measures are implemented, the proposed development is unlikely to significantly alter the land capability of the Project Area.</p>	Section 11.18, Appendix T
Land use	<p>Land use within the Project Area and DAA has been identified as predominately rural with some urban townships. Conservation Areas surround the Project Area however a small portion of only one, the Upper Nepean State Conservation Area, is located within the Project Area (though not within the proposed development). Subsidence impacts to the Upper Nepean State Conservation Area are considered to be negligible.</p> <p>Impacts to urban land uses are limited to physical impacts to dwellings and public infrastructure which are considered minor and manageable. Temporary impacts to Rural land are anticipated as a result of surface infrastructure upgrades and expansion of the REA, as well as subsidence related impacts to agriculture structures. However, these impacts are expected to be minor and readily managed through the EP.</p>	Section 11.19, Appendix T
Waste	<p>Construction waste from the proposed development would be managed in accordance with the existing Waste Management Strategy.</p> <p>The proposed development once fully operational would not result in a significant change in the amount or type of wastes generated on site.</p> <p>The Waste Management Plan for the existing Tahmoor Mine would be amended to reflect the operation of the proposed development.</p>	Section 11.21
Hazards	<p>The risks associated with the storage of dangerous goods, underground fire and explosion and bushfire on the proposed development would not differ to that which is present for the operation of the existing Tahmoor Mine. These risks would be managed through the implementation of the existing Hazardous Materials Management Procedure, Bushfire Management Plan and pre and post gas drainage.</p>	Section 11.22

Key issue	Key findings	Relevant EIS section
Rail transport and port capacity	<p>The Rail transport and port capacity assessment found that the generation of product coal from the proposed development would be accommodated within the four rail paths that are currently utilised for the operation of the existing Tahmoor Mine. There would be no change to the frequency or number of existing rail movements or operations.</p> <p>The assessment also found that the Port Kembla Coal Terminal has the capacity to receive four train paths of coal product per day from the proposed development, and has the capacity to store and handle the product coal that the proposed development would generate. The proposed development would facilitate the prolonged economic use of the Port Kembla Coal Terminal.</p> <p>Based on the assessment, the proposed development would not alter the existing impacts of the Tahmoor Mine on port and rail capacity other than the prolongation of utilising this infrastructure.</p>	Section 11.14, Appendix P

Management and mitigation measures outlined in this EIS would be implemented throughout the detailed planning, construction and operational phases of the proposed development. These safeguards would minimise any potential adverse impacts arising from the proposed development on the surrounding environment.

Project approval is sought for the extension of an existing underground coal mine and use of an existing Surface Facilities Area within an existing mining lease area. With the implementation of appropriate mitigation measures, the proposed development would meet environmental performance requirements. Further it would result in direct and indirect economic benefits to the local community, and has been assessed in accordance with the principles of Ecologically Sustainable Development (ESD) in order for the proposed development to be considered for approval.

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Glossary of Terms

Term	Definition
Aboriginal cultural heritage	The tangible (objects) and intangible (dreaming stories, song lines, and places) cultural practices and traditions associated with past and present day Aboriginal communities.
Aboriginal stakeholders	Members of a local Aboriginal land council, registered holders of Native Title, Aboriginal groups or other Aboriginal people who have registered their interest with Tahmoor Coal to be consulted about a proposed development.
annual recurrence interval (ARI)	Used to describe the frequency or probability of floods occurring (e.g. a 100 year ARI flood is a flood that occurs or is exceeded on average once every 100 years).
anticline	Upwards-arched fold in the rock strata, where the beds dip outwards in two or more directions from the crest.
aquifer	Geologic formation, group of formations, or part of a formation capable of transmitting and yielding quantities of water.
archaeological site	A site with material evidence of past Aboriginal or non-Aboriginal activity in which evidence of past activity is preserved.
archaeology	The scientific study of human history, particularly the relics and cultural remains of the distant past.
arterial roads	The main or trunk roads of the State road network.
Assessment Background Level	The Assessment Background Level (ABL), as defined by the NSW Industrial Noise Policy 2000, is a measure of the background level for noise, representing discrete assessment periods (i.e. day, evening or night) for each day. It is determined by calculating the 10th percentile (lowest 10%) background noise level over a 90 minute period (LA90).
background noise level	The NSW Industrial Noise Policy 2000 defines the background noise level as the ambient sound-pressure noise level in the absence of the sound under investigation exceeded for 90% of the measurement period. Normally equated to the average minimum A-weighted sound pressure level.
bed	Stratum of coal or other sedimentary deposit.
bin	Coal storage structure, either underground or surface structure.
blast	A controlled explosion which is used to loosen the substance being mined.
bore	A cylindrical drill hole sunk into the ground from which water is pumped for use or monitoring.
borehole	A hole produced in the ground by drilling for the investigation and assessment of soil and rock profiles.
Bulli seam	Shallowest coal horizon in the Illawarra Coal Measures in the Southern Coalfield. The Bulli coal seam is a primary source of coking coal, located in the Illawarra and Southern Coalfields of New South Wales.
catchment	The area from which a surface watercourse or a groundwater system derives its water.
Construction Environmental Management Plan (CEMP)	Construction Environmental Management Plan. A site specific plan developed for the construction phase of a project to ensure that all contractors and sub-contractors comply with the environmental conditions of approval for the proposed development and that environmental risks are properly managed.
clearing	The removal of vegetation or other obstacles at or above ground level.

Term	Definition
coal preparation	Treatment by screening of coal of various sizes to meet a purchaser's requirements and treatment by one or more processes to reduce the amount of waste (ash) present in the coal.
coking coal	Coal suitable for the manufacture of coke.
compressive strain	Compressive strains decrease in the distance between two points and may cause shear cracking, steps, or concave curvatures at the ground surface.
continuous miner	The electric powered cutting machine used to remove coal from the active mining face and load it into the shuttle car.
conveyor	The means of transporting coal from the face and to the underground bin or surface. It consists of a belt being driven by a motor drum system over a structure roller assembly.
cover	The overburden above the coal resource.
depth of cover	The depth from the surface to the mine workings.
Critically Endangered Ecological Community (EEC)	An ecological community identified by the <i>Biodiversity Conservation Act 2016</i> that is facing an extremely high risk of extinction in Australia in the immediate future, as determined in accordance with criteria prescribed by the regulations.
cumulative impacts	Combination of individual effects of the same kind due to multiple actions from various sources over time.
cut	Mechanically slice a coal seam to extract the coal resource.
cut-through	This is the mine opening at an angle to the main heading direction. It is the roadway which joins one roadway to another; they are numbered in sequence going in along the length of the development.
decibel	A scale unit used in the comparison of powers and levels of sound energy. Used for measuring noise.
mine development	The operations involved in preparing a mine for extraction, including cutting roadways and headings. Also includes tunnelling, sinking, crosscutting, drifting, and raising.
discharge	A release of water from a particular source.
downcast	Shaft or other mine opening down which fresh air from the surface passes.
drainage	Natural or artificial means for the interception and removal of surface or subsurface water.
drift	An inclined access from the surface to the coal seam or from coal seam to another coal seam. A drift often contains a conveyor belt or man-riding train.
drive	A heading, drift, or face.
earthworks	Operations involved in loosening, excavating, placing, shaping and compacting soil or rock.
ecology	The study of the relationship between living things and the environment.

Term	Definition
ecologically sustainable development	As defined in the <i>Protection of the Environment Administration Act 1991</i> , requires the effective integration of economic and environmental considerations in decision making processes including: <ul style="list-style-type: none"> • The precautionary principle; • Inter-generational equity; • Conservation of biological diversity and ecological integrity; and • Improved valuation, pricing and incentive mechanisms (includes polluter pays, full life cycle costs, cost effective pursuit of environmental goals).
ecosystem	As defined in the <i>Environment Protection and Biodiversity Conservation Act 1999</i> , an ecosystem is a 'dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.'
Endangered Ecological Community (EEC)	An ecological community identified by the <i>Biodiversity Conservation Act 2016</i> that is facing a very high risk of extinction in New South Wales in the near future, as determined in accordance with criteria prescribed by the regulations, and is not eligible to be listed as a critically endangered ecological community.
edge effects	A change in species composition, physical conditions or other ecological factors at the boundary between two ecosystems or the ecological changes that occur at the boundaries of ecosystems (including changes in species composition, gradients of moisture, sunlight, soil and air temperature, wind speed and other factors).
emission	The discharge of a substance into the environment.
Environmental Management Plan (EMP)	A plan used to manage environmental impacts during each phase of project development. It is a synthesis of proposed mitigation, management and monitoring actions, set to a timeline with defined responsibilities and follow up actions.
Environmental Management System (EMS)	A quality system that enables an organisation to identify, monitor and control its environmental aspects. An EMS is part of an overall management system, which includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy.
environment	As defined within the <i>Environmental Planning and Assessment Act, 1979</i> , all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings.
Environment Protection Licence (EPL)	EPLs are issued by NSW Environment Protection Authority (EPA) under the <i>Protection of the Environment Operations Act 1997</i> . EPLs with respect to scheduled development work or scheduled activities or non-scheduled activities may regulate all forms of pollution (including water pollution) resulting from that work or those activities. EPLs authorising or controlling an activity carried on at any premises may also regulate pollution resulting from any other activity carried on at the premises to which the licence applies.
Existing Tahmoor Mining Area	Encompasses all existing mining areas associated with the Tahmoor Mine, including the Surface Facilities Area.
extraction height	The heights at which the seam is extracted.

Term	Definition
Extraction Plan (EP)	<p>An Extraction Plan governs the management of subsidence impacts to natural and built features from longwall mining by:</p> <ul style="list-style-type: none"> • Providing an overview of the planned coal resource recovery methods; • Identifying and characterisation of the natural and built features within the Extraction Plan Area; • Identifying the predicted subsidence impacts and/or environmental consequences within the Extraction Plan Area associated with the planned coal recovery; • Identifying, and implementing as appropriate, a monitoring and management regime to control the identified subsidence risks; and • Implementing a review and auditing process to provide feedback <p>Extraction Plans replace the function of Subsidence Management Plans. On 1 July 2014 a consolidated Extraction Plan (EP) Process replaced the NSW Division of Resources and Geosciences' former Subsidence Management Plan process. Under the Extraction Plan, mine subsidence would be jointly regulated by the Resource and Geosciences Division (responsible for compliance and enforcement of the EP) and Planning Services Division (responsible for compliance and enforcement of the EP as it relates to the Development Consent) of the Department of Planning & Environment (DPE).</p>
exploration	The work done to prove or establish the extent and quality of the coal resource.
face	The inbye end of the mine roadway, usually the working place for coal extraction.
fan	Part of the ventilation system used to pass air through the mine workings. The 'main' fan is located on the surface but other booster fans may be located underground within the workings.
fault	Break in the continuity of a coal seam or rock strata.
FIDOL factor	An acronym used in odour impact assessments when collectively considering the issues of Frequency, Intensity, Duration, Offensiveness and Location of odour events.
first workings	Driving roadways in solid coal (before commencement) to act as either active working areas or function as development for subsequent extraction.
frequency (sound)	The number of cycles per second (Hertz) of anything that oscillates is called the "frequency". Most sounds comprise a composite of frequencies of varying sound-pressure levels in the range of 20 to 20,000 Hertz.
gate road	Roadway leading to a working place in longwall mining.
goaf	The goaf is the part of a longwall mine from which the coal has been removed. After longwall mining is complete, typically, the roof collapses filling the void.
GMRGS Plan	Greater Metropolitan Region Groundwater Sources Plan
greenhouse gases	Gases with the potential to cause climate change (e.g. methane, carbon dioxide and others listed in the <i>National Greenhouse and Energy Reporting Act 2007</i>). Expressed in terms of carbon dioxide equivalent.
green waste	Organic waste resulting from the trimming, pruning, lopping, cutting or felling of any form of vegetation, for example grass, trees or shrubs.

Term	Definition
groundwater	Water located within an aquifer, i.e. water that is held in the rocks and soil beneath the earth's surface.
habitat	The place where a species, population or ecological community lives (whether permanently, periodically or occasionally).
heading	Roadways forming the opening in the direction of longwall development.
hydrocarbon	Any organic compound (gaseous, liquid or solid) consisting only of carbon and hydrogen.
hydrogeology	The study of subsurface water in its geological context.
hydrology	The study of rainfall and surface water runoff processes.
impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
inbye	The direction along a roadway towards the face, thus going away from the surface entry. Additionally, inbye can also refer to a direction that is further into the mine, away from the surface entry, from a current position in the mine.
intake	Any passage taking fresh air into the workings.
interburden	The rock between two geological features.
intrusive noise	Intrusive noise, as defined in the NSW Industrial Noise Policy 2000, refers to noise that intrudes above the background level by more than 5 decibels.
Key Threatening Process	As defined under the <i>Biodiversity Conservation Act 2016</i> , a key threatening process is any listed process under the Act that adversely affects threatened species, populations or ecological communities, or that could cause species, populations or ecological communities that are not threatened to become threatened.
knickpoint	A local steep fall in channel bed elevation.
landscape character	The aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. Includes all aspects of a tract of land including built, planted and natural topographical and ecological features.
local road	A council controlled road which provides for local circulation and access.
longwall	A system of coal mining, where the coal seam is extracted from on a broad front or long face.
mine roof	The layer that lies over the coal seam.
outbye	Locations between the active face and the surface. Additionally, outbye can also refer to a direction that is further out of the mine, toward the surface entry, from a current position in the mine.
overburden	The geological units and material above the coal seam proposed or being mined.
panel	The mining unit that has previously been extracted or is currently being extracted.
perched water	Unconfined groundwater held above the water table by a layer of impermeable rock or sediment.
pollutant	Any matter that is not naturally present in the environment.
portal	Entrance to a tunnel.

Term	Definition
preparation plant	A place where coal is sized, treated by one or more processes, including washing, to reduce the amount of waste (ash) present and prepared for market.
product coal	Coal that has been processed within the processing plant to remove unwanted waste rock and prepared to customers specifications
Project Area	Shown on Figure 4.1
proposed development	Extension of underground coal mining and associated activities at Tahmoor Mine within the Project Area. Referred to as The Tahmoor South Project, as described in Section 4.0 of this EIS. The terms project and proposal are used interchangeably with the proposed development.
Rating Background Level (RBL)	The Rating Background Level, as defined in the NSW Industrial Noise Policy 2000, is the overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24-hour period used for the assessment background level).
Rehabilitation Management Plan (RMP)	Due to the commencement of the <i>Mining Amendment Act 2008</i> and <i>Mining Regulation 2010</i> on 15 November 2010, Rehabilitation Management Plans (RMP) are intended to replace the existing requirements for MOPs.
return air	Air that has passed through the workings and may contain gas or dust.
revegetation	Direct seeding or planting (generally with native species) within an area in order to re-establish vegetation that was previously removed from that area.
riparian	Relating to the banks of a natural waterway.
rising main	Pipes in shaft or drift delivering drainage water to surface.
run-off	The portion of water that drains away as surface flow.
Run of Mine (ROM)	Raw coal production that contains coal and rock.
seam	Layer or bed of coal.
sensitive receiver	A location where a person works or resides, including residential, hospitals, hotels, shopping centres, play grounds, recreational centres or similar.
shaft	An opening, usually vertical, that connects the surface with the underground workings.
shear	Vertical cut made in the coal face by the cutting machine. In longwall operations it refers to the cut of coal taken along the complete longwall face.
shuttle car	An electrically-propelled vehicle on rubber tires or caterpillar treads used to transfer materials, such as coal.
stockpile	Stored materials such as product coal, soil, sand, gravel and spoil/waste.
strain	The change in horizontal distance between two points at the surface after mining, divided by the pre-mining distance between the points and usually expressed in mm/m.
subsidence	The vertical lowering, sinking or collapse of the ground surface.
Subsidence Study Area	The predicted limit of vertical subsidence, taken as the 20 mm subsidence contour or a minimum of 600 m from the nearest edge of the proposed longwalls, whichever is the furthest.

Term	Definition
Surface Facilities Area	The surface components of the mine containing infrastructure related to mining operations.
surface water	Water flowing or held in streams, rivers and other wetlands in the landscape.
syncline	A trough-like fold in rocks.
tensile strain	The relative increase in the distance between two points on the surface.
tilt	The change in the slope of the ground as a result of subsidence, calculated as the change in subsidence between two points divided by the distance between the points and usually expressed in mm/m.
tributary	A river or stream flowing into a larger river or lake.
upcast	Shaft or other mine opening through which air returns to the surface after ventilating the mine workings.
vulnerable	As defined under the <i>Biodiversity Conservation Act 2016</i> , a species that is facing a high risk of extinction in New South Wales in the medium-term future.
water table	The surface of saturation in an unconfined aquifer at which the pressure of the water is equal to that of the atmosphere.
waterway	Any flowing stream of water, whether natural or artificially regulated (not necessarily permanent).

Acronyms

Acronym	Term/ Definition
µm	Micrometres
ABS	Australian Bureau of Statistics
ACHA	Aboriginal Cultural Heritage Assessment
ACHCR	Aboriginal cultural heritage consultation requirements
AEP	Annual Exceedance Probability
AHIMS	Aboriginal Heritage Information Management System
AIS	Agricultural Impact Statement
AQIA	Air Quality Impact Assessment
ARI	Annual Recurrence Interval
ARTC	Australian Rail Track Corporation
ASS	Acid sulfate soils
AST	Above-ground Storage Tank
AUSRIVAS	Australian River Assessment System
BC Act	<i>Biodiversity Conservation Act 2016</i>
BSAL	Biophysical strategic agricultural land
BTEX	Benzene, toluene, ethylbenzene and xylenes
CAMBA	China-Australia Migratory Bird Agreement
CBA	Cost Benefit Analysis
CCL	Consolidated Coal Lease
CEM	Continuous emission monitoring
CEMP	Construction Environmental Management Plan
CH ₄	Methane
CHMP	Cultural Heritage Management Plan
CHPP	Coal Handling and Preparation Plant
CL	Coal Lease
CLM Act	<i>Contaminated Land Management Act 1997</i>
CNVMP	Construction Noise and Vibration Management Plan
CO	Carbon monoxide
CO ₂	Carbon dioxide
CSI	Corporate Social Involvement
CTMP	Construction Traffic Management Plan
DAA	Disturbance assessment area
dB(A)	Decibels using the A-weighted scale measured according to the frequencies perceptible to the human ear.
DECCW	NSW Department of Environment, Climate Change and Water
DoEE	Commonwealth Department of Environment and Energy

Acronym	Term/ Definition
DI Water	NSW Department of Industry - Water
DPE	NSW Department of Planning and Environment
DPI	Department of Primary Industries
DRG	NSW DPE - Division of Resources and Geoscience (formerly the Division of Resources and Energy under NSW Trade & Investment)
DSC	Dams Safety Committee
EDL	Energy Developments Limited
EEC	Endangered Ecological Community
EIA	Economic Impact Analysis
EIS	Environmental Impact Statement
EL	Exploration Licence
EMS	Environmental Management System
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EP&A Regulation	<i>Environment Planning and Assessment Regulations 2000</i>
EP	Extraction Plan
EPA	NSW Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Act 1999 (Cth)</i>
EPL	Environment Protection Licence
ESA	Environmental Site Assessment
ESD	Ecological Sustainable Development
FM Act	<i>Fisheries Management Act 1994</i>
GHG	Greenhouse gas
GL	Gigalitre
GME	groundwater monitoring event
GMRGS	Greater Metropolitan Region Groundwater Sources
GRP	Gross Regional Product
GSP	Gross State Product
ha	Hectare/s
HVAS	High Volume Air Sampler
ICNG	<i>Interim Construction Noise Guideline</i>
IESC	Independent Expert Scientific Committee
ILUA	Indigenous Land Use Agreement
INP	<i>Industrial Noise Policy 2000</i>
IPM	Incremental Profile Method
JAMBA	Japan-Australia Migratory Bird Agreement
kPa	kilopascals
LALC	Local Aboriginal Land Council
LDP	licensed discharge point

Acronym	Term/ Definition
LEC	NSW Land and Environment Court
LEP	Local Environmental Plan
LOP	licensed overflow point
LGA	Local Government Area
LNAPL	Light non-aqueous phase liquid
LoS	Level of service
m AHD	metres Australian Height Datum
MAH	Monocyclic Aromatic Hydrocarbons
mg/L	milligrams per litre
micron	One millionth of a metre (abbreviation μ)
Mining SEPP	<i>State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i>
ML	Megalitre
MNES	Matters of National Environmental Significance (from the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>).
MOP	Mining Operations Plan
MPL	Mining Purpose Lease
MSA	Metropolitan Special Area
MSEC	Mine Subsidence Engineering Consultants Pty Ltd
Mtpa	Million tonnes per annum
NGER	National Greenhouse and Energy Reporting
NHMRC	National Health and Medical Research Council
NML	noise management levels
NMP	Noise Management Plan
NO	Nitric Oxide/Nitrogen monoxide
NO ₂	Nitrogen dioxide
NorBe	neutral or beneficial effect
NO _x	Oxides of nitrogen
NPfI	<i>Noise Policy for Industry 2017</i>
NPV	Net Present Value
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NVIA	Noise and Vibration Impact Assessment
O ₃	Ozone
OEH	Office of Environment and Heritage
OU	odour unit
PAC	Planning Assessment Commission
PAH	Polycyclic Aromatic Hydrocarbons

Acronym	Term/ Definition
PCB	Polychlorinated biphenyls
PEA	Preliminary Environmental Assessment
PFM	Planning Focus Meeting
pH	A measure of acidity or alkalinity of a solution. The potential of hydrogen.
PM	Particulate matter
PM ₁₀	Particulate matter less than 10 microns in diameter.
PM _{2.5}	Particulate matter less than 2.5 microns in diameter.
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PRP	Pollution Reduction Program
RAP	Registered Aboriginal Party
RBLs	Rating Background Levels
REA	Rejects emplacement area. Can also be called refuse emplacement area.
RMP	Rehabilitation Management Plan
RING	<i>Rail Infrastructure Noise Guideline 2013</i>
RMS	Roads and Maritime Services
RMZ	Risk Management Zone
RNP	<i>Road Noise Policy 2011</i>
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
ROM	Run Of Mine
SA NSW	Subsidence Advisory New South Wales
SEARs	Secretary's Environmental Assessment Requirements
SEPP	<i>State Environmental Planning Policy</i>
SHSW	Southern Highlands Shale Woodland
SIA	Social Impact Assessment
SIS	Surface to InSeam
SMP	Subsidence Management Plan
SO ₂	Sulfur dioxide
SSA	Subsidence Study Area
SSTF	Shale Sandstone Transition Forest
TARP	Trigger Action Response Plan
TCCCC	Tahmoor Coal Community Consultative Committee
TEOM	Tapered Element Oscillating Microbalance Instrument
TIA	Traffic Impact Assessment
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
TSP	Total Suspended Particulate matter

Acronym	Term/ Definition
UPSS	Underground Petroleum Storage Systems
UST	Underground storage tank
VHCs	Volatile halogenated compounds
VIA	Visual Impact Assessment
VOC	Volatile organic compounds
vpd	Vehicles per day
vph	Vehicles per hour
WARR Strategy	Waste Avoidance and Resource Recovery Strategy
WCMG	Waste Coal Mine Gas
Wingecarribee LEP 2010	Wingecarribee Local Environmental Plan 2010
Wollondilly LEP 2011	Wollondilly Local Environmental Plan 2011
WSP	Water Sharing Plans

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1.0 Introduction

This section provides an introduction to the Tahmoor Mine, the proposed Tahmoor South Project, the approval process for the proposed development, and the purpose and content of this Environmental Impact Statement (EIS).

1.1 Overview

Tahmoor Coal Pty Ltd (Tahmoor Coal) owns and operates the Tahmoor Mine. Tahmoor Coal trades as Tahmoor Coking Coal Operations (TCCO) within the SIMEC Mining Division of the GFG Alliance Group. The Tahmoor Mine is an underground coal mine approximately 80 kilometres (km) south-west of Sydney in the Southern Coalfields of New South Wales (NSW) (**Figure 1.1**).

Tahmoor Coal produces up to three million tonnes per annum (Mtpa) of run of mine (ROM) coal from its existing operation at the Tahmoor Mine, and undertakes underground mining under existing development consents, licences and the conditions of relevant mining leases. Underground mining, within the Existing Tahmoor Mining Area (refer to **Figure 1.2**), is anticipated to be completed by 2022, depending upon geological and mining conditions. **Section 1.2** discusses mining leases in detail.

Tahmoor Coal is seeking approval for the Tahmoor South Project (the proposed development), being the extension of underground coal mining to the south of the Tahmoor Mine Surface Facilities Area. The proposed development would continue to be accessed via the existing surface facilities at the Tahmoor Mine, located between the towns of Tahmoor and Bargo.

The proposed development seeks to extend the life of underground mining at the Tahmoor Mine until approximately 2035. The proposed development would enable mining to be undertaken within the southern portion of Tahmoor Coal's (and its wholly owned subsidiary Bargo Collieries Pty Ltd) existing lease areas, and operations and employment of the current workforce to continue for approximately a further 13 years. Additional surface lease areas will be required for surface facilities (refer to **Section 1.3** and **Figure 1.5**)

The Project Area is shown on **Figure 1.3** and comprises an area adjacent to, and to the south of, the Existing Tahmoor Mining Area. The Project Area also overlaps the Surface Facilities Area of the Existing Tahmoor Mining Area comprising the surface facilities, historical workings and existing mine infrastructure. The proposed development would extend mining at Tahmoor Mine within the Project Area, using longwall mining methods to mine the Bulli seam with the continued use of ancillary infrastructure at the existing Tahmoor Mine Surface Facilities Area. The mine plan for the project has undergone revisions to avoid longwall mining directly under sensitive features such as the Metropolitan Special Area (MSA), bedrock rivers with standing pools, items of Aboriginal heritage and significant landscape features such as river gorges. The Project Area traverses both the Wollondilly and Wingecarribee Local Government Areas (LGA) and covers the coal lease areas held by Tahmoor Coal and its wholly owned subsidiary Bargo Collieries Pty Ltd, including Consolidated Coal Lease (CCL) 747. Within the Project Area, the proposed development (including all longwall mining and surface development) would be confined to the Wollondilly LGA.

The Preliminary Environmental Assessment (PEA) for the proposed development was submitted to the then Department of Planning and Infrastructure (now NSW Department of Planning and Environment (DPE)) on 13 September 2012 to identify key environmental planning issues to inform the development of Director-General's Requirements (DGRs) for the preparation of this EIS.

In 2012 Director General's Requirements (DGRs) were issued and an EIS completed in 2014, however it was not submitted to the DPE. The proposed development was placed on hold and subsequently withdrawn in late 2015. In May 2017 the PEA was resubmitted to DPE requesting Secretary's Environmental Assessment Requirements (SEARs) in order to recommence the project development application and update the EIS. The SEARs for the Tahmoor South Project were issued on 9 June 2017 and revised on 20 June 2018 (social impact assessment requirements).

The project was determined to be a controlled action, under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), by Department of Environment and Energy on 12 January 2018 and supplementary SEARs were issued for the project on 14 February 2018 to include Commonwealth environmental assessment requirements. The Commonwealth government has accredited the NSW environmental assessment process under the *Environmental Planning & Assessment Act 1979* (EP&A Act) in a bilateral agreement between the governments. As such, the project will be assessed under the provisions of the EP&A Act in accordance with the bilateral agreement.

This EIS and the associated development application have been prepared in accordance with the SEARs and supplementary SEARs and also the requirements of the EP&A Act and the *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation) to seek approval from the NSW Minister for Planning (or delegate) and the Commonwealth Minister for the Environment (or delegate) for the Tahmoor South Project.

1.2 Background

The Tahmoor Mine consists of two Colliery Holdings, registered under section 163 of the *Mining Act 1992* (Mining Act):

- Tahmoor Colliery Holding – covering an area of 6,735 hectares (ha) with surface rights over 231.7 ha and consisting of Consolidated Coal Lease (CCL) 716 and Mining Leases (ML) 1308, 1376 and 1539; and
- Bargo Colliery Holding – consisting of CCL747 and covering 4,769 ha with surface rights over 921 ha.

A colliery is an underground mine, its associated buildings and equipment which has been established to specifically mine coal. Within this EIS, the term mine is used in preference to colliery.

Coal exploration operations commenced at the Tahmoor Mine during the 1960s by the NSW Government. This was then followed by the granting of exploration titles to private companies.

The Tahmoor and Bargo areas were initially secured by separate entities and developed as independent mines. Both the Tahmoor and Bargo Mines were granted planning and environmental approvals to commence coal mining operations in the mid to late 1970s.

The current Tahmoor Mine operation consists of:

- the Tahmoor Mine, which commenced mining operations in 1979 and has undertaken coal production until the present day; and
- the Bargo Mine, where limited development, including sinking the Bargo shaft, was undertaken between 1979 and 1981. Mine development work was discontinued in June 1981, followed by project feasibility investigations and exploration activities (refer **Section 1.2.2**).

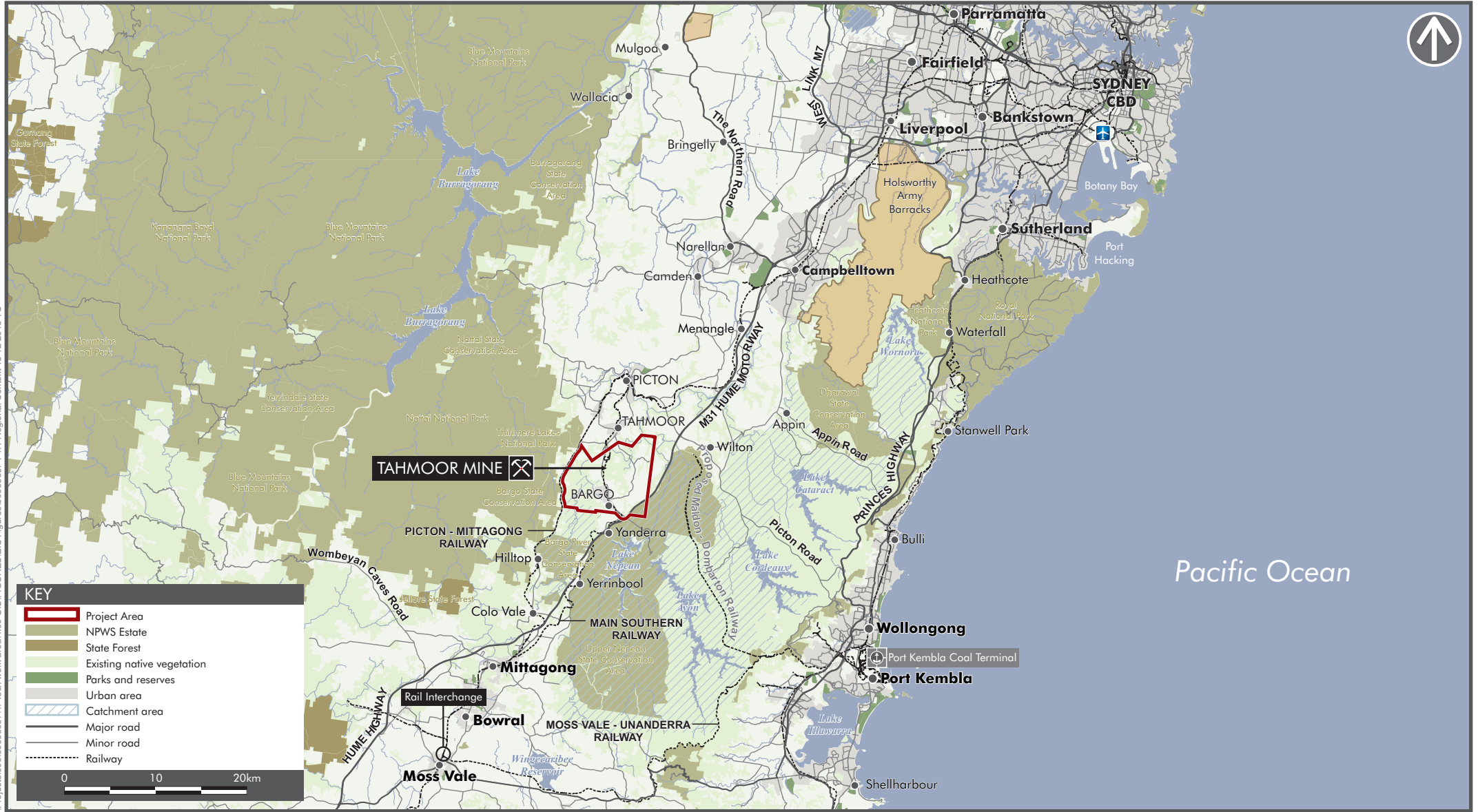
Tahmoor Mine is divided into three distinct mining areas (refer to **Figure 1.4**):

- Tahmoor Central (Longwalls 1-21);
- Tahmoor North (Longwalls 22-37); and
- Tahmoor South (the proposed development).

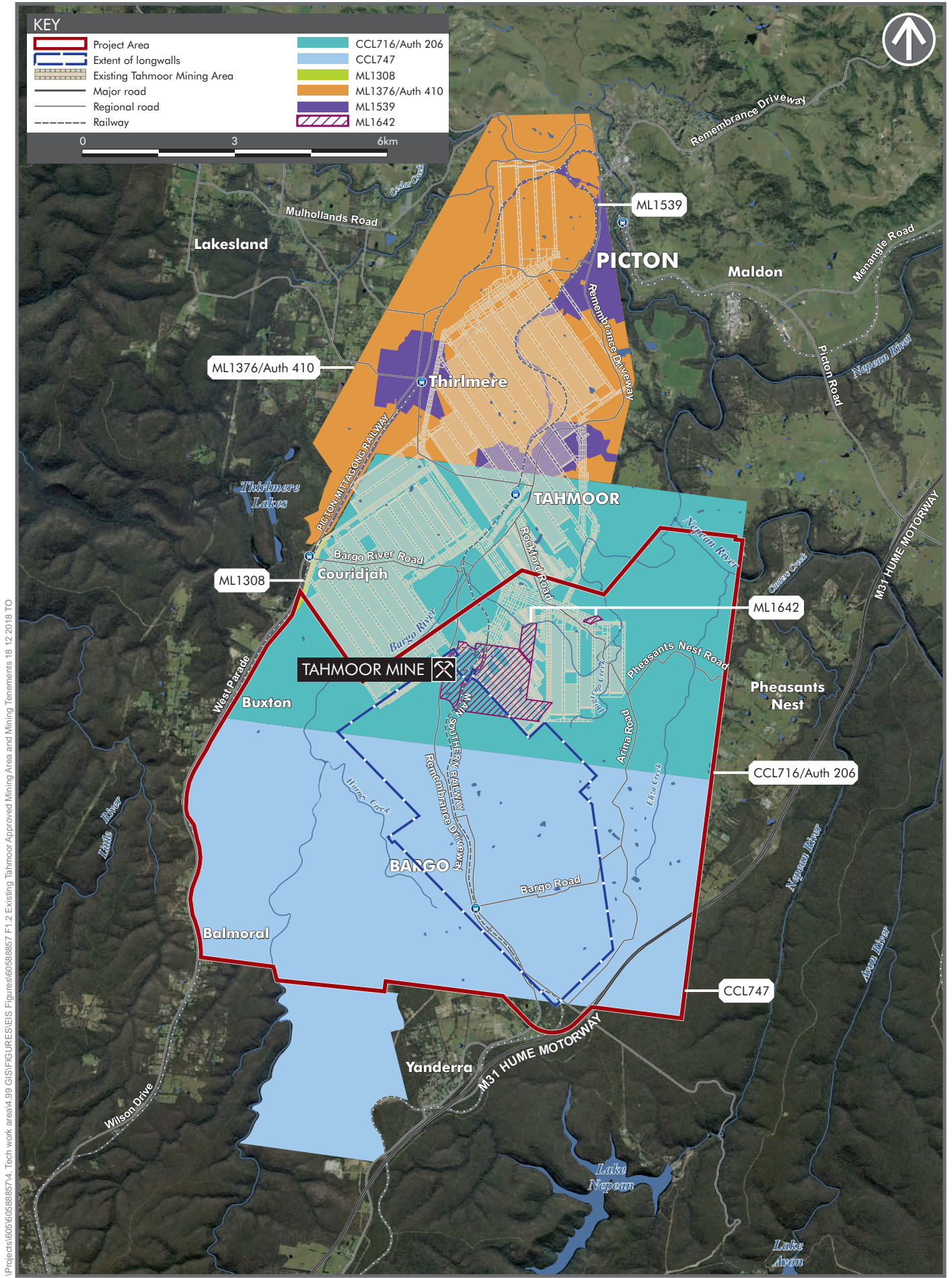
Tahmoor South comprises a single mining domain: the Central Domain.

Two additional domains, the Eastern and Southern Domains, were identified during project planning and pre-feasibility studies (refer to **Figure 1.4**). Mining in these domains are not proposed as part of the proposed development due to geological features and a greater proportion of risk management zones (RMZs) and sensitive features in these areas.

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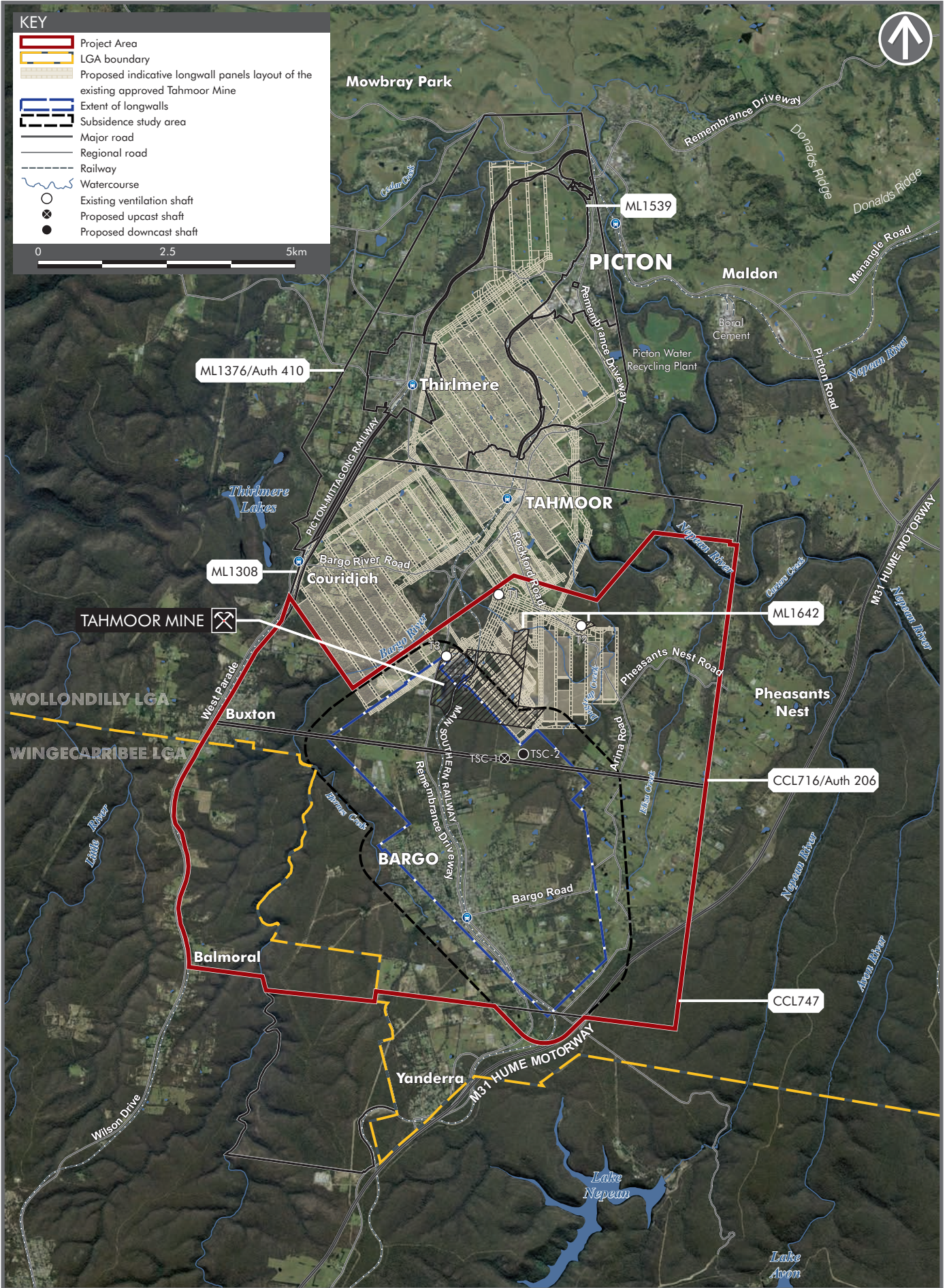
I:\Projects\605\60568857\4_Tech work area\4.99 GIS\FIGURES\EIS Figures\60568857_F1.2 Existing Tahmoor Approved Mining Area and Mining Tenements 18_12_2018 TO



EXISTING MINING AREAS AND MINING TENEMENTS AT TAHMOOR MINE
 Tahmoor South Project
 Environmental Impact Statement

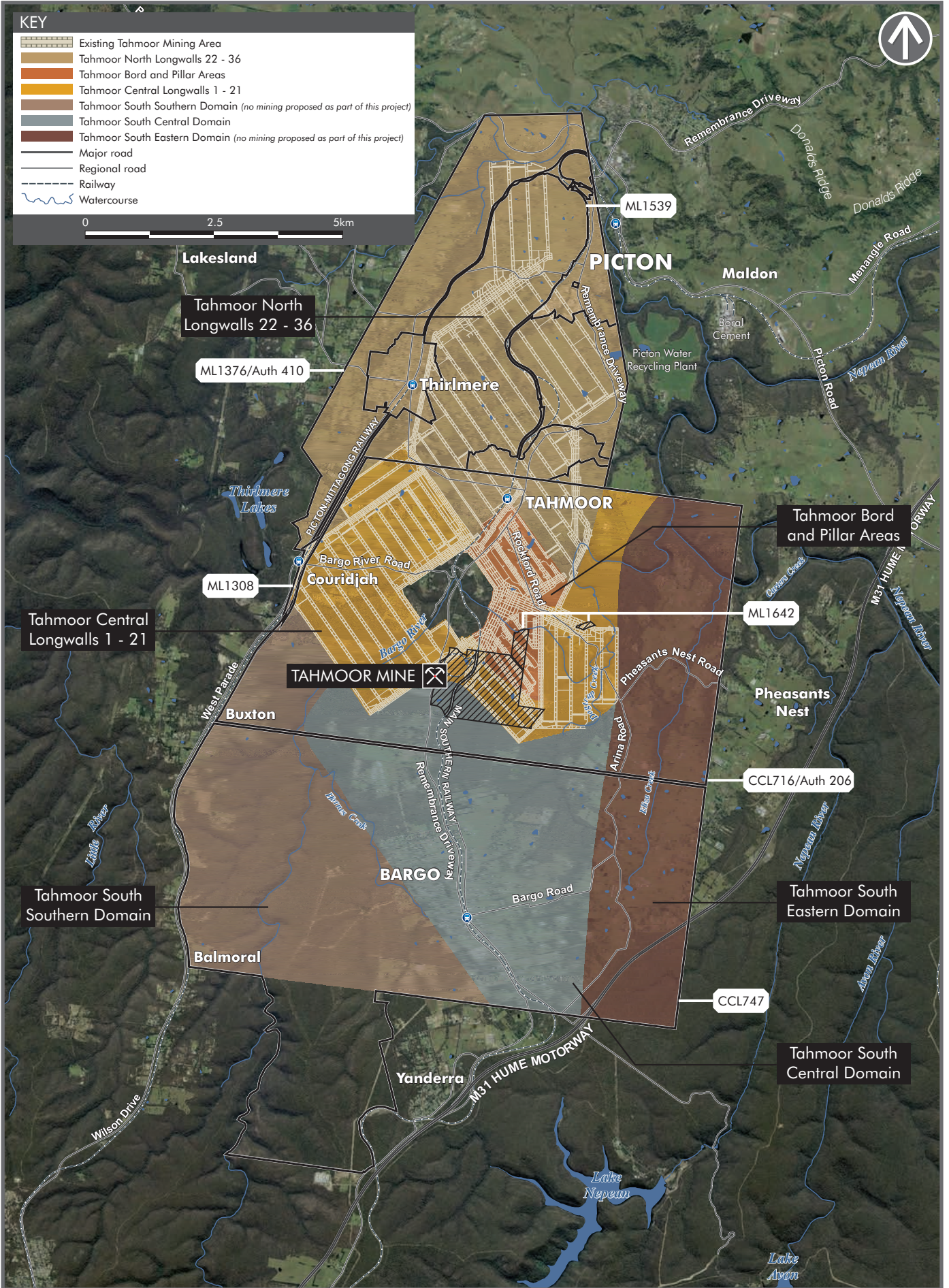
FIGURE 1.2

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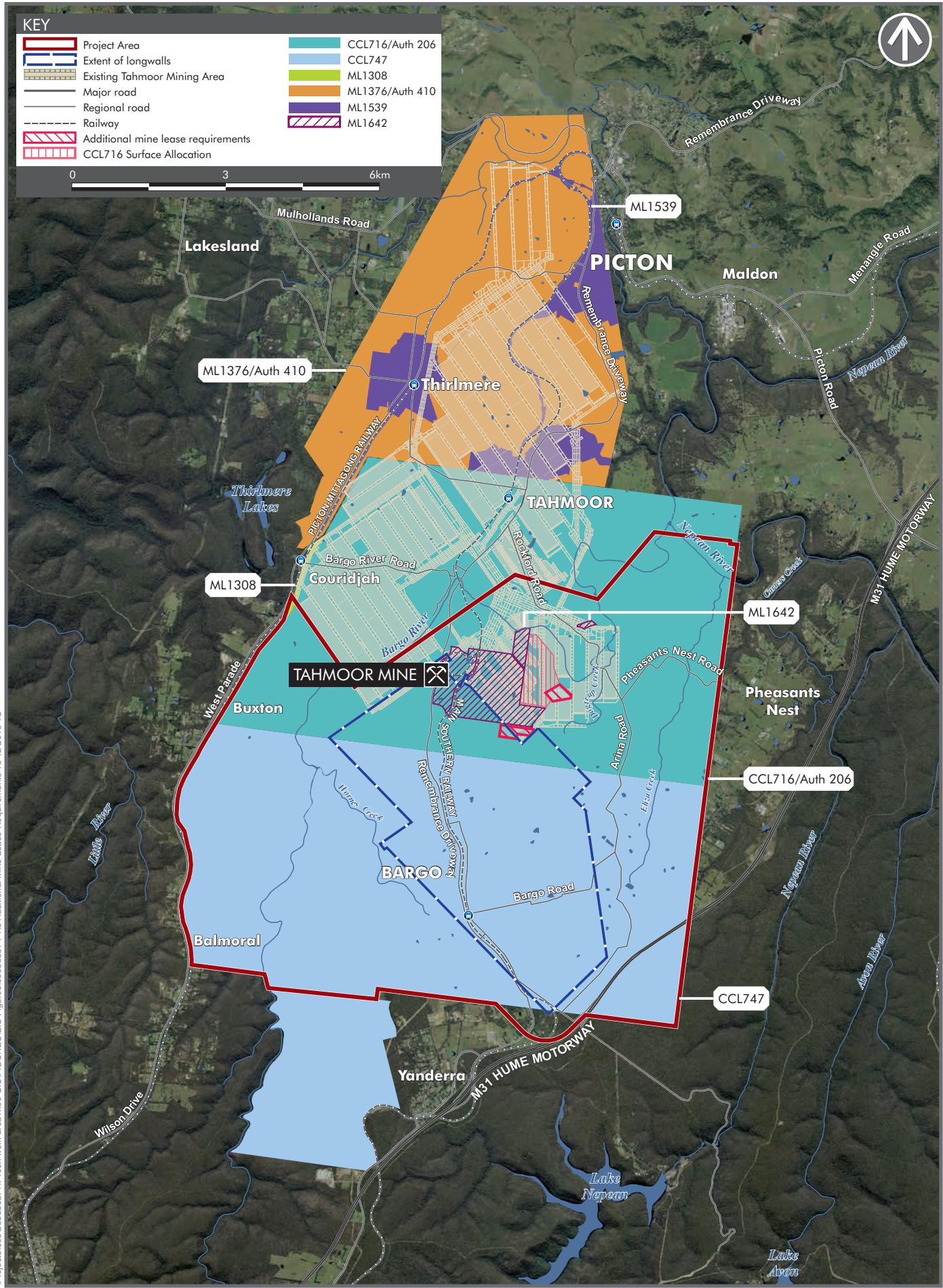
I:\Projects\6056\60568857\4_Tech work area\4.99 GIS\FIGURES\EIS Figures\60568857_F1.4 Historical and Approved Mining Areas 18 12 2018.T0



HISTORICAL AND PROPOSED MINING AREAS
 Tahmoor South Project
 Environmental Impact Statement

FIGURE 1.4

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ADDITIONAL MINE LEASE REQUIREMENTS
 Tahmoor South Project
 Environmental Impact Statement

FIGURE 1.5

1.2.1 Tahmoor Mine

Regional exploration drilling was undertaken in the area by the NSW Government during the 1960s. In the early 1970s, Clutha Development Pty Ltd commenced geological exploration of coal resources at Tahmoor under Exploration Licence (EL) No. 350. Clutha Development Pty Ltd then obtained development consent in 1975 for the underground coal mine, followed by a separate approval in 1979 for a Coal Handling and Preparation Plant (CHPP) and Rejects Emplacement Area (REA).

The Tahmoor Mine commenced operations in 1979 within the Existing Tahmoor Mining Area, which consists of the Tahmoor North and Tahmoor Central mining areas (refer to **Figure 1.4**). An overview of the ownership history of the Tahmoor Mine is provided in **Table 1.1**. The first commercial coal was produced at Tahmoor Mine in 1979.

Clutha Development Pty Ltd was granted five mining leases between 1970 and 1976, which were replaced by CCL 716 which was granted to Tahmoor Coal on 15 June 1990. During Tahmoor Coal's ownership of the Tahmoor Mine (refer to **Table 1.1**), four additional mining leases were granted for exploration and mining purposes between 1993 and 2010. These mining leases are summarised in **Table 1.2** below.

Table 1.1 History of Tahmoor Mine Ownership

Tahmoor Mine Ownership History	Parent Company and/ or Controlling Entity	Date from
Clutha Development Pty Ltd	Not applicable	April 1974
BP Coal Development Pty Ltd	Not applicable	December 1985
Novacoal Australia Pty Ltd	Novacoal Australia Pty Ltd was a business unit within Kembla Coal and Coke Pty Ltd (a subsidiary of CRA Limited)	December 1989
Tahmoor Coal Pty Ltd	Austral Coal Limited	February 1997
Tahmoor Coal Pty Ltd	Centennial Coal Pty Ltd	July 2005
Tahmoor Coal Pty Ltd	Glencore Coal Pty Ltd	November 2007 to April 2018
Tahmoor Coal Pty Ltd	SIMEC (Australia) Mining Pty Ltd. Tahmoor Coal trades as TCCO within the SIMEC Mining Division of the GFG Alliance Group.	April 2018

Table 1.2 Historic Mining Leases Granted for the Tahmoor Mine

Mining Lease	Date Granted	Description	Area
Clutha Development Pty Ltd			
Coal Lease (CL) 6	20 November 1970	Mining of coal from EL350	4,080 ha
Mining Purpose Lease (MPL) 87	19 February 1976	For the construction of dams and roads	19.12 ha
MPL 88	19 February 1976	For the construction of buildings and roads	61.98 ha
MPL 163	24 February 1976	Construction of a transmission line	0.6068 ha
MPL 164	19 February 1976	Construction of a transmission line	1.657 ha
Tahmoor Coal Pty Ltd			
Mining Lease 1308	2 March 1993	Expires 2 March 2035	13.16 ha
Mining Lease 1376	28 August 1995	Expired 28 August 2016 and an application for renewal has been submitted.	2,095 ha
Mining Lease 1539	16 June 2003	Expires 16 June 2024	547 ha
Mining Lease 1642	27 August 2010	Expires 27 August 2031	206.4 ha

The Tahmoor Mine initially operated using board and pillar mining methods. These early methods were replaced by longwall mining methods in 1987 when a gas extraction facility and longwall mining unit were commissioned and installed. An overview of the approvals history for Tahmoor Mine is provided in **Table 1.3**.

Tahmoor Coal has previously sought approval under Part 5 of the EP&A Act to undertake exploration activities within the Tahmoor South mining area for the Bargo coal resource. Current operations at the Tahmoor Mine are undertaken within the Tahmoor North mining area under the approvals shown in **Table 1.3** and illustrated in **Figure 1.4**. Coal is currently mined from the Bulli seam, producing mostly hard coking coal for steel production. Tahmoor Mine also produces a small amount of thermal coal which is used for power generation. Coal products from the mine are primarily transported via rail to Port Kembla Coal Terminal or Newcastle Port Waratah from time to time for delivery to both Australian and international markets. As described in **Table 1.3**, Tahmoor Mine also has approval to transport up to 50,000 tonnes per annum (tpa) of coal by road within the Wollondilly Shire or in circumstances where rail transport is unavailable.

Mining within the Tahmoor North mining area is scheduled for completion by approximately 2022, depending upon geological and mining conditions.

Exploration activities within the existing lease areas are currently carried out pursuant to Exploration Authority 410, Exploration Authority 206, and CCL 747 which are regulated under the Mining Act. A detailed description of the existing operations at Tahmoor Mine is provided in **Section 3.0**.

Table 1.3 History of Tahmoor Mine Consents

Consent	Consent Authority	Date	No. / Modification	Description
Tahmoor Mine (1975 Consent)	Wollondilly Shire Council	26/03/1975	7105/47	Mining from Bulli Seam in Tahmoor Central area, ROM trucked to Glenlee CHPP, 2.6 Mtpa ROM, two access shafts and one ventilation shaft
Tahmoor Mine - CHPP & REA (1979 Consent)	NSW Planning & Environment Commission	23/08/1979	7105/47	CHPP and REA, product transport via rail
	NSW Planning and Environment Commission	16/09/1985	Modification 1 76/20188	Transport by road of two trial shipments of 1,000 tonnes each
	NSW Planning and Environment Commission	05/11/1986	Modification 3 D80004/018	Upgrade of surface facilities for longwall mining
	NSW Department of Planning	08/07/1988	Modification 4	All coal transport from site via rail except for the following: <ul style="list-style-type: none"> up to 50,000 tpa by road for local and domestic use within the Wollondilly LGA only; and Coal transport by road where rail transport is not available.
	NSW Department of Planning	14/08/1990	Modification 5	Extension to CHPP
	NSW Department of Planning	13/09/1994	Modification 6	Transport of coal to Corrimal Cokeworks by road transport if the West Cliff mine was unable to supply
Tahmoor Gas Extraction	Wollondilly Shire Council	16/12/1985	190/85	Surface civil and mechanical work for gas extraction

Consent	Consent Authority	Date	No. / Modification	Description
Tahmoor North (1994 Consent)	NSW Land and Environment Court (LEC)	16/06/1994	LEC No. 10712 of 1993	Points of law on adequacy of EIS
	NSW LEC	07/09/1994	LEC No. 10712 of 1993	Tahmoor North mining from Bulli Seam, expansion of REA, Bridge Street shaft
	Wollondilly Shire Council	08/06/2007	Modification 1	Modification to conditions relating to damage of heritage items
Tahmoor North (1999 Consent)	NSW Department of Planning	25/02/1999	67/1998	Mining within ML 1376 following a Commission of Inquiry
	NSW Department of Planning	05/12/2006	67-5-2006 Modification 1	Modification of subsidence conditions
	NSW Department of Planning and Infrastructure	08/04/2012	67-5-2006 Modification 2	Modification for Redbank Tunnel Rail Deviation
	NSW Department of Planning and Infrastructure	01/11/2012	Modification 3	Modifications related to Redbank Tunnel Rail Deviation
	NSW Department of Planning and Infrastructure	15/10/2018	Modification 4	Modification to the project area for Tahmoor North to allow for low levels of predicted subsidence from approved Longwall 32.

1.2.2 Bargo Mine

The NSW Government commenced scout drilling of the coal resource within the area surrounding Bargo in 1965 and subsequently allocated the Bargo coal area to J&A Brown and Abermain Seaham Collieries Pty Ltd via EL No. 275, granted on 23 March 1970. A joint venture was formed between J&A Brown and Abermain Seaham Collieries Pty Ltd and Peko-Wallsend in May 1970 (the Bargo Joint Venture) to conduct a drilling program to investigate the coal resource. The joint venture formed Bargo Collieries Pty Ltd on 11 January 1972.

The Bargo Joint Venture was expanded on 21 July 1975, with the inclusion of BHP Limited. The Bargo Joint Venture completed a detailed feasibility assessment for the Bargo Mine during 1976. An application for planning and environmental approval for mining was submitted to Wollondilly Shire and Mittagong Shire Councils in 1975 and approvals were granted in 1976.

The following mining leases were granted to Bargo Collieries Pty Ltd in 1978:

- CL 186 – to mine coal from the area covered by EL275, covering 4,040 ha;
- MPL 156 – for shafts, roads, drift and pipelines, covering 71.7 ha; and
- MPL 157 – for buildings, railway and dam, covering 860 ha.

The Bargo Joint Venture commenced shaft construction at the Bargo Mine in May 1979, followed by trial mining and in seam work in January 1981. The 6.1 metre (m) diameter concrete lined shaft was constructed to a total depth of 444 m and extended through to the base of the Wongawilli Seam. Further development, to assess mining conditions and to obtain coal for coal quality assessments, was conducted in both the Bulli and Wongawilli Seams. This development was accompanied by approximately 740 m of roadways in the Bulli Seam and 53 m within the Wongawilli Seam.

On 23 May 1990, CCL 747 was granted to Bargo Collieries Pty Ltd. CCL747 consolidated and replaced CL186, MPL156 and MPL157.

Although physically commenced, the Bargo Mine development did not progress to commercial production due to economic conditions at the time. Following several feasibility studies undertaken by the Bargo Joint Venture partners, Bargo Collieries Pty Ltd was sold to Tahmoor Coal Pty Ltd in May 1999. An overview of the ownership history of the Bargo Mine is provided in **Table 1.4** and approvals gained for the Bargo Mine are provided in **Table 1.5**. Further information on the mining titles is provided in **Section 2.5**.

Table 1.4 History of Ownership of Bargo Mine

Bargo Mine Ownership History	Parent Company	Date
J&A Brown and Abermain Seaham Collieries Pty Ltd	A subsidiary of Coal and Allied Industries Ltd	March 1970
Bargo Joint Venture	Coal and Allied Industries Limited and Peko-Wallsend Limited	May 1970
Bargo Collieries Pty Ltd	Coal and Allied Industries Limited and Peko-Wallsend Limited	January 1972
Bargo Collieries Pty Ltd	Coal and Allied Industries Limited, Peko-Wallsend Limited and BHP Limited	July 1975
Bargo Collieries Pty Ltd	Tahmoor Coal Pty Ltd (a subsidiary of Austral Coal Limited)	May 1999
Bargo Collieries Pty Ltd	Tahmoor Coal Pty Ltd (a subsidiary of Centennial Coal Pty Ltd)	July 2005
Bargo Collieries Pty Ltd	Tahmoor Coal Pty Ltd (a subsidiary of Glencore Coal Pty Ltd)	November 2007
Bargo Collieries Pty Ltd	Tahmoor Coal Pty Ltd (a subsidiary of SIMEC (Australia) Mining Pty Ltd)	April 2018 to Present

An overview of the approvals for the Bargo Mine are provided in **Table 1.5**. Further information on the mining titles is provided in **Section 2.5**.

Table 1.5 History of approvals at Bargo Mine

Date	Consent Authority	Description
15/09/1975	Mittagong Shire Council	Mining from the Bulli and Wongawilli Seams, 3.65 Mtpa ROM, CHPP and REA, rail loop, drift and ventilation shaft, 60 year mine life
21/04/1976	Wollondilly Shire Council	Mining from the Bulli and Wongawilli Seams, 3.65 Mtpa ROM, CHPP and REA, rail loop, drift and ventilation shaft, 60 year mine life
09/05/1978	NSW Planning and Environment Commission	Concurrence required for Mittagong Council
03/11/1978	Mittagong Shire Council	Mining from the Bulli and Wongawilli Seams, 3.65 Mtpa ROM, CHPP and REA, rail loop, drift and ventilation shaft, 60 year mine life

1.3 Proposed Tahmoor South Project

Tahmoor Coal is seeking development consent for the continuation of mining at Tahmoor Mine, extending underground operations and associated infrastructure south, within the approved Bargo area. The proposed development seeks to extend the life of underground mining at Tahmoor Mine for an additional 13 years until approximately 2035.

The proposed development would use longwall mining to extract up to four (4) Mtpa of ROM coal from the Bulli seam. The majority of product coal produced (approximately 90-95%) would be coking coal, with a secondary thermal coal product (approximately 5-10%). Once the coal has been extracted and brought to the surface, it would be processed at Tahmoor Mine's existing CHPP and coal clearance facilities, and then transported principally via the existing rail loop, the Main Southern Railway and the Moss Vale to Unanderra Railway to Port Kembla for Australian and international markets. Some coal may also be transported to Port Waratah in Newcastle from time to time. Up to 200,000 tonnes per annum of either product coal or reject material is proposed to be transported to customers via road.

The proposed development would operate within the Project Area. The Project Area includes the extent of longwall mining to be undertaken as part of the proposed development, the existing Surface Facilities Area, other existing mine infrastructure of the Tahmoor Mine and immediately surrounding areas within the Wollondilly and Wingecarribee Local Government Areas (LGA). While the Project Area extends into Wingecarribee LGA, no project infrastructure or longwall panels associated with the proposed development would be located within this LGA. The Project Area is shown on **Figure 1.3** and encompasses CCL 747, Mining Lease 1642, a portion of CCL 716 (Exploration Authorisation 206) and the portion of the Subsidence Study Area (SSA) surrounding the proposed mine plan which extends beyond these areas. The SSA defines the predicted limit of vertical subsidence (taken to be the 20 mm subsidence contour) or a minimum of 600 m from the edge of the closest longwall (whichever is further), and forms the basis of the impact assessment undertaken for the proposed development.

During preparation of this EIS refinements have been made to the proposed development in response to environmental constraints and feedback from stakeholders and community members. The mine plan for the project has been revised a number of times to avoid longwall mining directly under sensitive features such as the Metropolitan Special Area, bedrock rivers with standing pools including Eliza Creek, items of Aboriginal heritage and significant landscape features such as river gorges.

In order to undertake the proposed development, Tahmoor Coal would require additional surface mining leases to encompass the proposed surface activities as shown on **Figure 1.5**.

The proposed development would utilise the existing surface infrastructure at the Tahmoor Mine Surface Facilities Area, with some upgrades proposed to facilitate the extension. The proposed development would also incorporate the planning for rehabilitation and mine closure.

The Tahmoor South Project proposes to extend underground mining operations at Tahmoor Mine within the Project Area including the following activities:

- undertake mine development and mine, using longwall mining methods, in the Bulli seam within CCL 747 and CCL 716, for approximately 13 years;
- extract up to four (4) Mtpa of ROM coal from longwalls situated within the Central Domain;
- continued use of existing mine ventilation shafts and the construction of two additional mine ventilation shafts;
- process up to four (4) Mtpa of ROM coal through the existing CHPP;
- transport product coal principally via rail to Port Kembla Coal Terminal and occasionally to Newcastle Port Waratah, using the existing rail load out, rail loop rail infrastructure;
- transport up to 200,000 tonnes per annum of either product coal or reject material via road;
- continue to use ancillary infrastructure and services until 2035;
- upgrade and augment the existing surface facilities, amenities, equipment and infrastructure to accommodate the extension of mining; and
- rehabilitate the Surface Facilities Area and associated infrastructure following the completion of mining.

An overview of the existing operations is provided in **Section 3.0** and further details regarding the proposed development are provided in **Section 4.0**.

Tahmoor Coal would continue mining from the Existing Tahmoor Mining Area (**Figure 1.2**) and use the existing surface facilities until the completion of mining in Tahmoor North in approximately 2022. The timing of completion of mining at Tahmoor North is dependent upon geological, mining and economic conditions.

Certain, existing development consents would be surrendered and Tahmoor Mine would transition to operating solely under the new development consent sought in the development application for the proposed development. Further detail regarding the proposed development consent strategy for Tahmoor Mine, including the interrelationship between the existing and proposed approvals, is provided in **Section 7.0**.

1.4 The Proponent

1.4.1 Tahmoor Coal Pty Ltd

The proponent is Tahmoor Coal Pty Ltd, Tahmoor Coal supplies coking and thermal coal to Australian and international markets. Tahmoor Coal is an operating business within the SIMEC Mining division of GFG Alliance.

1.4.2 GFG Alliance

GFG Alliance is an international group of businesses, founded and owned by the British Gupta Family. The Alliance's integrated business model encompasses mining, energy generation, metals and engineering, underpinned by industry-friendly financial services, a substantial property portfolio and a skills and education-focused charitable foundation.

For more than 60 years GFG Alliance has operated in sectors that are fundamental to the economy: energy, metals, engineering, logistics, and more recently infrastructure, financial services, property and mining.

GFG Alliance's main operating businesses are the Liberty House Group and the SIMEC Group.

Liberty House Group

Liberty House is an international industrial and metals business that provides an integrated solution ranging from global metals trading, metal making and processing through to engineering solutions.

Liberty House Group has five main divisions:

- Liberty Commodities - a global solutions provider to the international steel and non-ferrous metals industries.
- Liberty Recycling - operates ferrous and non-ferrous metals recycling in UK, USA, Australia and Europe. Australian operations include:
 - Rooty Hill (Sydney) mini mill; and
 - Laverton (Melbourne) mini mill.
- Liberty Steel - a global supplier of engineered steels with operations in UK, USA, Australia, India and Europe. Australian operations include:
 - Primary Steel works at Whyalla;
 - Rod & Bar mills at Sydney, Melbourne and Newcastle;
 - Wire mills at Newcastle, Geelong & Jindera;
 - Pipe & Tube mills at Newcastle & Brisbane; and
 - Distribution centres at 119 locations.
- Liberty Aluminium - owns the only remaining primary aluminium smelter in the United Kingdom.
- Liberty Engineering - engineers and manufactures components to customers in the automotive, general engineering, construction, motorsport, aerospace and other sectors.

SIMEC Group

The SIMEC Group is an international energy and natural resources business which supports the GFG Alliance with an infrastructure and trading platform. SIMEC has 5 major divisions which focus on Shipping, Infrastructure, Mining, Energy and Commodities:

- SIMEC Shipping charters, leases and owns of vessels and ports.
- SIMEC Infrastructure owns and operates commercial ports, railway stock, marine fleets and storage facilities. Australian operations include ports at Whyalla and shareholder in Port Kembla Coal Terminal.
- SIMEC Mining is a globally focused mining business. Australia operations include:
 - Iron ore assets in South Australia's Middleback Ranges; and
 - Coking coal asset at Tahmoor NSW.
- SIMEC Energy is a producer of renewable power, with a portfolio of assets across hydro, bio power, waste to energy, on- and off-shore wind, solar and pumped hydro. Australia operations include major shareholding in SIMEC Zen Energy.
- SIMEC Commodities specialises in the trade energy and energy related commodities.

1.5 Project Need

Development consent is required to enable Tahmoor Mine to continue to operate after mining is completed at Tahmoor North within the Existing Tahmoor Mining Area. The proposed development would:

- extend the life of the Tahmoor Mine to enable the ongoing direct employment for approximately 390 employees;
- provide ongoing significant local, regional, State and Federal economic benefits in the form of additional wages, royalties and flow-on positive economic effects;
- maximise recovery of the existing coal resource within Tahmoor Coal's lease areas; and
- enable existing coking, rather than thermal, coal markets to be serviced (refer **Section 1.5.1**, below).

The need for the proposed development is discussed in more detail in **Section 6.1**.

1.5.1 Coking Coal

Coal is classified by rank, from lowest to highest, based on its carbon and moisture content. Lower rank coals contain less carbon, more moisture and have lower calorific values. Based on its rank, coal is generally classified as either "thermal" coal or "metallurgical" (coking) coal. Thermal coal is lower in carbon content and calorific value, higher in moisture value, is the world's most abundant fossil fuel and is primarily used to produce energy. Coking coal is less abundant than thermal coal and is primarily used in the production of metallurgical coke which is an important part of manufacturing steel. Steel is an alloy based primarily on iron. As iron occurs only as iron oxides in the earth's crust, the ores must be converted, or 'reduced', using carbon. The primary source of this carbon is coking coal.

There are two types of metallurgical coal used to make coke: hard coking coal and semisoft coking coal. The Tahmoor Mine produces a hard coking coal, which is ideal for coke because it melts, swells and re-solidifies when placed into a superheated furnace. This type of coal also has lower levels of impurities.

1.6 Environmental Assessment Process and Purpose

1.6.1 Approval pathway

The proposed development is declared to be State significant development under clause 8 and Schedule 1 of the *State Environment Planning Policy (State and Regional Development) 2011* and is therefore subject to an assessment by the Minister for Planning (or his/her delegate) under Division 4.7, Part 4 of the EP&A Act. The development application will be determined by the Minister pursuant to s4.5(a) of the EP&A Act. An EIS is required to support the application for development consent.

Under the current approvals, mining at Tahmoor North is expected to be complete by approximately 2022, the timing of which is dependent upon geological, mining and economic conditions. If the Tahmoor South Project is granted development consent, it would authorise the proposed continuation of mining operations at Tahmoor Mine for approximately a further 13 years and maximise the recovery of the coal resource. In addition, if development consent is granted, some of the existing consents for the Bargo and Tahmoor Mines would be surrendered based on a schedule of completed activities (refer to **Section 7.2**).

1.6.2 Preliminary Environmental Assessment

The PEA, submitted to the Secretary of DPE on 1 May 2017, outlined the proposed development, provided background environmental data and identified key issues for assessment in the EIS, including:

- Subsidence and Geology;
- Surface Water;
- Groundwater; and
- Ecology.

1.6.3 Environmental Assessment Requirements

This EIS has been prepared in accordance with Division 4.7, Part 4 of the EP&A Act and Schedule 1 of the EP&A Regulation. Part 4 of the EP&A Act ensures that the potential environmental impacts of a proposal are properly assessed and considered in the decision-making process.

Under Part 2 of Schedule 2 of the EP&A Regulation, the EIS must be prepared in accordance with the requirements issued by the Secretary of the DPE. SEARs for the EIS were issued on 9 June 2017 and updated on 20 June 2018 and are attached as **Appendix A** to this EIS.

The proposed development may have a significant impact on Matters of National Environmental Significance (MNES). Consequently, the proposed development was referred to the Commonwealth Minister of Environment under the provisions of the EPBC Act. The proposed development was subsequently declared to be a Controlled Action and supplementary SEARs were issued by the DPE as discussed in **Section 1.6.4**.

The key matters raised by the Secretary of DPE to be considered in the EIS are outlined in **Table 1.6**, together with the relevant section of the EIS which addresses that matter.

Table 1.6 SEARs of the EIS issued 20 June 2018

Description	Reference in EIS
General	
The Environmental Impact Statement (EIS) for the development must comply with the requirements in Clauses 6 and 7 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i> .	This document
In particular, the EIS must include: <ul style="list-style-type: none"> • an executive summary; • a full description of the development, including: <ul style="list-style-type: none"> - historical mining operations at the mine and in the region; - the resource which would be extracted, demonstrating efficient resource 	Executive Summary Section 1.2 Section 4.0

Description	Reference in EIS
instruments, guidelines, policies, and plans that may be relevant to the environmental assessment of this development.	
<p>In addition to the matters set out in Schedule 1 of the <i>Environmental Planning and Assessment Regulation 2000</i>, the development application must be accompanied by a signed report from a suitably qualified independent person that includes an accurate estimate of the:</p> <ul style="list-style-type: none"> • capital investment value of the development (as defined in Clause 3 of the <i>Environmental Planning and Assessment Regulation 2000</i>), including details of all the assumptions and components from which the capital investment value calculation is derived; and • jobs that would be created during each stage of the development. 	<p>Provided separately to DPE</p> <p>Appendix Q</p> <p>Section 11.15 Section 4.6</p>
Specific Issues	
The EIS must address the following specific issues:	
<p>Subsidence – including a detailed quantitative and qualitative assessment of the potential conventional and non-conventional subsidence impacts and environmental consequences of the development on the natural and built environments, paying particular attention to features that are considered to have significant ecological, economic, social, cultural and environmental value, taking into consideration:</p> <ul style="list-style-type: none"> • recorded regional and historic subsidence levels, impacts and environmental consequences; • the potential extent of fracturing of the strata above the longwall panels; and • the implementation of a comprehensive subsidence monitoring program which is capable of detecting vertical, horizontal and far-field subsidence movements. 	Section 11.1
<p>Water – including:</p> <ul style="list-style-type: none"> • an assessment of the likely impacts of the development on the quantity and quality of surface and groundwater resources, having regard to EPA's, DI Water's and WaterNSW's requirements and recommendations (see Attachment 2); • an assessment of the likely impacts of the development on aquifers, watercourses, swamps, riparian land, water supply infrastructure and systems and other water users; • an assessment of any drinking water catchment losses from mining, and whether the development can be operated to achieve a neutral or beneficial effect on water quality in the Sydney Drinking Water Catchment, consistent with the provisions of <i>State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011</i>; • a detailed site water balance, including a description of site water demands, water disposal methods (inclusive of volume and frequency of any water discharges), water supply and transfer infrastructure and water storage structures; • a detailed description of the proposed water management system (including sewerage), beneficial water re-use program and all other proposed measures to mitigate surface water and groundwater impacts; • the proposed surface water and groundwater monitoring regime, which should include a comprehensive array of shallow and deep piezometers and extensometers across the underground mining area which are capable of detecting fluctuations in groundwater levels and the influence of fracture networks on regional groundwater resources; and • an assessment of the potential flooding impacts of the development. 	Sections 11.2, 11.3, 11.4, 11.5

Description	Reference in EIS
<p>Noise and Vibration – including:</p> <ul style="list-style-type: none"> • an assessment of the likely operational, rail “wheel squeal” and construction noise impacts of the development under the <i>NSW Industrial Noise Policy</i> (as may be updated or replaced), paying particular attention to the obligations in chapters 8 and 9 of the policy, and the <i>Voluntary Land Acquisition and Mitigation Policy</i> (DPE); • if a claim is made for specific construction noise criteria for certain activities, then this claim must be justified and accompanied by an assessment of the likely construction noise impacts of these activities under the <i>Interim Construction Noise Guideline</i> (ICNG); • an assessment of the likely road noise impacts of the development under the <i>NSW Road Noise Policy</i> (RNP); and • an assessment of the potential vibration and low frequency noise impacts of the development. 	<p>Section 11.10</p>
<p>Air – including:</p> <ul style="list-style-type: none"> • an assessment of the likely air quality impacts of the development in accordance with the Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW, having regard to EPA’s requirements (see Attachment 2); • an assessment of the likely greenhouse gas (GHG) impacts of the development; and • an odour assessment of the ventilation shafts in accordance with the <i>Technical Framework – Assessment and Management of Odour from Stationary Sources in NSW</i> 	<p>Section 11.11</p>
<p>Biodiversity – including:</p> <ul style="list-style-type: none"> • an assessment of the likely biodiversity impacts of the development, including impacts to terrestrial and aquatic species and habitats, in accordance with the Framework for Biodiversity Assessment, by a person accredited in accordance with s142(B)(1)(c) of the <i>Threatened Species Conservation Act 1995</i>, and having regard to OEH’s requirements (Attachment 2); and • a strategy to offset any residual impacts of the development in accordance with the <i>NSW Biodiversity Offsets Policy for Major Projects</i>. 	<p>Sections 11.6, 11.7</p>
<p>Land – including an assessment of the compatibility of the development with other land uses (including existing and planned urban development) in the vicinity, in accordance with the requirements of Clause 12 of <i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i>.</p>	<p>Sections 11.4, 11.18, 11.19</p>

Description	Reference in EIS
<p>Rehabilitation and Final Landform – including:</p> <ul style="list-style-type: none"> • an assessment of the likely impacts of the development on existing landforms and topography, including justification of the final landform design of the rejects emplacement area expansion and its long term geotechnical stability; • a detailed description of the progressive rehabilitation measures that would be implemented for the development; • a detailed description of the proposed rehabilitation and mine closure strategies for the project, having regard to DRG’s (Division of Resources and Geoscience) requirements (see Attachment 2) and the key principles in Strategic Framework for Mine Closure, and the: <ul style="list-style-type: none"> - rehabilitation objectives, methodology, monitoring programs, performance standards and proposed completion criteria; - decommissioning and management of surface infrastructure; - nominated final land uses, having regard to any relevant strategic land use planning or resource management plans or policies; and - potential for integrating the rehabilitation strategy with offset strategies proposed for the development; • the measures which would be put in place for the long-term protection and management of the site, any biodiversity offset areas following the cessation of mining; and • measures to avoid the propagation of acid sulphate soils. 	Section 11.23
<p>Heritage – including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, having regard to OEH’s requirements (Attachment 2).</p>	Sections 11.8, 11.9
<p>Transport – including an assessment of the likely transport impacts of the development on the capacity, condition, safety and efficiency of the rail network and the local and State road network.</p>	Sections 11.13, 11.14
<p>Visual – including an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, and minimising the lighting impacts of the development.</p>	Section 11.17
<p>Hazards – including an assessment of the likely risks to public safety, paying particular attention to potential bushfire risks, and the handling and use of any dangerous goods.</p>	Section 11.22
<p>Waste – including a waste management strategy.</p>	Section 11.20 & Section 11.21
<p>Social & Economic – including:</p> <ul style="list-style-type: none"> • a detailed assessment of the likely social impacts of the development on the local and regional community in accordance with the Social Impact Assessment Guideline for State Significant Mining, Petroleum Production and Extractive Industry Development (2017); and • an assessment of the likely economic impacts of the development, paying particular attention to: <ul style="list-style-type: none"> - the significance of the resource; - the costs and benefits of the development, identifying if it would result in a net benefit to NSW, including consideration of fluctuation in commodity markets and exchange rates; and - the demand for the provision of local infrastructure and services. 	Section 11.15 & 11.16

Description	Reference in EIS
Consultation	
<p>During the preparation of the EIS, you must consult with local government, State Government and Commonwealth Government authorities, service providers, community groups, Registered Aboriginal Parties and affected landowners.</p> <p>The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.</p>	Section 9.0

Written comments were received from relevant statutory agencies identified in the SEARs to assist with the preparation of the EIS. **Appendix A** summarises the key issues identified by the statutory agencies together with the relevant section of the EIS which addresses the matter.

1.6.4 Commonwealth Department of the Environment – EPBC Referral and Supplementary Requirements

The project was referred to the DoEE on 20 October 2017 (EPBC 2017/8084) to determine if the project is a controlled action under the EPBC Act, based on potential impacts to listed threatened species and communities, and water resources.

The proposed development was declared to be a Controlled Action under the EPBC Act on 12 January 2018.

The Commonwealth government has accredited the NSW State significant development assessment process under Part 4 of the EP&A Act in a bilateral agreement between the two governments. This means that potential impacts to Matters of National Environmental Significance (MNES) can be assessed in an integrated manner in the EIS as part of the State significant development assessment process in accordance with the bilateral agreement. To ensure that sufficient information is provided to enable an adequate assessment of the relevant MNES, DPE issued supplementary SEARs for the EIS on 14 February 2018.

The supplementary SEARs for the EIS are outlined in **Table 1.7** together with the relevant section of the EIS which addresses the requirements. The potential impacts of the proposed development on MNES are summarised in the EPBC Referral for the proposed development and **Section 11.6** of this EIS. Further details of the EPBC referral are also provided in **Section 8.3.1** of this EIS.

It is noted that the DoEE referral and Controlled Action determination of the proposed development was based on an earlier mine plan layout, which included mining in both the Central and Eastern domains. As discussed in **Section 6.2.4**, subsequent mine planning has led to a revised mine plan involving mining in the Central Domain only (current proposed development) which would result in a smaller surface footprint associated with ventilation facilities and less native vegetation clearing and associated habitat loss (49.2 ha compared to 53.3 ha). Terrestrial ecology impacts are further assessed in **Section 11.5**.

Table 1.7 Commonwealth Environmental Assessment Requirements

Description	Reference in EIS
The SEARs issued for the Tahmoor South Coal Project on 9 June 2017 have been revised and are as follows:	
<p>General Requirements</p> <p>Project Description - including:</p> <ul style="list-style-type: none"> • The title of the action, background and current status; • The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES; • How the action relates to any other actions that have been, or are being taken, in the region affected by the action; and • How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES. 	Section 1.1 – 1.5
<p>Impacts:</p> <ul style="list-style-type: none"> • The EIS must include an assessment of the relevant impacts of the action on threatened species and communities and water resources; including: <ul style="list-style-type: none"> - a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts; - a statement whether any relevant impacts are likely to be known, unpredictable or irreversible analysis of the significance of the relevant impacts; - analysis of the significance of the relevant impacts; and - any technical data and other information used or needed to make a detailed assessment of relevant impacts. 	Section 11.0

Description	Reference in EIS
<p>Avoidance, mitigation and offsetting:</p> <ul style="list-style-type: none"> • For each of the relevant matters protected that are likely to be significantly impacted by the development, the EIS must provide information on proposed avoidance and mitigation measures to deal with the relevant impacts of the action, including: <ul style="list-style-type: none"> - a description and an assessment of the expected or predicted effectiveness of the mitigation measures; - any statutory policy basis for the mitigation measures; - the cost of the mitigation measures; - an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provision for independent environmental auditing; and - the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program. • Where a significant residual adverse impact to a relevant protected threatened species or community is considered likely; the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy; • For each of the relevant matters likely to be impacted by the action the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any: <ul style="list-style-type: none"> - Conservation advice or recovery plan for the species or community; - Relevant threat abatement plan for a process that threatens the species or community; - Wildlife conservation plan for the species; and - Any strategic assessment. • In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined in paragraphs 9-18. 	<p>Section 11.6 – 11.7 Appendix K</p>

Description	Reference in EIS
<p>Key Issues: Biodiversity</p> <ul style="list-style-type: none"> • The EIS must identify <u>each</u> EPBC Act listed threatened species and community likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the vicinity that are not likely to be impacted, provide evidence why they are likely to be impacted; • For <u>each</u> of the EPBC Act listed threatened species and communities likely to be impacted by the action the EIS must provide a separate: <ul style="list-style-type: none"> - Description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans; - Details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements; - Description of the relevant impacts of the action having regard to the full national extent of the species or community's range; - Description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action; - Identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account; - A description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established; - Details of how the current published NSW Framework for Biodiversity Assessment (FBA) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and - Details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the FBA and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites; and • Any significant residual impacts not addressed by the FBA may need to be addressed in accordance with the <i>Environment Protection and Biodiversity Conservation Act 1999 Environmental Offset Policy</i>. 	<p>Section 11.6 – 11.7</p>

Description	Reference in EIS
<p>Water resource, in relation to coal seam gas development and large coal mining development</p> <ul style="list-style-type: none"> • the EIS should provide a description of the location, extent and ecological characteristics and values of the identified water resource potentially affected by the project; • the assessment of impacts should include information on: <ul style="list-style-type: none"> - any substantial and measurable changes to the hydrological regime of the water resource, for example a substantial change to the volume, timing, duration or frequency of ground and surface water flows; - the habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the water resource being seriously affected; and - substantial and measurable change in the water quality and quantity of the water resource – for example a substantial change to the volume. • the EIS must provide adequate information to allow the project to be reviewed by the Independent Expert Scientific Committee (IESC) on Coal Seam Gas and Large Coal Mining Development, as outlined in the <i>Information guidelines for independent expert scientific committee advice on coal seam gas and large coal mining development proposals</i>. 	<p>Section 11.1 – 11.5</p> <p>Sections 11.3 and 11.4</p>
<p>Other approvals and conditions</p> <ul style="list-style-type: none"> • information in relation to any other approvals or conditions required must include the information prescribed in Schedule 4 Clause 5 (a) (b) (c) and (d) of the EPBC Regulations 2000. 	<p>Section 8.0</p>
<p>Environmental Record of person proposing to take the action</p> <ul style="list-style-type: none"> • information in relation to the environment record of a person proposing to take the action must include details as prescribed in Schedule 4 Clause 6 of the EPBC Regulations 2000. 	<p>Section 1.1 Section 3.7</p>
<p>Information Sources</p> <ul style="list-style-type: none"> • for information given in an EIS, the EIS must state the source of the information, how recent the information is, how the reliability of the information was tested; and what uncertainties (if any) are in the information. 	<p>Section 15.0</p>

Description	Reference in EIS
<ul style="list-style-type: none"> • The Department of the Environment's Environment Reporting Tool (ERT) identifies that threaten species and communities may occur within the vicinity of the proposed action. Based on the information in the referral documentation, the location of the action, species records and likely habitat presents in the area, there are likely to be significant impacts to: <ul style="list-style-type: none"> - Shale/Sandstone Transition Forest (SSFT) ecological community – Critically Endangered; - Bargo Geebung (<i>Persoonia bargoensis</i>) – Vulnerable; - Small-flower Grevillea (<i>Grevillea parviflora</i> subsq. <i>Parviflora</i> – Vulnerable; and - Rufous Pomaderris (<i>Pomaderris brunnea</i>) – Vulnerable. • There is some risk that there may be significant impacts on the following matters and the levels of impact should be further investigated: <ul style="list-style-type: none"> - Turpentine-Ironbark Forest of the Sydney Basin Bioregion – Critically Endangered; - Woronora Beard-heath (<i>Leucopogon exolasius</i>) – Vulnerable; - Koala (<i>Phascolarctos conereus</i>) – Vulnerable; - Macquarie Perch (<i>Macquarie australasica</i>) – Endangered; and - Greater Glider (<i>Petauroides volans</i>) – Vulnerable. • The proponent should ensure that a comprehensive and scientifically rigorous water monitoring and adaptive management programme is put in place to ensure Thirlmere Lakes are not being impacted by the proposed action. The listed studies should be considered by the proponent when assessing the impacts of the proposed action on groundwater and surface water. 	<p>Section 11.6</p>

1.6.5 Stakeholder Consultation

During the preparation of this EIS, key stakeholders were consulted, including local community groups and key local, State and Federal Government agencies. Throughout the preparation of the EIS, these stakeholders have been kept informed of the progress of the proposed development. Further details regarding stakeholder consultation are provided in **Section 9.0**.

1.6.6 Purpose of this Report

The purpose of this EIS is to describe the proposed development and address the SEARs as required under Schedule 2 of the Regulation, and the supplementary SEARs received from the Commonwealth. The EIS assesses the environmental, social and economic impacts of the proposed development and identifies the measures necessary to manage and mitigate adverse environmental impacts. The purpose of the EIS is to allow the IPC and the Commonwealth Minister of the Environment to make an informed decision with regard to the approval of the proposed development.

1.7 Structure of this Environmental Impact Statement

This EIS is generally structured as follows:

- **Section 1.0** provides an introduction to the proposed development, including information about the applicant, the development context, the need for the development and the approvals regime;
- **Section 2.0** provides the site context and location of current operations, as well as a brief description of the land uses and ownership surrounding Tahmoor Mine;
- **Section 3.0** describes the existing operations at Tahmoor Mine;
- **Section 4.0** describes the proposed development and the scope of the Development Application;
- **Section 5.0** outlines the mine planning process and the potential sensitivities of the surrounding environment;

- **Section 6.0** provides information on the need for the proposed development and outlines the alternatives that were considered by Tahmoor Coal during the formulation of the Development Application;
- **Section 7.0** describes the approval pathway for the proposed development and its relationship to the existing consents;
- **Section 8.0** describes the legislative context of the proposed development;
- **Section 9.0** describes the stakeholder consultation process undertaken throughout the EIS in accordance with the SEARs;
- **Section 10.0** outlines the key environmental issues identified in the risk assessment, PEA, stakeholder consultation and SEARs, and their prioritisation;
- **Section 11.0** provides an assessment of the potential impacts of the proposed development on a range of environmental, social and economic issues and outlines mitigation and management measures to be implemented at Tahmoor Mine. Environmental issues include potential impacts from subsidence on groundwater; hydrology; Aboriginal and non-Aboriginal heritage; aquatic ecology; infrastructure and services; and geomorphology; as well as potential impacts associated with the Surface Facilities Area relating to noise and vibration; surface water; terrestrial ecology; air quality; greenhouse gas; traffic and transport; acid mine drainage and spontaneous combustion; visual landscape and lighting; soils; waste and hazards. The residual and cumulative environmental consequences of the proposed development are also discussed;
- **Section 12.0** Summarizes the environmental management and mitigation measures proposed for the development;
- **Section 13.0** details the justification for the development with respect to net project benefits and the principles of Ecologically Sustainable Development (ESD); and
- **Section 14.0** provides a summary of findings and a conclusion to the EIS.

2.0 Site and Context

2.1 Proposed Development Location and Site Context

Tahmoor Mine is located approximately 80 km southwest of the Sydney Central Business District (CBD) and 50 km northwest of Wollongong and Port Kembla, in the Southern Coalfields of NSW (refer to **Figure 1.1**). It is approximately 30 km southwest of the suburb of Campbelltown and to the west of the M31 Hume Motorway.

Tahmoor Mine's existing Surface Facilities Area is located approximately 2.5 km south of the village of Tahmoor and approximately 4 km north of the village of Bargo (refer **Figure 1.1**). Tahmoor Mine extends across mining leases 1308, 1376, 1539, 1642, Exploration Authority 410 and Exploration Authority 206, CCL 716 and CCL 747, which are illustrated in **Figure 1.2**.

The proposed development would be located immediately south of the existing coal mining operations of Tahmoor Mine, and across existing mining leases CCL 747, CCL 716, Mining Lease 1642, and Exploration Authority 206 (refer to **Figure 1.3**). Access to the underground mine for the proposed development would be via the existing Surface Facilities Area and related infrastructure at Tahmoor Mine.

2.2 Regional Context

Tahmoor Mine is located on the outer south western urban fringe of Sydney, approximately five km south of Picton and 20 km northeast of Mittagong. The mining area is bounded on the west by the Picton-Mittagong Railway. The Main Southern Railway bisects Tahmoor Mine's Surface Facilities Area and connects to the site via a rail loop.

The Project Area, comprising a conservative study area for the proposed development extends across the Wollondilly and Wingecarribee LGAs. All current surface infrastructure and longwall panels for the existing operation are located in the Wollondilly LGA. While the Project Area extends into the Wingecarribee LGA, no proposed infrastructure or longwall panels would be located within this LGA. Land use in the region is characterised by a mix of village residential, rural residential, market gardens, agriculture, vacant Crown land and conservation areas.

Coal mining has been carried out in the Southern Coalfields for around 200 years, contributing to the development of mining towns throughout the Southern Highlands and Illawarra. In addition to the Tahmoor Mine, there are another eight mining operations in the Southern Coalfields, including:

- Appin and Appin West Colliery;
- West Cliff Colliery;
- North Cliff Colliery (not operating);
- Peabody Metropolitan Colliery;
- Russell Vale Colliery (care and maintenance);
- Dendrobium Colliery;
- Wollongong Coal Wongawilli Colliery; and
- Boral Berrima Colliery (closure/care and maintenance).

Further details regarding the operation of these mines are provided in **Table 2.1**. The mining tenure of these eight operations is shown on **Figure 2.1**.

The region encompasses large areas dedicated to conservation. These include the Upper Nepean State Conservation Area to the east of the M31 Hume Motorway, and the Bargo River State Conservation Area, Nattai National Park, Thirlmere Lakes National Park and Blue Mountains National Park to the west of the Tahmoor Mine (refer to **Figure 1.1**). Nattai National Park, Thirlmere Lakes National Park and Blue Mountains National Park form part of the Blue Mountains World Heritage Area, protected under the EPBC Act.

The Project Area covers a small part of and is adjacent to the Sydney Drinking Water Catchment, with major drinking water catchments in the areas to the east, surrounding Lake Nepean, Lake Avon, Lake Cordeaux and Lake Cataract located within the Metropolitan Special Area (MSA) (Note: the MSA area includes and covers the Upper Nepean State Conservation Area). The Project Area is downstream of these areas, mostly within the Bargo catchment and contributing to the Nepean Catchments downstream of the MSA. Importantly, no longwall panels, nor surface infrastructure, are proposed in the MSA. The proposed development has been specifically designed to avoid extending longwall panels into the MSA as described in **Section 6.2.4**.

Townships, villages and rural residences dot the landscape, the nearest of which include the towns of Tahmoor and Bargo, and the villages of Couridjah, Balmoral and Buxton (refer to **Figure 1.3**). These villages are serviced by road transport routes including Picton Road, Remembrance Driveway, and Wilson Drive and the Main Southern Railway infrastructure corridor.

2.2.1 The Southern Coalfields

Tahmoor Mine is located within the Southern Coalfields of NSW. The Southern Coalfields is one of five major coalfields located within the Sydney-Gunnedah Basin. It is located south of Sydney and to the west of Wollongong with topography that is defined by the Illawarra and Woronora Plateau.

The geology of the Southern Coalfields includes the Illawarra Coal Measures and is the only NSW source of premium quality hard coking coal, which is primarily used for steel production. There are six operational underground coal mines in the Southern Coalfields and three are non-operational or under closure or care and maintenance, shown on **Figure 2.1** and detailed in **Table 2.1**.

Table 2.1 Current mining operations and exploration in the Southern Coalfields

Coal Mine	Current Owner/Operator	Source of Coal (Seam)	Status
Appin and Appin West Colliery (formerly Tower Colliery) (labelled 1 on Figure 2.1)	Illawarra Coal Holdings Pty Ltd	Bulli	Operating
West Cliff Colliery (labelled 2 on Figure 2.1)	Illawarra Coal Holdings Pty Ltd	Bulli	Operating
North Cliff Colliery (labelled 3 on Figure 2.1)	Illawarra Coal Holdings Pty Ltd	Bulli	Non Operational
Peabody Metropolitan Colliery (labelled 4 on Figure 2.1)	Helensburgh Coal Pty Ltd, a subsidiary of Peabody Energy Australia Coal Pty Ltd.	Bulli	Operating
Russell Vale Colliery (labelled 5 on Figure 2.1)	Wollongong Coal Ltd.	Bulli	Care & Maintenance
Dendrobium Colliery (labelled 6 on Figure 2.1)	Illawarra Coal Holdings Pty Ltd	Wongawilli	Operating
Wongawilli Colliery (labelled 7 on Figure 2.1)	Wollongong Coal Ltd.	Wongawilli	Operating
Tahmoor Mine	Tahmoor Coal Pty Ltd.	Bulli	Operating
Berrima (Medway) Colliery (labelled 8 on Figure 2.1)	Boral Cement Pty Ltd.	Wongawilli	Closure, care & Maintenance
Hume Coal Project (labelled 9 on Figure 2.1)	POSCO (Pohang Iron and Steel Company)	Wongawilli	Proposed

Underground coal mining in the Southern Coalfields has been the subject of a number of environmental investigations which have specifically focused on the unique environmental context of the region, including:

- *Impacts of Underground Coal Mining on Natural Features in the Southern Coalfield: Strategic Review* (NSW Department of Planning, July 2008);
- *The Metropolitan Coal Project Review Report* (NSW Planning Assessment Commission (PAC), 2009);
- *Bulli Seam Operations PAC Report* (PAC, 2010);
- *Thirlmere Lakes Inquiry – Final Report of the Independent Committee* (Independent Thirlmere Lakes Inquiry Committee, 2012);
- *Thirlmere Lakes Inquiry - Review of the Final Report of the Independent Committee* (NSW Chief Scientist and Engineer, 2013); and
- *On measuring the cumulative impacts which impact ground and surface water in the Sydney Water Catchment* (NSW Chief Scientist and Engineer, 2014).

The findings of these investigations have been considered as part of the mine planning process for the proposed development and during the preparation of this environmental assessment, and are discussed in detail in **Section 5.3**.

2.2.2 Geology and Soils

The region is underlain by sandstone of the Hawkesbury Sandstone Group and shales within the Wianamatta Group. The coal bearing sequence in the region is the Late Permian Illawarra Coal Measures, and includes a number of coal seams, including the Bulli seam, the Balgownie seam (approximately 10 m below the Bulli seam) and the Wongawilli seam (approximately 30 m below the Bulli seam).

The proposed development would target the Bulli coal seam, which is currently mined at the Tahmoor Mine. The Bulli coal seam in the Project Area is located approximately 375 to 430 m below the surface and is approximately 1.8 to 3.3 m in thickness.

The Nepean Fault complex is a regional geological structure present in the eastern section of the Project Area which exhibits a general north-south trend. The Nepean Fault complex occurs as a series of smaller 'en echelon' faults, which are closely-spaced, parallel or sub parallel, overlapping or step-like structural features which lie oblique to the overall structural trend. Further information on this fault complex and its relationship to the proposed development is provided in **Section 5.1**. A number of smaller geological faults exist within the proposed development, including the Central Fault.

The Project Area lies mostly within the residual Blacktown and Lucas Heights soil landscapes of the region, which are intersected by the highly permeable and erosional Gynea and colluvial Hawkesbury landscapes associated with local watercourses (Hazelton and Tille, 1990) (**Figure 2.2**).

2.3 Local Context

The Project Area is generally bounded by the Bargo and Nepean Rivers to the north, West Parade and the Picton-Mittagong Railway to the west, the Nepean River, MSA and Upper Nepean State Conservation Area to the east, and Crown land and the M31 Hume Motorway to the south (refer to **Figure 2.4**). The mine infrastructure at the Surface Facilities Area is surrounded by vegetated land and gullies, bounded by Remembrance Driveway to the west and bisected by the Main Southern Railway.

2.3.1 Land Use

The Project Area extends beneath semi-rural and partly forested landscapes, along with a mix of rural and environmental land uses. The Project Area is located in a region with a long history of agricultural use. Rural uses within the Project Area include small-scale agricultural activities such as poultry, cattle grazing, trotting horse training, greyhound training and several horse studs. While incised gullies and plateaux have largely remained undisturbed, large areas of flat and low gradient slopes have

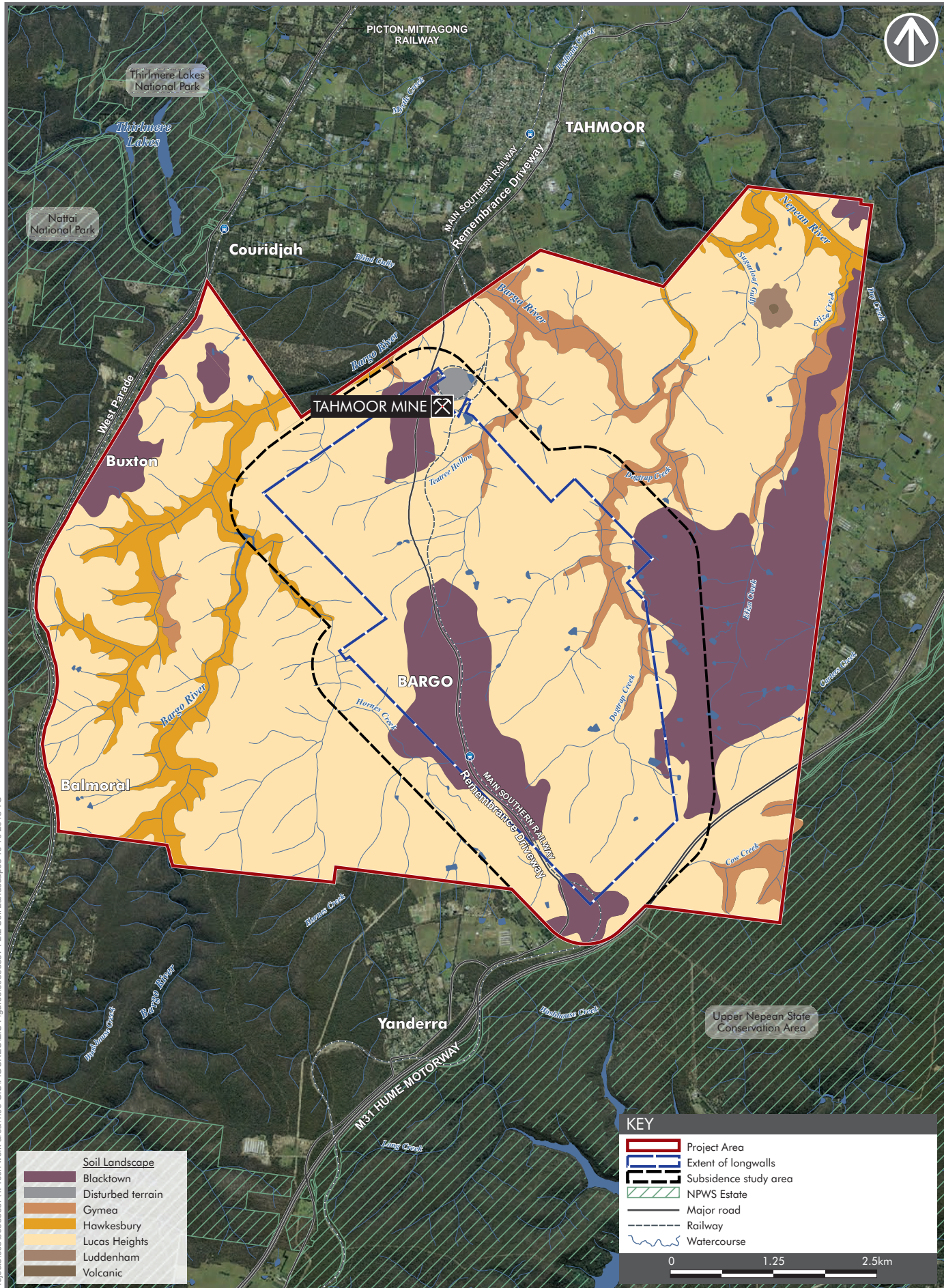
undergone moderate landscape disturbances as a result of large-scale vegetation clearance relating to agricultural activities, generally on the areas with the shale derived soils.

The Project Area extends under the residential, semi-rural and agricultural areas of the villages of Buxton, Bargo and Balmoral. The Surface Facilities Area is located approximately 3 km south of Tahmoor and 3.5 km north of Bargo. The proximity of residential receivers is discussed in the context of the air quality, noise and traffic impact assessments in **Section 11.0**.

Surface infrastructure features within the Project Area include:

- Tahmoor Mine Surface Facilities Area, existing ventilation shafts and rail loop;
- Main Southern Railway, which runs north to south through the Project Area, carries passenger and freight services between Sydney and Melbourne and connects Tahmoor Mine to Port Kembla for coal transport via the Moss Vale to Unanderra Railway;
- residential areas of Bargo, Buxton and Balmoral and commercial development associated with the Bargo township;
- the M31 Hume Highway;
- Sydney to Moomba Gas Pipeline;
- Gorodok Ethane Pipeline;
- utilities infrastructure, including water pipelines and transmission lines; and
- farms, dams and other agricultural features.

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SOIL LANDSCAPES OF THE PROJECT AREA
 Tahmoor South Project
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FIGURE 2.2

2.3.2 Natural Features

The Project Area exhibits a gently undulating landscape with generally low relief and small slopes. However, topography becomes steeper nearer to the valleys of the Bargo and Nepean Rivers which lie in the northern and western portions of the Project Area, respectively. These areas, generally associated with the steeply incised sandstone embankments and escarpments, are more densely vegetated (undisturbed forest) and, in the case of the Nepean River, form part of designated protected areas. Approximately one third of the Project Area remains forested, in particular in the west of CCL 747, surrounding the Surface Facilities Area and along the Bargo River.

Tributaries of the Bargo and Nepean Rivers traverse the Project Area, contributing to the undulating landscape (refer to **Figure 2.3**). These include both named and unnamed watercourses of varying stream orders. Watercourses within the Project Area include:

- Bargo River;
- Hornes Creek;
- Tea Tree Hollow;
- Dog Trap Creek;
- Carters Creek;
- Eliza Creek;
- Dry Creek; and
- Cow Creek.

Natural features in the local area include Thirlmere Lakes, which includes unique wetland systems protected within the Thirlmere Lakes National Park to the northwest of the Project Area (refer to **Figure 2.3**). Thirlmere Lakes National Park also forms part of the Greater Blue Mountains World Heritage Area. Lake Nepean lies south of the Project Area. The Upper Nepean State Conservation Area and MSA are located to the southeast and are partially overlain by the southeast corner of the Project Area (although the proposed development itself would be located outside of these sensitive areas) (refer to **Figure 2.3**).

2.4 Land Ownership

Within the Project Area, land ownership is a combination of Crown land, Government authority owned land, private land, and land owned by Tahmoor Coal. The land ownership across the Project Area is illustrated in **Figure 2.4**.

Crown land occupies approximately one third of the Project Area. Privately owned rural residential and commercial properties are located in the villages of Bargo and Buxton and the town of Tahmoor and on the cleared agricultural land in the east of the Project Area. The Surface Facilities Area, existing ventilation shafts and areas in relation to the Bargo lease areas in the south of the Project Area are owned by Tahmoor Coal.

A detailed schedule of land within the Project Area is included in **Appendix B**.

2.5 Mining and Exploration Tenure

Mining tenure over the Project Area includes:

- CCL 747, held by Bargo Collieries Pty Ltd; and
- CCL 716, Mining Lease 1642, and Exploration Authorisation 206 held by Tahmoor Coal Pty Ltd.

The proposed development would utilise existing surface infrastructure facilities at the Tahmoor Mine, located within Mining Lease 1642, also held by Tahmoor Coal Pty Ltd (**Figure 1.3**). Mine tenure pertaining to the proposed development is listed in **Table 2.2**.

Table 2.2 Mining tenements relevant to the proposed development

Mining Tenement	Details	Purpose (historical or proposed)
CCL 716	Tahmoor Coal Pty Ltd Area: 4,800 ha Expiry: 13 March 2021	Historical workings within the Bulli seam. Mining of the Bulli seam within CCL 716. Ventilation shafts as required by the mine plan.
CCL 747	Bargo Collieries Pty Ltd (a subsidiary of Tahmoor Coal Pty Ltd) Area: 4,769 ha Expiry: 6 November 2025	Mining of the Bulli seam within CCL 747. Ventilation shafts as required by the mine plan.
Mining Lease 1642	Tahmoor Coal Pty Ltd Area: 206.4 ha Expiry: 27 August 2031	Mining lease for surface infrastructure and the mine drift entries.
Exploration Authorisation 206	Tahmoor Coal Pty Ltd Area: 4,080 ha Expiry: 21 January 2018 and an application for renewal has been submitted	Historical exploration drilling and seismic surveys.

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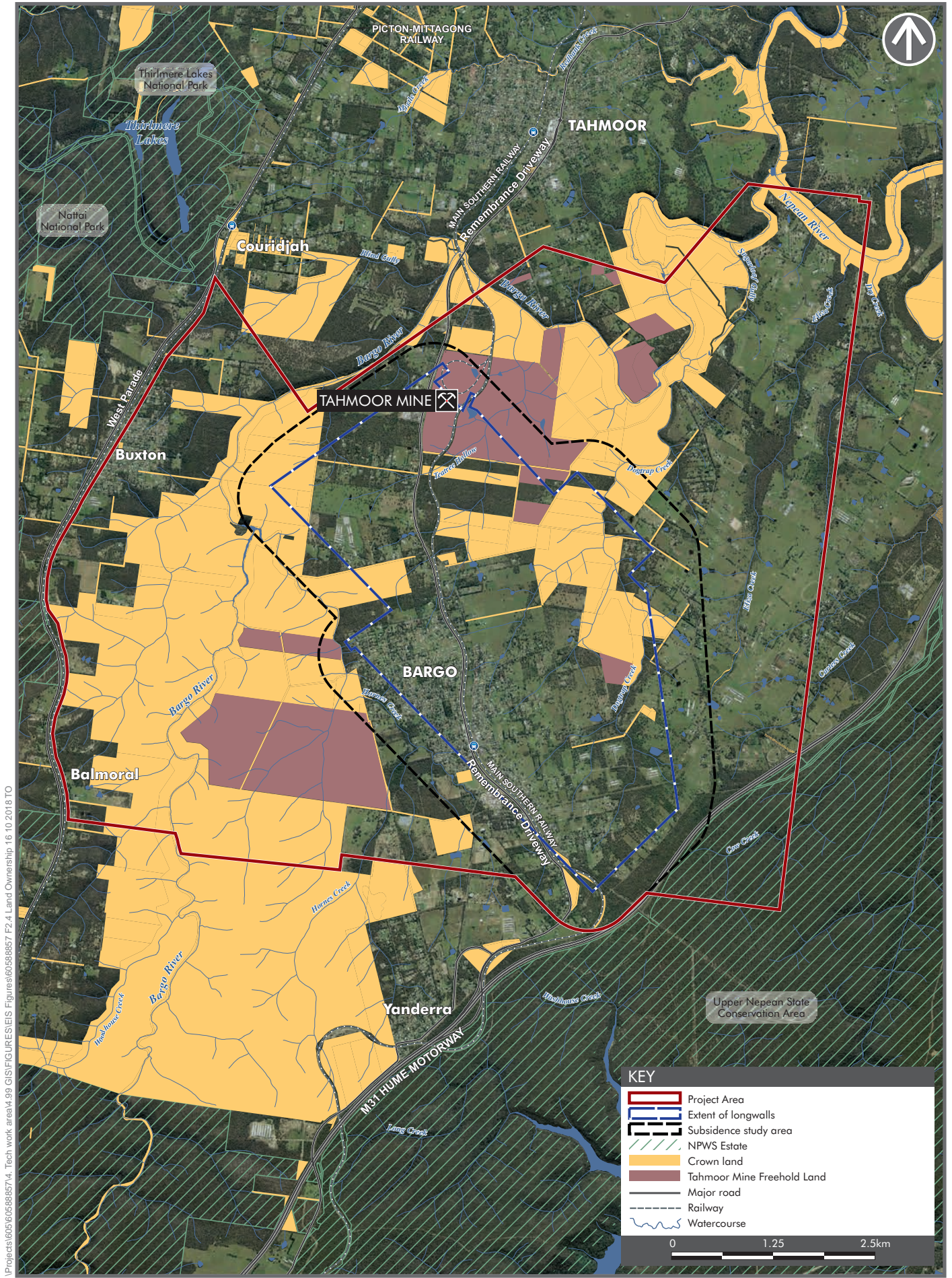
Projects\605605688574_Tech work area\4.99 GIS\FIGURES\EIS Figures\60568857 F2.3 Natural Surface Features of the Project Area 18.12.2018 TO



NATURAL SURFACE FEATURES OF THE PROJECT AREA
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FIGURE 2.3

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KEY	
	Project Area
	Extent of longwalls
	Subsidence study area
	NPWS Estate
	Crown land
	Tahmoor Mine Freehold Land
	Major road
	Railway
	Watercourse

0 1.25 2.5km



LAND OWNERSHIP OF THE PROJECT AREA
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FIGURE 2.4

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3.0 Existing Operations

3.1 Overview

Tahmoor Mine uses longwall mining methods to extract up to 3 million tonnes of ROM coal per annum from the Bulli seam. Once coal has been extracted and brought to the surface, it is processed at the CHPP. Product coal is then transported via an existing mine rail loop, the Main Southern Railway and the Moss Vale to Unanderra Railway to Port Kembla or to Port Waratah in Newcastle from time to time.

Coal extracted from the Bulli seam produces mostly hard coking coal exported for steel production. Tahmoor Mine also produces a small amount of export thermal coal which is used for power generation. Longwall mining under the current approved mine plan is expected to continue until 2022, depending upon geological, mining and economic conditions (refer to **Section 3.6**), with the current workforce of approximately 390 ongoing permanent and contract staff.

The components of the existing approved operations are shown on **Figure 3.1** to **Figure 3.4**, and in summary comprise:

- longwall mining in Tahmoor North (refer to **Section 3.2.1**);
- coal processing at the CHPP and coal clearance facilities (refer to **Section 3.3.1**);
- disposal of coal rejects at the REA (refer to **Section 3.3.3**);
- mine and surface water management (refer to **Section 3.3.6**);
- rail transport of product coal to Port Kembla and Port Waratah (refer to **Section 3.2.7**);
- on-going exploration activities (refer to **Section 3.4**); and
- mine closure and rehabilitation (refer to **Section 3.5**).

Each of the individual components of the existing operations, along with an overview of the Environmental Management System (EMS) at Tahmoor Mine, is described in further detail in the following sections (**3.2** to **3.7**).

3.2 Underground Mining Operations

3.2.1 Existing Tahmoor Mining Area

The Existing Tahmoor Mining Area is illustrated in **Figure 3.1**.

Coal extraction from the Bulli seam is currently undertaken within CCL 716, Mining Lease 1376 and Mining Lease 1539. The existing Surface Facilities Area and mine drift (which provides staff and materials access to the underground workings) are located within Mining Lease 1642 (refer to **Figure 1.2**).

The lease areas are operationally divided into three mining areas being Tahmoor North, Tahmoor Central and Tahmoor South (refer to **Figure 1.4**). Tahmoor Central was the original mining area of Tahmoor Mine; Tahmoor North is the area where mining is currently occurring; and Tahmoor South is the area where mining would occur under the proposed development.

Coal is currently extracted from Tahmoor North (refer to **Figure 3.1**) at a depth of between approximately 400 and 450 m below ground level. The thickness of the Bulli seam varies from between 1.7 to 2.3 m in this area. Extracted and future longwalls in the Tahmoor North mining area are orientated in a south-east/ north-west direction, underlying the town of Tahmoor and are generally located between the Bargo River in the south-east, the township of Thirlmere in the west and Picton in the north (refer to **Figure 3.1**).

3.2.2 Gas Drainage Operations

The Bulli seam, and the coal seams that underlie the Bulli seam (Balgownie and Wongawilli seams), contain gas, including carbon dioxide (CO₂) and methane (CH₄), which is extracted ahead of longwall mining to provide a safe working environment within the mine. This process is referred to as pre-gas drainage.

Pre-gas drainage is achieved by underground drilling boreholes directly into the coal seam to allow gas flow. This process forms part of the existing underground in-seam gas drainage system. Gas drainage from recently mined areas is also undertaken (referred to as post gas drainage) by extracting gas from the overlying rock strata (or goaf) to capture a large portion of these gases before they leak into the mine.

Gas management infrastructure at the Tahmoor Mine consists of a Mine Gas Plant, Gas Plant Vent, Gas Flare Plant, and the Waste Coal Mine Gas (WCMG) Power Plant. These processes are described below.

Gas generated from pre- and post-gas drainage is transferred to the Gas Plant by the underground gas drainage system. The Gas Plant has an existing capacity of approximately 30,000 m³ per hour from up to six vacuum pump modules. The Gas Plant vacuum pump modules are modified from time to time to meet gas drainage demands and requirements from the different parts of the mine. Gas collected at the Gas Plant is tested to determine its composition. Depending on the composition, the gas is processed via one of the three options:

- if the gas has sufficient CH₄ content, it is used to generate electricity at the WCMG Power Plant;
- if the gas composition does not meet the specification for electricity generation, the gas is sent to the onsite Gas Flare Plant where the CH₄ is flared; and
- if the gas does not have sufficient CH₄ for the operation of the Gas Flare Plant, it is vented to the atmosphere at the Gas Plant through the Gas Plant Vent.

The WCMG Power Plant at Tahmoor Mine, is located on two hectares of land adjacent to the Gas Plant. The WCMG Power plant was commissioned in 2000 and consists of seven spark ignition gas engines, each of one megawatt capacity. The WCMG Power Plant operates under a separate Environment Protection Licence (EPL) to Tahmoor Mine, EPL 11768.

The WCMG Power Plant burns gas to generate electricity, which is used in the first instance by Tahmoor Mine and any surplus electricity is reticulated into the NSW electricity grid. Utilisation of mine gas in this way provides two main benefits, namely an energy source for Tahmoor Mine and a reduction in the mine's contribution to greenhouse gas emissions. The WCMG Power Plant at Tahmoor Mine captures and converts up to 130,000 tonnes of CO₂ equivalent emissions each year. The volume of mine gas converted to electricity each year is dependent on the ratio of CH₄ to CO₂, which varies throughout the coal seam.

The Tahmoor Mine Flare Plant has sufficient design capacity of approximately 9,000 litres per second to accommodate all projected gas drainage from the proposed development, should it be required.

The existing Tahmoor Mine Gas Plant, Gas Flare Plant and the WCMG Power Plant has sufficient capacity for the operation of the proposed development.

3.2.3 Mine Ventilation

Tahmoor Mine uses a combination of upcast and downcast ventilation shafts to provide a reliable ventilation system and adequate supply of clean air to personnel in the mine. The ventilation shafts currently in use for the existing operations are shown on **Figure 3.1** and include:

- Tahmoor Shaft No. 1: a downcast ventilation shaft that is located north of the Bargo River, on the southern side of Stratford Road;
- Tahmoor Shaft No. 2: an upcast ventilation shaft that is located north of the Bargo River, on the northern side of Rockford Road;

- Tahmoor Shaft No. 3: a downcast ventilation shaft that is located within the Surface Facilities Area of Tahmoor Mine, directly northwest of the rail loop, which includes shaft winder with man riding capabilities; and
- Mine drift: an inclined shaft for man and materials transport.

Mine exhaust air is extracted through the Tahmoor Shaft No. 2 which houses the main ventilation fans for Tahmoor Mine. Tahmoor Shafts No. 1 and No. 3 are used as air intakes for the underground operations. The mine drift also provides air intake to the underground workings.

Gases discharged via the ventilation system are classified as fugitive emissions. Mine exhaust air contains gases including CO₂, CH₄ and oxygen. Mine exhaust air is continuously monitored as part of the environmental management program at Tahmoor Mine. Treatment of mine exhaust air from the main ventilation fans at Tahmoor Shaft No. 2 is not undertaken (refer to **Section 3.7**).

3.2.4 Mining Method and Equipment

Underground mining is undertaken using conventional longwall development through operation of a number of continuous miners. Longwall development refers to the mining of a series of roadways (gate roads) and cut-throughs between the roadways to form pillars of coal that support the overlying strata during the extraction of coal. Longwalls in the Tahmoor North mining area are 285 m wide, measured as the distance between gate road centrelines. The gate roads themselves are 5.2 m wide and 3 m tall.

Following the development of gate roads and cut-throughs, coal is cut from the coal face by a longwall shearer, which proceeds in the direction of mining. Coal is transported to the Surface Facilities Area via a system of underground conveyors and the mine's drift (refer to **Section 3.2.4**). The longwall retreats as coal is mined and the overlying rock is collapsed into the void (forming the goaf) left behind by the coal extraction (refer to **Figure 3.2**).

3.2.5 Mine Access

Access to the underground mine for staff and materials is via a drift that extends from the Surface Facilities Area to the mine pit bottom. In addition, a 70 person vertical travel lift (man rider) is located at Tahmoor Shaft No. 3, to provide secondary access from the Surface Facilities Area to the underground workings.

3.2.6 Coal Production Limits

The Tahmoor Mine CHPP has approval to process up to three million tonnes of ROM coal per annum.

3.2.7 Coal Logistics

Product coal produced by the mine is primarily transported to the Port Kembla Coal Terminal from a rail loop at the Surface Facilities Area which connects the mine to the Main Southern Railway, and the Moss Vale to Unanderra Railway to Port Kembla. The Main Southern Railway is also used for passenger and freight routes between Sydney and Melbourne. The Moss Vale to Unanderra Railway provides a route off the Main Southern Railway for diesel powered freight trains travelling to Port Kembla.

The Australian Rail and Track Corporation (ARTC) has allocated Tahmoor Mine four train paths per day on the rail network between Tahmoor Mine and Port Kembla via the Moss Vale to Unanderra Railway Line. Product coal can also be transported to the Port Kembla Coal Terminal via the Illawarra Line, when required, such as when track maintenance is being conducted. Some coal is also transported to Port Waratah in Newcastle from time to time.

Tahmoor Coal's current approval allows 50,000 tpa of product coal to be hauled from Tahmoor Mine by road within Wollondilly Shire for local domestic use and allows road transport of product coal in situations when rail transport is unavailable. The current approval also allows road transport of 50,000 tpa of reject material from the site.

3.2.8 Mine Dewatering

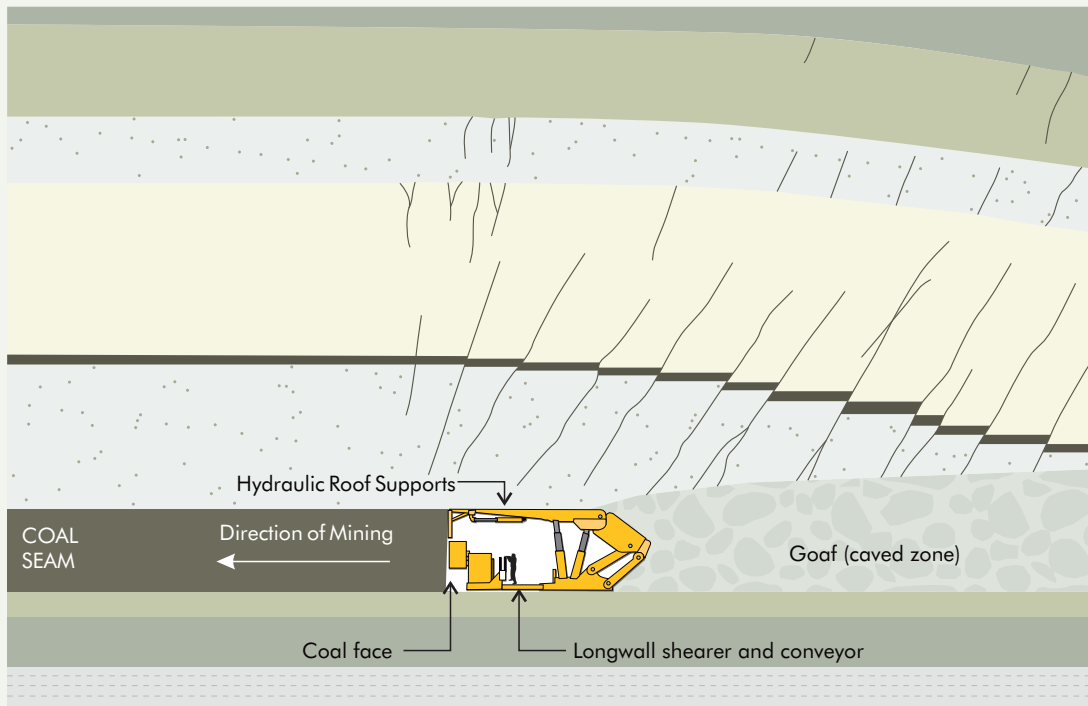
To maintain a safe underground mine environment for staff and to enable the efficient mining of coal, water entering the mine from adjacent strata is collected and extracted throughout mining.

Mine water is collected in underground sumps and pumped from the mine to the water management system at the Surface Facilities Area for treatment (refer to **Section 3.3.6** for further details). Treated mine water is then either reused underground for non-potable uses during mining or discharged at the surface to Tea Tree Hollow via an existing licensed discharge point (LDP) (refer to **Section 3.3.6**).

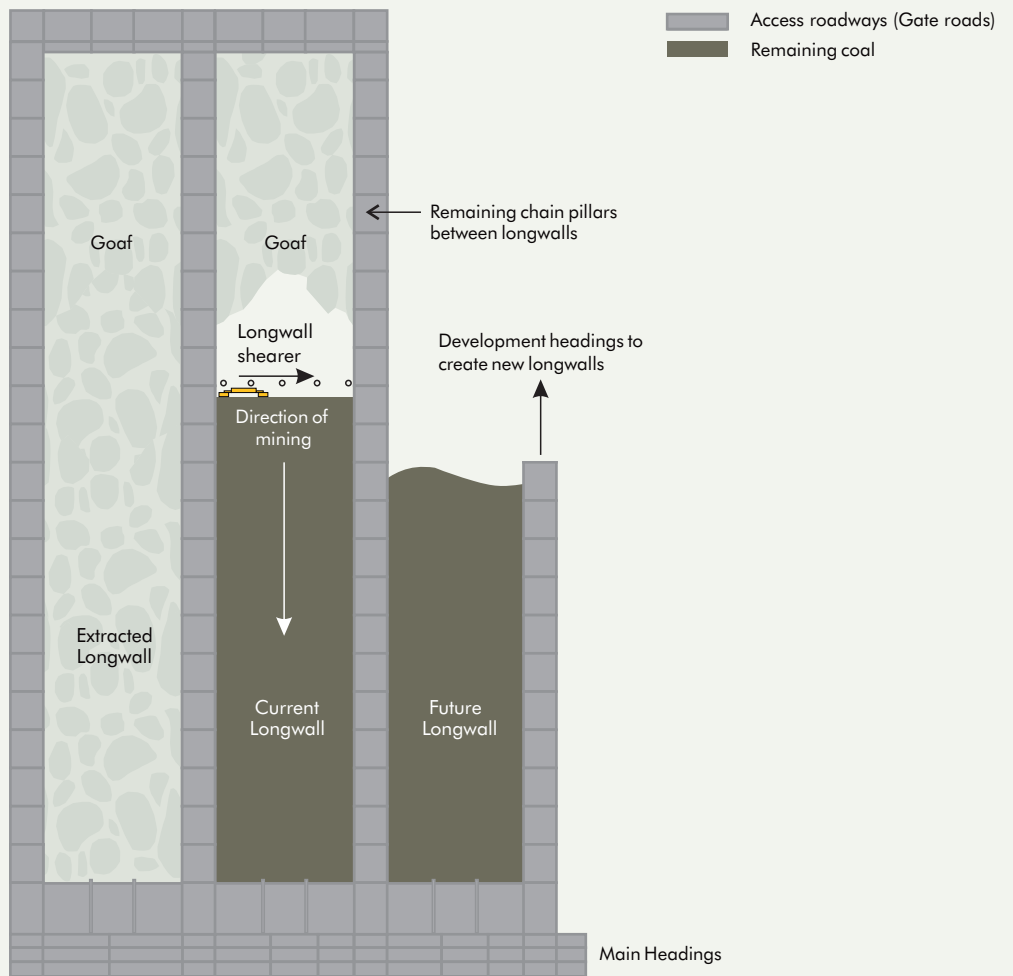


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Section View



Plan View

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3.2.9 Subsidence Monitoring and Management

Mining operations at Tahmoor Mine are governed by a Mining Operations Plan (MOP), Subsidence Management Plans (SMPs) and/or Extraction Plans (EPs) prepared specifically for each longwall, or series of longwalls. The MOP, SMPs and EPs are submitted to the DPE and NSW DPE - Division of Resources and Geoscience (DRG) for approval prior to the commencement of mining. Longwall 32 within Tahmoor North was the last longwall approved under a SMP approval for secondary extraction. All secondary extraction past Longwall 32 would be via an EP, which can include up to 5 longwalls.

A series of SMPs or EPs are prepared to manage the impacts of longwall mining on specific features which could potentially be impacted by subsidence. These features include:

- natural features (such as waterways and cliffs);
- heritage items;
- Council owned assets and infrastructure;
- rail assets and infrastructure;
- potable water assets and infrastructure;
- sewer assets and infrastructure;
- gas assets and infrastructure;
- power assets and infrastructure;
- communications assets and infrastructure; and
- public, commercial and residential structures. Specific sub-plans may also be developed for large structures, such as bridges, retail complexes and industrial facilities.

The SMPs or EPs provide details regarding subsidence management, mitigation and monitoring. The objectives of the SMPs or EPs are to:

- ensure the safe and serviceable operation of all surface infrastructure;
- reduce disruption and inconvenience to a minimum;
- monitor ground movements and the condition of surface infrastructure during mining;
- initiate action to mitigate or remedy potentially significant impacts that are expected to occur on the surface;
- provide a plan of action in the event that the impacts of mine subsidence are greater than those that are predicted;
- provide a forum to report, discuss and record impacts to the surface; and
- establish lines of communication and emergency contacts.

An Environmental Management Plan (EMP) is prepared as part of the SMPs/EPs. The EMP establishes procedures to measure, manage, mitigate and repair potential impacts that might occur to natural features. The objectives of the EMP are met by undertaking the following:

- assessment of the potential subsidence impacts to natural features resulting from the proposed mining;
- monitoring ground movements and the condition of natural features during mining;
- initiating action to mitigate or remedy potential significant impacts that are expected to occur on the surface;
- providing a plan of action in the event that the impacts of mine subsidence are greater than those that are predicted;
- providing a forum to report, discuss and record impacts to the surface, including community and government stakeholders and consultants as required; and

- establishing lines of communication and emergency contacts.

The SMPs/EPs are developed in consultation with stakeholders and describe the required measures for monitoring surface subsidence and physical changes that are predicted to occur during mining. Measures detailed in the management plans include:

- the requirements for inspection regimes;
- the layout of monitoring points and parameters to be measured;
- monitoring methods and accuracy;
- the timing and frequency of surveys and inspections; and
- processes for recording and reporting of monitoring results.

Tahmoor Coal actively manages impacts resulting from subsidence movements in line with the SMPs/EPs and EMPs developed for the mine. The mine would continue to implement this management framework to manage impacts to surface features resulting from subsidence associated with its current operations and the proposed development.

Since 2004, Tahmoor Mine has mined under the entire township of Tahmoor, completing these operations in mid-2014 as longwall mining progressed north of the town into more rural areas. In this time, Tahmoor has safely and competently managed the subsidence impacts on major built infrastructure such as:

- the Main Southern Railway rail line;
- Tahmoor Town Centre shopping centre;
- Wollondilly Council road, bridges and drainage structures;
- gas, electricity, water, sewer and drainage infrastructure;
- a poultry processing plant;
- Aboriginal cultural heritage sites; and
- post-European settlement heritage structures.

Tahmoor Mine has subsided in the order of 1,950 residential dwellings and commercial premises, the majority of which experienced little if any damage from mine subsidence impacts. A small percentage experienced more significant impacts which have been rectified or continue to be repaired, replaced or otherwise satisfactorily addressed, by Tahmoor Mine in close working relationship with Subsidence Advisory NSW (SA NSW).

It is noted that due to the commencement of the *Mining Amendment Act 2008* and *Mining Regulation 2010* on 15 November 2010, Rehabilitation Management Plans (RMP) are intended to replace the existing requirements for MOPs. However, it is understood that the implementation of the RMPs has been delayed until supporting guidelines are finalised. Consultation with the DRG would be undertaken to ensure that the MOP or RMP is prepared for the proposed development in accordance with the relevant guidelines.

From 1 July 2014 a consolidated Extraction Plan process has replaced the former SMP process. Under the EP, mine subsidence would be jointly regulated by the Resource and Geosciences Division (responsible for compliance and enforcement of the EP) and Planning Services Division (responsible for compliance and enforcement of the EP as it relates to the Development Consent) of the DPE. Consultation with the relevant divisions of DPE would be undertaken to ensure that the EP is prepared for the proposed development in accordance with the relevant guidelines. Longwall 32 was the last longwall approved under the SMP approval process.

3.3 Surface Facilities Area

Existing surface facilities at Tahmoor Mine include:

- the CHPP;
- stockpiles for ROM and product coal;
- the REA;
- plant and equipment;
- site amenities;
- the Gas Plant,
- the Gas Flare Plant;
- WCMG Power Plant; and
- water management infrastructure.

Each of these components of the Surface Facilities Area are discussed in **Section 3.3.1** to **Section 3.3.6** and presented in **Figure 3.3**.

3.3.1 Coal Handling and Preparation Plant

Tahmoor Mine processes ROM coal using an on-site CHPP (refer to **Figure 3.3**).

The CHPP processes up to 650 tonnes of ROM coal per hour and separates it into two products by removing rock and other foreign materials (coal rejects) through screening and cyclonic processes. High quality coking coal is the major product of the mine which also produces a lesser volume of thermal coal as a secondary product.

At the CHPP, ROM coal is crushed and screened prior to being processed using primary and secondary cyclones and a flotation circuit in the coal washery to produce the coking and thermal coal products. The product coal is then transported via conveyors to stockpiles at the Surface Facilities Area prior to being loaded onto trains for transport to Port Kembla and/ or Port Waratah.

Fine reject material from the coal washery process is dewatered using drum filters and belt press filters. The fine reject material is then mixed with coarse reject material before being transported via conveyor and haul trucks to the REA for disposal.

3.3.2 Stockpiles

Stockpile areas used at Tahmoor Mine include:

- the ROM coal stockpile;
- the product coking coal stockpile; and
- the thermal coal product stockpile.

The ROM coal stockpile is located inside the rail loop at the Surface Facilities Area, adjacent to the CHPP and receives ROM coal from the main drift conveyor.

The coking coal product stockpile receives coking product coal from the CHPP and is located in the southern section of the Surface Facilities Area, between Remembrance Driveway and the Main Southern Railway. Product coal from the coking coal product stockpile is transported via conveyor to the rail load out bin where it is loaded onto trains.

The thermal coal product stockpile is located to the east of the coking coal product stockpile and receives thermal coal from the CHPP. Product coal from the thermal coal product stockpile is transported by conveyor or trucks to the rail load out bin where it is then loaded onto trains.

Occasionally, ROM coal can be stockpiled at locations at the end of either product coal stockpiles. On these occasions the movement of ROM coal is managed by internal site truck haulage between stockpile locations.

3.3.3 Rejects Management

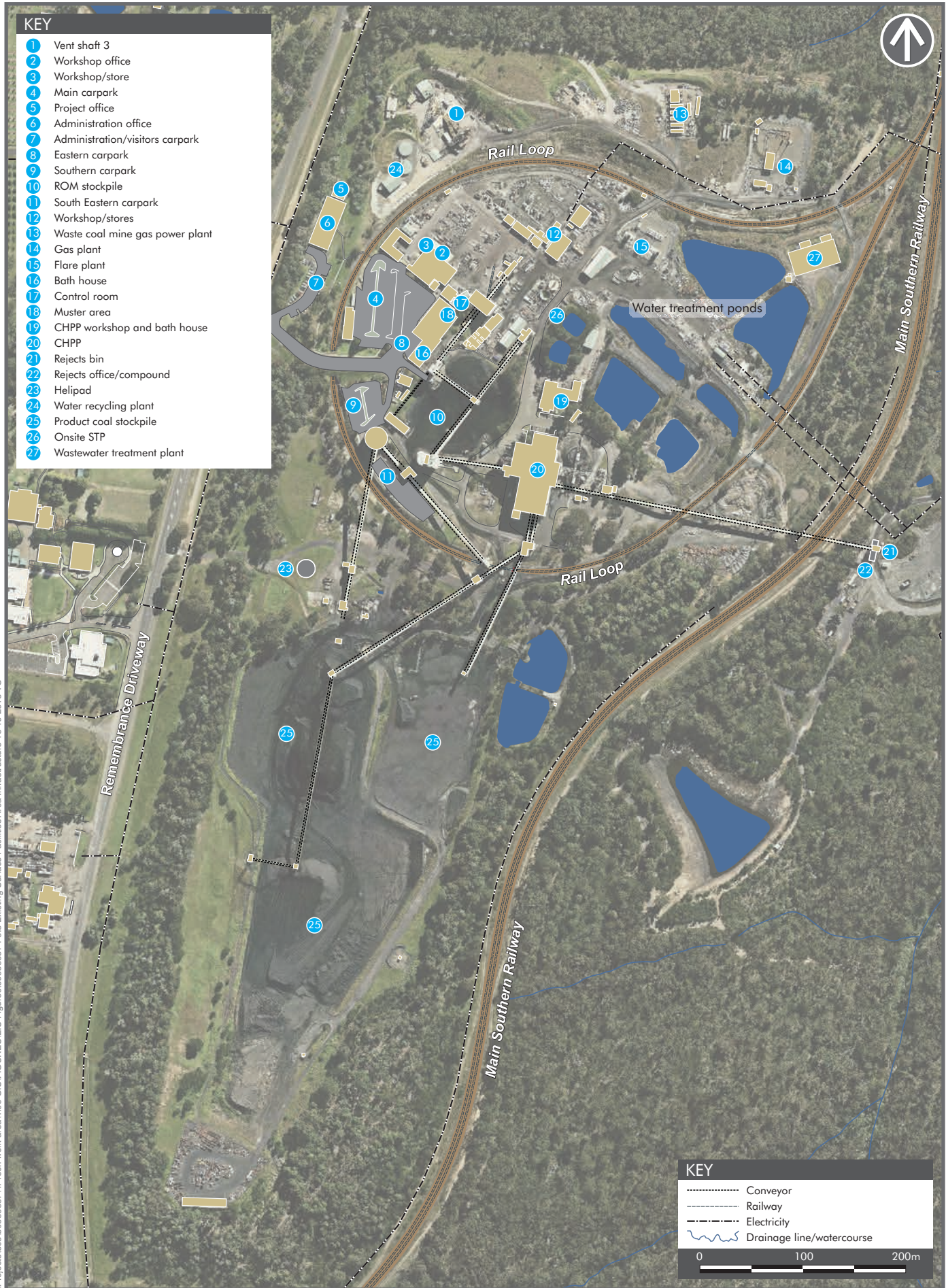
Coal rejects (also sometimes known as refuse) is the waste rock and fine material generated from the CHPP. The rejects consist mostly of the shale and claystone material from the roof and floor of the underground workings with a small proportion of carbonaceous material and coal from the seam. The percentage of coal in the rejects is dependent on the CHPP, the mining process and mining efficiency. The coal rejects material is generally sized at less than 35 millimetres in diameter, is dark grey to black in colour and is inert.

Coal rejects from the CHPP are transported via conveyor to a reject loading bin on the eastern side of the Main Southern Railway where it is collected by haul trucks and emplaced at the REA.

The existing approved REA at the Tahmoor Mine has been in operation since 1980 and is approximately 89 ha in size. The REA has an approved capacity of about 13 Mt and has about 4 Mt of capacity remaining, which is expected to be used by 2022, with the completion of the Tahmoor North operations. Approximately 60 percent (60%) of the REA has been capped and revegetated. Reject material is spread by dozer in layers to achieve suitable compaction. As reject material is progressively placed in the REA, a dozer is used to shape the landform. Once the final landform profile has been achieved, the area is capped and progressively rehabilitated (refer to **Section 3.5**). The final landform profile consists of a stable battered slope, approximately 12 m high with external batters ranging from 1:4 to 1:8.

Erosion and sediment control measures are incorporated into each stage of the REA operation. These measures include sedimentation and retention ponds, clean and contaminated water drains, scour protection and sediment fencing.

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EXISTING SURFACE FACILITIES AREA INFRASTRUCTURE
Tahmoor South Project
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FIGURE 3.3

3.3.4 Site Amenities and Layout

The site amenities at the Surface Facilities Area are shown in **Figure 3.3** and include:

- administration building, located on the western side of the Surface Facilities Area between Remembrance Driveway and the rail loop;
- car parking facilities located at the entrance to Tahmoor Mine, as well as inside the rail loop adjacent to the mine office;
- mine office and bathhouse; and
- workshop and store.

3.3.5 Site Access

The entrance to the Tahmoor Mine Surface Facilities Area is located on the eastern side of Remembrance Driveway between Tahmoor and Bargo. Remembrance Driveway serves as a regional connection between Picton, Tahmoor and Bargo and intersects the M31 Hume Motorway south-east of Tahmoor Mine.

3.3.6 Water Management

Water movements at Tahmoor Mine are as follows:

- inflows from surface runoff, direct rainfall onto dam surfaces, potable water draw and groundwater inflows to the underground operations; and
- outflows including discharges to the Bargo River catchment via licensed discharge or overflow points to Tea Tree Hollow, evaporation from dam surfaces, and water loss to product coal and coarse rejects.

Water at Tahmoor Mine is managed consistent with the requirements of a Soil and Water Management Plan that aims to ensure that:

- surface water runoff is reused as process water as required;
- licensed discharge occurs within licence conditions; and
- the quality and quantity of water discharged is in accordance with relevant water quality criteria.

The main components of the water management system are as follows:

- surface water runoff treatment, reuse and discharge of excess water via a licensed discharge point (LDP) and licensed wet weather overflow points (LOPs);
- mine water treatment, reuse and discharge of excess water to Tea Tree Hollow via the LDP1 in accordance with EPL1389; and
- effluent treatment and discharge via LDP1.

The water management system at Tahmoor Mine treats mine and surface water and directs excess water to four discharge locations under the site's existing EPL No. 1389 including one main mine water licensed discharge point (LDP 1) and three wet weather licensed overflow points (LOPs 3, 4 and 5). All four locations LDP 1, LOP 3, LOP 4 and LOP 5 discharge to Tea Tree Hollow.

Each component is discussed below, while the primary water management infrastructure at the Surface Facilities Area is shown on **Figure 3.4**, **Figure 3.5** and **Figure 3.6**.

Surface Water Management

Surface water runoff from operational areas and stockpiles at Tahmoor Mine is captured by a network of stormwater treatment dams at the Surface Facilities Area to allow suspended solids in the water runoff to settle out. Following treatment, the water discharges or overflows to Tea Tree Hollow at the LDP and LOPs (refer to **Figure 3.4** & **Figure 3.5**). Specifically, surface water runoff from the following areas is managed:

- the surface workshop;

- storage yard and remaining hardstand areas of the Surface Facilities Area;
- the ROM coal and coal product stockpiles;
- the REA; and
- the ventilation shaft areas.

Water runoff from within and around the surface workshop area passes through an oil and water separator prior to entering the stormwater treatment dams. Oil traps and separators are inspected and cleaned monthly by a contractor. Oil drained from equipment is transferred to a waste oil storage area prior to being disposed of offsite.

Stormwater runoff from the storage yard and remaining hardstand areas of the surface facility area (mix of sealed and unsealed ground) is captured by drainage channels and directed to a series of dams for retention prior to discharge via LDP1. Dams M1, M2, M3 and M4 enable settling of solids from surface water runoff and also treat mine water prior to discharge at LDP1.

The coal stockpiles stormwater system areas are drained or pumped to settlement dam S4 prior to being discharged via LDP1. Specifically, water runoff from the stockpiles is contained within bund walls which direct water to two interconnected retention dams (marked as stockpile dams S2 and S3 on **Figure 3.4**, **Figure 3.5** and **Figure 3.6**).

Pumps located on the stockpile dams S2 and S3 provide water for the stockpile dust suppression sprays. Water overflows from S2 and S3 to the main treatment dam (S4). Flow entering S4 from the stockpile dams is automatically dosed with a flocculent to allow suspended solids to settle out in the dam, treated water overflows are discharged via LDP1.

Water runoff from the REA is captured in sediment retention dams S5, S6, S7, S7a, S7b, S8 and S9, with water pumped to S4 dam for treatment, via automatic flocculent dosing, prior to discharge via LDP1. The REA is also currently served by the following discharge and overflow points:

- LOP 4 – wet weather overflow from the treatment dam (S4);
- LOP 3 – wet weather overflow from the haul road dam (S9); and
- LOP 5 – wet weather overflow from reject seepage dam (S8).

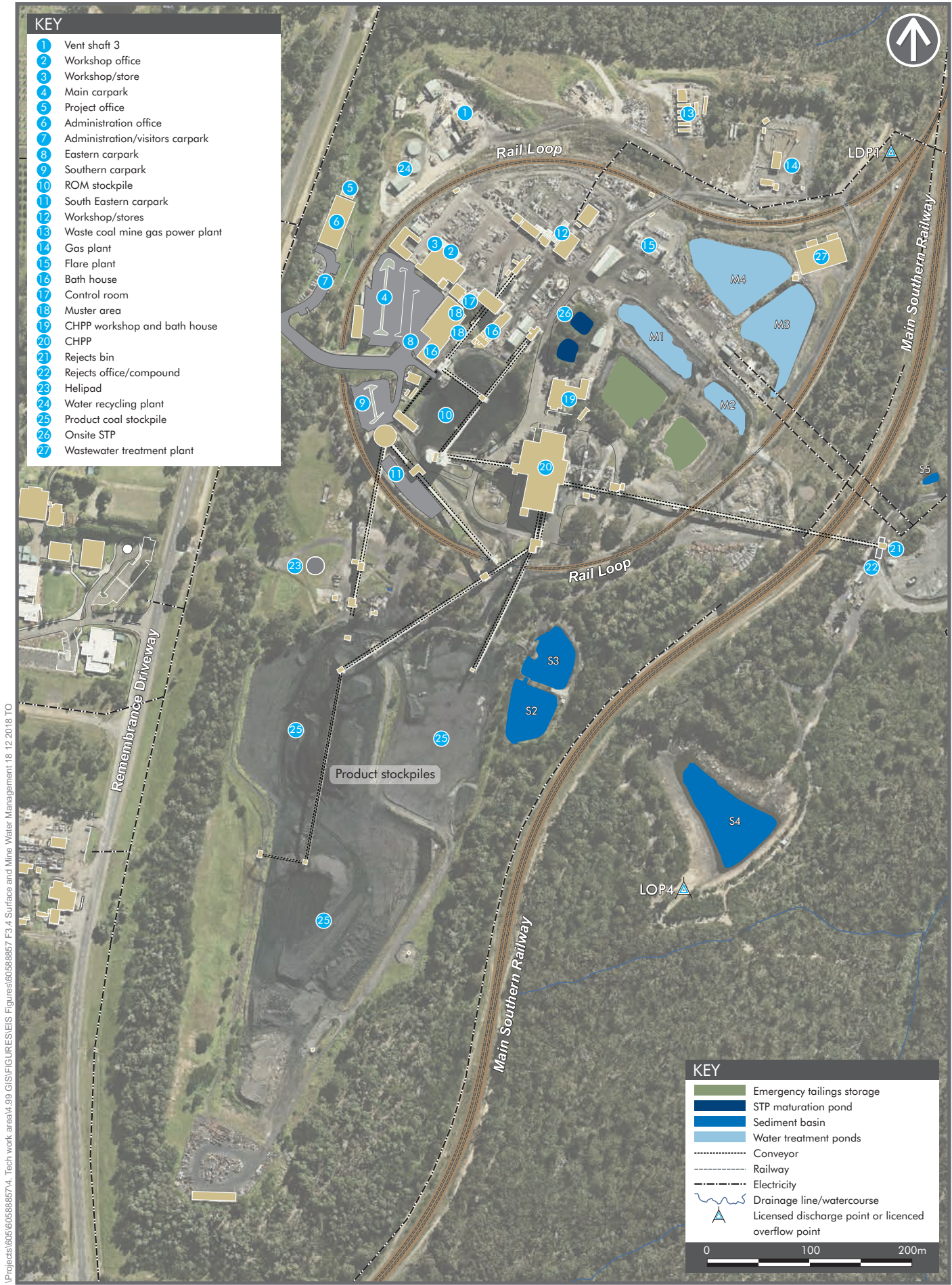
In December 2011, Tahmoor Mine's EPL was varied following completion of Pollution Reduction Program (PRP) 15 'Improvement of Stormwater Management' which was designed to meet the requirements of *Managing Urban Stormwater* (Landcom, 2004) ('the Blue Book'), including Volume 2E Mines and Quarries (2008).

Following acceptance of the completed measures required by PRP 15 by the NSW Environment Protection Authority (EPA) in October 2011, discharge quality and volume limits were removed from LOP 3 and LOP 5 on the EPL. Under the EPL, overflow is permitted to occur via the unregulated wet weather overflow points during rain events exceeding the design capacity of the stormwater system.

Stormwater management at the existing ventilation shafts is as follows:

- Tahmoor Shaft 1 (T1): located on Stratford Road serves as a downcast shaft only, with no water discharges. The site is considered a clean water catchment as there are no active surface operations or work areas at the site, with all clean surface stormwater runoff draining to the surrounding bushland and down towards the Bargo River via natural drainage lines;
- Tahmoor Shaft 2 (T2): located on Rockford Road, it is currently used as the main upcast ventilation fan for the Mine. Runoff from the surface area around Tahmoor Shaft 2 (gravel road, core sheds and bushland) flows via a surface drainage channel down to settling dams M5 and M6; and
- Tahmoor Shaft 3 (T3): located adjacent to the Surface Facilities Area, outside the rail loop, and currently serves as a downcast shaft and staff access to the mine via a shaft winder. Runoff from the surface area around Tahmoor Shaft 3 (unsealed roads and vegetated earthen bund) flows to a series of gravel sediment retention dams, before continuing along a surface drainage channel around the outside of the rail loop, eventually joining the overflow water from M4 dam, before discharge via LDP1.

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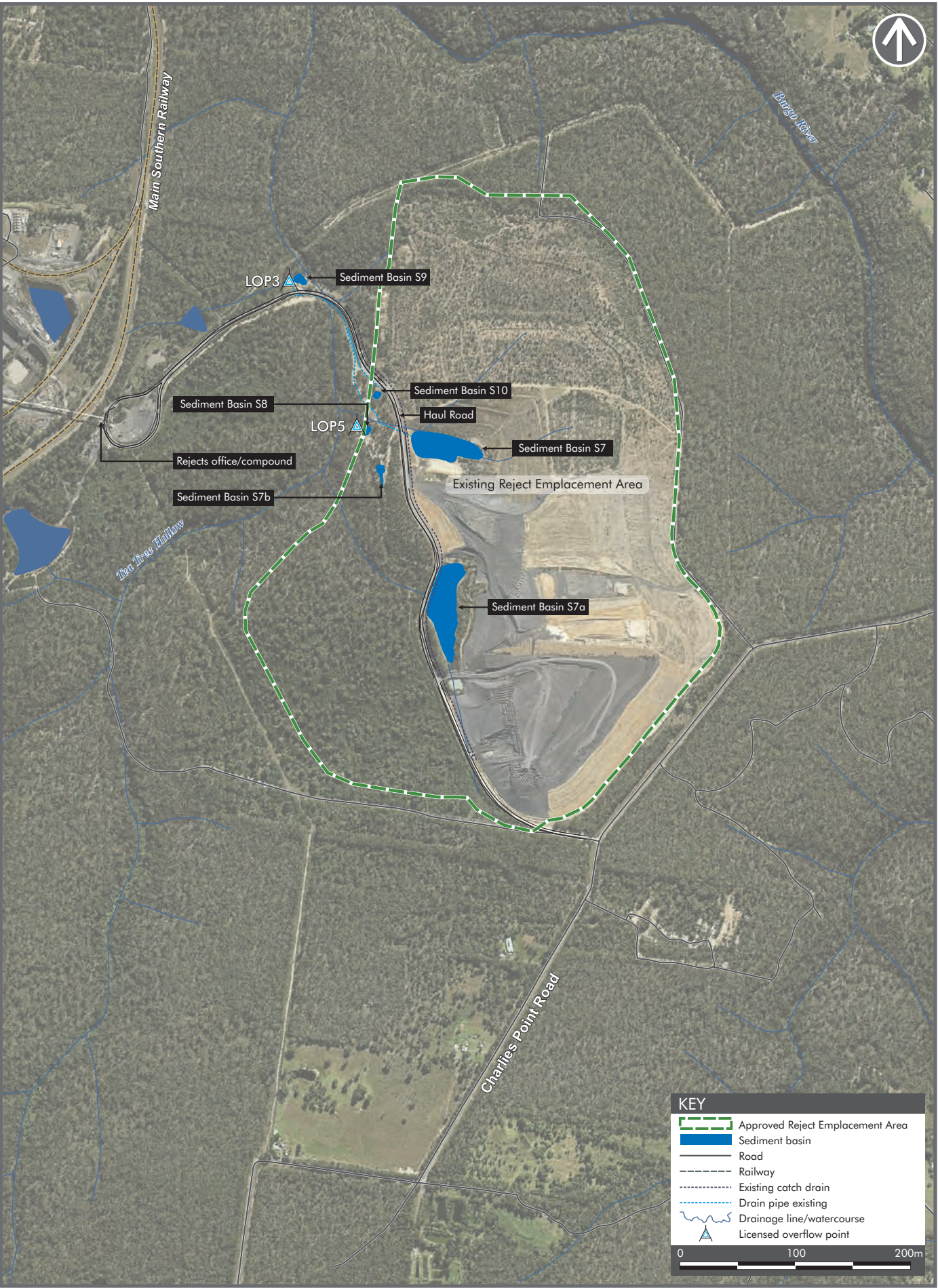


SURFACE AND MINE WATER MANAGEMENT
Tahmoor South Project
Environmental Impact Statement

FIGURE 3.4

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KEY	
	Approved Reject Emplacement Area
	Sediment basin
	Road
	Railway
	Existing catch drain
	Drain pipe existing
	Drainage line/watercourse
	Licensed overflow point

0 100 200m

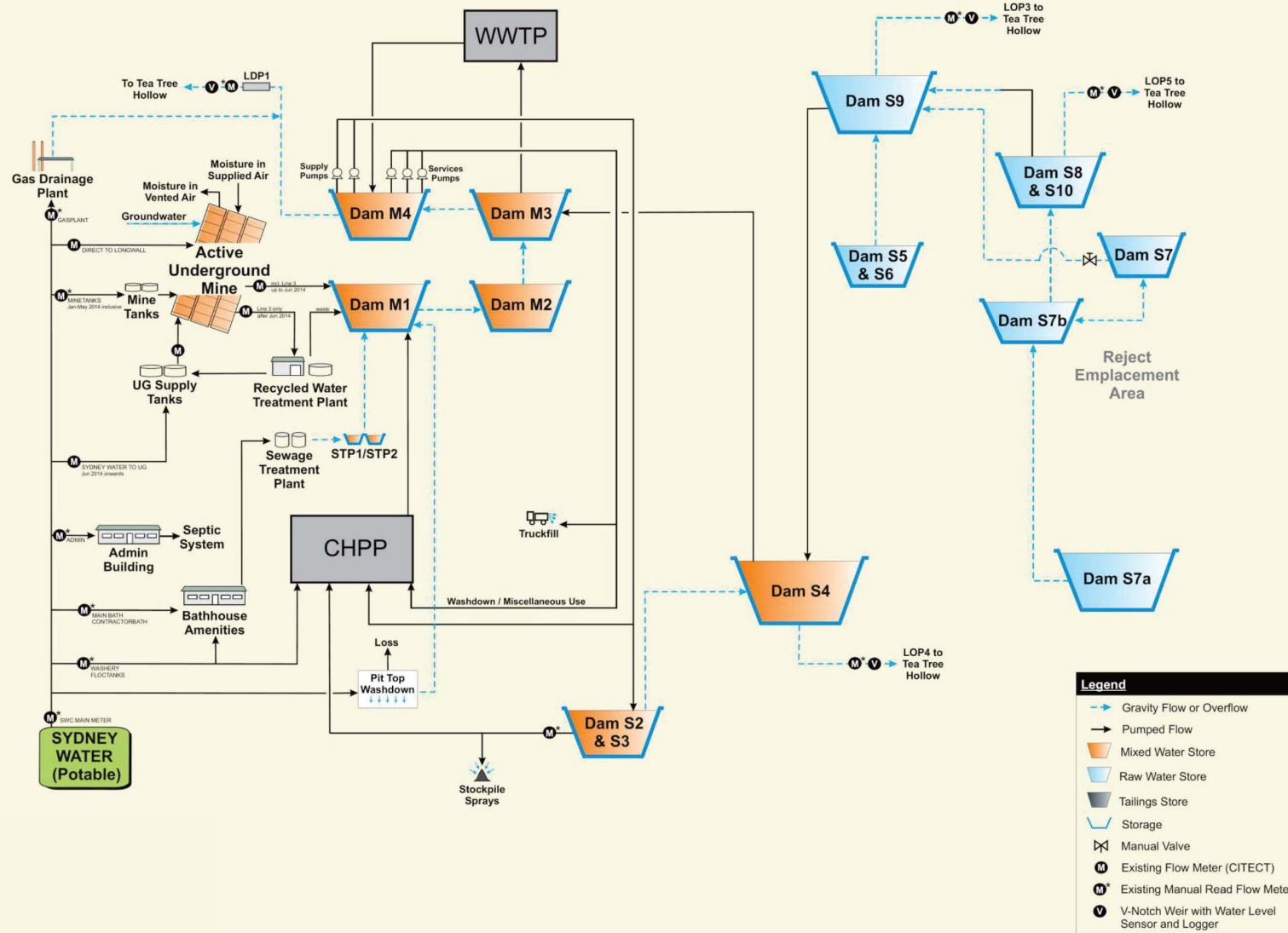


EXISTING REJECT EMPLACEMENT AREA SURFACE WATER MANAGEMENT
 Tahmoor South Project
 Environmental Impact Statement

FIGURE 3.5

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EXISTING WATER MANAGEMENT SYSTEM SCHEMATIC

Tahmoor South Project
Environmental Impact Statement

Mine Water

Inflows of groundwater into the underground mine from the coal seam and adjacent strata are referred to as mine water. Water from porous sandstone layers above the mine workings seeps into the mine at rates of between approximately 2 and 5 Megalitres (ML) of mine water per day. This water is intercepted by an underground water reticulation system, eventually reaching pit bottom where it is pumped up the main drift to the Surface Facilities Area. Water is pumped to the surface via dewatering lines one and two, and then directed to a series of settling dams (M1, M2, M3 and M4) on the Surface Facilities Area and on to the waste water treatment plant (WWTP). The WWTP has capacity to treat up to 6 ML per day of mine water to reduce the concentrations of Arsenic, Nickel and Zinc in the water discharged from the mine. Treated water is then either reused at the mine or discharged via LDP1 to Tea Tree Hollow, flowing into the Bargo River.

The WWTP was constructed at Tahmoor Underground Mine in June 2015 as part of PRP22 to improve the quality of water discharged from LDP1. Following modifications, detailed commissioning of the WWTP occurred during September to November 2018. PRP22 on EPL 1389 for the WWTP has been extended until November 2018.

Water is also pumped from the bottom of Tahmoor Shaft 3 to the surface via dewatering line three. This water is a cleaner stream with limited exposure to operational areas, and is mainly composed of groundwater with low solids contamination. Water from this source is sent for recycling in the Recycled Water Plant at the Surface Facilities Area. It recycles 1.0 ML of mine water per day for reuse in the underground mine. Mains water use is minimised where possible by using recycled mine water for these non-potable uses.

Potable water is supplied to Tahmoor Mine by Sydney Water, with the take-off from the main pipeline near the main administration building on Remembrance Driveway. The mine uses up to approximately 1.2 ML of water per day. The water drawn from mains supply is offset with water reused from the mine's recycled water plant.

Dewatering from underground operations at Tahmoor Mine is governed by groundwater licence WAL36442 (10WAI18745) with an annual allocation of less than or equal to 1,642 ML. Groundwater dewatering volumes are reported annually in the Annual Review.

Sewage Treatment

A sewage treatment plant discharges effluent into two maturation ponds, which flow through to and are discharged via LDP1.

3.4 Exploration Activities

Tahmoor Mine has undertaken, and continues to undertake, exploration programs ahead of mining operations to determine the geological structure and to better understand the coal resources within its coal lease areas. The exploration program is carried out under a series of approvals granted by DRG under the Mining Act. There are generally two components involved in exploration activities: seismic reflection surveys, and exploration borehole drilling programs, which are explained in further detail below.

Seismic survey for minerals exploration uses a vibration source to investigate the geological structure of the subsurface environment. The vibration source generates a seismic wave which reflects off underground structures. The returning signals from the sources are detected by geophones (similar to a microphone), laid on the land's surface in known locations relative to the position of the source. The recorded signals are then subjected to specialist analytical review and processing to yield comprehensible data which may assist further geological survey and future mine planning.

The seismic reflection survey involves the following:

- standard vehicles to carry and lay out recording cables;
- a specialised truck-mounted Envirovibe unit – to deliver the seismic vibration; and
- use of in some instances a small, manually operated vibration source similar to a small hand-operated soil compactor, may be used.

Exploration boreholes have been drilled throughout the history of mining at Tahmoor Mine to define coal quality across the coal lease areas and to inform mine planning. The information gained during exploration is used to assist the detailed mine design process and further define the coal resource potential ahead of mining activities. The drilling of each exploration borehole is undertaken as follows:

- establishment of the exploration borehole site (one week);
- drilling of the exploration borehole using a truck-mounted or skid-mounted drill rig. A rod truck, core boxes, pumps and compressors and ancillary equipment are also delivered to the drill site (four to eight weeks); and
- decommissioning (including sealing and rehabilitation) of the exploration borehole site (one week plus three to six months of rehabilitation monitoring).

3.5 Rehabilitation and Mine Closure

The primary objectives of closure, decommissioning and rehabilitation of the existing Tahmoor Mine will be to:

- return land affected by the operations to a condition suitable for a range of sustainable future land uses; and
- to provide for the safety of employees and the public during and following mine closure.

Disturbed areas at Tahmoor Mine are progressively rehabilitated in accordance with a Conceptual Mine Closure Plan following completion of works at those locations (exploration boreholes and the REA, for example).

The majority of rehabilitation currently undertaken at Tahmoor Mine is at the REA, as emplaced areas are progressively reshaped, covered with topsoil and revegetated. Revegetation involves planting a combination of sterile, exotic cover crops and native grass, shrub and tree seed mixes to achieve the rehabilitation objective of establishing native bushland. Monitoring of rehabilitated areas is undertaken annually to assess the success and to inform the management of areas of re-established vegetation.

In line with the development consent conditions for the existing operations, mine closure will occur once mining has ceased within the Tahmoor North mining area and once rehabilitation activities are complete. The preliminary final land use option proposed for the existing Tahmoor Mine involves a return to natural bushland. However, it is recognised that given the location and activities of the site, there are potential opportunities to establish a range of final land use options. The selection of viable options will be informed by the preparation of a detailed Mine Closure Plan to be prepared by Tahmoor Coal within five years of the planned completion of current mining. This Plan will include measures to be undertaken to rehabilitate the Surface Facilities Area and related infrastructure, as well as the proposed method of closing the underground workings.

The timing and staging of the rehabilitation and closure of the existing operational areas of Tahmoor Mine, as well as the proposed final land use of the entire site, would be influenced by the requirements and timeframes associated with the proposed extension of mining, if approved, as further outlined in **Sections 4.0** and **Section 11.23**.

3.6 Timeframe

3.6.1 Remaining Mining Schedule

Tahmoor Mine is currently extracting from Longwall 32 within Tahmoor North, which commenced extraction in October 2018. The existing approved Tahmoor Mine has capacity for a future four longwalls with a mine life extending to 2022, depending on geological and mining conditions.

3.6.2 Hours of Operation

Tahmoor Mine operates 24 hours per day, seven days per week. The current working hours of the permanent workforce are split as follows:

- Monday to Fridays three 10 hour overlapping shifts (night shift, day shift, afternoon shift); and
- weekends two 12 hour shifts (night shift and day shift).

3.7 Environmental Management

Tahmoor Mine operates under an existing Environmental Management System (EMS), which governs the management of environment and community aspects, impacts and performance. This document provides a framework for the standards, plans and procedures implemented to ensure operations are managed in accordance with the relevant licences and approvals held by Tahmoor Mine. The following specific environmental management and monitoring plans are currently in place at Tahmoor Mine and form part of the Environmental Framework:

- Cultural Heritage Management Plan (CHMP);
- Biodiversity and Land Management Plan;
- Air Quality and Greenhouse Gas Management Plan;
- Waste Management Plan;
- Noise Management Plan (NMP);
- Conceptual Mine Closure Plan;
- Environmental Monitoring Program;
- Product Stewardship Management Plan;
- Social Involvement Plan;
- Pollution Incident Response Management Plan;
- Energy Savings Plan;
- Reject Emplacement Area Management, Rehabilitation and Water Monitoring Plan;
- Soil and Water Management Plan; and
- Groundwater Management Plan.

3.8 Community Consultation

Tahmoor Mine has developed an effective and responsible community consultation and communication program. Initiated during 2004 as longwall mining first approached the township of Tahmoor, the program has been improved and enhanced over time. A broad program of consultation activities include:

- community information days held at least twice yearly;
- quarterly meetings of the Tahmoor Coal Community Consultative Committee (TCCCC);
- a community newsletter distributed by post;
- a general enquiries email (tahmoorenquiries@simecgfg.com);
- a 24 hour community information telephone service (1800 154 415);
- Tahmoor Coal's website providing project updates;
- Resident Information packs sent to landowners at commencement of each longwall; and
- regular meetings to consult with landowners.

Further details of Tahmoor Coal's community consultation program, related to subsidence impacts are provided in **Section 11.1.5**.