



Centennial Coal



Newstan Mine Extension Project Scoping Report

May 2019

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Abbreviations

ABS	Australian Bureau of Statistics
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AIP	Aquifer Interference Policy
AIS	Agricultural Impact Statement
BAM	Biodiversity Assessment Methodology
Banpu	Banpu Public Company Limited
BC Act	<i>Biodiversity Conservation Act 2016</i>
BoM	Bureau of Meteorology
°C	Degrees Celcius
CCC	Community Consultative Committee
Centennial Coal	Centennial Coal Company Limited
Centennial Newstan	Centennial Newstan Pty Ltd
CEMP	Construction Environmental Management Plan
Coastal Management SEPP	State Environmental Planning Policy (Coastal Management) 2018
CL Act	<i>Crown Lands Act 1989</i>
CMSC Act	<i>Coal Mine Subsidence Compensation Act 2017</i>
Dams Safety Act	<i>Dams Safety Act 1978</i>
DCCEE	Department of Climate Change and Energy Efficiency
DoI – Lands & Water	Department of Industry – Lands and Water
DotEE	Department of the Environment and Energy
DLWC	Department of Land and Water Conservation
DP&E	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	Environmental Planning and Assessment Regulation
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environment Protection Licence
Forestry Act	<i>Forestry Act 1916</i>
FTE	Full Time Equivalent
GDEs	Groundwater Dependent Ecosystems
GHG	Greenhouse Gas
Heritage Act	<i>Heritage Act 1977</i>
HVAS	High Volume Air Sampler
ILUA	Indigenous Land Use Agreement
IPC	Independent Planning Commission
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
kV	kilovolt
kW	kilowatt
LALC	Local Aboriginal Land Council
LDP	Licensed Discharge Point
LEP	Local Environmental Plan
LGA	Local Government Area
LIDAR	Light Detection and Ranging
m	metres
m ³ /t	cubic metres per tonne
Mining Act	<i>Mining Act 1992</i>

Mining SEPP	State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
ML	megalitres
MNES	Matters of National Environmental Significance
mm	millimetres
Mt	Million tonnes
Mtpa	Million tonnes per annum
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007</i>
NGERs	National Greenhouse and Energy Reporting system
Northern Coal Services	Northern Coal Services Pty Ltd
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NRAR	Natural Resources Access Regulator
NSW	New South Wales
NT Act	<i>Native Title Act 1993</i>
P&C	parents and citizens
PED	Personal Emergency Device
RAPs	Registered Aboriginal Parties
RMS	Roads and Maritime Services
PHA	Preliminary Hazard Analysis
PM10	Particulate matter less than 10 microns in diameter
PM2.5	Particulate matter less than 2.5 microns in diameter
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PSE	Principal Subsidence Engineer
Roads Act	<i>Roads Act 1993</i>
ROM	Run of Mine
SA	Statistical Area
SAL	Strategic Agricultural Land
SCADA	Supervisory Control and Data Acquisition
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SEPP 14	State Environmental Planning Policy No. 14 - Coastal Wetlands
SEPP 26	State Environmental Planning Policy No. 26 - Littoral Rainforests
SEPP 33	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
SEPP 44	State Environmental Planning Policy No. 44 – Koala Habitat Protection
SEPP 71	State Environmental Planning Policy No. 71 - Coastal Protection
SHR	State Heritage Register
SIA	Social Impact Assessment
SSD	State Significant Development
State and Regional Development SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SUA	Significant Urban Area
TARP	Trigger Action Response Plan
TEOM	Tapered Element Oscillating Microbalance
TSP	total suspended particulates
µm	microns
VWP	vibrating wire piezometer
WAL	water access licence
Water Act	<i>Water Act 1912</i>
WBCSD	World Business Council for Sustainable Development

WHS	work health and safety
WM Act	Water Management Act 2000
WRI	World Resources Institute
WSP	Water Sharing Plan

1. Executive summary

1.1 Background

Newstan Colliery is an existing underground coal mine located in the Lake Macquarie Local Government Area (LGA), approximately 25 kilometres south west of Newcastle and 140 kilometres north of Sydney, NSW. It is owned and operated by Centennial Newstan Pty Ltd (Centennial Newstan).

Mining operations at Newstan Colliery began in 1887 and upon the introduction of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) operated pursuant to continuing use rights in accordance with Part 4, Division 10 of the EP&A Act (continuing use rights). On 14 May 1999 the (then) Minister for Urban Affairs and Planning granted Development Consent DA 73-11-98 under Part 4 of the EP&A Act for the Newstan Colliery Life Extension Area. This approval enabled mining to continue within the existing mining areas as well as the expansion into areas that had not previously been mined. Development Consent DA 73-11-98 has been modified on eight occasions, with the most recent modification approved on 17 January 2019.

Newstan Colliery has at various times mined the upper coal seams (Great Northern and Fassifern seams) and lower coal seams (West Borehole, Borehole, Young Wallsend and Yard seams) and produced both semi-soft coking coal and thermal coal for the domestic and export markets. In the lower seams, workings to date have been concentrated to the west of the seam split, which is a defining geological feature of the project. Mining has been undertaken using a combination of bord and pillar and longwall mining.

Newstan Colliery is also integrated with the Northern Coal Logistics Project, under which Centennial Northern Coal Services Pty Ltd (Northern Coal Services) provides the coal handling, processing and transport facilities to deliver coal from Mandalong Mine and Newstan Colliery to domestic and export markets. These activities are approved under State Significant Development consent SSD-5145, with facilities comprised of the Newstan Colliery Surface Site, Cooranbong Entry Site, private haul roads and rail loading infrastructure.

In 2002, Centennial Coal purchased Awaba Colliery, which historically produced around 800,000 tonnes of thermal coal annually. Over the years, more than 30 million tonnes of coal was mined from the Great Northern seam using bord and pillar mining. With coal reserves exhausted, Awaba Colliery ceased operating as a producing mine in March 2012. However, the surface facilities have remained in use to service the Newstan Colliery, about 6 km to the north-east. Awaba Colliery is approved under Development Consent PA 10_0038.

In April 2009 Newstan Colliery was placed on care and maintenance due to market forces. In July 2011, mining was recommenced within the Main West area and the Main East area in response to the then strong export market and to allow Newstan Colliery to generate revenue while ongoing assessments for future mining were being undertaken. In August 2014, the underground operations at Newstan Colliery were placed back onto care and maintenance due to poor market conditions. In recent years, Centennial Newstan has commenced feasibility investigations into the recommencement of mining at Newstan Colliery. The most recent modification to DA 73-11-98 in January 2019, permits first workings mining within the West Borehole seam in the southern portion of the Newstan Colliery mining lease area. The first workings aim to improve Centennial Newstan's understanding of the geology within the West Borehole seam, including the presence, throw and strike of a major fault zone projected from the historic Newstan workings.

Centennial Newstan is now seeking approval for the continuation of mining within the West Borehole seam. The Newstan Mine Extension Project proposes to extract up to 25.9 million tonnes (Mt) over a fifteen year period at a maximum production rate of 4 million tonnes per annum of Run of Mine (ROM) coal (Mtpa) using bord and pillar mining.

The project is aligned with the broader Centennial Coal business strategy in that it facilitates the development of a new semi-soft coking coal product stream and a thermal coal product for both the domestic and export markets. The project will enable supply of export coal products while meeting contractual coal supplies to the domestic markets. Over time, the project can potentially replace the coal product currently supplied to the domestic market by other Centennial operations as these other resources become depleted. This will ensure ongoing security of supply for domestic electricity generation.

The project, if approved, will allow for the optimisation of resource recovery from Newstan Colliery while providing ongoing direct and indirect employment opportunities. In addition, the project will provide a number of positive flow-on effects to the local, regional and state economies through additional wages and royalties.

1.2 Approvals process and document purpose

Centennial Newstan is seeking approval for the project under Part 4, Division 4.7 of the EP&A Act. An Environmental Impact Statement (EIS) is a requirement of the approval process. Before preparing an EIS, terms of reference must be established. In NSW, the terms of reference for an EIS are referred to as the Secretary's Environmental Assessment Requirements (SEARs). In order for a proponent to receive SEARs for a project, an application must be made to the Secretary of the NSW Department of Planning and Environment (DP&E). The application is to be accompanied by a Scoping Report prepared in accordance with the requirements of Part 2 of Schedule 2 of the NSW Environmental Planning and Assessment Regulation 2000 (EP&A Regulation).

This document has been prepared to accompany Centennial Newstan's request to the Secretary of DP&E for SEARs for the project. Its purpose is to brief government agencies, the community and other stakeholders about the project, and identify key matters to be addressed in the EIS and the proposed assessment methodologies. It is expected that DP&E will circulate this document to relevant government agencies. It will assist government agencies in preparing their advice to DP&E on matters seen as relevant for assessment in the EIS. These matters must then be taken into account by the Secretary in preparing the SEARs.

The EIS must also assess the project's impacts on Matters of National Environmental Significance, as required under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Following the lodging of this document, Centennial Newstan will make a referral to the Commonwealth Department of the Environment and Energy (DotEE) to determine whether or not approval is also required under the EPBC Act.

1.3 Project description

Proposed mining activities

Bord and pillar mining will be undertaken using continuous miner methods and will include areas of first workings, partial extraction and total extraction. The project proposes to extract up to 4 Mtpa of ROM coal and a total of 25.9 Mt over a fifteen-year mine life.

Mining will target the West Borehole seam, which is an agglomeration of the Borehole seam, the Young Wallsend seam and the Yard seam. A mix of metallurgical and thermal coal will be extracted. ROM coal will be delivered to the Newstan Colliery Surface Site via a series of existing underground conveyors. Historic mining undertaken by the former Awaba Colliery in the overlying Great Northern seam will result in some areas of multi-seam conditions. The potential reactivation of subsidence in these historic mining areas by the project has been extensively considered with regard to the proposed mine design.

The combination of first workings, partial and total extraction has been adopted to mitigate potential subsidence impacts on sensitive surface features. Total extraction, where all pillars in a panel are removed, is proposed to the south of the existing Awaba workings (i.e. single-seam conditions) and in some areas beneath the existing workings (multi-seam conditions) where sensitive surface features are not present.

The proposed partial extraction zones will extract three of the four rows of pillars, leaving a spine pillar (i.e. one row of pillars) within each panel, thereby reducing the mining span and consequently the subsidence effect. Partial extraction is proposed under the Ulan Rail Loop and under the sections of an existing 132 kV transmission line that are subject to multi-seam conditions.

The development of first workings only (i.e. no secondary extraction) will occur beneath certain sensitive surface features in both single-seam and multi-seam conditions. This includes under second and third order streams, the Main Northern Railway, a 132 kV substation, the Eraring Power Station, and the Eraring Ash Dam wall.

With the presence of the overlying Awaba mine workings, sensitive environmental features, and larger than previously encountered volume of gas within the West Borehole seam and overlying seams, which will be released by the mining process, this versatile mining system allows for greater control of subsidence, particularly with regard to minimising multi-seam subsidence, improved gas management, and superior flexibility to avoid impacts to sensitive surface features and deal with geological anomalies.

Gas drainage

Centennial Newstan propose to use in-seam gas drainage methods to manage gas during mining. Gas captured during the in-seam drainage system will be transferred to a gas flaring facility located at the Awaba Colliery Surface Site. This approach is considered the most appropriate strategy as it minimises surface disturbance and associated greenhouse gas impacts whilst also providing a safe and cost effective solution to managing emissions in line with current industry practice.

Investigations will also be undertaken to determine the viability of installing gas turbines to generate energy from the mine gas once the volume and reliability of gas flows is better understood.

Ventilation

Existing ventilation shafts at the Newstan Colliery Surface Site and Awaba Colliery Surface Site will continue to be used for the project. The two existing ventilation fans at the Newstan Colliery Surface Site will be utilised during development of the first workings. During this development phase, new fans will be installed at the existing ventilation shaft at the Awaba Colliery Surface Site. Once these fans become operational, the existing fans at Newstan Colliery Surface Site will be decommissioned.

Access and egress

Personnel and materials will be transported down the existing men and materials drift at Newstan Colliery Surface Site. The project proposes to use specialised underground vehicles for both personnel and material transport. No additional access portals are proposed for the Awaba Colliery Surface Site.

Coal processing and transportation

ROM coal will be transported from the underground workings to the Newstan Colliery Surface Site by a conveyor system at a rate of up to 4 Mtpa. Once the coal reaches the Newstan Colliery Surface Site it will be handled in accordance with the approved operations for the Northern Coal Logistics Project (SSD-5145), managed by Centennial Coal's Northern Coal Services business unit.

The Northern Coal Logistics Project has sufficient coal processing and transportation capacity to accommodate the project's maximum production rate (4 Mtpa) and total production over the mine life (25.9 Mt) without exceeding the throughput limits imposed under SSD-5145.

No coal handling operations at Awaba Colliery Surface Site are proposed as part of the project.

Coal reject management system

Coal reject management activities will be undertaken in accordance with the approved operations for the Northern Coal Logistics Project (SSD-5145) and do not form part of the project.

The Northern Coal Logistics Project has sufficient capacity to accommodate the processing of the ROM coal from the project over the mine life (25.9 Mt) without exceeding the limits imposed under SSD-5145.

Surface infrastructure

The project will utilise the existing surface infrastructure of the Newstan and Awaba Collieries. A number of upgrades and additions to the existing surface facilities are proposed, including:

- Installation and operation of two new fans at the approved ventilation facility at the Awaba Colliery Surface Site following the completion of first workings.
- A new gas flaring facility within the confines of the current disturbance area at the Awaba Colliery Surface Site.
- Upgrades to the existing electrical and communications equipment at Newstan and Awaba Colliery Surface Sites.

Utility and infrastructure relocations

Utility and infrastructure relocations are not proposed as part of the project. However, subsidence mitigation works to existing surface infrastructure are expected to be required. Consultation with utility and infrastructure owners will continue throughout the EIS and post-approval phases of the project to ensure impacts are managed appropriately.

Surface water and groundwater management system

The groundwater management system for the project will generally be comprised of:

- Extraction of underground water via the existing Fassifern Pump Station at Newstan Colliery Surface Site.
- Ongoing monitoring and management in accordance with Centennial Coal's Northern Operations Water Management Plan.

The existing groundwater model for Newstan Colliery will be revised and any upgrades to the existing water management system will be considered during the preparation of the EIS.

Surface water management at the Newstan Colliery Surface Site will continue as approved under SSD-5145.

Surface water management at the Awaba Colliery will continue and include the utilisation of existing and approved licensed water discharge points. Any upgrades to the Awaba Colliery surface water management system will be considered during the preparation of the EIS.

Site access and parking

Access and parking will remain consistent with the current approved arrangements for the Newstan and Awaba Collieries. Underground access will be via the existing men and materials drift at Newstan Colliery Surface Site.

Construction activities and facilities

Construction activities will be undertaken within previously disturbed areas. Existing surface facilities will be utilised where practicable to minimise the need for temporary construction facilities.

Construction activities will be guided by a Construction Environmental Management Plan (CEMP) to ensure work is carried out in accordance with the project's environmental management obligations.

Workforce

The construction workforce is expected to peak at approximately 50 Full Time Equivalent (FTE) personnel. The operational workforce is expected to peak at approximately 320 FTE personnel. A more definitive estimate of the number of personnel required for the project will be determined during the preparation of the EIS.

The majority of operational personnel, including the underground workforce, will be located at the Newstan Colliery Surface Site. A small number of administrative, maintenance and monitoring personnel (less than 10) will be located at Awaba Colliery Surface Site.

Hours of operation and construction

It is anticipated that construction will be largely carried out during the following hours:

- Monday to Friday: 7.00 am to 6.00 pm
- Saturday: 8.00 am to 6.00 pm
- Sundays and public holidays: no work.

Operation activities will occur 24 hours a day, seven days a week, consistent with existing operations.

Rehabilitation and final landform

Following the completion of mining, the Awaba Colliery Surface Site will be decommissioned and the area rehabilitated such that it can support land uses similar to those that occurred prior to mining. The proposed post-mining land use will be determined in consultation with Lake Macquarie City Council and with consideration of land zoning within and surrounding the site. It is expected that the Newstan Colliery Surface Site will be decommissioned and rehabilitated as part of closure activities for the Northern Coal Logistics Project in accordance with the requirements of SSD-5145.

Exploration activities will be ongoing throughout Centennial Newstan's lease areas for the life of the project. Disturbance areas associated with exploration activities will be rehabilitated in accordance with the relevant conditions of Centennial Newstan's leases and licences issued under the *Mining Act 1992* (Mining Act), and where relevant, the Exploration Code of Practice: Rehabilitation (DP&E, 2015).

A detailed rehabilitation strategy for the project will be developed in consultation with stakeholders and with consideration of relevant standards and guidelines, and the detailed environmental investigations undertaken as part of the EIS.

1.4 Project rationale and alternatives considered

The project proposes the continuation of underground mining within an established mining precinct that has been operating for over 130 years. The potential impacts of the project have been minimised by maximising the use of existing surface infrastructure and equipment, developing a low-impact and flexible mine design, minimising surface disturbance for gas drainage and greenhouse gas abatement and proposing a complementary suite of mitigation measures and management strategies to be implemented during construction, operation, and closure.

The combination of first workings only, partial extraction, and total extraction using bord and pillar mining methods has been adopted to minimise subsidence impacts to sensitive built and natural surface features and to mitigate multi-seam subsidence impacts associated with the Awaba workings in the overlying Great Northern seam.

Conservative angles of draw and barrier pillars have been adopted in the mine design to minimise subsidence impact risks to overlying infrastructure such as the Main Northern Railway, Eraring Power Station and Eraring Ash Dam wall and sensitive surface water features such as Stockyard Creek, Kilaben Creek and Stony Creek.

There is also inherent flexibility in the proposed bord and pillar mining method as it provides Centennial Newstan with the ability to vary mining activities as required in response to unforeseen geological or environmental constraints.

The coal recovered from the West Borehole seam can produce both a semi-soft coking coal product for the export market and a thermal coal product for both the domestic and export markets. The project will enable supply of export coal products while meeting contractual coal supplies to the domestic markets. Over time, the project can potentially replace the coal product currently supplied to the domestic market by other Centennial Coal operations as these other resources become depleted. This will ensure ongoing security of supply for domestic electricity generation.

The project, if approved, will allow for the optimisation of resource recovery from within Centennial Newstan's lease areas while providing ongoing direct and indirect employment opportunities. In addition, the project will provide a number of positive flow-on effects to the local, regional and state economies through additional wages and royalties.

The project has been developed and refined in consultation with the community, regulatory agencies, infrastructure owners, and other stakeholders to maximise environmental, social and economic outcomes by following the 'avoid, minimise, offset' hierarchy.

A review of feasible alternatives to the proposed development has been undertaken to demonstrate that the preferred option constitutes the most appropriate scenario to meet the identified project needs. The following alternatives have been considered by Centennial Newstan during the preliminary planning for the project:

- Not proceeding with the project.
- Alternative locations and designs for various infrastructure components of the project.
- Alternative methods for extraction of the resource.
- Alternative environmental management techniques for moderate or higher risk impacts.

The long history of mining at the Newstan and Awaba Collieries, and the associated environmental monitoring and management activities that have been undertaken over many years, has provided Centennial Newstan with a large amount of baseline information to help guide the development of the project. Centennial Newstan has also undertaken extensive detailed project-specific geological, engineering, environmental, financial and other technical investigations over several years to develop and refine the project.

Investigations and stakeholder consultations are ongoing and the project will continue to be refined during the EIS phase in response to the outcomes. Some of the processes and strategies Centennial Newstan has adopted to date for managing key risks as part of the mine design are described in further detail in the following subsections.

Mine design

Centennial Newstan has gone through numerous iterations of the mine design for the project in order to develop a mine plan that responds to two key considerations:

- The coal resource is a public asset owned by the State of NSW and it is therefore in the public interest to optimise resource recovery.
- The project is constrained by a range of sensitive built and natural environmental features and their protection throughout all project phases must be a priority.

The current proposed bord and pillar mine plan aims to strike a balance between optimising resource recovery and protecting sensitive environmental features. It has been developed based on extensive modelling of subsidence impacts and through consultation with key government agencies and infrastructure owners.

Centennial Newstan proposes to vary the coal recovery within the West Borehole seam depending on the natural and built features located directly above these workings and the potential for compound subsidence impacts associated with the overlying Awaba workings in the Great Northern seam.

Modelling of the proposed interaction between the seams has indicated that by the application of a spine-pillar layout, the risk for compound subsidence can be managed. The combination of first workings only, partial extraction and total extraction mining methods will reduce multi-seam subsidence impacts associated with the overlying Awaba workings. With the presence of the overlying Awaba workings and larger than previously encountered volume of gas within the West Borehole seam and overlying seams, which will be released by the mining process, this versatile mining system allows for greater control of subsidence, particularly with regard to minimising multi-seam subsidence, improved gas management and superior flexibility to deal with geological anomalies. It also allows resource recovery to be optimised.

Railway protection zone

Centennial Newstan consulted with the Resources Regulator's Principal Subsidence Engineer (PSE) regarding the proposed workings in the West Borehole seam in the vicinity of the Main Northern Railway. As a result of this consultation, the proposed workings have been designed to incorporate a 165 m barrier, with a 26.5 degree angle of draw projected from the Awaba Great Northern seam workings to the West Borehole seam. This barrier is significantly larger than the 20 m offset and 35 degree angle of draw from the rails to the West Borehole seam that has been historically maintained around the Main Northern Railway and as prescribed in Centennial Newstan's mining lease conditions. Only long-term stable first workings are proposed in the West Borehole seam within the barrier area.

Pillar run risks

The mine plan for the project has been developed to take into consideration the pillar run risks identified during the preliminary risk review and that risk is considered to be manageable. Extensive modelling of both the vertical and horizontal displacement in the worst case pillar run scenario has indicated that the effects on the railway can be safely managed. Further assessment of pillar run risk will be undertaken, in consultation with Transport for NSW, as part of the subsidence assessment for the EIS, and mitigation measures will be proposed, as necessary.

Hydrogeological risks in proximity to Eraring Ash Dam

The Eraring Ash Dam is located above the southern ends of the proposed workings in the West Borehole seam. Total extraction is proposed in this area. There are no existing workings in the Great Northern seam beneath the current extent of the Eraring Ash Dam.

Centennial Newstan has commissioned preliminary subsidence predictions for the current mine design to understand the potential for continuous and discontinuous fracturing above the West Borehole seam following subsidence (MSEC, 2019). This work has been undertaken to gain a preliminary understanding of the risk of leachate from the Eraring Ash Dam migrating into the underground workings. The preliminary predictions indicate only minor changes to the permeability within the surface zone are predicted as a result of the proposed workings within the West Borehole seam and that the migration pathways for leachate to enter the workings will be limited.

The findings of these preliminary assessments will be used as background for the more detailed subsidence, surface water, groundwater and geotechnical models to be developed for the EIS.

Mining in proximity to Eraring Power Station

First workings only are planned within a 35 degree angle of draw from Eraring Power Station, in accordance with existing approved mining lease conditions. Preliminary subsidence predictions (MSEC, 2019) indicate that the structural steel frame of the power generation facility would be able to tolerate the small differential horizontal movements without adverse impacts. Further work will be undertaken during the EIS in consultation with Origin Energy to understand the potential for impacts to the Power Station from the proposed mining activities.

Mining in proximity to Awaba Biodiversity Conservation Area

Potential impacts to the Awaba Biodiversity Conservation Area have been considered by proposing first workings only within 2nd and 3rd order watercourses within this area. Extraction of the coal resource outside these watercourses is proposed in accordance with the mine plan. Further investigations will be undertaken during the EIS to ensure potential impacts to the Awaba Biodiversity Conservation Area from the project are managed appropriately in consultation with Lake Macquarie City Council.

Surface infrastructure

The surface infrastructure design has been developed to provide a number of operational, economic and environmental benefits. Where possible the project has sought to make use of the existing surface infrastructure facilities at Newstan and Awaba Collieries. All new major surface infrastructure is proposed within the existing approved disturbance footprint at Awaba Colliery Surface Site. The proposed use of the existing surface infrastructure facilities at Newstan and Awaba Collieries has also minimised the project's potential for intrusions on the amenity of sensitive receptors and sensitive environments not already impacted to some extent by mining operations.

The proposed adoption of in-seam gas drainage methods has further reduced surface disturbance requirements by minimising the number of drill pads and gas pipelines required on the surface.

The project will supply ROM coal to the existing approved Newstan Coal Logistics Project (SSD-5145) at Newstan Colliery Surface Site. As such, additional impacts associated with the construction and operation of new coal handling, processing and transportation infrastructure have been avoided.

Centennial Newstan will continue to pursue opportunities to refine the project design in response to the outcomes of the detailed environmental and technical investigations, and extensive stakeholder engagement activities that will be undertaken during the EIS.

1.5 Matters for consideration in the EIS

Key issues and the proposed level and scope of assessments were identified using DP&E's draft Scoping Worksheet. The relevant matters and impacts proposed for detailed consideration in the EIS include the project's potential subsidence, groundwater, surface water, terrestrial and aquatic ecology, air quality and greenhouse gas, noise and vibration, traffic and transport, soil and land resources, Aboriginal and historic heritage, visual amenity, socio-economic, hazard, bushfire and waste impacts. Recognised specialists will be commissioned to conduct the impact assessment studies for the EIS, and independent peer reviews will be completed for select key studies in consideration of the draft Peer Review guideline (NSW Government, 2017a) (or its latest version).

1.6 Stakeholder engagement

Newstan Colliery has operated from its current site for over a century and therefore has well-established local community networks and relationships with landholders and other stakeholders.

Centennial Newstan has consulted with a number of community members, Aboriginal groups, infrastructure owners and government agencies to present the project and, where relevant, seek feedback on key mine design considerations and areas for investigation during the EIS.

Key project stakeholders include:

- Local community.
- Aboriginal groups.
- Centennial Newstan employees.
- Infrastructure owners.
- Government (Federal, State and Local).

Centennial Newstan has sought and received recommendations for mine design parameters from government agencies to manage direct and indirect subsidence-related impacts to key infrastructure assets such as the Main Northern Railway, Eraring Power Station and Eraring Ash Dam. These recommendations have formed an integral part of the mine design process and these consultations will continue for the EIS.

Whilst project-specific community consultation is in its infancy, community stakeholders consulted to date have indicated they would like to be kept up to date on important project details as more information becomes available.

Many community sentiments are yet to be understood, however, anecdotally there is particular interest in:

- The project's potential subsidence-related interactions with sensitive built and natural features, including the Eraring Power Station and Ash Dam. In particular, there is an interest in the potential for mining activities to create a pathway for leachate from Eraring Ash Dam to enter groundwater aquifers and migrate into Lake Macquarie.
- The potential contribution of the project to cumulative impacts.

Key infrastructure owners Origin Energy (owners of Eraring Power Station and Eraring Ash Dam) and Transport for NSW (managers of the Main Northern Railway) have been given an introduction to the project and an opportunity to review the preliminary mine plan and subsidence predictions. Feedback received to date has indicated that an open and consultative approach to the mine design process is generally supported and that information sharing should continue throughout the EIS.

Centennial Newstan will lead the stakeholder and community consultation for the EIS. A detailed Stakeholder Engagement Plan will be developed and implemented to provide a framework to identify and appropriately consult with stakeholders that may be influenced by or have an interest in the project.

The feedback received from Centennial Newstan's stakeholder engagement activities will help to identify key concerns to be addressed in the EIS and ensure the project optimises environmental, social and economic outcomes.

1.7 Assessment process

The project is in the early stages of the comprehensive assessment and approval processes required by Commonwealth and State legislation. This Scoping Report accompanies Centennial Newstan's request to the Secretary of DP&E for SEARs. It is expected that DP&E will circulate it to the relevant government agencies and invite them to recommend assessment requirements. The Secretary for DP&E will then issue the SEARs for the project, which will identify the matters that must be addressed in the EIS.

The project's environmental assessment has already commenced. Baseline information has in part been derived from the range of environmental monitoring and impact assessment works undertaken as part of the ongoing planning and environmental management activities for the existing Newstan Colliery. Project-specific technical investigations, including feasibility studies, monitoring and surveys, have also commenced and will continue throughout 2019.

The next step for Centennial Newstan is to undertake detailed impact assessments and develop environmental mitigation, management, monitoring and offset measures to enhance the project's benefits and address any impacts. This includes detailed subsidence, groundwater, surface water, terrestrial and aquatic ecology, air quality and greenhouse gas, noise and vibration, traffic and transport, soil and land resources, Aboriginal and historic heritage, visual, socio-economic, hazard, bushfire, and waste assessments. The assessments will be prepared in accordance with relevant guidelines, policies and assessment requirements issued by DP&E, and in consultation with government agencies and other stakeholders. The findings will be documented in the EIS for the project.

Extensive consultation and engagement with the community, government agencies and other stakeholders will continue during preparation of the EIS. This will include seeking feedback on the project and the proposed approaches to mitigating and managing impacts. The project will continue to be refined during development of the EIS in response to the outcomes of ongoing investigations and stakeholder consultation. The EIS will accompany Centennial Newstan's development application for the project. It will be made publicly available for review and comment. In the meantime, Centennial Newstan will continue to keep the community informed about the project and its role within the local community as information comes to hand.

2. Proponent details

The proponent for the project is Centennial Newstan Pty Limited (Centennial Newstan) (ABN 68 101 508 865), a wholly owned subsidiary of Centennial Coal Company Limited (Centennial Coal) (ABN 30 003 714 538). Centennial Coal is a wholly owned subsidiary of Banpu Public Company Limited (Banpu) listed on the Stock Exchange of Thailand.

The proponent's address is:
Centennial Newstan Pty Limited
PO Box 1000
Toronto NSW 2283

The proponent's nominated contact is:

Iain Hornshaw

Centennial Coal Company Limited

100 Miller Road, Fassifern NSW 2238

This Scoping Report has been prepared by:

James McDonough (BSc, MEnvMgt)

GHD Pty Ltd

Level 1, 230 Harbour Drive, Coffs Harbour NSW 2450

Ownership of the project site (Project Application Area) is comprised of a combination of Crown land, reserves and roadways, private land, State Conservation Area, Centennial Newstan-owned land, Lake Macquarie City Council-owned land, and Origin Energy-owned land. Further details regarding site ownership are presented in Section 3.1.4.

3. Project details

3.1 Project Application Area

The project site encompasses three distinct areas (Newstan Colliery, the proposed Extension of Mining Area, and Awaba Colliery) which collectively form the Project Application Area. The locations of these areas are described in the following subsections and illustrated on Figure 3-1.

3.1.1 Newstan Colliery

The nearest major population settlements to Newstan Colliery are Toronto, Blackalls Park and Fassifern to the east, Wakefield to the north and Dora Creek to the south. Newstan Colliery is also bordered to the east by the Lake Macquarie foreshore, and the expanding urban areas of Rathmines and Buttaba. Newstan Colliery pit top and surface infrastructure (Newstan Colliery Surface Site) is located at Fassifern, approximately four kilometres north of Toronto. Access is via Miller Road, Fassifern. Parts of the Newstan Colliery Surface Site also operate under SSD-5145 for the Northern Coal Logistics Project. The interrelationship between Newstan Colliery and the Northern Coal Logistics Project is described in detail in Section 3.2.

Newstan Colliery also incorporates the existing underground mining areas within Great Northern, Fassifern, West Borehole, Borehole, Young Wallsend and Yard seams. The existing workings within the Fassifern, Great Northern and Borehole seams are utilised as underground water storages that integrate with the Northern Coal Logistics Project.

3.1.2 Extension of Mining Area

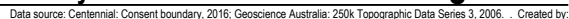
The majority of the proposed Extension of Mining Area is located under undulating, unpopulated bushland. Lake Macquarie and the surrounding residential suburbs of Toronto, Rathmines, Balmoral, Buttaba, Arcadia Vale, and Wangi Wangi are located to the east of the area. To the south lies the Eraring Power Station and associated infrastructure including the Eraring Ash Dam. To the west lies the M1 Pacific Motorway. The Main Northern Railway traverses the area in a north-south direction. The Extension of Mining Area is bordered by previous Newstan Colliery mine workings to the north and northwest while the western area of the proposed mining area is overlain with the Awaba Colliery mine workings in the Great Northern seam.

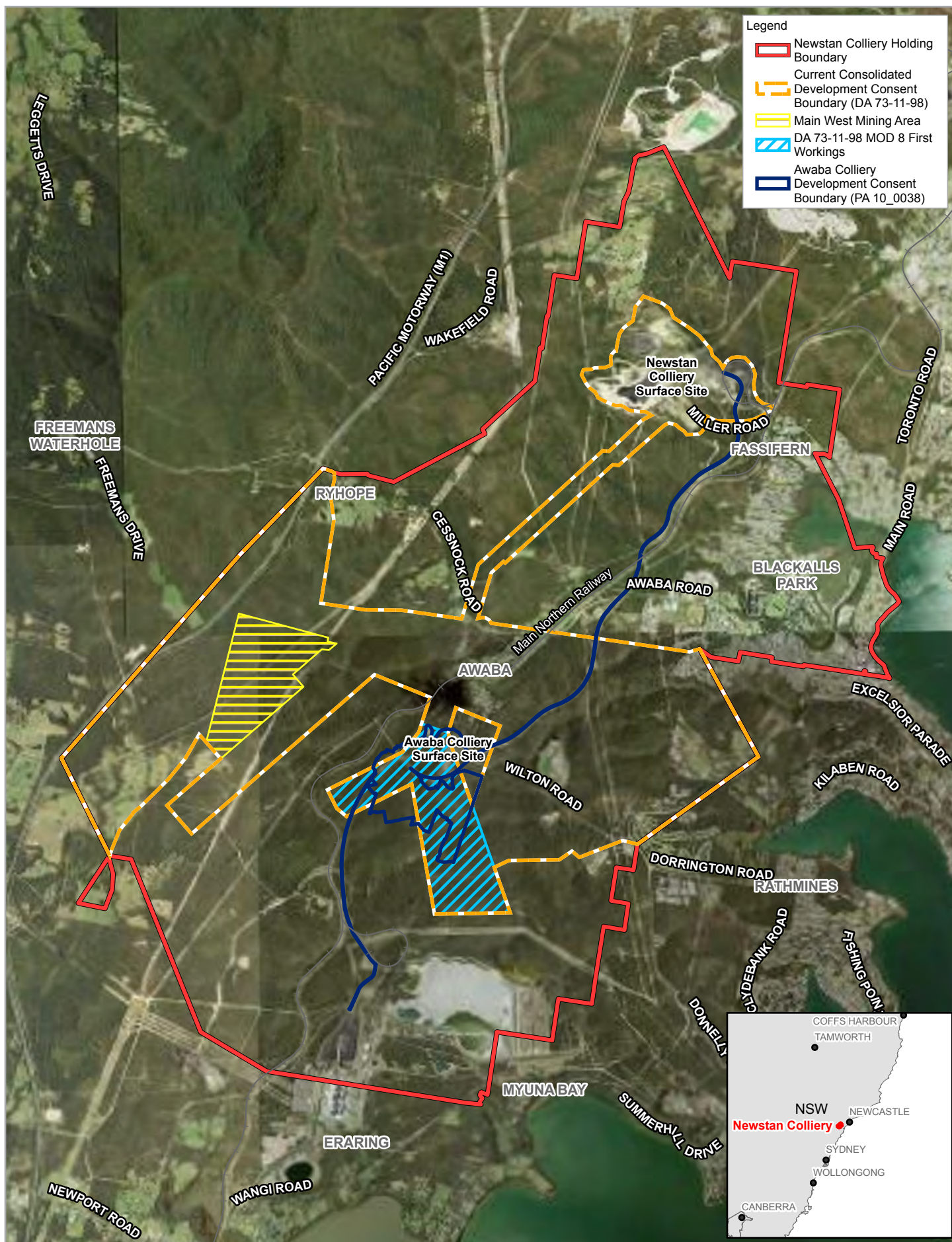
The Extension of Mining Area is also partially overlain by a biodiversity offset site known as the Awaba Biodiversity Conservation Area. The site is owned by Lake Macquarie City Council and managed for biodiversity conservation in accordance with the terms of an agreement established under the EPBC Act.

3.1.3 Awaba Colliery

The Awaba Colliery Surface Site is located approximately one kilometre south of the Awaba village and 5.5 kilometres south-west of Toronto, adjacent to the Newstan-Eraring private haul road. The site is accessed via Wilton Road, Awaba. Further details regarding the current approved operations at Awaba Colliery, including Awaba Colliery Surface Site, are presented in Section 3.2.3.

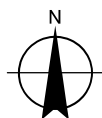
Awaba Colliery also incorporates the existing underground mining area within the Great Northern seam, which is utilised for the storage of groundwater.





Paper Size ISO A4
0 0.4 0.8 1.2 1.6 2
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Existing Approved Operations

Figure 3-2

3.1.4 Land ownership of the site

Land ownership within and surrounding the Project Application Area includes:

- Crown land, Crown roads and Crown reserves
- Private land
- State Forest managed by Forestry Corporation of NSW
- State Conservation Area
- Land owned by Lake Macquarie City Council
- Land owned by Origin Energy
- Land managed by RailCorp.

The majority of land that will be affected by mining within the Project Application Area is Crown land or land owned by Origin Energy (the owner of Eraring Power Station).

Land ownership within the Extension of Mining Area, Newstan Colliery Surface Site and Awaba Colliery Surface Site is described in the following subsections. A schedule of land for the Project Application Area is provided in Appendix A.

Newstan Colliery Surface Site

The majority of land occupied by the Newstan Colliery Surface Site is freehold land. The remainder of the land is owned by the Crown. Centennial Coal own three land parcels and the remaining freehold parcels are privately owned and leased to Centennial Coal. Land title descriptions and ownership details are listed in Table 3-1. The land titles within the Newstan Colliery Surface Site are shown in Figure 3-3.

Table 3-1 Land ownership –Newstan Colliery Surface Site

Lot	DP	Owner
C	381399	Centennial Fassifern Pty Limited
441	583057	Private land
442	583057	Private land
443	583057	Private land
148	728974	Centennial Fassifern Pty Limited
390	1064199	Centennial Fassifern Pty Limited
64	755207	Private land
1	121470	Private land
630	816256	Crown land
631	816256	Crown land

Lot	DP	Owner
11	1031778	Private land
12	1031778	Private land
13	1031778	Private land
14	1031778	Private land
15	1031778	Private land
16	1031778	Private land
17	1031778	Private land
18	1031778	Private land
20	1031778	Private land
27	755207	Private land
66	755207	Private land
182	7372736	Private land
591	607932	Private land
234	755207	Crown land
5	46737	Crown land
6	46737	Crown land

Ballast borehole and services site

A small ballast borehole and services site is also located approximately 4 km to the south west of the drift entries at the Newstan Colliery Surface Site. The purpose of the site is to provide access for bulk materials such as ballast. The site is located off Forest Road at Awaba, on Freehold land (Lot 194 DP 755207). Centennial Newstan holds a registered land lease with the owner of the land for the construction and ongoing operation of the ballast borehole and services site.

Extension of Mining Area

The Extension of Mining Area occupies an area of 1167 ha. The land is comprised of a mix of Crown land, Crown roads, and privately owned Freehold land. Land title descriptions and ownership details for all lots within the Extension of Mining Area are listed in Table 3-2.

Table 3-2 Land ownership – Extension of Mining Area

Lot	DP	Owner
99	755218	Crown land
100	755218	Crown land
101	755218	Crown land
54	755218	Private land
6	239629	Crown land
5	239629	Crown land
9	239629	Crown land
10	239629	Crown land
213	755207	Crown land
3	239629	Crown land
4	239629	Crown land
7	239629	Crown land
8	239629	Crown land
212	755207	Crown land
1	585142	Private land
110	755207	Private land
1	737496	Private land
21	734860	Private land
20	734860	Private land
20	734860	Private land
211	840670	Private land
50	840671	Private land
51	840671	Private land

Lot	DP	Owner
1	817425	Private land
102	755218	Crown land
214	755207	Crown land
101	828283	Private land
100	828283	Private land
11	1050120	Private land
1	582126	Crown land
216	755207	Crown land
231	755207	Crown land
153	755207	Private land
215	755207	Crown land
1	1109558	Private land
65	1126625	Private land
462	1138964	Crown land
463	1138964	Private land
7305	1149082	Crown land
7304	1149082	Crown land
7306	1164232	Crown land
7309	1164559	Crown land
7321	1166295	Crown land
7322	1166295	Crown land
7320	1166295	Crown land
7336	1170023	Crown land

Lot	DP	Owner
1	1191308	NSW Government

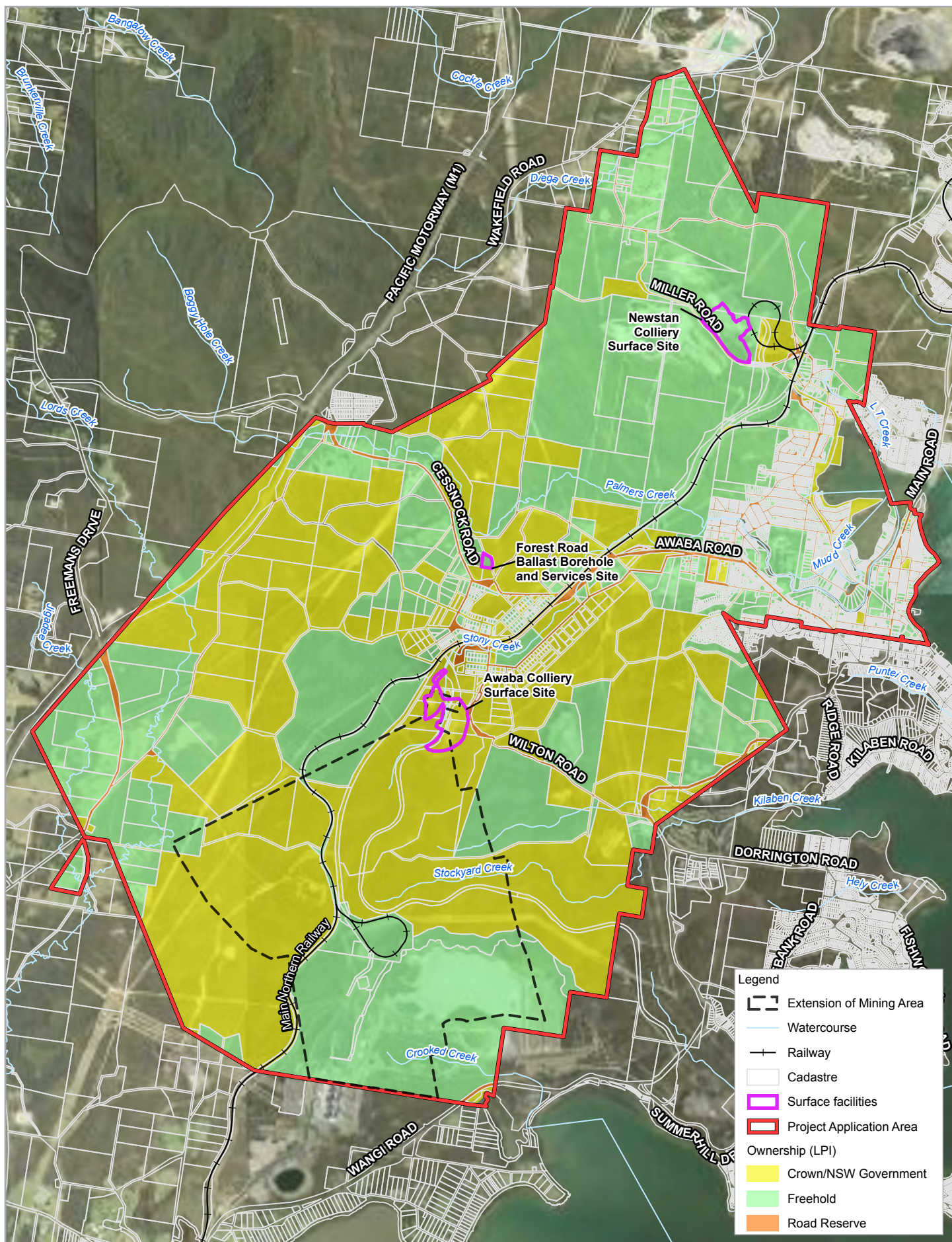
Awaba Colliery Surface Site

The Awaba Colliery Surface Site is entirely located on Crown land. Land title descriptions and ownership details are listed in Table 3-3.

The land titles that make up the Awaba Colliery Surface Site are shown in Figure 3-3.

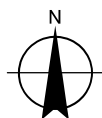
Table 3-3 Land ownership – Awaba Colliery Surface Site

Lot	DP	Owner
1	582126	Crown land
1	816752	Crown land
2	816752	Crown land
6	816752	Crown land
7	816752	Crown land
5	239629	Crown land
6	239629	Crown land
7	239629	Crown land
8	239629	Crown land
9	239629	Crown land
10	239629	Crown land
212	755207	Crown land
213	755207	Crown land
216	755207	Crown land
1	816752	Crown land



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Land ownership

Figure 3-3

3.2 Current approved operations

3.2.1 Newstan Colliery

The Newstan Colliery comprises the underground workings and some associated surface facilities within the consolidated development consent boundary for DA 73-11-98. The primary activities currently authorised under DA 73-11-98 are as follows:

- Extraction of up to 4 Mtpa of ROM coal from within the consolidated development consent boundary, which includes the Main West mining area and first workings within the West Borehole seam.
- Pumping water from underground workings to Newstan Colliery Surface Site for recycling, reuse and discharge.
- Operation of ventilation shafts, boreholes and associated overhead power lines.
- Operation of a men and materials drift to the underground workings from Newstan Colliery Surface Site.
- Personnel of up to 320 full time employees.
- Operating 24 hours per day, seven days a week.

The project proposes the ongoing use of the infrastructure and mining areas authorised under DA 73-11-98. It is proposed that this development consent will be surrendered subject to consent being granted for the project.

Specifically, the project proposes the ongoing use of the following mine infrastructure located at the Newstan Colliery Surface Site:

- The men and materials drift and winder.
- The ventilation shaft and fans.

All other surface infrastructure at the Newstan Colliery Surface Site, including bathhouse, administration buildings, coal handling infrastructure and car parking areas will remain 'as approved' under SSD-5145 for the Northern Coal Logistics Project (refer to Section 3.2.2 for further details).

3.2.2 Northern Coal Logistics Project

Newstan Colliery is integrated with the Northern Coal Logistics Project, under which Northern Coal Services provides the coal handling, processing and transport facilities to deliver coal from Mandalong Mine and Newstan Colliery to domestic and export markets. These activities are approved under Development Consent SSD-5145, with facilities comprised of the Newstan Colliery Surface Site, Cooranbong Entry Site, private haul roads and rail loading infrastructure.

Activities that occur at Newstan Colliery Surface Site, as approved under SSD-5145 for the Northern Coal Logistics Project, include:

- Processing of 8 Mtpa ROM coal through the Newstan Coal Processing Plant.
- Exporting product coal through the Newstan Colliery rail loading facilities by train to the Port of Newcastle.
- Haulage of coal to the Vales Point Power Station.

- Receiving coal from the Cooranbong Entry Site and Awaba Colliery by truck utilising the Cooranbong and Newstan-Eraring private haul roads.
- Transporting reject material from the Newstan Colliery Coal Processing Plant to the Northern and Southern Reject Emplacement Areas and Hawkmount Quarry.
- Discharge of water from Licensed Discharge Points.

Once ROM coal from the Newstan Colliery underground workings reaches the surface at the Newstan Colliery Surface Site, it forms part of the Northern Coal Logistics Project. The Northern Coal Logistics Project is approved to receive, handle and process up to 8 Mtpa of ROM coal, of which up to 4.5 Mtpa may be received from Newstan Colliery. The 4 Mtpa of ROM coal proposed to be extracted as part of the project would be received, handled and processed at the Newstan Colliery Surface Site in accordance with the approved operations under SSD-5145. At this production rate, the project would not exceed the approved processing capacity of the Northern Coal Logistics Project.

Underground water management and transfers between coal seams also form part of the project. All surface water management, including operation of licenced discharge points, form part of the Northern Coal Logistics Project (SSD-5415). Transfers of water between the Newstan Colliery underground workings and the Newstan Colliery Surface Site were considered as part of the Northern Coal Logistics Project. These transfers and associated volumes will also be considered as part of the EIS for the project.

3.2.3 Awaba Colliery

Awaba Colliery is approved under Development Consent PA 10_0038, which provides approval for:

- Bord and pillar development and pillar extraction using continuous miners within the 'Main South' and 'East B' underground mining areas.
- Production, handling and distribution of up to 880,000 Mtpa ROM coal using existing surface facilities.
- Use of existing ancillary surface facilities.
- Expansion of the existing Pollution Control Dam.
- Delivery of coal to the Newstan Colliery Surface Site and/or the Eraring Power Station using the existing private haul road/transport facilities.

With coal reserves exhausted, Awaba Colliery ceased operating as a producing mine in March 2012. However, the surface infrastructure is still being used as a service facility for Newstan Colliery. The existing workings within the Great Northern seam also continue to be utilised for the storage of groundwater.

In 2018, Centennial Newstan also received approval under Part 4 of the EP&A Act (DA/477/2018) to construct and operate a 200 kW prefabricated photovoltaic solar farm within the confines of the existing parking facilities at the Awaba Colliery Surface Site. The solar farm will provide power to onsite air compressors that supply compressed air to underground workings at Newstan Colliery.

Owing to the long history of activities at Awaba Colliery dating back to 1947, the site contains a number of previously disturbed areas. To minimise environmental impacts, Centennial Newstan proposes to make use of these existing disturbance areas for the siting of new infrastructure as part of the project.

The project proposes the ongoing use and upgrade of the surface infrastructure at Awaba Colliery Surface Site in addition to the construction and operation of a number of new facilities. The following activities are proposed at Awaba Colliery Surface Site as part of the project:

- Ongoing use of the administration offices and parking facilities, excluding the footprint of the Awaba photovoltaic solar farm (DA/477/2018).
- The construction and operation of a gas flaring facility within the existing disturbance footprint of the site.
- Installation of two new ventilation fans. The fans would be installed at the site of the existing approved ventilation shaft and operating during extraction of the West Borehole seam.
- Upgrade and ongoing use of the underground water supply and communications infrastructure.
- Drilling of boreholes into the workings for the supply of bulk materials, gas drainage infrastructure, electricity, compressed air, and water.

In addition to the proposed continued operation of the Awaba Colliery Surface Site, the project proposes the ongoing use of the existing underground workings for the ongoing storage of groundwater.

It is proposed that Project Approval 10_0038 be surrendered subject to consent being granted for the project.

3.3 Description of the project

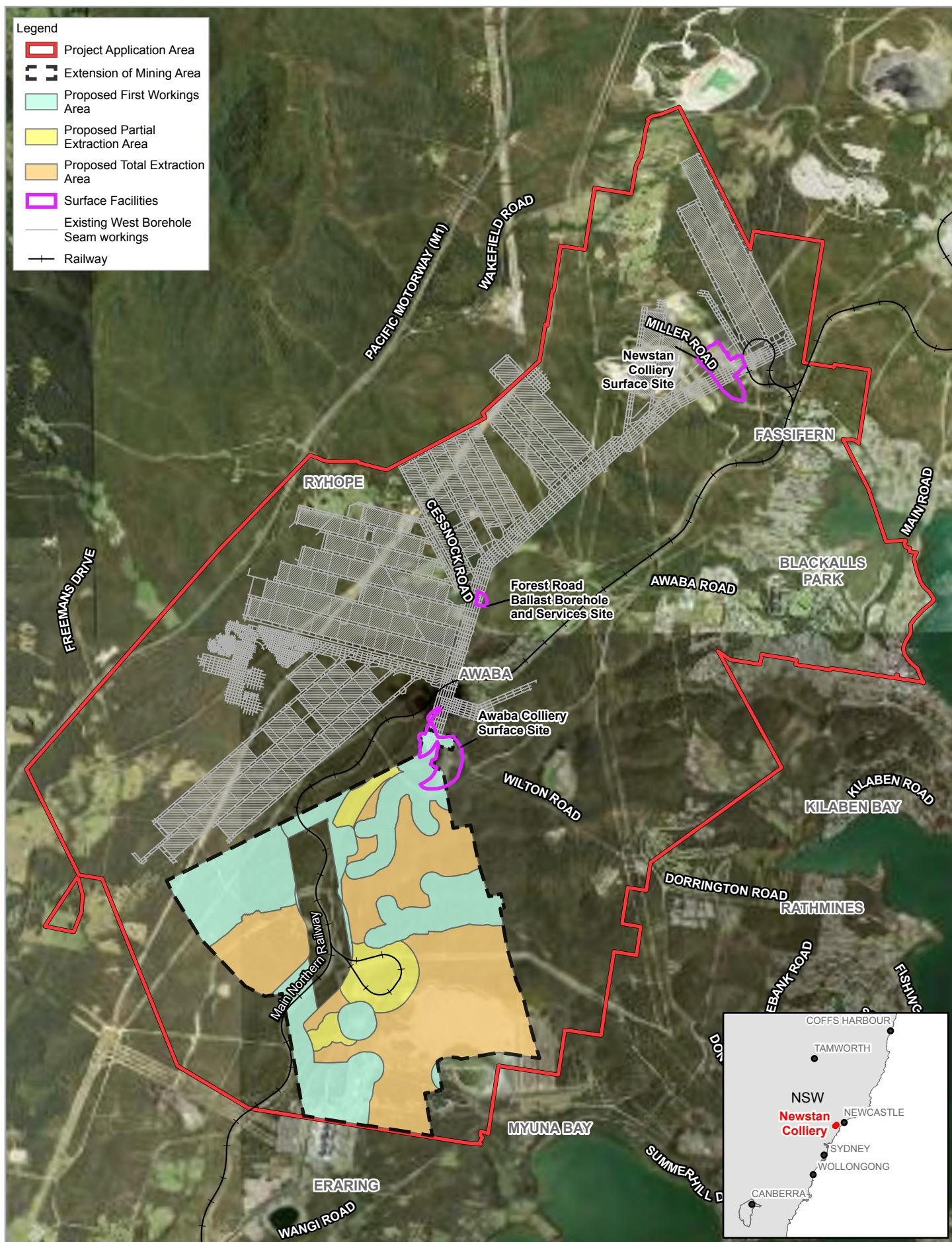
An overview of the project is presented in Table 3-4. The project is described in further detail in the subsections below and general features are illustrated on Figure 3-4 and Figure 3-5.

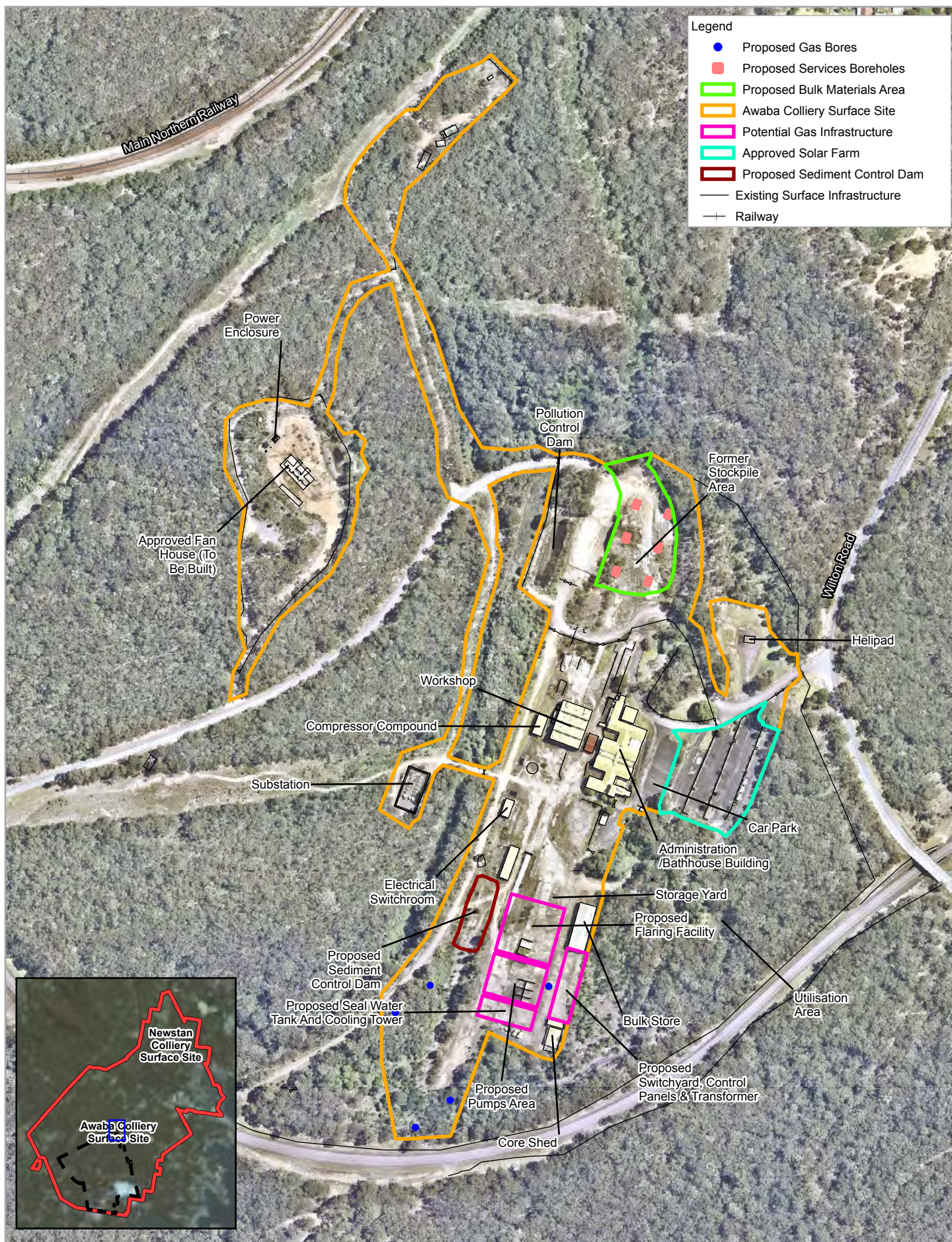
Table 3-4 Project overview

Aspect	Description
Project duration	15 years
Resource	Estimated 25.9 Mt of recoverable ROM coal within the West Borehole Seam, at depths of between 140 m and 320 m
Annual production rate	Up to 4 Mtpa ROM coal
Product coal	As approved under SSD-5145 for the Northern Coal Logistics Project. Product coal handling does not form part of the project (refer to Section 3.2.2).
Mining methods	Bord and pillar mining using a combination of first workings, partial extraction and total extraction.
Mine infrastructure area and access	<p>The project will utilise the existing infrastructure at the Newstan and Awaba Collieries.</p> <p>Awaba Colliery Surface Site will be upgraded as part of the project and be utilised for:</p> <ul style="list-style-type: none"> • Power supply • Compressed air and nitrogen inertisation • Greenhouse gas capture and abatement

Aspect	Description
	<ul style="list-style-type: none"> • Ventilation • Communications • Parking • Administration. <p>Newstan Colliery Surface Site will be utilised for:</p> <ul style="list-style-type: none"> • Access to underground workings (as approved under DA 73-11-98) • Parking, offices, bathhouse facilities and workshop (as approved under SSD-5145) • Ventilation (during first workings).
Coal handling, processing and transport infrastructure	<p>ROM coal will be transported via underground conveyor to the Newstan Colliery Surface Site at a rate of up to 4 Mtpa. Once it reaches the surface it will be handled in accordance with the approved operations for the Northern Coal Logistics Project (SSD-5145).</p> <p>The Northern Coal Logistics Project has sufficient coal processing and transportation capacity to accommodate the project's maximum production rate (4 Mtpa) and total production over the mine life (25.9 Mt) without exceeding the throughput limits imposed under SSD-5145.</p> <p>No coal handling operations at Awaba Colliery Surface Site are proposed as part of the project.</p>
Product coal transport	<p>Product coal transport does not form part of the project. The project proposes the transportation of ROM coal via underground conveyor to the Northern Coal Logistics Project, at which point the processing and product coal transportation would be undertaken as approved under SSD-5145.</p>
Ventilation and gas drainage	<p>Operation of existing ventilation fans at Newstan Colliery Surface Site during first workings, then relocation of the two fans to the existing ventilation shaft at Awaba Colliery Surface Site and operation of those fans during extraction.</p> <p>Construction and operation of a gas flaring facility within previously disturbed areas at Awaba Colliery Surface Site.</p>
Water supply	<p>Upgrade existing reticulated water system at Awaba Colliery Surface Site.</p> <p>Use of recycled wastewater for mining and dust suppression.</p>
Water and wastewater management	<p>Extraction of underground water via the Fassifern Pump Station.</p> <p>Underground water management and transfers between coal seams and the Newstan Colliery Surface Site.</p> <p>Surface water management at the Newstan Colliery Surface Site will continue as approved under SSD-5145 and does not form part of the project.</p> <p>Surface water management at the Awaba Colliery including the utilisation of existing and approved licensed water discharge points. Any upgrades to the Awaba Colliery surface water management system will be considered during the preparation of the EIS.</p>
Communications and electrical supply	<p>Upgrades to 33 kV switchyard and 11 kV switch room at Awaba Colliery Surface Site.</p> <p>Upgrades to underground electrical equipment.</p>

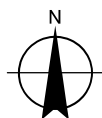
Aspect	Description
	Upgrades to the communications network.
Reject management	<p>As approved under SSD-5145 (refer to Section 3.2.2). The Northern Coal Logistics Project has sufficient capacity to accommodate the processing of the ROM coal from the project over the mine life (25.9 Mt) without exceeding the limits imposed under SSD-5145.</p> <p>Reject management does not form part of the project.</p>
Exploration and other investigations	Ongoing throughout Centennial Newstan's lease areas for the life of the project.
Disturbance area	1,256 ha (underground Extension of Mining Area). All proposed surface infrastructure is within previously disturbed areas at Awaba Colliery and Newstan Colliery Surface Sites.
Operating hours	24 hours a day, seven days a week
Peak operational workforce	320 Full Time Equivalent (FTE) personnel
Peak construction workforce	50 FTE personnel (indicative)
Temporary construction facilities	If required, they will be located within previously disturbed areas at Awaba Colliery Surface Site.
Rehabilitation	<p>A detailed rehabilitation strategy will be developed in consultation with stakeholders and with consideration of the detailed environmental investigations undertaken as part of the EIS. Conceptually, the rehabilitation strategy for the project will include:</p> <ul style="list-style-type: none"> Progressively rehabilitating minor surface disturbance areas (e.g. drill pads, access tracks, surface cracking) to their previous land use. Removing underground plant and equipment at the completion of mining. Filling and sealing mine accesses (drifts and shafts) in accordance with relevant guidelines and standards. Removing or finding a beneficial reuse for mine infrastructure at Awaba Colliery Surface Site and rehabilitating surface disturbance areas. <p>Rehabilitation of the Newstan Colliery Surface Site will be in accordance with SSD-5145 and does not form part of the project.</p>
Project capital cost	\$145M
Sustaining capital (e.g. for equipment replacement)	\$98M
Project schedule	2020 - 2035





Paper Size ISO A4
0 0.03 0.06 0.09 0.12
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



Centennial Coal
Newstan Mine Extension Project
Scoping Report

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Surface Infrastructure Concept Plan

Figure 3-5

3.3.1 Exploration and resource definition

Exploration drilling will continue to be undertaken throughout Centennial Newstan's lease areas for the life of the project to obtain specific geological information and to assist in mine planning.

3.3.2 Mining operations

Mining system and development

Bord and pillar mining is proposed to be undertaken using continuous miners and will include first workings, partial extraction and total extraction. Mining will be designed to extract up to 4 Mtpa of ROM coal from within the Extension of Mining Area and a total of 25.9 Mt over a fifteen-year mine life.

Mining will target the West Borehole seam, which is an agglomeration of the Borehole seam, the Young Wallsend seam and the Yard seam. A mix of metallurgical and thermal coal will be extracted. The depth of cover within the Extension of Mining Area ranges from 140 m in the north west to 320 m in the east. The target seam is overlain by the previous Awaba mine workings in parts of the Extension of Mining Area with the interburden between the two seams ranging from 100 m to 210 m.

The project proposes to extend the existing mains in the West Borehole seam and then turn to the west, with panels developed from the mains to the south. The panels will be developed in a 'super panel' layout using two continuous miners per development section, shuttle cars and feeder breakers. The panels will be between 665 m and 4,485 m in length, and 168.5 m in width. Each panel will comprise four rows of pillars with cut throughs at 70 degree angles, with pillar dimensions of 35 m by 35 m. These pillar dimensions provide for a Factor of Safety of greater than 2.11, or 'long term stable', prior to extraction. The mine design also includes 45 m barrier pillars to improve regional stability and separate the panels for improved gas and water management. Roadways will be mined at widths of 5.5 m and heights of 3.2 - 3.4 m. All development will be down dip for improved water management.

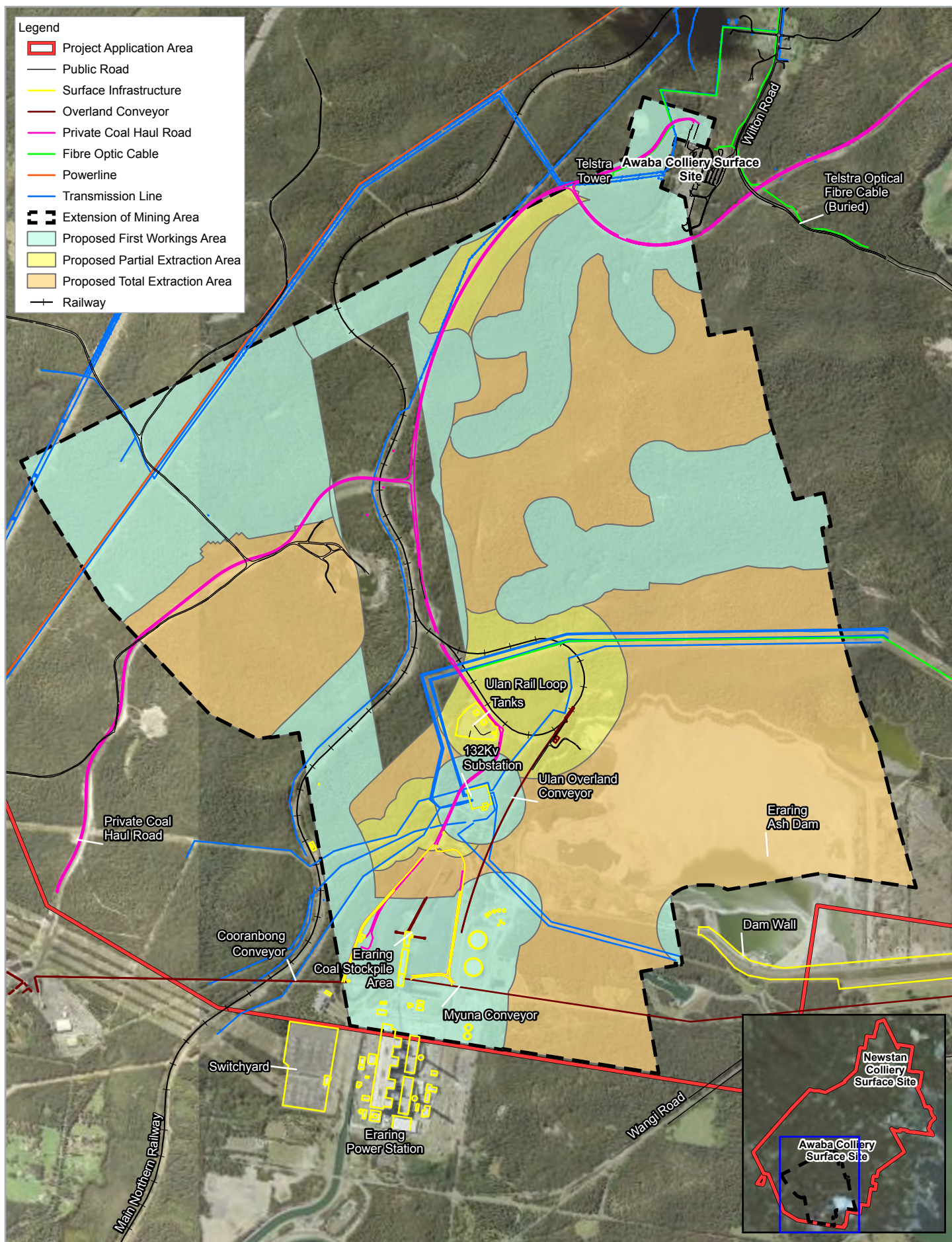
Following the development phase, the pillars will be extracted using a high capacity continuous miner paired with a flexible conveyor train. The extraction panels will extract close to the full seam outside of the previously supported development roadways to maximise resource recovery and manage potential future spontaneous combustion risks arising from coal left behind in the goaf. ROM coal will be delivered to the Newstan Colliery Surface Site via a series of underground conveyors.

The combination of first workings, partial and total extraction has been adopted to mitigate impacts on sensitive surface features (refer to Figure 3-6). Total extraction, where all pillars in a panel are removed, is proposed to the south of the existing Awaba workings in areas that have not been subject to mining previously (i.e. single-seam conditions) and in some areas beneath the existing workings (multi-seam conditions) where sensitive surface features are not present. The total extraction in the multi-seam areas will provide the additional benefit of reducing the long-term liability of pillar failure in the overlying Awaba workings in the Great Northern seam.

The proposed partial extraction will mine three of the four rows of pillars, leaving a spine pillar (i.e. one row of pillars) within each panel. This spine pillar will reduce the maximum mining span to 86 m, which will reduce subsidence effects. Partial extraction is proposed under the Ulan Rail Loop and under the sections of an existing 132 kV transmission line that are subject to multi-seam conditions.

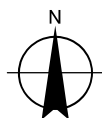
The development of first workings only (i.e. no secondary extraction) will occur beneath certain sensitive surface features in both single-seam and multi-seam conditions. This includes under second and third order streams, the Main Northern Railway, a 132 kV substation, the Eraring Power Station, and the Eraring Ash Dam wall.

With the presence of the overlying Awaba mine workings and larger than previously encountered volume of gas within the West Borehole seam and overlying seams, which will be released by the mining process, this mining system allows for greater control of subsidence, particularly with regard to minimising multi-seam subsidence, improved gas management, and superior flexibility to deal with geological anomalies.



Paper Size ISO A4
0 0.15 0.3 0.45 0.6
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Newstan Mine Extension Project
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Existing Infrastructure Features within
Extension of Mining Area

Figure 3-6

Gas drainage

Historically gas levels have been low at Newstan Colliery, with gas emissions of approximately 1 cubic metre per tonne (m³/t) of coal extracted. Within the Extension of Mining Area the predicted gas emissions have increased within both the West Borehole seam and overlying seams.

The majority of the gas within the Extension of Mining Area is contained in the Australasian and Fern Valley seams, which overlie the target West Borehole seam. The gas from these seams will be released into the workings through the de-pressurisation of the overlying seams during the formation of the goaf. Gas emissions are expected to vary between 13.3 m³/t and 17.1 m³/t within the Extension of Mining Area.

Historically all gas emissions at Newstan Colliery have been free vented to atmosphere through boreholes to the surface, in line with accepted practice at the time. However, Centennial Newstan proposes to use in-seam gas drainage methods to manage gas within the Extension of Mining Area. This method will involve undertaking horizontal directional drilling between 15 m and 20 m above the West Borehole seam following the orientation of the panels and roadways within the Extension of Mining Area. Gas captured during the in-seam drainage system will be transferred to a gas flaring facility located at the Awaba Colliery Surface Site (refer to Section 3.3.5) via underground pipelines. This approach minimises surface disturbance and associated environmental impacts whilst also providing a safe and cost effective solution to managing gas emissions in line with current industry practice.

Ventilation

Existing ventilation shafts at the Newstan Colliery Surface Site and Awaba Colliery Surface Site will continue to be used for the project. The two existing ventilation fans at the Newstan Colliery Surface Site will be utilised during development of the first workings. During this development phase, new fans will be installed at the existing ventilation shaft at the Awaba Colliery Surface Site. Once these fans become operational, the existing fans at Newstan Colliery Surface Site will be decommissioned.

Access and egress

Personnel and materials will be transported down the existing men and materials drift at Newstan Colliery Surface Site. The project proposes to use specialised underground vehicles for both personnel and material transport.

3.3.3 Coal processing and transportation

Coal handling and preparation plant

ROM coal will be transported from the underground workings to the Newstan Colliery Surface Site by a conveyor system at a rate of up to 4 Mtpa. Once the coal reaches the Newstan Colliery Surface Site it will be handled in accordance with the approved operations for the Northern Coal Logistics Project (SSD-5145), managed by Centennial Coal's Northern Coal Services business unit.

All surface coal handling and transportation operations undertaken at Newstan Colliery will form part of SSD-5145 and as such do not form part of the project. The Northern Coal Logistics Project has sufficient coal processing and transportation capacity to accommodate the project's maximum production rate (4 Mtpa) and total production over the mine life (25.9 Mt) without exceeding the throughput limits imposed under SSD-5145.

No coal handling operations at Awaba Colliery Surface Site are proposed as part of the project.

3.3.4 Coal reject management system

Coal reject management activities will be undertaken in accordance with the approved operations for the Northern Coal Logistics Project (SSD-5145) and do not form part of the project.

The Northern Coal Logistics Project has sufficient capacity to accommodate the processing of the ROM coal from the project over the mine life (25.9 Mt) without exceeding the limits imposed under SSD-5145.

3.3.5 Surface infrastructure

The project will utilise the existing surface infrastructure of the Newstan and Awaba Collieries. The additional works described in the following subsections will also be undertaken as part of the project.

Parking, administration, bathhouse and workshop facilities

Upgrades to the existing administration buildings at the Awaba Colliery Surface Site will be undertaken to support the project's administrative workforce.

The existing parking, offices, bathhouse facilities and workshop at the Newstan Colliery Surface Site will continue to be utilised as approved under SSD-5145 for the Northern Coal Logistics Project.

Ventilation fans

New fans will be installed at the existing ventilation shaft at the Awaba Colliery Surface Site. Once these fans become operational, the existing fans at Newstan Colliery Surface Site will be decommissioned.

Gas flaring facility

A gas flaring facility will be established within the confines of the current disturbance area at the Awaba Colliery Surface Site. This will involve the installation of one or multiple vertical enclosed elevated flare stacks. The gas captured from the in-seam drainage system, approximately 90% of which will be methane, will be burned and converted to carbon dioxide in the flare stacks.

The global warming potential of methane is estimated to be 34 times greater than that of carbon dioxide. Through the conversion of the pre-drained gas to carbon dioxide during the flaring process, the project's greenhouse gas emissions will be substantially reduced.

Centennial Newstan is also considering the option of establishing a small gas fired power station at Awaba Colliery Surface Site. This development is known as Gas Engines. The future development of Gas Engines will be contingent on the volume and composition of the gas produced from the underground workings, power demand requirements and market conditions. The option of establishing Gas Engines will be evaluated in more detail during the EIS.

3.3.6 Utilities and services

The following utilities and services will be required for the project:

- Upgrade of the existing 33 / 11 kV Substation at Newstan Colliery Surface Site.
- Upgrade of the existing 33 kV switchyard and 11 kV switch room at Awaba Colliery Surface Site.
- Upgrade and replacement of a number of existing pumps and compressors at Newstan Colliery Surface Site.
- Upgrade of the existing drift conveyor drives at Newstan Colliery Surface Site.
- Installation of new or replacement underground electrical equipment (pumps, substations, control panels, drives, etc.)
- Provision of electrical supply to the underground workings via cables run from the Awaba Colliery Surface Site through boreholes into the workings.
- Extension of the existing intrinsically safe (IS) mine automatic telephone system.

- Installation of a Personal Emergency Device (PED) emergency messaging and control system.
- Installation of a Supervisory Control and Data Acquisition (SCADA) system.
- Installation of boreholes for the supply of bulk materials, compressed air, gas drainage infrastructure and electricity.

3.3.7 Utility and infrastructure relocations

Utility and infrastructure relocations are not proposed as part of the project. However, subsidence mitigation works to existing surface infrastructure are expected to be required. Centennial Newstan regularly consults with utility and infrastructure owners in accordance with an approved Extraction Plan as part of the ongoing management of subsidence impacts at Newstan Colliery. Consultation with utility and infrastructure owners will continue throughout the EIS and post-approval phases of the project to ensure impacts are managed appropriately.

3.3.8 Surface water and groundwater management system

The groundwater management system for the project will generally be comprised of:

- Extraction of underground water via the existing Fassifern Pump Station.
- Ongoing monitoring and management in accordance with Centennial Coal's Northern Operations Water Management Plan.

The existing groundwater model for Newstan Colliery will be revised and any upgrades to the existing groundwater water management system will be considered during the preparation of the EIS.

Surface water management at the Newstan Colliery Surface Site will continue as approved under SSD-5145.

Surface water management at the Awaba Colliery will continue and include the utilisation of existing and approved licensed water discharge points. Any upgrades to the Awaba Colliery surface water management system will be considered during the preparation of the EIS.

3.3.9 Site access and parking

Access and parking will remain consistent with the current approved arrangements for the Newstan and Awaba Collieries. Awaba Colliery Surface Site will continue to be accessed via Wilton Road, Awaba. Newstan Colliery Surface Site will continue to be accessed via Miller Road, Fassifern. The existing parking facilities at both sites will also continue to be utilised as currently approved. All underground access will continue to be via the Newstan Colliery Surface Site.

3.3.10 Construction activities and facilities

Construction activities will be undertaken within previously disturbed areas. Existing surface facilities will be utilised where practicable to minimise the need for additional construction. Should additional facilities, such as construction offices, parking areas, stores and laydown areas, equipment assembly areas, fuel facilities, power, communications or water services be required, they will be sited within previously disturbed areas.

Aggregate and other road building material may be imported to site for use in road and access upgrades, as required. Any excess or unsuitable material will be removed from site for beneficial reuse or disposal at an approved facility.

Construction activities will be guided by a CEMP to ensure work is carried out in accordance with the project's environmental management obligations. Detailed work methodologies will be determined during detailed design and construction planning.

A range of plant and equipment will be used during construction. The construction contractor will determine the final equipment and plant requirements. An indicative list is provided below:

- Bulldozers
- Backhoes
- Dump trucks
- Road trucks
- Excavators
- Cranes
- Concrete pumps
- Water trucks
- Water pumps
- Light vehicles
- Bitumen spray and ancillary equipment
- Concrete saws
- Drill rigs
- Roller/compacters
- Graders
- Scrapers
- Concrete trucks
- Generators
- Trenching Machine
- Hand tools (motorised and pneumatic)
- Oxy torches and welders
- Concrete agitators
- Crushers

3.3.11 Workforce

The construction workforce is expected to peak at approximately 50 FTE personnel. The operational workforce is expected to peak at approximately 320 FTE personnel. A more definitive estimate of the number of personnel required for the project will be determined during the preparation of the EIS.

The majority of operational personnel, including the underground workforce, will be located at the Newstan Colliery Surface Site. A small number of administrative and maintenance personnel (less than 10) will be located at Awaba Colliery Surface Site.

3.3.12 Hours of operation and construction

It is anticipated that construction will be largely carried out during the following hours:

- Monday to Friday: 7.00 am to 6.00 pm
- Saturday: 8.00 am to 6.00 pm
- Sundays and public holidays: no work

Operation activities will occur 24 hours a day, seven days a week.

3.3.13 Rehabilitation and final landform

Following the completion of mining, the Awaba Colliery Surface Site will be decommissioned and the area rehabilitated such that it can support land uses similar to those that occurred prior to mining or be repurposed for light industrial use. It is expected that the Newstan Colliery Surface Site will be decommissioned and rehabilitated as part of closure activities for the Northern Coal Logistics Project in accordance with the requirements of SSD-5145. As such, decommission and rehabilitation of the Newstan Colliery Surface Site does not form part of the project.

A detailed rehabilitation strategy for the project will be developed in consultation with stakeholders and with consideration of the detailed environmental investigations undertaken as part of the EIS. Conceptually, the rehabilitation strategy for the project will include:

- Progressively rehabilitating minor surface disturbance areas (e.g. drill pads, access tracks, surface cracking) to their previous land use.
- Removing underground plant and equipment at the completion of mining.
- Filling and sealing mine accesses (drifts and shafts) in accordance with relevant guidelines and standards.
- Removing mine infrastructure at Awaba Colliery Surface Site and rehabilitating surface disturbance areas.

The final rehabilitation strategy will be developed following an open and consultative approach that aligns with community expectations and considers relevant industry standards.

3.4 Relationship to other major projects and/or developments

3.4.1 Eraring Power Station and Ash Dam

The proposed Extension of Mining Area is partially overlaid by the Eraring Power Station and Eraring Ash Dam. Origin Energy own and operate these assets, which are located on Rocky Point Road at Eraring.

Centennial Newstan understands that Origin Energy lodged an application on 10 August 2018 to modify Project Approval 07_0084 to augment the Eraring Ash Dam using an alternate placement strategy and landform design to maintain operational flexibility and extend the storage life of the dam in the short to mid-term whilst continuing to support long term ash placement strategies towards 2032.

The proposed ash dam augmentation would involve the placement of ash in a series of upstream raises or terraces, or through placement from a pipe (or pipes) from the edges of the dam to form a 'beach' extending across the length of the ash dam operational area to achieve ash deposition to Relative Level (RL) 140 m. The design shares similarities with the existing project approval in terms of the overall landform profile and ash placement techniques. However the augmented landform requires a western saddle embankment, improved stormwater diversion system and remediation of mine voids underlying the Eraring Ash Dam (AECOM, 2018).

Centennial Newstan has commenced consultation with Origin Energy regarding the interaction of the project with the ongoing and proposed operations at Eraring Power Station and Eraring Ash Dam. This consultation will continue during the EIS.

Furthermore, the interaction of the project with these assets has been a key consideration during development of the project design. Centennial Newstan understands there is significant community and government agency interest regarding the potential for leachate from Eraring Ash Dam to enter the historic Awaba workings and then mobilise via groundwater aquifers into Lake Macquarie.

Centennial Newstan has placed considerable effort into understanding these risks as part of the preliminary mine planning process.

Whilst Centennial Newstan is cognisant of the proposed ash dam augmentation project, Origin Energy's application to modify Project Approval 07_0084 remains subject to ongoing assessment and approval under the EP&A Act. Consequently, it is possible that elements of the proposed ash dam augmentation project will change as the approval process progresses. Therefore, Centennial Newstan will continue to focus on known constraints and interactions between the project and Eraring Ash Dam with the objective of optimising resource recovery in the context of Origin Energy's current approved project under Project Approval 07_0084.

Notwithstanding, the project's potential to interact with the Eraring Power Station and Eraring Ash Dam will be a key focus for environmental impact assessment investigations during the EIS, particularly with regard to mine planning and the assessment and management of subsidence, groundwater, and surface water impacts.

3.5 Project rationale and alternatives considered

3.5.1 Project rationale

The project proposes the continuation of underground mining within an established mining precinct that has been operating for over 130 years. The potential impacts of the project have been minimised by maximising the use of existing surface infrastructure and equipment, developing a lower-impact and flexible mine design, minimising surface disturbance for gas drainage and greenhouse gas abatement, and proposing a complementary suite of mitigation measures and management strategies to be implemented during construction, operation, and closure.

The combination of first workings only, partial extraction, and total extraction using bord and pillar mining methods has been adopted to minimise subsidence impacts to sensitive built and natural surface features and to mitigate multi-seam subsidence impacts associated with the Awaba workings in the overlying Great Northern seam.

Conservative buffers have been adopted in the mine design to minimise subsidence impact risks to overlying infrastructure such as the Main Northern Railway, Eraring Power Station and Eraring Ash Dam and sensitive surface water features such as Stockyard Creek, Kilaben Creek, and Stony Creek.

There is also inherent flexibility in the proposed bord and pillar mining method as it provides Centennial Newstan with the ability to vary mining activities as required in response to unforeseen geological or environmental constraints.

The coal recovered from the Project Application Area can produce both a semi-soft coking coal product for the export market and a thermal coal product for both the domestic and export markets. The project will enable supply of export coal products while meeting contractual coal supplies to the domestic markets. Over time, the project can potentially replace the coal product currently supplied to the domestic market by other Centennial Coal operations as these other resources become depleted. This will ensure ongoing security of supply for domestic electricity generation.

The project, if approved, will allow for the optimisation of resource recovery from within the Project Application Area while provide ongoing direct and indirect employment opportunities. In addition, the project will provide a number of positive flow-on effects to the local, regional and state economies through additional wages and royalties.

3.5.2 Alternatives considered

Principles and processes

The project has been developed and refined in consultation with the community, regulatory agencies, infrastructure owners, and other stakeholders to maximise environmental, social and economic outcomes by following the ‘avoid, minimise, offset’ hierarchy.

A review of feasible alternatives to the proposed development has been undertaken to demonstrate that the preferred option constitutes the most appropriate scenario to meet the identified project needs. The following alternatives have been considered by Centennial Newstan during the preliminary planning for the project:

- Not proceeding with the project.
- Alternative locations and designs for various infrastructure components of the project.
- Alternative methods for extraction of the resource.
- Alternative environmental management techniques for moderate or higher risk impacts.

The long history of mining at the Newstan and Awaba Collieries, and the associated environmental monitoring and management activities that have been undertaken over many years, has provided Centennial Newstan with a large amount of baseline information to help guide the development of the project. Centennial Newstan has also undertaken extensive detailed project-specific geological, engineering, environmental, financial and other technical investigations over several years to develop and refine the project.

Investigations and stakeholder consultations are ongoing and the project will continue to be refined during the EIS phase in response to the outcomes.

Mine design

Centennial Newstan has gone through numerous iterations of the mine design in order to develop a mine plan that responds to two key considerations:

- The coal resource is a public asset owned by the State of NSW and it is therefore in the public interest to optimise resource recovery.
- The project is constrained by a range of sensitive built and natural environmental features and their protection throughout all project phases must be a priority.

The current proposed bord and pillar mine plan aims to strike a balance between optimising resource recovery and protecting sensitive environmental features. It has been developed based on extensive modelling of subsidence impacts and through consultation with key government agencies and infrastructure owners.

Centennial Newstan proposes to vary the coal recovery within the West Borehole seam depending on the natural and built features located directly above these workings and the potential for compound subsidence impacts associated with the overlying Awaba workings in the Great Northern seam.

Modelling of the proposed interaction between the seams (MSEC 2018; 2019) has indicated that by the application of a spine pillar type layout, the risk for compound subsidence can be managed. The combination of first workings only, partial extraction, and total extraction mining methods (refer to Figure 3-4) will reduce multi-seam subsidence impacts associated with the overlying Awaba workings.

This combination of first workings, partial and total extraction has also been adopted to mitigate impacts on sensitive surface features. The development of first workings only (i.e. no secondary extraction) is proposed beneath certain sensitive surface features in both single-seam and multi-seam conditions. This includes under second and third order streams, the Main Northern Railway, a 132 kV substation, the Eraring Power Station, and the Eraring Ash Dam wall.

The proposed partial extraction will mine three of the four rows of pillars, leaving a spine pillar (i.e. one row of pillars) within each panel. Partial extraction is proposed under the Ulan Rail Loop and under the sections of an existing 132 kV transmission line that are subject to multi-seam conditions.

Total extraction, where all pillars within each panel are removed, is only proposed to the south of the existing Awaba workings (i.e. single-seam conditions) and in some areas beneath the existing workings (multi-seam conditions) where sensitive surface features are not present.

With the presence of the overlying Awaba mine workings and larger than previously encountered volume of gas within the West Borehole seam and overlying seams, which will be released by the mining process, this mining system allows for greater control of subsidence, particularly with regard to minimising multi-seam subsidence, improved gas management, and superior flexibility to deal with geological anomalies. It also allows for recovery of the resource to be optimised.

Some of the key processes and strategies Centennial Newstan has adopted for managing key subsidence impacts and gas drainage risks as part of the mine design are described in further detail in the following subsections.

Railway protection zone

During the latter stages of production in the Great Northern seam at Awaba Colliery, secondary extraction was not permitted within a barrier of nominally 165 m from the railway tracks of the Main Northern Railway. This barrier far exceeded Awaba Colliery's mining lease condition requirements and was imposed to mitigate the risk of a pillar run that may affect the railway.

In 2017 and 2018, as part of the mine planning process, Centennial Newstan consulted with the Resources Regulator's Principal Subsidence Engineer (PSE) regarding the proposed workings in the West Borehole seam. The Resources Regulator's PSE requested that there be no subsidence from the proposed West Borehole seam mining within this enlarged barrier in the Great Northern seam surrounding the Main Northern Railway.

As a result of this consultation, the proposed workings have been designed to incorporate a 165 m barrier, with a 26.5 degree angle of draw projected from the Awaba Great Northern seam workings to the West Borehole seam. This barrier is significantly larger than the 20 m offset and 35 degree angle of draw from the rails to the West Borehole seam that has been historically maintained around the Main Northern Railway and as prescribed in Centennial Newstan's mining lease conditions. Only long-term stable first workings are proposed in the West Borehole seam within the barrier area.

Pillar run risks

As part of the mine design process, Centennial Newstan engaged specialist subsidence consultants (MSEC, 2018; 2019) to complete a preliminary review of the risk of pillar run due to historical and proposed workings.

The existing and overlying Awaba workings in the Great Northern seam contain areas of first workings only, partial extraction, total extraction and areas where the 'Teralba Conglomerate' has spanned. The Teralba Conglomerate 'spanning areas' in the Great Northern seam are not considered to be long-term stable. The rapid subsidence of these areas due to mining or long-term instability could result in pillar runs in the adjacent first workings and partial extraction areas within the Great Northern seam. Similarly, rapid subsidence events could also occur in the total extraction areas in the Great Northern seam where the roof remains in place. The preliminary review found that, whilst there is a low risk of pillar run occurring, that risk will require active management during future mining.

The mine plan for the project has been developed to take into consideration the pillar run risks identified during the preliminary risk review and that risk is considered to be manageable. Extensive modelling of both the vertical and horizontal displacement in the worst case pillar run scenario has indicated that the effects on the railway can be safely managed.

Further assessment of pillar run risk will be undertaken, in consultation with Transport for NSW, as part of the subsidence assessment for the EIS, and mitigation measures will be proposed, as necessary.

Hydrogeological risks in proximity to Eraring Ash Dam

The Eraring Ash Dam is located above the southern ends of the proposed workings in the West Borehole seam. Total extraction is proposed in this area. There are no existing workings in the Great Northern seam beneath the current extent of the Eraring Ash Dam.

Centennial Newstan has commissioned preliminary subsidence predictions for the current mine design to understand the potential for continuous and discontinuous fracturing above the West Borehole seam following subsidence (MSEC, 2019). This work has been undertaken to gain a preliminary understanding of the risk of leachate from the Eraring Ash Dam migrating into the underground workings. The preliminary predictions indicate only minor changes to the permeability within the surface zone are predicted as a result of the proposed workings within the West Borehole seam and that the migration pathways for leachate to enter the workings will be limited.

The findings of these preliminary assessments will be used as background for the more detailed subsidence, surface water, groundwater and geotechnical models to be developed for the EIS.

Mining in proximity to Eraring Power Station

First workings only are planned within a 35 degree angle of draw from Eraring Power Station, in accordance with mining lease conditions. Preliminary subsidence predictions (MSEC, 2019) indicate that the structural steel frame of the power generation facility would be able to tolerate the small differential horizontal movements without adverse impacts. Further work will be undertaken during the EIS to understand the potential for impacts to the Power Station from the proposed mining activities.

Mining in proximity to Awaba Biodiversity Conservation Area

Centennial Newstan understands that Lake Macquarie City Council has established a biodiversity offset area (the Awaba Biodiversity Conservation Area) on Lot 463 DP 1138964, which is located within the Extension of Mining Area. Potential impacts to this offset area have been considered by proposing first workings only within the 2nd and 3rd order watercourses within this area. Extraction of the coal resource is proposed outside these watercourses in accordance with the mine plan.

Further investigations will be undertaken during the EIS to ensure potential impacts to the Awaba Biodiversity Conservation Area from the project are managed appropriately in consultation with Lake Macquarie City Council.

Surface infrastructure design

The surface infrastructure design has been developed to provide a number of operational, economic and environmental benefits. The ways in which it has been optimised and the associated benefits are summarised in Table 3-5.

Table 3-5 Surface infrastructure optimisation

Aspect	Description and benefits
Minimising surface disturbance	Where possible the project has sought to make use of the existing surface infrastructure facilities at Newstan and Awaba Collieries. All new major surface infrastructure is proposed within the existing approved disturbance footprint at Awaba Colliery Surface Site. The proposed adoption of in-seam gas drainage methods, with underground piping of the gas, has further reduced surface disturbance requirements by minimising the number of drill pads and gas pipelines required on the surface.
Access to key infrastructure	The project will supply ROM coal to the existing approved Newstan Coal Logistics Project (SSD 5145) at Newstan Colliery Surface Site. As such, additional impacts associated with the construction and operation of new coal handling, processing and transportation infrastructure have been avoided. Traffic and transport impacts have also been minimised through the project's proposed use of the existing access and parking facilities at the Newstan and Awaba Collieries.
Land availability	Centennial Newstan's proposed use of the existing surface infrastructure facilities at Newstan and Awaba Collieries and the proposed underground mining method has minimised the area of land required to develop the project.
Proximity to sensitive receptors and sensitive environments	The project is proposed within an established mining precinct that has been operating for over 130 years. The proposed use of the existing surface infrastructure facilities at Newstan and Awaba Collieries has minimised the project's potential for intrusions on the amenity of sensitive receptors and sensitive environments not already impacted to some extent by mining operations.
Proximity to underground mining areas	The proposed underground mining areas are located immediately to the south of the existing Awaba Colliery Surface Site. They are also a continuation of the existing Newstan workings within the West Borehole Seam, which are accessed via a men and materials drift at Newstan Colliery Surface Site. The proposed workings will be accessed via this existing drift portal, thus eliminating the need for construction of a new drift portal. Similarly, the underground mining areas will be ventilated through the utilisation of the existing ventilation fans at Newstan Colliery Surface Site and the site of the approved ventilation fans at Awaba Colliery Surface Site. Surface disturbance and amenity impacts associated with the construction and operation of a new ventilation fan site have consequently been minimised, if not avoided.

Centennial Newstan will continue to pursue opportunities to refine the project design in response to the outcomes of the detailed environmental and technical investigations that will be undertaken during the EIS.

3.6 Baseline information

3.6.1 Climate

The meteorological information presented in this section has been sourced from long-term data collected at the Bureau of Meteorology's (BoM) nearest operational weather stations, along with information provided in recent assessment reports (GHD, 2018; SLR, 2018; RPS, 2018) commissioned by Centennial Newstan.

Temperature

The Project Application Area is located in a temperate climate zone with no designated wet season, although the area can be susceptible to occasional heavy showers and thunderstorms due to easterly troughs during warmer months. The local climate is characterised by warm to hot summers and cool to mild winters. Based on the long-term climate statistics sourced from the BoM between 1994 and 2012, mean monthly maximum temperatures in the area range between 15.1 degrees Celsius (°C) in July to 26.9 °C in January. Mean monthly minimum temperatures range between 6 °C in July to 17 °C in February. Autumn and spring are generally mild with sporadic temperature fluctuations.

Rainfall and evaporation

Continuous daily rainfall datasets were obtained from the BoM Cooranbong (Avondale) weather station (station number 061012), with missing data "patched" in from interpolations from nearby stations. The available rainfall data extended from January 1889 through to December 2017, with the representative statistics reported as:

- Minimum annual rainfall – 531 mm (in 1944).
- Average annual rainfall – 1,121 mm.
- Median annual rainfall – 1,076 mm.
- Maximum annual rainfall – 1994 mm (in 1950).

The average annual evaporation total was approximately 1,172 mm, compared to the annual average rainfall of 1,121 mm. This gives an annual deficit (difference between annual rainfall and annual evaporation) of approximately 51 mm.

Wind

The area predominantly experiences light to moderate winds (between 1.5 and 8 metres per second), with occasional high-speed winds (greater than 8 metres per second). Wind direction is seasonally dependent.

While winds occur reasonably evenly from all quadrants, summer winds appear to be generally from the east-northeast and winter winds appear to be predominately from the west-northwest. Calm wind conditions (less than 0.5 metres per second) generally occur just over 1 percent of the time.

3.6.2 Topography and landform

The topography of the Project Application Area generally consists of rolling low hills with short side slopes and numerous closely spaced drainage lines, on predominately coarse grained sediments of the Narrabeen Group and Newcastle Coal Measures. Slope gradients are generally 10 – 25 percent and local relief is between 20 metres and 110 metres Australian Height Datum (AHD).

3.6.3 Surface water

Within the Project Application Area, there are several creek systems, including:

- LT Creek, which flows in an easterly direction into Fennel Bay.
- Kilaben Creek and Stockyard Creek, which flow in an easterly direction into Kilaben Bay.
- Palmers Creek and Stony Creek, which flow in an easterly direction into Fennell Bay.
- Lords Creek, and its associated tributaries, which flows in a westerly direction into Jigadee Creek.
- Crooked Creek, which flows in a south-easterly direction into Lake Macquarie.

Creeks that overlie the proposed Extension of Mining Area include Kilaben Creek, Stockyard Creek, Stony Creek, and Crooked Creek. The majority of the creeks are ephemeral with some sections of the lower reaches being perennial flowing into estuarine waters.

The surface hydrology within the Project Application Area and Extension of Mining Area is shown in Figure 3-7.

3.6.4 Biodiversity

The Project Application Area occurs within the Hunter subregion of the Sydney Basin Bioregion, which is generally characterised by:

- Rolling hills, wide valleys, with a meandering river system on a wide flood plain and river terraces.
- A complex of Permian shales, sandstones, conglomerates, volcanic and coal measures, bounded on the north by the Hunter Thrust fault and on the south by cliffs of Narrabeen Sandstone.
- A variety of harsh texture contrast soils on slopes and deep sandy loam alluvium on the valley floors.
- Dunes on the southern tributaries of the Hunter River and deep sands in dunes on the barrier, and saline, organic muds in the estuary.
- Soil salinity on some bedrocks in the upper catchment.
- Streams that are brackish or saline at low flow.
- Numerous small swamps in the upper catchment, and extensive estuarine swamps behind the coastal barrier of beach and dunes.
- A variety of vegetation types including:
 - Rainforest brush in the lower valleys.
 - Forest and open woodland of white box, forest red gum, narrow-leaved ironbark, grey box, grey gum spotted gum, rough-barked apple and extensive of stands of swamp oak in the upper reaches and foothills.
 - River oak and river red gum along streams.
 - Mangroves, salt marsh and freshwater reed swamps in estuaries (NSW National Parks and Wildlife Service 2003).

The biodiversity values within the Project Application Area are described in further detail in Sections 5.2.4 and 5.2.5.

3.6.5 Ambient air quality

There are a range of influences on the air quality surrounding the Project Application Area including coal-fired power generation, coal mining, agriculture, vehicle emissions, and wind-blown dust. Key sources of local air emissions include:

- Eraring and Vales Point power stations.
- Non-project related traffic-generated emissions.
- Agricultural activities, predominantly livestock grazing.
- Underground mining operations, including Newstan Colliery and Mandalong Mine.

Regional events such as bushfires and dust storms also periodically contribute to short-term elevated concentrations of suspended particulates.

Ambient air quality monitoring has been undertaken at the Newstan and Awaba Collieries for many years. This has included:

- Monitoring of dust deposition (insoluble solids) using deposited dust gauges.
- Monitoring of TSP (total suspended particulates - particulate matter less than 50 microns in diameter), PM10 (particulate matter with an aerodynamic diameter of 10 microns (μm) or less), and PM2.5 (particulate matter with an aerodynamic diameter of 2.5 μm or less) using High Volume Air Samplers (HVAS).
- Continuous PM10 monitoring using a Tapered Element Oscillating Microbalance (TEOM).

Northern Coal Services also operate an on-site meteorological monitoring station at Newstan Colliery Surface Site to determine the prevailing regional and local weather conditions.

Long-term trends indicate that Newstan and Awaba Collieries have operated generally within the air quality performance criteria established under each operation's respective Development Consent and Environment Protection Licence (EPL).

Sensitive receivers surrounding the Project Application Area predominantly consist of residential and rural residential properties to the north and east. Relative to Newstan Colliery Surface Site these properties are located to the north-west in the suburb of Wakefield, and to the south-east in the suburbs of Fassifern, Blackalls Park and Fennell Bay. Relative to Awaba Colliery Surface Site the majority of residential properties are located to the north in Awaba, and to the east in Toronto, Kilaben Bay and Rathmines.

There are also a number of rural residential properties to the west located in the areas of Freemans Waterhole and Ryhope.

3.6.6 Ambient noise environment

The existing acoustic environment is generally characterised by traffic noise from local roads and rail lines, urban and industrial noise in some areas, such as near the existing Newstan Colliery Surface Site and Eraring Power Station, and rural and natural sounds such as birds, and wind in vegetation.

Attended noise monitoring is undertaken monthly at the Newstan Colliery in accordance with the Newstan Colliery Project Approval. The existing baseline data provides a good understanding of the acoustic environment within and surrounding the Project Application Area. Centennial Newstan will undertake additional background noise monitoring near proposed surface infrastructure areas which will further improve this understanding.

Noise sensitive receivers surrounding the Project Application Area predominantly consist of residential and rural residential properties to the north and east. Relative to Newstan Colliery Surface Site these properties are located to the north-west in the suburb of Wakefield, and to the south-east in the suburbs of Fassifern, Blackalls Park and Fennell Bay. Relative to Awaba Colliery Surface Site the majority of residential properties are located to the north in Awaba, and to the east in Toronto, Kilaben Bay and Rathmines.

There are also a number of rural residential properties to the west located in the areas of Freemans Waterhole and Ryhope.

3.6.7 Heritage

Aboriginal

The Project Application Area is located within the traditional lands of the Awabakal people and in the administrative boundaries of the Biraban Local Aboriginal Land Council (LALC). The exact traditional boundaries of the Awabakal tribes are unknown, but the broad geographical and cultural boundaries are relatively consistent between sources. The Awabakal appear to have been people of the coast, estuaries, lakes and wetlands, but also with attachment to the rugged sandstone country through the Sugarloaf and Watagan Ranges. The traditional country of the Awabakal people was bounded to the north by the Worimi, to the west by the Wonnarua, to the south west by the Darkinjung and to the south along the coast by the Kuring-gai people.

Historical records identify several different clans as occupying the region, with the Awabakal people being located in the Newcastle and Lake Macquarie area. There is limited information available regarding the Aboriginal occupation of the area given the impacts of European settlement. Abundant sources of marine and terrestrial resources were available in the Newcastle area. As such, the area was likely occupied both transiently, when ephemeral water sources were accessible, and more permanently where a continual water source, such as Lake Macquarie, was available. Both of these environments would have provided a variety of seasonal and annual floral and faunal resources.

A review of the Aboriginal Heritage Information Management System (AHIMS) (OEH, 2019) indicates there are six recorded Aboriginal heritage sites within the Extension of Mining Area. These are comprised of:

- Two isolated artefact sites (ID 45-7-0300; ID 45-7-0301).
- Three scarred trees (ID 45-7-0318; ID 45-7-0319; ID 45-7-0324).
- One artefact scatter (ID 45-7-0302).

Historic

A search of the National Heritage Register database, State Heritage Register and Lake Macquarie Local Environmental Plan 2014 (Lake Macquarie LEP) has identified 40 heritage items within the Project Application Area. Of these, 32 are listed on heritage registers and 8 have been identified, but are not listed (i.e. they do not meet the criteria for local heritage listing).

National Heritage Register database

There are no items in Newstan Colliery holdings listed on the National Heritage database.

State Heritage Register

There is one heritage item on the State heritage Register within the Newstan Colliery Holding. This item is the Wangi Wangi Power Station (SHR 01014).

Lake Macquarie LEP

There are 30 heritage items listed on the Lake Macquarie LEP. Of these, 26 are built heritage items and four are archaeological sites. Two of these items are also listed on Section 170 registers. The majority of these heritage sites are in the vicinity of the Lake Macquarie foreshore and outside the mine operations and areas of surface disturbance.

Heritage items within the Extension of Mining Area

There are two locally listed heritage items in the Extension of Mining Area:

- Portions of the Great Northern Railway line (RT-03).
- Eraring Power Station (ER-01).

Awaba Colliery Surface Site

Previous studies (RPS, 2010; 2012) have also identified the Awaba Colliery as a locally significant heritage item, despite it not being listed on any heritage register.

The Awaba Colliery complex is historically significant at a local level as the first colliery to be planned, constructed and operated by the NSW State Government via the State Mines Control Authority. It is representative of the significant expansion in colliery development in NSW by the State Government during the post-war period. Furthermore, the colliery's operation from 1947 to the present day marks a significant period of continuity in use.

3.6.8 Geology and soils

Geology

The project is located in the south-western part of the Newcastle Coalfield, which occupies the north-eastern portion of the Sydney Basin. The stratigraphy of the region consists of material from the Triassic and Permian periods.

The Newcastle Coal Measures are characterised by complex patterns of splitting and coalescence of the various coal seams. This is generally related to the localised presence of alluvial paleochannels within the sedimentary sequence. The West Borehole seam is contained within the Lambton Formation, the earliest formation of the Newcastle Coal Measures.

The surface lithology in the vicinity of the Extension of Mining Area comprises shallow Quaternary alluvium (associated with the major watercourses) as well as bedrock and surface deposits from the Narrabeen Group and the Moon Island Beach Group of the Newcastle Coal Measures, which dip gently at approximately 1 to 2 degrees to the south-west. The Triassic and Permian rocks that comprise the surface lithology include conglomerate, sandstone, siltstone, claystone, tuff and coal.

The Young Wallsend, Great Northern, Fassifern, Borehole and West Borehole seams have been previously mined at Newstan Colliery. Most recently, mining has been undertaken in the West Borehole seam.

Soil landscapes

The soil landscapes within the Project Application Area area have been previously mapped by the former Department of Land and Water Conservation (DLWC) at a scale of 1:100,000 as Doyalson, Wyong, Warners Bay, Gateshead, and Awaba soil landscapes.

Awaba Soils are characterised by steep and low rolling hills on predominantly coarse-grained or hard setting soils. The Awaba soils consist of shallow Lithosols on the steeper slopes and transition to moderate to deep Soloths on the gentler slopes. In the drainage lines Yellow and Gleyed Podzolic soils are formed on fine-grained substrates. These soils are considered to be a very high erosion hazard and are prone to rill and sheet erosion with a moderate erodibility for non-concentrated flows and a high erodibility for concentrated flows. The soils are strongly acidic with typically a low fertility.

Doyalson Soils have similar properties to the Awaba soil landscape but are located on the higher elevations in the area. The Doyalson soils are moderately deep Yellow Earths, Yellow Podzolic and Soloths overlaying the Conglomerate Sandstone and Yellow Leached Earths, Grey Earths and Gleyed Podzolic soils. These soils occur on the drainage lines and they typically have a high erosion hazard with a high erodibility for both non-concentrated and concentrated flows. The soils are strongly acidic and have low fertility and are prone to seasonal waterlogging.

Gateshead Soils are generally stable when disturbed and of low fertility due to low pH. The soils are generally located within cleared woodland, open forest and are dominated by Yellow Podzolic Soils, Yellow Soloths, Tenosols and Red Podzolic Soils. The soil unit is a well to moderately drained soil dependent upon the position vertically within the unit (SLR, 2014).

Gateshead Soils are typical of the Newstan Colliery Surface Site only.

Warners Bay Soils are moderately deep to deep Grey and Yellow Podzolic soils and structured loams. The soils are predominantly located on steep slopes and have potential for mass movement. These soils are considered a high erosion hazard which is prone to rill and sheet erosion with a moderate erodibility for non-concentrated flows and a moderate to high erodibility for concentrated flows. They are strongly acidic with low fertility.

Wyong Soils are poorly drained deltic soils of the floodplain and alluvial flats. The soils are predominately deep Yellow Podzolic, Brown Podzolic soils with Soloths and Humus Podzols around the lake edges. The soils are prone to waterlogging and are strongly acidic with low fertility.

3.6.9 Coal resource

The target coal resources are contained within the lower part of the Late Permian Newcastle Coal Measures. Within the Extension of Mining Area, the Lambton Formation, at the base of the Newcastle Coal Measures, contains the only seam considered to have economic mining potential. The seam of interest is the West Borehole seam, which is the agglomeration of the Borehole, Young Wallsend and Yard seams.

The converged West Borehole seam exists in the south-western part of the Project Application Area where it ranges in thickness from 3.5 m to 5.5 m, with average raw ash content of 29.6%.

The coal seams generally dip gently to the southeast at grades of 1 in 20; however localised seam rolls associated with paleochannels and seam splitting are present in the central part of the Extension of Mining Area. This can increase seam grades locally up to 1 in 10. The depth of cover to the target seam ranges from 140 m in the north-west to 320 m in the east.

3.6.10 Infrastructure and utilities

Public and private infrastructure and utilities (non-Centennial owned) within the Extension of Mining Area, include:

- Electricity transmission lines and substations.
- Water and sewerage lines.
- Communication towers and cables.
- Paved and unsealed roads.

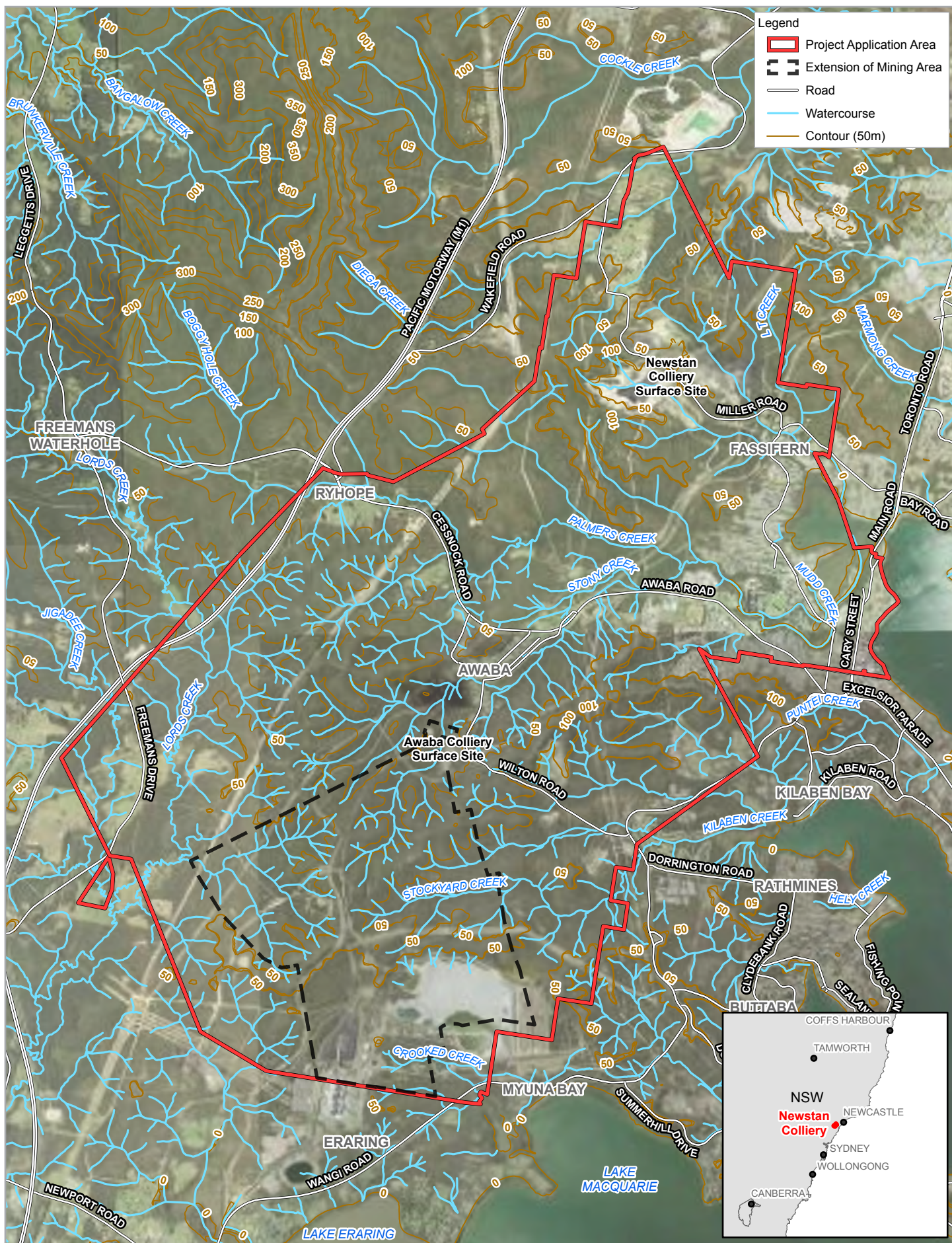
- The Main Northern Railway line.
- The Eraring Power Station and Eraring Ash Dam.

Key infrastructure features within the Extension of Mining Area are shown on Figure 3-6.

3.6.11 Protected areas

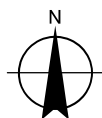
Parts of the north-western portion of the Project Application Area are overlaid by the Awaba State Forest. None of the Extension of Mining Area is overlaid by the Awaba State Forest.

The Extension of Mining Area is overlaid by a biodiversity offset site owned by Lake Macquarie City Council. The land, known as the Awaba Biodiversity Conservation Area, is located on Lot 463 DP 1138964. Consideration will be given to any potential project-related impacts to this offset site during the EIS process.



Paper Size ISO A4
0 0.4 0.8 1.2 1.6 2
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Hydrology of Project Application Area

Figure 3-7

4. Strategic and statutory context

4.1 Strategic location of the project

The project is located within an existing underground mining precinct that has been established for over 130 years. Underground coal mining operations commenced on the western side of Lake Macquarie in the area now known as Newstan Colliery in 1887 and, upon the introduction of the EP&A Act, operated pursuant to continuing use rights in accordance with Part 4, Division 10 of the EP&A Act (continuing use rights) until 1999. On 14 May 1999 the (then) Minister for Urban Affairs and Planning granted Development Consent DA 73-11-98 under Part 4 of the EP&A Act for the Newstan Colliery Life Extension Area. This approval enabled mining to continue within the existing mining areas as well as the expansion into areas that had not previously been mined. Development Consent DA 73-11-98 has been modified on eight occasions, with the most recent modification approved on 17 January 2019.

The majority of the proposed Extension of Mining Area is located under undulating, unpopulated bushland. However, the Extension of Mining Area also underlies the Eraring Power Station and associated infrastructure including the Eraring Ash Dam. The proposed Extension of Mining Area is bordered by previous Newstan Colliery mine workings to the north and northwest while the western and northern area of the proposed Extension of Mining Area is partially overlaid with mine workings from the Awaba Colliery in the Fassifern and Great Northern coal seams.

Lake Macquarie and the surrounding residential suburbs of Toronto and Rathmines border the Project Application Area to the east. To the south lie the suburbs of Dora Creek and Myuna Bay. To the west lies the M1 Pacific Motorway. The Main Northern Railway dissects the Project Application Area in a north-south direction.

The Newstan Colliery Surface Site is located in Fassifern approximately 4 kilometres north of the township of Toronto. The Awaba Colliery surface site is located approximately one kilometre south of the Awaba village and 5.5 kilometres south-west of Toronto, adjacent to the Newstan-Eraring private haul road.

4.2 Approval pathway and permissibility

4.2.1 Applicability of Division 4.7 of Part 4 of the Environmental Planning and Assessment Act 1979

The EP&A Act and EP&A Regulation provide the legal basis for environmental planning and assessment in NSW. Part 4 of the EP&A Act prescribes the processes for development assessment. Division 4.7 relates specifically to the assessment of development deemed to be State Significant Development (SSD).

Under Section 4.36 of the EP&A Act, a class of development, such as mining, may be declared as SSD by a State Environmental Planning Policy.

Clause 8 of the State Environmental Planning Policy (State and Regional Development) 2011 (State and Regional Development SEPP) provides that the development is declared to be SSD for the purposes of the EP&A Act if:

- *The development on the land concerned is, by the operation of an environmental planning instrument, not permissible without Development Consent under Part 4 of the EP&A Act (first criterion); and*
- *The development is specified in Schedule 1 or 2 (second criterion).*

With respect to the first criterion, the project may be carried out only with development consent under Part 4 of the EP&A Act, pursuant to Clause 7 of the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP) (described below in 4.4.2).

With regard to the second criterion, development for the purpose of mining that is coal or mineral sands mining, or has a capital investment value of more than \$30 million, is specified in Schedule 1, Item 5 as being SSD.

The project is development for the purpose of coal mining and has a capital investment value of more than \$30 million. Therefore, the project is considered to be SSD.

The Minister for Planning is the consent authority for SSD, however the Minister for Planning may delegate their functions to determine SSD applications to either senior officers of the DP&E or the NSW Independent Planning Commission (IPC).

A development application for SSD must be accompanied by an EIS, prepared in accordance with the EP&A Regulation. Before preparing an EIS, the applicant must request Secretary's Environmental Assessment Requirements (SEARs), which are the terms of reference for the EIS. This document accompanies Centennial Newstan's request for SEARs.

4.2.2 Operation of Section 4.63(3) of the EP&A Act

The project proposes the ongoing use of some of the infrastructure and mining areas authorised by the existing development consents for Newstan Colliery (DA 73-11-98) and Awaba Colliery (PA 10_0038) and it is proposed that these development consents will be surrendered subject to consent being granted for the project.

Section 4.63(3) of the EP&A Act provides that:

If a development consent is to be surrendered as a condition of a new development consent and the development to be authorised by that new development consent includes the continuation of any of the development authorised by the consent to be surrendered:

- a) the consent authority is not required to re-assess the likely impact of the continued development to the extent that it could have been carried out but for the surrender of the consent, and*
- b) the consent authority is not required to re-determine whether to authorise that continued development under the new development consent (or the manner in which it is to be carried out), the works already authorised under the planning approvals proposed to be consolidated and surrendered as part of the Project, do not require re-assessment in the EIS.*

Accordingly, only works which are in addition to those currently approved under DA 73-11-98 for Newstan Colliery and PA 10_0038 for Awaba Colliery will be assessed in the EIS.

4.2.3 Permissibility of the project

The project is located within the Lake Macquarie LGA and is therefore subject to the provisions of the Lake Macquarie LEP.

Land zonings within the Project Application Area pursuant to the Lake Macquarie LEP are:

- B1 Neighbourhood Centre
- B2 Local Centre
- B4 Mixed Use
- E1 National Parks and Nature Reserves
- RE2 Private Recreation
- RU2 Rural Landscape
- RU3 Forestry
- RU4 Rural Small Holdings

- E2 Environmental Conservation
- E3 Environmental Management
- IN2 Light Industrial
- R2 Low Density Residential
- R3 Medium Density Residential
- RE1 Public Recreation
- RU6 Transition
- SP1 Special Activities
- SP2 Infrastructure
- SP3 Tourist
- W1 Natural Waterways.

Land zoning within the Project Application Area is shown on Figure 4-1.

Clause 8 of the Mining SEPP outlines its relationship to other environmental planning instruments:

8 Determination of permissibility under local environmental plans

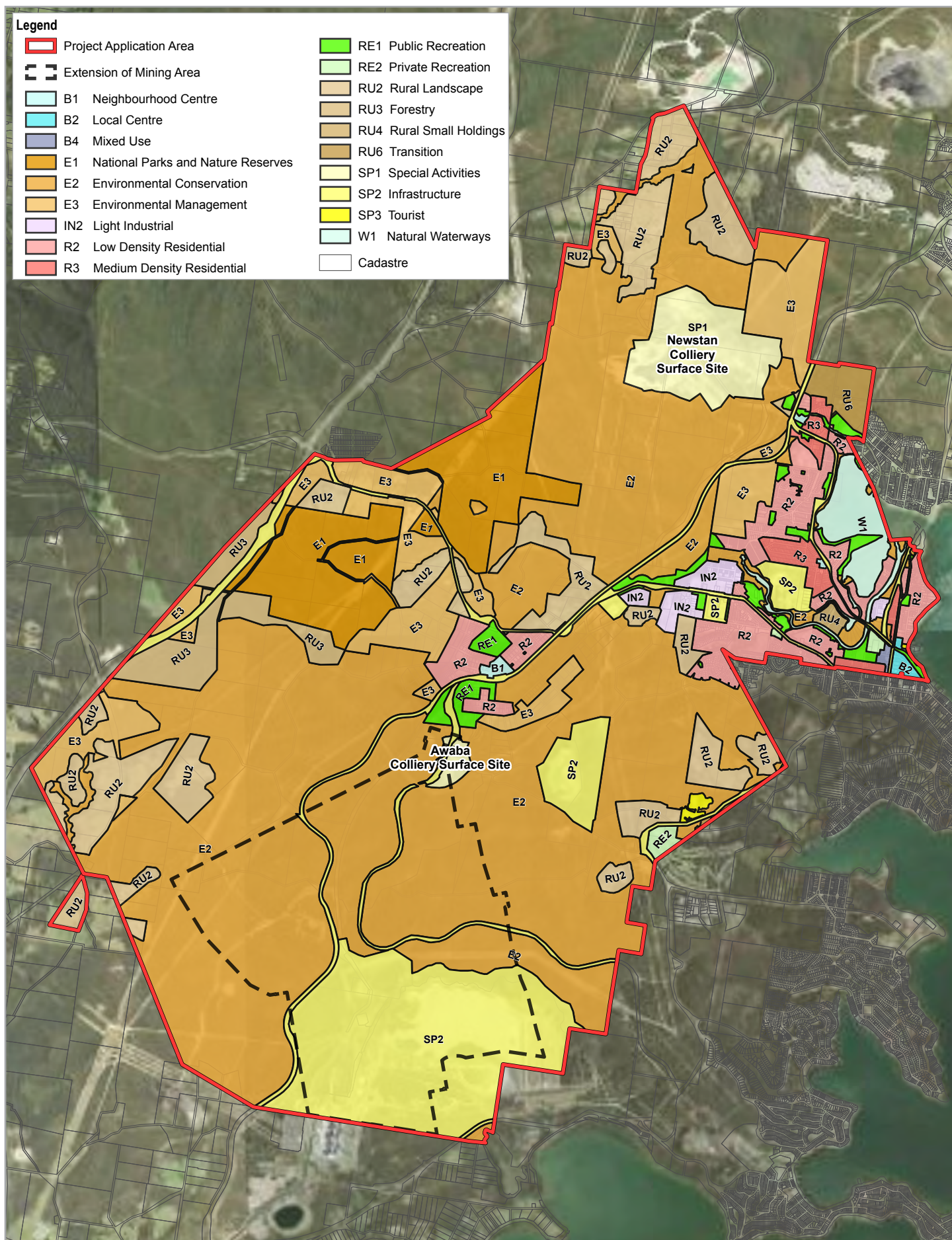
(1) If a local environmental plan provides that development for the purposes of mining, petroleum production or extractive industry may be carried out on land with development consent if provisions of the plan are satisfied:

(a) development for that purpose may be carried out on that land with development consent without those provisions having to be satisfied, and

(b) those provisions have no effect in determining whether or not development for that purpose may be carried out on that land or on the determination of a development application for consent to carry out development for that purpose on that land.

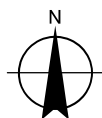
(2) Without limiting subclause (1), if a local environmental plan provides that development for the purposes of mining, petroleum production or extractive industry may be carried out on land with development consent if the consent authority is satisfied as to certain matters specified in the plan, development for that purpose may be carried out on that land with development consent without the consent authority having to be satisfied as to those specified matters.

On this basis, any provision in the Lake Macquarie LEP that would otherwise operate to prohibit the project has no effect due to Clause 8 of the Mining SEPP, and accordingly, the project is permissible with development consent on the land over which it would be carried out within the Lake Macquarie LGA.



Paper Size ISO A4
0 0.4 0.8 1.2 1.6
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



Centennial Coal
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Land Zoning within
Project Application Area

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Figure 4-1

4.3 Strategic policies

4.3.1 Integrated Mining Policy

The Integrated Mining Policy is a whole-of-government initiative that aims to:

- *Improve the regulation and assessment of major mining projects*
- *Strike a balance between the significant benefits mining can bring to the economy and the potential impacts on communities and the environment*
- *Help manage the environmental and social impacts of mining*
- *Ensure the community has access to relevant and timely information about mining projects.*

The Integrated Mining Policy includes a series of guidelines to assist proponents of mining projects to communicate key issues that are of interest to government and the community when lodging development applications. The Integrated Mining Policy documents that will be considered during development of the EIS for the project include:

- Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals (NSW Government, 2015a).
- Indicative Secretary's Environmental Assessment Requirements (NSW Government, 2015b).
- The Mine Application Guideline (NSW Government, 2015c).
- Water Regulation Overview (NSW Government, 2015d).

4.3.2 Strategic Regional Land Use Policy

The Strategic Regional Land Use Policy sets out a range of initiatives to better balance growth in the mining and coal seam gas industries with the need to protect important agricultural land and water resources. In accordance with the requirements of the Policy, all new SSD applications for mining and petroleum projects with the potential to affect agricultural resources or industries are required to prepare an Agricultural Impact Statement (AIS) as part of the EIS. This requirement applies regardless of whether or not the proposal is located on Strategic Agricultural Land (SAL).

The project's potential to affect agricultural resources will be assessed through the preparation of an AIS as part of the EIS.

A review of NSW Government's Strategic Agricultural Land Map indicates the project is not located on land mapped as SAL. Further, the land is not the subject of a site verification certificate issued under the Mining SEPP. As such, the gateway process does not apply to the project.

4.3.3 Aquifer Interference Policy

The Aquifer Interference Policy (AIP):

- *clarifies the requirements for obtaining water licenses for aquifer interference activities under NSW water legislation; and*
- *establishes and objectively defines considerations in assessing and providing advice on whether more than minimal impacts might occur to a key water-dependent asset.*

The AIP sets the requirements for assessing potential impacts to surface and groundwater resources as a result of aquifer interference activities. The project's potential impacts on surface and groundwater water resources will be assessed in accordance with the requirements of the AIP as part of the EIS.

4.4 State environmental planning policies

State environmental planning policies relevant to the project are described in the following subsections.

4.4.1 State Environmental Planning Policy (State and Regional Development) 2011

The State and Regional Development SEPP identifies development that is SSD. Division 4.36 of the EP&A Act enables an EPI to declare a development to be SSD. The project is SSD pursuant to Schedule 1 of the State and Regional Development SEPP, as it is development for the purpose of (coal) mining.

4.4.2 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The Mining SEPP regulates the permissibility of mining and related development and specifies matters that must be considered in assessing mining developments requiring consent under Part 4 of the EP&A Act.

Sub-clause 7(1)(a) of the Mining SEPP states that development for the purpose of underground mining (which includes mine related development) may be carried out on any land with development consent.

Clauses 12 to 17 (inclusive) require consideration to be given to the compatibility of projects with other surrounding land uses, including the existing and potential extraction of minerals, natural resource management and environmental management, resource recovery, transportation and rehabilitation.

The project is consistent with the aims and objectives of the SEPP. The information presented in the EIS will need to address each of the relevant matters for consideration prescribed in Clauses 12 to 17 of the SEPP.

4.4.3 State Environmental Planning Policy No. 44 – Koala Habitat Protection

SEPP No. 44 – Koala Habitat Protection (SEPP 44) provides for the protection of koala habitat by ensuring that areas subject to development proposals are considered for their value as habitat or potential habitat for koalas. The Lake Macquarie LGA is listed under Schedule 1 of SEPP 44 as an area to which the SEPP applies.

The project's potential to impact areas of potential koala habitat will be assessed as part of the EIS.

4.4.4 SEPP (Infrastructure) 2007

The SEPP (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across NSW. ISEPP includes provisions for development in rail corridors, electricity easements and within or adjacent to road corridors and road reservations, which will be relevant for the project and addressed in the EIS.

Centennial Newstan will consult with NSW Roads and Maritime Service, Transport for NSW, TransGrid and Origin Energy during the EIS process with respect to project activities that have the potential to impact on their infrastructure.

4.4.5 SEPP No. 33 – Hazardous and Offensive Development

SEPP No. 33 - Hazardous and Offensive Development (SEPP 33) regulates, amongst other matters, the determination of development applications to carry out what is defined in SEPP 33 as development for the purposes of a "potentially hazardous industry" or "potentially offensive industry". The project will be assessed to determine if it is classified as "potentially hazardous" or "potentially offensive" development, with consideration of DP&E's guidelines Applying SEPP 33 (Department of Planning (DoP) 2011). If required, an assessment of hazards will be included in the EIS.

4.4.6 SEPP (Coastal Management) 2018

SEPP (Coastal Management) 2018 (Coastal Management SEPP) updates and consolidates into one integrated policy SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5 of the Standard Instrument – Principal Local Environmental Plan. These policies are now repealed. The Coastal Management SEPP gives effect to the objectives of the *Coastal Management Act 2016* from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone.

There are coastal environment areas mapped under the Coastal Management SEPP that are within the Project Application Area. The EIS will assess the project's impact on the coastal environment area in accordance with the requirements of the Coastal Management SEPP.

4.5 Other relevant legislation

4.5.1 Commonwealth legislation

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is administered by the DotEE and provides a legal framework to protect and manage nationally important flora, fauna, ecological communities and heritage places defined as 'matters of national environmental significance' (MNES). An action that "has, will have or is likely to have a significant impact on a matter of National Environmental Significance" may not be undertaken without prior approval from the Commonwealth Minister, as provided under Part 9 of the EPBC Act. Approval under the EPBC Act is also required where actions are proposed on, or will affect, Commonwealth land and its environment.

As assessment of whether the project will have a significant impact on these MNES will be undertaken as part of the environmental assessment process. A referral to DotEE will be made to determine if the project is a controlled action under the EPBC Act.

Native Title Act 1993

The *Native Title Act 1993* (NT Act) recognises that Aboriginal people have rights and interests to land and waters which derive from their traditional laws and customs. Native title may be recognised in places where Indigenous people continue to follow their traditional laws and customs and have maintained a link with their traditional country. It can be negotiated through a Native Title Claim, an Indigenous Land Use Agreement (ILUA) or future Act agreements.

An ILUA is an agreement between a native title group and other parties who use or manage the land and waters. The ILUA process allows for negotiation between indigenous groups and other parties over the use and management of land and water resources, and the ability to establish a formal agreement. An ILUA is binding once it has been registered on the Native Title Tribunal's Register of Indigenous Land Use Agreements.

Much of the land within the Project Application Area is subject to an ILUA that was entered into on 28 May 1999 by the Wonnarua people (Wonnarua Nation Aboriginal Corporation) and Powercoal Pty Ltd (since acquired by Centennial Coal). As such, Centennial Coal is bound by the terms of the ILUA, which are set out in the Master Deed, in the use and management of the subject land. Clause 7 of the Master Deed outlines Centennial Coal's obligations, including provisions for compliance with an Aboriginal Heritage Protection Protocol (Clause 7.2 and Schedule 5). The Deed is subject to a confidentiality clause and, as such, detailed commentary regarding the ILUA is not provided in this Scoping report.

There may be some parcels of Crown land within the Project Application Area to south of the existing Newstan Colliery Holding boundary that are not included in the ILUA. The status of native title within these areas will be confirmed during the environmental assessment process. Centennial Newstan will comply with any requirements to negotiate agreements with any claimants as part of the mining lease application process.

4.5.2 NSW legislation

Mining Act 1992

The *Mining Act 1992* (Mining Act) makes provision for the granting of mining authorities, leases and licences. It also sets requirements for methods of exploration and mining, management of mining waste, land rehabilitation, and environmental management activities. The project will not require a new or extended mining lease. All project activities are proposed within the Colliery Holding Boundary for the existing Newstan Colliery.

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is the principal environmental protection legislation in NSW. Schedule 1 of the POEO Act identifies activities that require an environment protection licence (EPL). An EPL sets the management standards and monitoring requirements to control pollution for the relevant 'scheduled activity'. Schedule 1 lists 'mining for coal' and 'coal' works' as scheduled activities. These activities are currently licenced at Newstan Colliery under the provisions of EPL 395.

As EPL 395 permits coal works (between 2 to 5 million tonnes handled per annum) and mining for coal (between 2 to 3.5 million tonnes produced per annum), no variation to EPL 365 is required for the project.

Water Management Act 2000

The *Water Management Act 2000* (WM Act) is intended to ensure that water resources are conserved and properly managed for sustainable use benefitting both present and future generations. Water sharing plans prepared in accordance with the WM Act include rules for protecting the environment and administering water licencing and trading. The Project Application Area is covered by the following two water sharing plans:

- The North Coast Fractured and Porous Rock Groundwater Sources Water Sharing Plan, which commenced in July 2016 and regulates the interception and extraction of groundwater from the fractured and porous rock aquifer within the Plan boundary. Centennial Newstan is currently in consultation with Department of Industry – Lands and Water (DoI – Lands & Water) regarding the licensing of groundwater take from this source. Water licence applications were submitted by Centennial Newstan in 2015 and are awaiting determination. Follow-up consultation occurred in 2016, 2017 and 2018.
- The Hunter Unregulated and Alluvial Water Sources WSP, which commenced in August 2009 and covers unregulated rivers and creeks and alluvial groundwater within the Hunter region.

Water management will be an important aspect of the environmental impact assessment process for the project. The principal regulatory authority concerned will be the Natural Resources Access Regulator.

Section 4.41 of the EP&A Act removes the need for a number of approvals under the WM Act when development consent has been granted for a SSD. These are a water use approval under section 89, a water management work approval under section 90 and an activity approval (other than an aquifer interference approval) under section 91.

The project will require water access licences and aquifer interference approvals under the WM Act. Pursuant to Section 4.41 of the EP&A Act these licences and approvals cannot be refused if development consent is granted for a SSD and their terms must be substantially consistent with the terms of the development consent. Details of the relevant water sharing plan and licences and approvals required under the WM Act will be provided in the EIS.

Water Act 1912

The *Water Act 1912* (Water Act) governs access, trading and allocation of licences associated with surface water and groundwater sources where a water sharing plan is not in place. The Project Application Area is covered by two water sharing plans, as such the Water Act does not apply to the project.

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) contains provisions for the protection and management of nature and places, objects and features of significance to Aboriginal people.

A person must not harm or desecrate an Aboriginal object or place without an Aboriginal heritage impact permit under section 90 of the NPW Act. Section 4.41 of the EP&A Act removes the need for a section 90 permit when development consent has been granted for a SSD. Nonetheless, an assessment of the project's potential to impact Aboriginal heritage will be completed as part of the EIS.

Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future. The BC Act lists threatened species, populations and ecological communities as well as critical habitat and key threatening processes that must be considered when assessing the effects of an activity.

An assessment of the project's impacts on biodiversity, including any offsetting requirements, will be completed as part of the EIS in accordance with the requirements of the BC Act.

Roads Act 1993

The *Roads Act 1993* (Roads Act) regulates activities that may impact on public roads in NSW. Consent is required from the relevant roads authority under section 138 of the Roads Act for any work in, on or over a public road.

Section 4.42 of the EP&A Act stipulates that a consent under section 138 cannot be refused for SSD and must have terms that are substantially consistent with the development consent for the SSD. Nevertheless, a referral to the NSW Roads and Maritime Services (RMS) will be required as the project is classified a 'traffic-generating development' pursuant to ISEPP.

Coal Mine Subsidence Compensation Act 2017

The *Coal Mine Subsidence Compensation Act 2017* (CMSC Act) provides a scheme for the provision of compensation for damage caused by subsidence from coal mines, and the assessment and management of risks associated with subsidence from coal mines.

The project is located within the West Lake Mine Subsidence District declared under section 20 of the CMSC Act, and the regulations made under the CMSC Act.

At all times while the project is an active mine, Centennial Newstan (or the relevant proprietor) will be liable to pay compensation in relation to damage caused by subsidence arising from the project on improvements or goods under Part 2 of the CMSC Act. Any claims for compensation by another party under the CMSC Act would be lodged with Subsidence Advisory NSW.

Crown Lands Act 1989

The *Crown Lands Act 1989* (CL Act) sets out how Crown land is to be managed in NSW. Applications to use Crown land generally need to be authorised by a lease, licence or permit. Approval of the NSW Department of Industry – Lands and Water will be required under the CL Act for any works or mining on Crown land. This also applies to Crown roads in the Project Application Area.

Heritage Act 1977

Historical archaeological relics, buildings, structures, archaeological deposits and features are protected in NSW under the *Heritage Act 1977* (Heritage Act). Section 4.41 of the EP&A Act removes the need for approvals under Part 4 or an excavation permit under section 139 of the Heritage Act when development consent has been granted for a SSD. Nonetheless, an assessment of the project's potential to impact historic heritage will be completed as part of the EIS.

Dam Safety Act 1978

The role of the Dams Safety Committee is to approve and maintain records of 'prescribed dams' in NSW. Prescribed dams are defined in Schedule 1 of the Dams Safety Act 1978 (Dams Safety Act).

The project will involve underground mining in the vicinity of the Eraring Ash Dam, which is a prescribed dam under the Dam Safety Act.

The Dams Safety Committee has been consulted during development of the preliminary mine design. This consultation, with regard to the effects of underground mining on Eraring Ash Dam, will be continued as part of the EIS.

Work Health and Safety Act 2011 and Work Health and Safety (Mines) Act 2013

The *Work Health and Safety Act 2011* establishes a consistent approach to ensuring the health and safety of workers in NSW. The *Work Health and Safety (Mines) Act 2013* supplements the provisions of the *Work Health and Safety Act 2011* by providing additional health and safety requirements specifically for mining operations.

Centennial Newstan currently holds all necessary approvals required under these Acts. Centennial Newstan will continue to implement the necessary policies, training and procedures during planning, construction and operation of the project in accordance with the requirements of this legislation.

Forestry Act 1916

The *Forestry Act 1916* (Forestry Act) provides the statutory framework for the dedication, reservation, control and use of State forests. Under section 31 of the Forestry Act, an occupation permit is required for any component of the project within a State forest. Parts of the Project Application Area fall within Awaba State Forest. An occupation permit will therefore be required for the project.

Aboriginal Land Rights Act 1983

The Aboriginal Land Rights Act 1983 provides for the establishment of local, regional and State Aboriginal Land Councils and a mechanism for Aboriginal Land Councils to claim Crown land.

The status of any land claims made of Crown land within the Project Application Area will be investigated and considered as part of the EIS.

5. Matters and impacts

5.1 Overview

The identification of issues to be addressed in the EIS has been undertaken through a risk based and consultative approach. Key potential issues are those environmental aspects that will require project-specific assessments to assess the potential impacts and develop measures to avoid, mitigate and/or offset those impacts, where necessary. The key assessment issues were identified with consideration of a range of factors including:

- The existing environmental context of the project and its surrounding locality (see Section 3.1 and Section 3.6).
- The proposed project activities (see Section 3.2).
- The regulatory framework applicable to the project (see Section 4).
- The outcomes of consultation undertaken with the community and other relevant stakeholders (see Section 6).
- The outcomes of preliminary environmental investigations completed to date for the project.
- The project team's experience from previous environmental approvals for underground coal mining projects in NSW.

Key issues and the proposed level and scope of assessments were documented using DP&E's draft Scoping Worksheet, a copy of which is provided in Appendix B. In accordance with the draft Scoping Worksheet, each issue has been categorised as either a 'Key' issue, 'Other' issue, or 'Scoping only' issue. Further details regarding the identified issues and the proposed level and scope of assessment are presented in the following sections.

5.2 Key issues and other issues for inclusion in the EIS

Described below are the relevant matters and impacts proposed for detailed consideration in the EIS. This includes those that are of particular concern to the community and other stakeholders. For each relevant matter, further details of the baseline conditions, proposed assessment methodology and proposed impact mitigation measures are provided. Recognised specialists will be commissioned to conduct the studies outlined below, and independent peer reviews will be completed for select key studies in consideration of the draft Peer Review guideline (NSW Government, 2017a) (or its latest version).

5.2.1 Subsidence

Existing environment

The seam floor of the West Borehole seam is the Waratah Sandstone. The immediate seam roof is the Nobbys Tuff (generally less than 2 m thick), which is overlaid by the Adamstown Formation comprising many conglomerate and sandstone bands interbedded with shale, siltstone, tuffaceous claystone bands and high ash coal seams.

The West Borehole seam dips from the north-west towards the south-east with an average grade of approximately 3 %. The depth of cover varies between 140 m in the north-western corner and 325 m on the eastern side of the Extension of Mining Area. The existing Awaba workings in the Great Northern Seam are located above the northern and central parts of the Extension of Mining Area. The interburden thickness between the existing and proposed workings varies between 100 m and 210 m. The maximum mining height in the West Borehole seam is 3.6 m. The mining height in the Great Northern seam is expected to range between approximately 2.2 m and 3.6 m.

Natural and built features above the Extension of Mining Area include:

- Stony Creek, Kilaben Creek, Stockyard Creek, Crooked Creek, and a tributary of Lords Creek. These creeks are second and third order ephemeral streams with shallow incisions in the natural surface soils.
- Aboriginal heritage sites, comprising isolated finds, artefact scatters and scarred trees.
- Terrestrial and aquatic habitats and ecological communities.
- Steep slopes with natural gradients typically up to 1 in 2.
- The Main Northern Railway.
- A railway loop line.
- The Eraring Power Station.
- The Eraring Ash Dam.
- An overland conveyor.
- 132 kV transmission line and substation.

There are no dwellings above the Extension of Mining Area.

Potential impacts

Subsidence occurs when the rock strata immediately above the target seam is allowed to collapse into the void that is left after the coal is extracted. The overlying strata, or overburden, then sags down onto the collapsed material, resulting in a subsidence trough developing at the surface. Further fracturing and bedding shear failures may also develop in the overburden above the caved zone, with the extent and severity dependent upon the mine geometry and geology.

The extent of subsidence is dependent on the extraction height, panel layout, depth of cover, overburden strata strength and stiffness, and bulking characteristics of the collapsed strata in the caving and fractured zones.

Additional subsidence impacts may occur where multi-seam mining conditions exist. Within the Extension of Mining Area, the proposed extraction of the panels directly beneath or adjacent to the existing Awaba workings may result in the reactivation of these existing workings. Additional subsidence above and outside of the mined panels can develop due to the presence of these existing workings.

Broadly, subsidence-induced effects from first workings, partial and total extraction using bord and pillar mining, such as that proposed for the project, can include:

- Surface cracking.
- Sub-surface cracking.
- Surface gradient changes.
- Rock falls.
- Land slides.
- Sink holes.
- Terrain adjustments due to erosion and deposition of soils after subsidence.
- Valley uplift and closure.
- Far-field horizontal displacements and strains.

The above subsidence effects can lead to a range of impacts to the built and natural environment, all of which will be assessed in detail during the EIS.

Preliminary subsidence predictions

To understand the risks associated with the proposed mining activities, Centennial Newstan commissioned a preliminary subsidence impact assessment for the proposed workings within the Extension of Mining Area (MSEC, 2018; 2019). The preliminary assessment predicted the potential subsidence due to the extraction of the proposed workings within the West Borehole seam and the additional subsidence due to the reactivation of the existing Awaba workings in the Great Northern seam. The existing Awaba workings are comprised of total extraction areas and areas where the Teralba Conglomerate has been spanned.

For the purposes of the preliminary subsidence predictions it was conservatively assumed that the total extraction areas and conglomerate spanning areas in the Awaba workings are currently standing. That is, full reactivation of these existing workings would occur due to the total or partial extraction of the proposed workings beneath them. No reactivation of these existing workings was assumed where first workings only are proposed within the West Borehole seam beneath the existing workings.

The conditions of the existing workings will be reviewed in future studies based on the available ground monitoring data, Light Detection and Ranging (LIDAR) data and visual inspections of the surface. The subsidence model will then be refined where it is identified that workings within the overlying Great Northern seam have already failed. In these cases, the predicted subsidence will be reduced.

The maximum predicted total vertical subsidence for multi-seam conditions (i.e. above the existing Awaba workings) is 3.2 m. The maximum subsidence occurs above the Teralba Conglomerate spanning areas. The maximum predicted additional vertical subsidence due to the reactivation of these existing workings varies between 1.6 m and 2.0 m.

The maximum predicted vertical subsidence for single-seam mining conditions (i.e. south of the existing Awaba workings) is 1 m, which represents approximately 28 % of the maximum mining height of 3.6 m. The predicted vertical subsidence above areas of first workings only within the proposed workings is less than 20 mm for both single and multi-seam conditions.

A summary of the preliminary subsidence impact predictions that have been made for public and private (non-Centennial Coal owned) infrastructure within the Extension of Mining Area is presented in Table 5-1. These predictions will be further refined during the detailed subsidence impact modelling to be completed for the EIS.

Table 5-1 Preliminary subsidence impact predictions for infrastructure within Extension of Mining Area

Asset	Summary of predicted subsidence impacts
Eraring Power Station	<p>The infrastructure associated with the Power Station is predicted to experience less than 20 mm vertical subsidence.</p> <p>The large building structures could experience far-field horizontal movements, in the order of 50 mm to 100 mm, and they could be sensitive to the associated differential horizontal movements.</p> <p>It is expected that the structural steel frame of the power generation facility would be able to tolerate the small differential horizontal movements without adverse impacts.</p>

Asset	Summary of predicted subsidence impacts
	<p>The other infrastructure associated with the power station, including the tanks, ancillary structures and services, are unlikely to experience adverse impacts due to the low-level ground movements.</p>
Eraring Ash Dam	<p>The total extraction areas within the proposed workings have been conservatively set back from the Eraring Ash Dam wall based on a 35 degree angle of draw. However, first workings extend into the 35 degree angle of draw for the Dam wall. These first workings will not result in measurable subsidence at the surface and, therefore, are not anticipated to result in adverse impacts on the Dam wall.</p> <p>The maximum predicted vertical subsidence for the Eraring Ash Dam, due to the proposed workings, is 1000 mm (i.e. 1 m). The depth of cover beneath the Dam varies between 230 m and 300 m.</p> <p>Water inflow issues are not observed in the NSW coalfields at similar levels of vertical subsidence and depths of cover as for the proposed workings (MSEC, 2019). Notwithstanding, water inflow risks will require further consideration for the EIS.</p>
Main Northern Railway	<p>The Main Northern Railway is predicted to experience less than 20 mm vertical subsidence due to the extraction of the proposed workings. This low-level vertical subsidence is not anticipated to result in adverse impacts on the track.</p> <p>There is a risk of pillar run in the existing workings adjacent to the Main Northern Railway. This risk is considered manageable through engineering controls, monitoring and the implementation of a Trigger Action Response Plan (TARP).</p> <p>A 26.5 degree angle of draw (which is much greater than a 35 degree angle of draw typically required by mining lease conditions) and 165 m offset from the Main Northern Railway for all proposed partial and total extraction has been adopted to provide a suitable buffer distance to mitigate subsidence impacts.</p>
Railway loop line	<p>The railway loop line is predicted to experience up to 1 m of vertical subsidence. The loop line has been designed for mine subsidence of approximately 1 m. However, the track may be sensitive to differential horizontal movements (i.e. strains) rather than absolute vertical movements.</p> <p>Further investigations regarding the sensitivity of the railway loop line to subsidence impacts and any required mitigation measures will be undertaken prior to extraction and documented in the EIS</p>
Overland conveyor	<p>The overland conveyor is predicted to experience up to 1 m vertical subsidence.</p> <p>Further investigations are required to understand the potential for subsidence to adversely impact this structure and to identify suitable mitigation measures, if required.</p>
132 kV transmission line and substation	<p>The 132 kV transmission line is predicted to experience up to 1.3 m vertical subsidence.</p> <p>It is expected that impacts to the transmission line can be managed with the implementation of the appropriate preventative measures, such as cable rollers, guy wires or additional poles. Cable catenaries may also require adjustment during active subsidence.</p>

Asset	Summary of predicted subsidence impacts
	The substation is located directly above the partial extraction area within the proposed workings and above first workings in the Great Northern seam. The substation is predicted to experience up to 1 m vertical subsidence.

Potential for sink holes

The depths of cover above some parts of the existing Awaba workings are less than 30 m and, hence, there is potential for sinkholes to develop in these areas under existing conditions. The proposed workings in the West Borehole seam are not expected to increase the potential for sinkholes compared with existing conditions.

Proposed assessment approach

A detailed subsidence assessment will be undertaken for inclusion in the EIS. The subsidence assessment will include:

- Identification of mine characteristics (depth of cover, geology, mining method, mining height, mine layout and percentage extraction) and how these characteristics influence subsidence levels.
- Identification of known geotechnical constraints to existing and/or proposed mine design.
- A review of previous subsidence predictions from Newstan Colliery against actual subsidence results.
- Identification of conventional and non-conventional subsidence effects and impacts likely to be experienced at the site.
- Identification of an appropriately scaled subsidence prediction methodology for the site that is clearly described and, where available, supported by actual subsidence data.
- Assessment of the conservativeness applied to the prediction methodology used.
- Identification of the maximum likely predicted vertical subsidence, tilts and strains.
- Identification of a range of suitable subsidence mitigation and management measures, as required.

The outcome of the specialist subsidence assessment will be used to inform the other specialist studies to determine the consequences of subsidence on sensitive features. Additionally, the subsidence assessment will allow the development of the subsidence monitoring framework within the Extension of Mining Area.

Proposed actions to mitigate impacts

Centennial Newstan will continue to employ the management strategies and mitigation measures that are currently in place at Newstan Colliery to manage subsidence and mitigate associated impacts, including monitoring of surface features and infrastructure above active mining areas. Subsidence management will continue to be underpinned by a mine design that is developed by geotechnical specialists in accordance with applicable standards and legal requirements and in consultation with relevant government agencies and infrastructure owners. Ongoing monitoring will provide the mechanism to confirm predictions and identify impacts.

Should the project be approved, Centennial Newstan will prepare an Extraction Plan to manage subsidence associated with the proposed mining in the Extension of Mining Area in consultation with the relevant government agencies. This will include a Public Safety Management Plan, along with a series of other subsidence management plans for each key stakeholder that will be developed with the following key elements:

- Subsidence prediction data specific to the particular item of infrastructure or feature.
- Risk assessment – damage impacts, likelihood and consequences.
- Subsidence monitoring to assess performance against predictions and action triggers.
- TARPs and remediation strategies for each element of interest.

5.2.2 Groundwater

Existing environment

Newstan Colliery water management system

The main groundwater management features within the Project Application Area are the Fassifern Underground storage and West Borehole seam workings. The Fassifern Underground Storage is the void formed by previous mining activity in the Fassifern and Great Northern seams at Newstan Colliery.

The West Borehole seam workings receive groundwater inflows and can be supplied with water for underground operations from Newstan Colliery Surface Site. Water is collected in sumps and pumped to the Fassifern Underground Storage.

The Fassifern Underground Storage receives inflows as a result of infiltration from the surface catchment, groundwater inflows and transfers from Newstan Colliery Surface Site. Water levels in the storage are managed by transferring water to Newstan Colliery Surface Site. During wet periods when water within the Fassifern Underground Storage rises above 16.6 m below ground level (6.4 m AHD), the storage discharges water by gravity through two 600 mm diameter pipes into Stony Creek via Newstan Licensed Discharge Point (LDP) 017.

A water management and monitoring station was commissioned at Newstan LDP 017 in 2013 to allow for emergency discharges in a controlled manner in order to ensure the safety of personnel in the underground workings at Newstan Colliery.

Awaba Colliery water management system

Dewatering of the Awaba underground workings ceased in 2012 with the cessation of mining. The existing mine workings at Awaba Colliery form an underground void in the Great Northern seam. When mining activities were concluded and dewatering ceased, water levels in the underground void began to return to natural pre-mining levels due to a combination of inflows of surrounding groundwater, infiltration from the surface, and the pumping of runoff water collected at the Awaba Colliery Surface Site. As water levels equilibrated with the surrounding groundwater, infiltration from the surface became the dominant inflow and water from the void began to seep out through a series of natural faults at the south end of the void. This area is known as the Awaba Seepage.

The Awaba Seepage discharges to the surface water environment via an unnamed creek that flows into Muddy Lake and then Lake Macquarie. Centennial Coal monitors water quality in the unnamed creek as part of ongoing surface water management activities at Awaba Colliery.

Water levels in the underground void in the vicinity of Eraring Ash Dam are also managed as required by infrequently pumping water to the Eraring Ash Dam.

Groundwater levels

Groundwater flow in the region is generally to the south-east towards Lake Macquarie.

Alluvial monitoring is undertaken within Lords Creek, Kilaben Creek, Stockyard Creek and Stony Creek alluvium. Alluvial groundwater levels fluctuate with rainfall and have not been impacted by previous mining at Newstan Colliery.

A groundwater monitoring network has been progressively established at Newstan Colliery since 2005 and consists of monitoring bores installed in alluvium, overburden rock and coal seam strata to monitor potential impacts of mining on groundwater sources and/or provide baseline data for the assessment of impacts from future workings. The bores are generally monitored monthly or quarterly for groundwater levels and groundwater quality, although some alluvial bores also contain water level loggers. Coal seam monitoring previously consisted of vibrating wire piezometers (VWPs) which ceased to operate in October 2009. The piezometric head data collected prior to this time indicates that the head of groundwater in the West Borehole seam is in the order of 0 – 20 m AHD.

Groundwater inflows

Based on Centennial Newstan's water transfer data, average groundwater inflow into the existing Newstan workings within the West Borehole seam was calculated to be approximately 1.4 ML/day during 2013, reducing over time to approximately 0.7 ML/day in 2018. This is based on the assumption that the workings are fully dewatered.

Centennial Newstan's groundwater model predicts existing groundwater inflows into the Newstan workings to be approximately 1.1 ML/day.

Groundwater quality

Alluvial groundwater quality monitoring indicates that historical mining activities have not impacted groundwater quality. Based on available monitoring data, no change or lowering of the beneficial use category is evident over the period 2006 to 2009 when longwall panels were being developed in the vicinity of these bores. It is considered that in most cases the variability in pH and EC is the result of rainfall and natural conditions.

Potential impacts

The project has the potential to cause hydraulic connective fracturing which may result in:

- Groundwater depressurisation and reduction of standing water levels and alteration of groundwater flow paths above the proposed workings.
- Ingress of leachate from the Earing Ash Dam into aquifers above and within the proposed workings.
- Impacts to local groundwater users including agricultural activities.
- Impacts to groundwater dependent ecosystems (GDEs).

Hydraulic connection between the coal seam, overlying aquifers and water contained in the overlying Awaba workings has the potential to occur due to subsidence induced fracturing.

Proposed assessment approach

A groundwater impact assessment will be undertaken as part of the EIS and will include:

- A review of any available hydrogeological and mining data. All existing geological, hydrological, and monitoring data for the current and past Newstan and Awaba Colliery workings will be compiled to provide a baseline assessment for the study area. Input from subsidence engineers regarding the historic, current and potential post subsidence integrity and hydraulic conductivity features of the overburden will also be obtained.

- Searches of DoI – Lands & Water records to identify beneficial use of groundwater in the anticipated radius of drawdown.
- Consideration of the biodiversity assessment report (to be prepared concurrently with the groundwater assessment) to identify possible impacts to GDEs.
- Assessing the potential for any intrusions or structures that could provide conduits for groundwater flow to the workings.
- Development of a conceptual groundwater model to understand the current and potential post-subsidence geomechanical and hydrogeological nature and integrity of the overburden. This will include assessing the potential for any connectivity between the Eraring Ash Dam, overlying aquifers, and the proposed workings.
- Refining the existing numerical groundwater model to predict the project's potential impacts, including consideration of:
 - groundwater flow direction and quality
 - rate and volume of groundwater inflows to the mine
 - groundwater drawdown, including the spatial extent and magnitude
 - baseflow to surface watercourses
 - ecosystems that potentially rely on groundwater
- Identification of potential groundwater impacts of the project, including impacts on beneficial users and GDEs. The potential effects of subsidence over the workings on the local hydrogeological regime and potential connection (or lack of) to overlying aquifers will be described using outputs from the numerical groundwater model. The potential impacts of the project on the groundwater environment will be assessed in accordance with the requirements of the NSW Aquifer Interference Policy (AIP).
- Development of groundwater management strategies and mitigation measures as required.

Proposed actions to mitigate impacts

Centennial Newstan proposes the following measures to mitigate groundwater impacts during construction, operation and decommissioning of the project:

- Development and implementation of Extraction Plans to mitigate, monitor, remediate, manage and offset potential impacts on water resources.
- Ongoing groundwater and surface water monitoring.
- Review of the Centennial Northern Region Water Management Plan and relevant sub-plans based on regular reviews of the site water balance.
- Implementation of subsidence control and remediation measures along drainage lines, as required.
- Licencing of groundwater take in accordance with the requirements of the WM Act.
- Implementation of contingency measures in the event that groundwater users are adversely affected by the project.

5.2.3 Surface water

Existing environment

The proposed Extension of Mining Area is located within the catchment area of Lake Macquarie. A number of watercourses traverse the proposed Extension of Mining Area including:

- Stony Creek.
- Kilaben Creek.
- Stockyard Creek.
- Crooked Creek.
- Some unnamed creeks and tributaries.

LT Creek does not traverse the proposed Extension of Mining Area, however it does traverse the Newstan Colliery Surface Site, flowing in an easterly direction.

Downstream water users

Six residential properties are located adjacent to the downstream freshwater reach of LT Creek. The search of the NSW Water Register completed in April 2019 indicated that there were no water access licences (WALs) for surface water use downstream of the proposed Extension of Mining Area.

Potential impacts

Potential impacts associated with the project include:

- Changes to groundwater conditions or surface and groundwater connectivity which affect stream base flows.
- Catchment and drainage modifications from construction of surface infrastructure. However, this would be mitigated through all surface infrastructure for the project being located within pre-existing disturbed areas at the Awaba Colliery Surface Site and generally managed in accordance with the existing water management system.
- Changes to in-stream conditions.
- Impacts to water quality during construction or operation of surface infrastructure, such as from erosion and sediment entrainment in surface runoff.
- Impacts to receiving environments from any release of treated water to nearby watercourses (under licence) or supply to others for irrigation or other uses (if either of these options is adopted to manage water not re-used on-site).

Proposed assessment approach

A surface water assessment will be prepared as part of the EIS, which will investigate each of the above aspects. It will:

- Characterise existing flow paths and regimes; water quality, quantity and users; fluvial geomorphology; and flooding and catchment characteristics. The baseline survey and monitoring data will be important inputs.

- Update the existing site water balance model to simulate and assess the effectiveness of the revised site water management system. The model will incorporate anticipated mine inflows, surface runoff, water demands, rainfall, evaporation and catchment characteristics. The results will be used to predict the likely frequency and volume of water discharges, that is, when surface runoff and mine inflow volumes exceed demand and storage capacity.
- Assess the potential surface water impacts of the project's construction and operation including:
 - geomorphology impact assessment
 - water quality impact assessment
 - hydrologic modelling and assessment to determine potential impacts on stream flows
 - flood modelling and assessment to predict the project's impact on flooding behaviour and risk of inundation by flood waters.
- Describe the proposed water management and monitoring system in detail, including proposed mitigation measures, as required.

Proposed actions to mitigate impacts

Centennial Newstan proposes the following measures to mitigate surface water impacts during construction, operation and decommissioning of the project:

- Development and implementation of Extraction Plans to mitigate, monitor, remediate, manage and offset potential impacts on water resources.
- Ongoing surface water monitoring.
- Review of the Centennial Northern Region Water Management Plan and relevant sub-plans based on regular reviews of the site water balance.
- Implementation of subsidence control and remediation measures along drainage lines, as required.
- Licencing in accordance with the requirements of the WM Act and POEO Act.
- Implementation of contingency measures in the event that surface water users or the receiving environment is adversely affected by the project.

5.2.4 Terrestrial ecology

Existing environment

Threatened terrestrial fauna

A desktop assessment and literature review of threatened fauna species completed in April 2019 identified 39 threatened fauna species with moderate or greater likelihood of occurrence within 10 kilometres of the Extension of Mining Area. Of these, Centennial Newstan is aware of three species (*Miniopterus schreibersii oceanensis*, and *Ninox strenua*, *Petaurus norfolcensis*) which have been previously recorded within the Extension of Mining Area.

Table 5-2 Threatened species with potential to occur within the Extension of Mining Area

Scientific name	Common name	BC Act	EPBC Act
<i>Litoria brevipalmata</i>	Green-thighed Frog	V	-
<i>Crinia tinnula</i>	Wallum Froglet	V	-
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	E
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake	V	-
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	-
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	-
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V	-
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	-
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-
<i>Lathamus discolor</i>	Swift Parrot	E	CE
<i>Ninox connivens</i>	Barking Owl	V	-
<i>Ninox strenua</i>	Powerful Owl	V	-
<i>Tyto novaehollandiae</i>	Masked Owl	V	-
<i>Tyto tenebricosa</i>	Sooty Owl	V	-
<i>Mormopterus norfolkensis</i>	East Coast Freetail-bat	V	
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	-
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	V	E
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V	-
<i>Planigale maculata</i>	Common Planigale	V	-
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	-
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	-
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V
<i>Petaurus australis</i>	Yellow-bellied Glider	V	-
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	-
<i>Phascolarctos cinereus</i>	Koala	V	V
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	V	V

Scientific name	Common name	BC Act	EPBC Act
<i>Petauroides volans</i>	Greater Glider	-	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-
<i>Kerivoula papuensis</i>	Golden-tipped Bat	V	-
<i>Miniopterus australis</i>	Little Bentwing-bat	V	-
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	-
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-

Threatened flora

A desktop assessment and literature review completed in April 2019 identified 18 threatened flora species occurring or predicted to occur within 10 km of the Extension of Mining Area. Of these, the following 16 species were assessed as having the potential to occur within the Extension of Mining Area:

- Heath Wrinklewort (*Rutidosis heterogama*) (Vulnerable – BC Act and EPBC Act).
- Bynoe's Wattle (*Acacia bynoea*) (Endangered – BC Act, Vulnerable – EPBC Act).
- *Maundia triglochinos* (Vulnerable – BC Act).
- *Angophora inopina* (Vulnerable – BC Act and EPBC Act).
- Crimson Bottlebrush (*Callistemon linearifolius*) (Vulnerable – BC Act).
- *Eucalyptus camfieldii* (Vulnerable – BC Act and EPBC Act).
- Charmhaven Apple (*Angophora inopina*) (Vulnerable – BC Act and EPBC Act).
- Biconvex Paperbark (*Melaleuca biconvexa*) (Vulnerable – BC Act and EPBC Act).
- Magenta Lilly Pilly (*Syzygium paniculatum*) (Endangered – BC Act, Vulnerable – EPBC Act).
- Thick-lip Spider Orchid (*Caladenia tessellate*) (Endangered – BC Act, Vulnerable – EPBC Act).
- *Corybas dowlingii* (Endangered – BC Act).
- Leafless Tongue-orchid (*Cryptostylis hunteriana*) (Vulnerable – BC Act and EPBC Act).
- Variable Midge Orchid (*Genoplesium insignis*) (Endangered – BC Act).
- *Rhizanthella slateri* (Vulnerable – BC Act, Endangered – EPBC Act).
- Small-flowered Grevillea (*Grevillea parviflora* subsp. *Parviflora*) (Vulnerable – BC Act and EPBC Act).
- Black-eyed Susan (*Tetradlea juncea*) (Vulnerable – BC Act and EPBC Act).

Of the 16 species listed above, Centennial Newstan is aware of two species (*Grevillea parviflora* and *Tetradlea juncea*) which have been previously identified within the Extension of Mining Area.

Vegetation communities

Review of the Lake Macquarie City Council Plant Community Types (PCT) map on 11 April 2019 indicates there are nine (9) PCTs identified as potentially occurring within the Extension of Mining Area (refer to Figure 5-1), of which four (4) have been identified as having a Threatened Ecological Community (TEC) equivalent under the BC Act. The identified PCTs include:

- PCT 1636 - Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast.
- PCT 1619 - Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands.
- PCT 1588 - Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast.
- PCT 1627 - Smooth-barked Apple - Turpentine - Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast.
- PCT 1718 - Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast, TEC equivalent: Swamp Sclerophyll Forest on Coastal Floodplains listed as an EEC under the BC Act.
- PCT 1649 - Smooth-barked Apple - Red Mahogany - Swamp Mahogany - Melaleuca sieberi heathy swamp woodland of coastal lowlands, TEC equivalent: Swamp Sclerophyll Forest on Coastal Floodplains listed as an EEC under the BC Act.
- PCT 1716 – Prickly-leaved Paperbark forest on coastal lowlands of the Central Coast and Lower North Coast, TEC equivalent: Swamp Sclerophyll Forest on Coastal Floodplains listed as an EEC under the BC Act.
- PCT 1737 - Typha rushland, TEC equivalent: Freshwater Wetlands on Coastal Floodplains listed as an EEC under the BC Act.
- PCT 1638 - Smooth-barked Apple - Red Bloodwood - Scribbly Gum grass - shrub woodland on lowlands of the Central Coast.

Groundwater Dependent Ecosystems

Seven GDEs have been identified as potentially occurring within approximately 5 km of the Extension of Mining area (BOM, 2019). These include:

- Narrow-leaved Apple/Parramatta Red Gum/Persoonia oblongata heathy woodland of the Howes Valley area.
- Scribbly Gum/Red Bloodwood/Angophora inopina heathy woodland on lowlands of the central coast.
- Smooth-barked Apple/Red Bloodwood/Brown Stringybark/Hairpin Banksia heathy open forest of the Central Coast.
- Spotted gum/Broad-leaved Mahogany/Grey Gum grass/shrub open forest on Coastal Lowlands of the Central coast.
- Spotted Gum/Broad-leaved Mahogany/Red Ironbark shrubby open forest.

- Swamp Mahogany/Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast.
- Sydney Blue Gum/Lilly Pilly mesic tall open forest of coastal ranges and tablelands escarpment.

Lake Macquarie, Muddy Lake, and Whiteheads Lagoon are mapped as aquatic GDEs.

The primary source of groundwater in the region, owing to the underlying sandstone, is likely to be a sedimentary rock groundwater system. Terrestrial GDEs (i.e. facultatively dependent) may be present and, if so, most likely associated with creeks and waterways within the Extension of Mining Area.

Potential impacts

Potential impacts to terrestrial ecology from the project include:

- Clearing of vegetation during construction of new surface infrastructure and ancillary facilities.
- Loss of fauna habitat and habitat features directly impacted by vegetation clearing or subsidence related impacts (e.g. ponding, cracking).
- Impacts on threatened species and endangered populations.
- Habitat fragmentation and connectivity issues for flora and fauna.
- Indirect impacts to fauna such as from increased noise, light and dust.

Proposed assessment approach

The EIS will include a terrestrial ecology assessment completed in accordance with the Biodiversity Assessment Methodology (BAM) (OEH, 2018) and Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (DoE, 2013a).

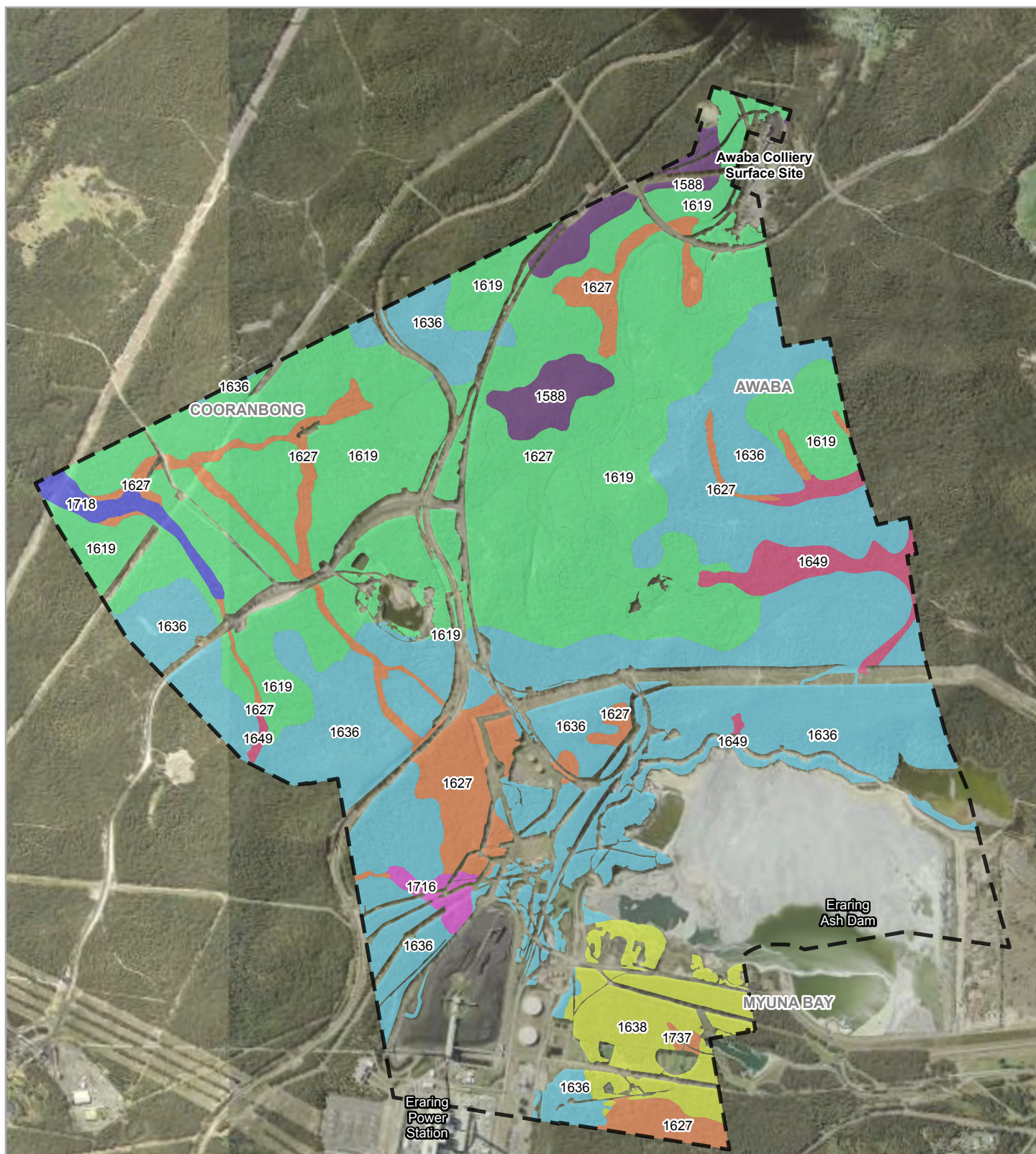
The assessment would build on the ecological survey work already completed at Newstan Colliery and would include:

- Augmentation of previous flora and fauna surveys in consideration of relevant survey guidelines.
- Assessment of potential impacts on State and Commonwealth listed terrestrial and aquatic species, populations, ecological communities or their habitats, with consideration of proposed surface disturbance and the predicted subsidence, groundwater, surface water, air and noise impacts of the project.
- Assessment of potential impacts to GDEs.
- Assessment of potential cumulative impacts resulting from the project and other vegetation and habitat disturbance in the region.
- Identification of measures that would be implemented to maintain or improve the biodiversity values of the surrounding region in the medium to long-term.
- A strategy to offset any residual impacts of the project in accordance with the Biodiversity Offsets Scheme under the BC Act.

Proposed actions to mitigate impacts

Centennial Newstan proposes the following measures to mitigate biodiversity impacts during construction, operation and decommissioning of the project:

- Avoidance and minimisation of vegetation clearing through the siting of surface infrastructure within previously disturbed areas.
- Consideration of environmental assessment outcomes during detailed mine planning (including minimisation of subsidence and direct vegetation disturbance, particularly disturbance of areas with higher ecological value).
- Surface disturbance protocols (including pre-clearance surveys).
- Weed and feral animal control measures.
- Review, update and implementation of Centennial Coal's Northern Operations Biodiversity Management Plan.
- Implementation of offset and compensatory measures in accordance with NSW and Commonwealth Government policies.



Legend

Extension of Mining Area

Plant Community Type

1588 - Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast

1619 - Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands

1627 - Smooth-barked Apple - Turpentine - Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast

1636 - Scribbly Gum - Red Bloodwood - Angophora inopina heathy woodland on lowlands of the Central Coast

1638 - Smooth-barked Apple - Red Bloodwood - Scribbly Gum grass - shrub woodland on lowlands of the Central Coast

1649 - Smooth-barked Apple - Red Mahogany - Swamp Mahogany - Melaleuca sieberi heathy swamp woodland of coastal lowlands

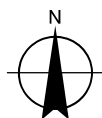
1716 - Prickly-leaved Paperbark forest on coastal lowlands of the Central Coast and Lower North Coast

1718 - Swamp Mahogany - Flaxleaved Paperbark swamp forest on coastal lowlands of the Central Coast

1737 - Typha rushland

Paper Size ISO A4
0 0.15 0.3 0.45 0.6 0.75
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



Centennial Coal
Newstan Mine Extension Project
Scoping Report

**Vegetation communities within
Extension of Mining Area**

Project No. **22-19878**
Revision No. **0**
Date **07/05/2019**

Figure 5-1

5.2.5 Aquatic ecology

Existing environment

Instream aquatic ecology monitoring of LT Creek and Stony Creek is undertaken biannually as part of the Newstan Colliery aquatic ecology monitoring program. The monitoring program assesses the stream health of LT Creek and Stony Creek through the sampling of aquatic macroinvertebrates at five freshwater sites and three estuarine sites.

Results from recent sampling events have shown some influence of Newstan Colliery's licensed discharges on the community composition, but no evidence of impacts to the sensitivity and diversity of freshwater macroinvertebrates in LT Creek. Freshwater sites on Stony Creek have been dry during most recent aquatic ecology monitoring events. Estuarine macroinvertebrate samples have shown no patterns to suggest impacts due to discharges from Newstan Colliery.

Potential impacts

Key areas for investigation include the effects of any changes to surface water or groundwater conditions, principally the potential for impacts to:

- Aquatic biodiversity, associated with any change to water quality, runoff, catchment characteristics or hydrology, proximity to infrastructure, or any habitat disturbance.
- Stygofauna, associated with any change to groundwater conditions, such as water levels, water pressure or connectivity with surface water.

Proposed assessment approach

Potential impacts to aquatic ecology will be assessed as part of the EIS, with consideration given to relevant guidelines, including:

- Aquatic Ecology in Environmental Impact Assessment (DoP, 2003).
- Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (NSW Department of Primary Industries, 2013).

The aquatic ecology assessment will be undertaken in conjunction with the groundwater and surface water assessments described in Sections 5.2.2 and 5.2.3. The assessment will include:

- Augmentation of previous aquatic ecology surveys in consideration of relevant survey guidelines.
- Assessment of potential impacts on State and Commonwealth listed aquatic species, or their habitats.
- Assessment of potential cumulative impacts resulting from the project and nearby projects.
- Identification of measures that would be implemented to maintain or improve the aquatic biodiversity values of the receiving environment in the medium to long-term.

Proposed actions to mitigate impacts

Centennial Newstan proposes the following measures to mitigate aquatic ecology impacts during construction, operation and decommissioning of the project:

- Avoidance and minimisation of vegetation clearing through the siting of surface infrastructure within previously disturbed areas.

- Review, update and implementation of Centennial Coal's Northern Operations Biodiversity Management Plan and Northern Operations Water Management Plan.
- Surface and groundwater monitoring in accordance with the Centennial Northern Region Water Management Plan and relevant sub-plans.
- Consideration of environmental assessment outcomes during detailed mine planning (including minimisation of vegetation disturbance, particularly disturbance of areas with higher ecological value).
- Surface disturbance protocols (including pre-clearance surveys).

5.2.6 Air quality and greenhouse gas

Existing environment

A range of anthropogenic and natural sources including coal-fired power generation, coal mining, vehicle emissions, and wind-blown dust influence the air quality in the region surrounding the Project Application Area. Specifically, the air quality is influenced by:

- Eraring and Vales Point power stations.
- Non-project related traffic-generated emissions.
- Agricultural activities, predominantly livestock grazing.
- Underground mining operations, including Newstan Colliery and Mandalong Mine.

Regional events such as bushfires and dust storms also periodically contribute to short-term elevated concentrations of suspended particulates.

Ambient air quality monitoring at the Newstan and Awaba Collieries has been undertaken for many years. This has included:

- Monitoring of dust deposition (insoluble solids) using deposited dust gauges.
- Monitoring of TSP (total suspended particulate - particulate matter less than 50 microns in diameter), PM10 (particulate matter with an aerodynamic diameter of 10 microns (μm) or less), and PM2.5 (particulate matter with an aerodynamic diameter of 2.5 μm or less) using High Volume Air Samplers (HVAS).
- Continuous PM10 monitoring using a tapered element oscillating microbalance (TEOM).

On-site meteorological monitoring stations are also operated at Newstan Colliery Surface Site and Awaba Colliery Surface Site to determine the prevailing regional and local weather conditions.

Long-term trends indicate that Newstan and Awaba Collieries have operated generally within the air quality performance criteria established under each operation's respective Development Consent and Environment Protection Licence (EPL).

Sensitive receivers surrounding the Project Application Area predominantly consist of residential and rural residential properties to the north and east. Relative to Newstan Colliery Surface Site these properties are located to the north-west in the suburb of Wakefield, and to the south-east in the suburbs of Fassifern, Blackalls Park and Fennell Bay. Relative to Awaba Colliery Surface Site the majority of residential properties are located to the north in Awaba, and to the east in Toronto, Kilaben Bay and Rathmines.

There are also a number of rural residential properties to the west located in the areas of Freemans Waterhole and Ryhope.

Potential impacts

Air quality

Potential dust-generating activities will principally be associated with constructing and operating surface facilities at the Awaba Colliery Surface Site and the operation of the mine ventilation shafts and ventilation fans at the Newstan Colliery Surface Site. These impacts include short-term impacts from ground disturbance and vehicle movements on unpaved surfaces during construction, and operational impacts from mine ventilation.

The emissions from the ventilation fans include particulates (TSP, PM10 and PM2.5) and odour.

There are likely to also be some minor emissions of combustion gases from the ventilation shaft due to combustion of diesel in underground equipment used to mine the coal. However, any emissions from the combustion of fuel in equipment on site would not be emitted in high enough concentrations to have potential to result in any adverse off-site air quality impacts.

Greenhouse gas

The potential greenhouse gas emission sources (Scope 1 to Scope 3) from the project include:

- Scope 1:
 - Diesel use in equipment used to mine ROM coal over the mine life.
 - Fugitive CH₄ and CO₂ emissions from the mine ventilation system.
 - Consumption of oils during the mine life.
- Scope 2 – Electricity consumption associated with the underground mine during the mine life.
- Scope 3 – Emissions associated with the production and transport of diesel and oil consumed at the site during the mine life.

Proposed assessment approach

Air quality impact assessment

An air quality impact assessment will be undertaken as part of the EIS to assess potential impacts on nearby sensitive receptors. The assessment will include:

- Identification of an appropriate meteorological data set to utilise for the project.
- Identification of sensitive receptors.
- Identification of all likely dust generating sources (depositional dust, PM10, PM2.5 and TSP).
- Establishment of background air quality levels and air quality goals for all relevant air quality emissions in accordance with relevant guidelines.
- Estimation of emission rates primarily using emission inventory data.
- Dispersion modelling to predict PM10, PM2.5, TSP and deposition rates at the closest sensitive receptors.
- Cumulative assessments, considering:
 - Existing (background) air quality in the local area, established from the monitoring data
 - Predicted incremental concentrations due to the project's emissions
 - Predicted impacts from other existing and proposed industrial developments in the local area.

- Recommendations on mitigation and management strategies.

The assessment will be prepared in accordance with the NSW EPA Approved Methods and in consideration of the SEARs and government agency comments.

Greenhouse gas assessment

A greenhouse gas (GHG) assessment for the project will be performed with reference to the Australian Department of Climate Change and Energy Efficiency's (DCCEEs) National Greenhouse Accounts Factors (DotEE, 2017), the *National Greenhouse and Energy Reporting Act 2007* (NGER Act) and the World Resources Institute/World Business Council for Sustainable Development (WRI/WBCSD) GHG Protocol Initiative (WRI, 2004). Consideration will also be given to the project's potential to impact Australia's ability to achieve its greenhouse gas emissions reduction commitments made under the Paris Agreement (UNFCCC, 2015).

The greenhouse gas emissions associated with the project will be assessed in terms of direct (Scope 1) emission potential, indirect (Scope 2) emission potential and significant upstream/downstream (Scope 3) emission potential.

Scope 1, 2 and 3 greenhouse gas estimations for the activities associated with the project will be made in accordance with the requirements of the NGER Act, and by applying all relevant emission factors and methods including those documented in the relevant NGERs guidelines.

The significance of greenhouse gas emissions for the project will be assessed in relation to national greenhouse gas objectives, and the impacts of those emissions in the context of Commonwealth and State government policies and protocols. Mitigation and management measures will be determined as required.

Proposed actions to mitigate impacts

Air quality

Centennial Newstan will continue to employ the mitigation measures and management strategies currently adopted at the Newstan Colliery, as relevant to the project, to minimise emissions of dust and particulate matter. These include:

- Implementing standard work procedures to minimise emissions of particulate matter.
- Maintaining plant and equipment to ensure optimal operating condition.
- Using water sprays to dampen exposed surfaces to minimise windblown and traffic-generate dust emissions.
- Ensuring diesel engines conform to the United States EPA Tier 3 standards for exhaust emissions.
- Implementing an underground dust suppression system (water sprays on coal cutting machinery and rubber conveyor belts).
- Ensuring all mobile machines are fitted with particulate filter assembly units. This is current best practice standards for the underground coal mining industry.

The fans at the Awaba Colliery Surface Site will be designed and installed to be directed away from the closest sensitive receptors to minimise potential air quality impacts.

Centennial Newstan's currently approved and implemented Air Quality Management Plan, will be reviewed and updated for the Newstan Mine Extension Project. The review will take into consideration the findings and conclusions of the air quality impact assessment, the commitments made in the EIS and all relevant consent conditions.

A CEMP will also be developed and implemented for the project. The CEMP will outline a range of air quality mitigation measures to be implemented during the construction phase of the project.

Greenhouse gas

As part of Centennial Coal's Sustainability Strategy, the company has set its "Vision 2020", the platform to tangibly deliver the Company Vision and Values. Vision 2020 incorporates a target for greenhouse gas, being to reduce company greenhouse gas emissions by 25 per cent by 2020. An action plan and roadmap is in place to deliver this goal.

Historically all gas emissions at Newstan Colliery have been free vented to atmosphere through boreholes to the surface, in line with accepted practice at the time. However, Centennial Newstan now propose to use in-seam gas drainage methods to manage gas within the Extension of Mining Area. Gas captured during the in-seam drainage system will be transferred to a gas flaring facility located at the Awaba Colliery Surface Site. This approach minimises greenhouse gas emissions from the project.

Greenhouse gas emissions will be further minimised through the proposed utilisation of existing surface facilities at Newstan Colliery Surface Site and Awaba Colliery Surface Site wherever possible. The utilisation of these facilities will serve to minimise additional greenhouse gas emissions associated with the construction and operation of additional mine infrastructure facilities.

Existing greenhouse gas mitigation and management measures implemented at Newstan Colliery such as the sealing up of old mine workings will also continue to be applied for the project.

5.2.7 Noise and vibration

Existing environment

The existing acoustic environment is generally characterised by traffic noise from local roads and rail lines, urban and industrial noise in some areas, such as near the existing Newstan Colliery Surface Site and Eraring Power Station, and rural and natural sounds such as birds, and wind in vegetation.

Attended noise monitoring is undertaken monthly at the Newstan Colliery in accordance with the Newstan Colliery Project Approval. The existing baseline data provides a good understanding of the acoustic environment within and surrounding the Project Application Area. Centennial Newstan will undertake additional background noise monitoring near proposed surface infrastructure areas which will further improve this understanding.

Noise sensitive receivers surrounding the Project Application Area predominantly consist of residential and rural residential properties to the north and east. Relative to Newstan Colliery Surface Site these properties are located to the north-west in the suburb of Wakefield, and to the south-east in the suburbs of Fassifern, Blackalls Park and Fennell Bay. Relative to Awaba Colliery Surface Site the majority of residential properties are located to the north in Awaba, and to the east in Toronto, Kilaben Bay and Rathmines.

There are also a number of rural residential properties to the west located in the areas of Freemans Waterhole and Ryhope.

Potential impacts

The project proposes the continuation of an underground mining operation within an established mining precinct, which limits the potential for noise impacts. It also proposes the ongoing use of existing surface infrastructure sites (i.e. Newstan Colliery Surface Site and Awaba Colliery Surface Site), which further limits any potential for increased noise impacts compared with current approved operations.

The operation of existing surface facilities at Newstan Colliery Surface Site is approved under SSD 5145 and does not form part of the project. Potential noise-generating activities to be assessed in the EIS will principally be associated with constructing and operating new surface facilities at the existing Awaba Colliery Surface Site. Other key areas for investigation will be the potential for vibration impacts during construction and noise from additional road traffic generated by the project.

Proposed assessment approach

A noise impact assessment will be undertaken as part of the EIS and will include:

- Installation of noise loggers, where required, at locations representing the nearest affected residential premises to determine existing background noise levels and contributors in accordance with applicable guidelines and policies.
- A construction noise and vibration assessment in accordance with the EPA's Interim Construction Noise Guideline (DECC, 2009).
- Noise measurements to determine sound power levels of all acoustically significant plant and equipment associated with the project.
- Analysis of noise data with reference to local weather conditions and cumulative impacts.
- Modelling and assessing operating noise and vibration, using EPA-endorsed modelling software, to predict future noise levels at surrounding sensitive receptors in accordance with the EPA's Noise Policy for Industry (2017). This will include assessing cumulative noise emissions from the project and surrounding industrial premises against relevant noise criteria.
- Impact assessment of the proposed project's contribution to the noise environment at the nearest sensitive receptors for day, evening and night time periods under calm and prevailing meteorological conditions.
- Identification of noise management strategies and mitigation measures, as required.

Proposed actions to mitigate impacts

Centennial Newstan will continue to employ the mitigation measures and management strategies currently adopted at the Newstan Colliery, as relevant to the project, to minimise noise emissions. These include:

- Implementing standard work procedures to minimise noise emissions.
- Maintaining plant and equipment to ensure optimal operating conditions.
- Assessing the sound power levels when purchasing new plant and equipment.
- Continuing to report noise monitoring results on a monthly basis on Centennial Coal's website and on an annual basis in the Annual Review.

The fans at the Awaba Colliery Surface Site will be designed and installed to be directed away from the closest sensitive receptors to minimise potential noise impacts.

Centennial Newstan's currently approved and implemented Noise Management Plan, will be reviewed and updated for the Newstan Mine Extension Project. The review will take into consideration the findings and conclusions of the noise impact assessment, the commitments made in the EIS and all relevant consent conditions.

A CEMP will also be developed and implemented for the project. The CEMP will outline a range of noise mitigation measures to be implemented during the construction phase of the project.

5.2.8 Traffic and transport

Existing environment

Awaba Colliery Surface Site is accessed via Wilton Road, Awaba. Newstan Colliery Surface Site is accessed via Miller Road, Fassifern. There are existing approved workforce and visitor parking facilities at both surface sites.

Potential impacts

Road traffic from the project will include cars and trucks for deliveries of equipment and consumables and employee, contractor, service provider and visitor movements to and from the Newstan Colliery Surface Site and Awaba Colliery Surface Site. Only marginal changes to the operational traffic volumes at these two sites are expected as a result of the project.

The majority of construction related traffic will be to and from Awaba Colliery Surface Site, whilst the majority of operational traffic will be to and from Newstan Colliery Surface Site.

Proposed assessment approach

A detailed road traffic impact assessment will be conducted, generally in accordance with the Roads and Traffic Authority (now RMS) (2002) Guide to Traffic Generating Developments. It will evaluate the potential for traffic generated by the project's construction and operation to impact on the performance (capacity, congestion and safety) of surrounding roads.

A summary of the assessment and any proposed mitigation and management measures will be presented in the EIS.

Proposed actions to mitigate impacts

No modifications to the existing road network are currently proposed. If required, any changes to the operation of the road network will be described in the EIS.

Existing operational management plans for the Newstan and Awaba Collieries will be reviewed and, if necessary, updated to account for any changes to traffic management requirements as a result of proposed project activities.

A CEMP will also be developed and implemented for the project. The CEMP will outline a range of traffic mitigation measures to be implemented during the construction phase of the project.

5.2.9 Soil and land resources

Existing environment

The former DLWC have previously mapped the soil landscapes within the Project Application Area area at a scale of 1:100,000 as Doyalson, Wyong, Warners Bay, Gateshead, and Awaba soil landscapes (Murphy, 1993). Further details regarding the characteristics of these soil landscapes are presented in Section 3.6.8.

The Newstan Colliery Surface Site, Awaba Colliery Surface Site and associated surface facilities are located within previously disturbed areas, with runoff generally contained within the existing surface water management system.

No agricultural activities are undertaken within the Extension of Mining Area. The area is characterised by heavily vegetated rolling low hills with short side slopes and numerous closely spaced drainage lines.

Neither the Project Application Area nor the Extension of Mining Area are located within an area mapped as SAL.

Potential impacts

The potential for impacts to land and soil capability and agricultural enterprises is limited by the project design, which is for an underground mine located within an area with limited agricultural land use. Direct surface disturbance will be largely restricted to existing disturbance areas at the Awaba Colliery Surface Site. Direct surface disturbance elsewhere in the Project Application Area will be limited to small temporary disturbance areas such as for drill pads or cabling.

Proposed assessment approach

A soil and land resources assessment will be undertaken for the EIS. It will include:

- Assessment and mapping of soil types across the Project Application Area.
- Pre- and post-mining land and soil capability assessment in accordance with relevant government guidelines.
- An Agricultural Impact Statement prepared in accordance with relevant government guidelines.
- Assessment of available topsoil resources for rehabilitation of infrastructure areas.
- Identification of any impact mitigation, management and monitoring measures required.

Proposed actions to mitigate impacts

Land management for the project will incorporate specific land management requirements identified during the EIS. This will include requirements for:

- Protection of water resources.
- Remnant vegetation management.
- Prevention and rehabilitation of land degradation.
- Management of priority weed species listed under the *Biosecurity Act 2015*.
- Feral animal control.

These requirements will be documented in an approved Mining Operations Plan (MOP) for the project.

5.2.10 Aboriginal heritage

Existing environment

The Project Application Area is located within the traditional lands of the Awabakal people and in the administrative boundaries of the Biraban Local Aboriginal Land Council (LALC). The exact traditional boundaries of the Awabakal tribes are unknown, but the broad geographical and cultural boundaries are relatively consistent between sources. The Awabakal appear to have been people of the coast, estuaries, lakes and wetlands, but also with attachment to the rugged sandstone country through the Sugarloaf and Watagan Ranges. The traditional country of the Awabakal people was bounded to the north by the Worimi, to the west by the Wonnarua, to the south west by the Darkinjung and to the south along the coast by the Kuring-gai people.

Historical records identify several different clans as occupying the region, with the Awabakal people being located in the Newcastle and Lake Macquarie area. There is limited information available regarding the Aboriginal occupation of the area given the impacts of European settlement. Abundant sources of marine and terrestrial resources were available in the Newcastle area. As such, the area was likely occupied both transiently, when ephemeral water sources were accessible, and more permanently where a continual water source, such as Lake Macquarie, was available. Both of these environments would have provided a variety of seasonal and annual floral and faunal resources.

A review of the Aboriginal Heritage Information Management System (AHIMS) (OEH, 2019) indicates there are six recorded Aboriginal heritage sites within the Extension of Mining Area including:

- Two isolated artefact sites (AHIMS IDs: 45-7-0300, 45-7-0301).
- Three scarred trees (AHIMS IDs: 45-7-0324, 45-7-0318, and 45-5-0319).
- One artefact scatter (AHIMS ID: 45-7-0302).

Potential impacts

Potential impacts to Aboriginal cultural heritage that from the project include:

- Potential subsidence related disturbance or loss of items of Aboriginal heritage or Aboriginal cultural values.
- Direct disturbance or loss of items of Aboriginal heritage or Aboriginal cultural values as a result of surface disturbance.

Proposed assessment approach

An Aboriginal Cultural Heritage Assessment will be prepared as part of the EIS in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the following additional guidelines:

- Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW, 2010a).
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010b).
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010c).

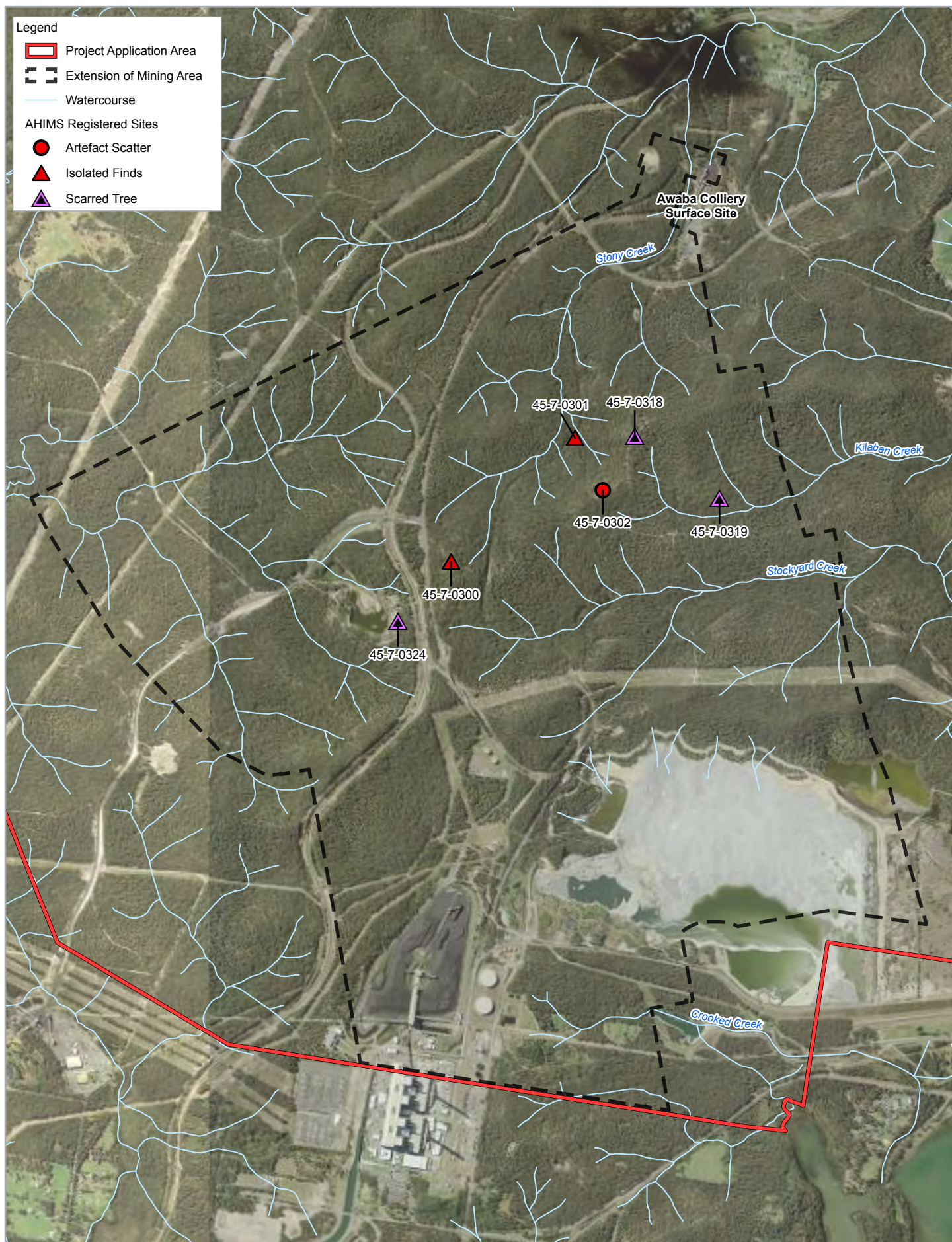
The assessment will include consultation with the relevant stakeholders and Aboriginal parties.

The assessment will describe and assess the significance of any Aboriginal objects and/or places that may be impacted by the project and provide options to avoid, mitigate or manage the harm to those object and/or places.

Proposed actions to mitigate impacts

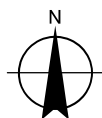
Measures to manage and mitigation potential impacts to Aboriginal cultural heritage will be identified and refined during the assessment process and in consultation with relevant stakeholders, but will generally include:

- Consideration of environmental assessment outcomes during detailed mine planning (e.g. locations of Aboriginal heritage sites).
- Continued involvement of Aboriginal stakeholders during the assessment and operational phase.
- Surface disturbance protocols (including salvage or demarcation of sites where applicable).
- Development of subsidence performance measures for any significant heritage sites.
- Adaptive management approach to achieve subsidence performance measures.
- Development and implementation of Extraction Plans to mitigate, monitor and manage potential impacts on Aboriginal heritage.



Paper Size ISO A4
0 0.15 0.3 0.45 0.6
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



Centennial Coal
Newstan Mine Extension Project
Scoping Report

Project No. 22-19878
Revision No. 0
Date 07/05/2019

**Aboriginal cultural heritage sites
within Extension of Mining Area**

Figure 5-2

5.2.11 Historic heritage

Existing environment

A search of the National Heritage Register database, State Heritage Register (SHR) and Lake Macquarie LEP has identified 40 heritage items within the Project Application Area. Of these, 32 are listed on heritage registers and 8 have been identified, but are not listed (i.e. they do not meet the criteria for local heritage listing).

National Heritage Register database

There are no items within the Project Application Area listed on the National Heritage database.

State Heritage Register

There is one heritage item on the SHR within the Project Application Area. This item is the Wangi Wangi Power Station (SHR 01014).

Lake Macquarie LEP

There are 30 heritage items listed on the Lake Macquarie LEP. Of these, 26 are built heritage items and four are archaeological sites. Two of these items are also listed on Section 170 registers. The majority of these heritage sites are in the vicinity of the Lake Macquarie foreshore and outside the mine operations and areas of surface disturbance.

Heritage items within the Extension of Mining Area

There are two locally listed heritage items within the Extension of Mining Area:

- The Main Northern Railway line.
- Eraring Power Station.

Awaba Colliery Surface Site

Previous studies (RPS, 2010; 2012) have also identified the Awaba Colliery as a locally significant heritage item, despite it not being listed on any heritage register.

The Awaba Colliery complex is historically significant at a local level as the first colliery to be planned, constructed and operated by the NSW State Government via the State Mines Control Authority. It is representative of the significant expansion in colliery development in NSW by the State Government during the post-war period. Furthermore, the colliery's operation from 1947 to the present day marks a significant period of continuity in use.

Potential impacts

Potential impacts to historic heritage as a result of the project include:

- Amenity impacts and or damage to the locally significant Awaba Colliery Surface Site due to the construction of new infrastructure at the site.
- Subsidence related impacts following mining within the Extension of Mining Area.

Proposed assessment approach

A historical heritage assessment will be prepared in accordance with relevant standards and guidelines, including Assessing Heritage Significance (NSW Heritage Office, 2015) and with consideration of the principles contained in the Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance.

This would include an assessment of the potential subsidence impacts on identified built features of historic heritage significance and identify measures to avoid, mitigate, monitor and manage the potential impacts of the project.

Proposed actions to mitigate impacts

Measures to manage and mitigation potential impacts to historic heritage will be identified and refined during the assessment process and in consultation with relevant stakeholders. They will include, at a minimum, the development and implementation of Extraction Plans to mitigate, monitor, manage and remediate potential subsidence impacts on built heritage.

5.2.12 Visual amenity**Existing environment**

The land use within the Project Application Area is defined by a range of large scale industrial activities related to underground mining and power generation, contiguous with areas of native tree cover extending beyond existing mining operations.

Land use in the vicinity of the Extension of Mining Area includes both large scale industrial development (e.g. Eraring Power Station and associated electrical infrastructure), as well as rural residential areas primarily to the west, and denser urban development to the east fringing Lake Macquarie.

Potential impacts

The potential for visual impacts is limited by the project design which is for an underground mine, with surface infrastructure that is largely shielded by existing vegetation. Furthermore, all new surface infrastructure, with the exception of ancillary equipment such as cabling, is proposed to be located within previously disturbed areas at the Awaba Colliery Surface Site. This would limit the potential impacts to visual amenity as a result of the project.

Proposed assessment approach

A visual impact assessment will be undertaken for the EIS. The assessment will:

- Describe the existing visual character of the Project Application Area and surrounds.
- Evaluate the significance of any predicted changes to viewscales and visual amenity at representative viewpoints, considering factors such as the predicted magnitude of change, contrast, viewing distance and direction, length of viewing time and receptor sensitivity.
- Provide recommendations to enable avoidance or mitigation of impacts, and include assessment of residual impacts taking into account recommended mitigation and management measures.

Proposed actions to mitigate impacts

Where practicable, Centennial Newstan will position surface infrastructure in locations where visual screening can be provided by the topography or existing vegetation. Building heights will also be limited to minimise visual amenity impacts.

5.2.13 Socio-economic

Existing environment

Community profile

Newstan Colliery is located in the Lake Macquarie LGA, which is part of the Hunter Region of NSW. The LGA encompasses a total land area of about 750 square kilometres, of which a large proportion is National Park, State Forest and nature reserve.

Residential areas are dispersed around the lake and the largest population centres are located to the north (in suburban Newcastle) including Charlestown, Glendale and Cardiff. The other main population centres are Belmont, Morisset, Mount Hutton, Swansea, Toronto and Warners Bay. The Lake Macquarie LGA is one of the fastest growing cities in the Hunter, and one of the largest cities in NSW. In summary:

- Lake Macquarie's population is approaching 200,000 people.
- Lake Macquarie is the Hunter's largest city, accounting for 37% of the Lower Hunter population.
- Lake Macquarie is the fourth most populous city in NSW, and the eighth most populous city in Australia.
- The population of Lake Macquarie is expected to grow by 60,000 – 70,000 people over the next 25 years, which will create a demand for 36,500 new dwellings.

The project is located within the following Australian Bureau of Statistics (ABS) statistical geographic units:

- Lake Macquarie LGA.
- Lake Macquarie West Statistical Area Level 3 (SA3).
- Newcastle-Maitland Significant Urban Area (SUA).
- New South Wales.

Key demographic features of these geographic units, based on the ABS Census (2016), are as follows:

- The Lake Macquarie West SA3 population is approximately 38% of the Lake Macquarie LGA population, and approximately 16% of the regional Newcastle-Maitland SUA population.
- The balance of male and female residents is relatively consistent across all populations.
- The Lake Macquarie West SA3 population is older than each of the other populations, with a median age of 43 compared with 42 for Lake Macquarie LGA, 39 for Newcastle-Maitland SUA, and 38 for NSW .
- The local and regional populations are relatively less ethnically diverse than for NSW, with around 85% of people born in Australia, compared to approximately 66% for NSW.
- The Lake Macquarie West SA3 population is comprised of 4.9% of residents with Aboriginal or Torres Strait Islander descent, which is a markedly larger proportion than that of NSW at 2.9%.

- The median weekly household income within Lake Macquarie West SA3 is \$1,499, which is lower than the Lake Macquarie LGA at \$1,610, Newcastle-Maitland SUA at \$1,641 and NSW at \$1,780.
- Housing costs, which represent a significant element of cost of living, are reported as being the same for the local and regional communities, and lower than for NSW.

The mining industry is an important economic contributor to the Lower Hunter Region, with the Lake Macquarie West SA3, Lake Macquarie LGA and Newcastle-Maitland SUA all having significantly greater proportions of mining employees than NSW. Mining directly employs 3.1% of the population within the Lake Macquarie West SA3, 2.6% within the Lake Macquarie LGA, 3.6% within the Newcastle-Maitland SUA and 0.9% within NSW. There are also larger representations of technicians and trades workers, and machinery operators and drivers in the Lake Macquarie West SA3, when compared with general workforce data for the larger populations. These are employment categories typically associated with mining.

Newstan Colliery workforce profile

A review of the residential distribution of the Newstan Colliery workforce as at 2014 indicates the following:

- Approximately 65% of the workforce resides in the Lake Macquarie LGA.
- In relative terms, much lower proportions of Newstan Colliery's workforce reside in other individual LGAs. However, approximately 92% of the workforce resides in the Newcastle – Maitland SUA.
- Approximately 40% of the workforce resides in the Lake Macquarie West SA3, within which Newstan Colliery is located.
- The mining workforce is regionally based. Consequently, much of the social and economic activity of the workforce takes place in the local and regional areas, further contributing to the socioeconomic functioning of these areas.
- The average annual income for mining employees within the Lake Macquarie LGA is \$143,070, which compares to the annual average income of \$81,960 for the broader economy within the LGA.

The retention of mining employee incomes in the region is economically significant, as emphasised by comparison of mining employee incomes with overall average annual incomes for the Lake Macquarie LGA. The higher incomes in mining employment encourage increased expenditure in the local and regional economies in which these employees live, when compared to population medians and measures for the regional workforce.

Potential impacts

The project will facilitate enhanced commercial/ economic elements and associated social impacts. Commercial engagement of locally and regionally based suppliers and contractors supports those businesses and the consequent employment and extended economic benefits such transactions produce. This also has positive social impacts, through increasing the number of residents and households that have the resources to engage in the community on a variety of levels.

The role of employees as local and regional economic contributors is also significant. The number of household members who directly benefit from employment with Newstan Colliery during operations further supports this assertion. This has short and longer-term benefits for these households in terms of financial security and wealth creation. As is the case with Newstan Colliery's commercial partners, these households also have greater resources, permitting them to engage in the community and to form part of and/or contribute to the social fabric, functioning and cohesion of their communities.

A small number of households situated close to the Project Application Area may experience some negative amenity impacts from the operation of the project.

On balance, the contribution to the local, regional and State economies from the continued operation of Newstan Colliery due to the project is likely to be positive.

Proposed assessment approach and actions to mitigate impacts

Centennial Newstan will undertake a detailed assessment of the social impacts of the project as a component of the EIS. The Social Impact Assessment (SIA) will be prepared in accordance with the SIA Guideline (NSW Government, 2017). It will:

- Identify the project's area of social influence and the socio-economic characteristics of that area.
- Identify, predict and analyse the potential negative and positive social impacts that may arise from the project, drawing on information contained in the other technical assessments completed for the EIS.
- Evaluate the significance of the identified social impacts, including residual impacts.
- Outline a series of mitigation measures for significant negative social impacts and enhancement measures for significant positive social impacts.
- Outline a process for monitoring, evaluating and reporting on the effectiveness of the proposed mitigation and enhancement measures.

In accordance with the requirements of the SIA Guideline (NSW Government, 2017b), Centennial Newstan has completed the SIA Scoping Worksheet to identify key social impacts requiring further investigation in the SIA and to assign a proportionate level of assessment. A copy of the SIA Scoping Worksheet is provided in Appendix C.

5.2.14 Hazards

Existing environment

The project will require coal handling and the delivery, storage and use of hydrocarbons such as fuel and oil, explosives (occasional use only) and other potentially hazardous substances.

Gas within the West Borehole seam and overlying strata is also a potential hazard source.

Potential impacts

Atypical events with potential to cause a hazard are spills or leaks of hazardous materials, such as due to equipment failure, and fires or explosion, for example, an equipment fire. There is also a risk of outburst in the underground workings due to the gas within the West Borehole seam and overlying strata.

Proposed assessment approach

As part of the EIS, risk screening will be undertaken using criteria and guidance in DP&E's Applying SEPP 33 (DoP 2011a), to confirm whether or not the project is classified as potentially hazardous, requiring a preliminary hazard analysis (PHA) and if so, the level of assessment required. The screening criteria relate to factors such as the types and quantities of hazardous materials to be stored on-site, how and where they will be stored, and anticipated frequency of road movements of this material to and from the site.

If a PHA is required, it will be conducted in accordance with SEPP 33 requirements, following relevant DP&E guidance. The PHA would identify potential hazards associated with the project and estimate the likelihood and consequences of them occurring, taking into account Centennial Newstan's proposed controls. This information would then be reviewed to assess the level of off-site risk to people, property and the environment.

Additional risk mitigation measures would be incorporated into the project design if required. This would ensure that the proposed safeguards are adequate and the project does not pose an unacceptable level of risk.

Proposed actions to mitigate impacts

Storage and handling of potentially hazardous materials will be in accordance with statutory requirements. Appropriate controls will be in place to prevent spills and leaks.

Safety systems and procedures will be in place to minimise the potential for incidents and to manage and respond to them if they do occur. This will include a firefighting system and other systems required by law.

5.2.15 Bushfire

Existing environment

A bushfire prone area is an area of land that can support a bushfire or is likely to be affected by bushfires. Bushfire prone areas are identified on bushfire prone land maps and identify bushfire hazards and associated buffers zones within an LGA. The project is located on land identified as bushfire prone by Lake Macquarie City Council and must therefore consider the aims and objectives of the NSW Rural Fire Service (2006) Planning for Bush Fire Protection guideline.

Potential impacts

Potential impacts from bushfire include damage to property and the environment, and injury to the Centennial Newstan workforce or members of the public.

Proposed assessment approach

A bushfire hazard assessment will be prepared for the EIS, in accordance with the applicable guidelines, standards and policies, and with consideration to the NSW Rural Fire Service (2006) Planning for Bush Fire Protection guideline. The assessment will:

- Identify the presence and extent of the bushfire hazard in the vicinity of proposed surface infrastructure, taking into account vegetation characteristics (for example the type and amount of vegetation present), slope and the area's bushfire history.
- Determine appropriate asset protection zones, that is, the separation distances required between structures and vegetation which could pose a bushfire hazard, to minimise the bushfire risk and enable fire fighting vehicle access.
- Identify other measures to reduce the risk of a bushfire impacting the project or an incident at the mine starting a bushfire. For example, this would include maintenance requirements to reduce the fuel load in asset protection zones, and emergency access and egress provision.

Proposed actions to mitigate impacts

Water for use in fire-fighting will continue to be provided for as part of the Newstan Colliery site water management system, to ensure that there is sufficient water available on-site for bushfire fighting purposes. Fire-fighting equipment including fire hydrants, extinguishers and hose reels will be provided at all surface infrastructure areas and mobile equipment maintained in accordance with Australian Standards and work health and safety (WHS) guidelines.

5.2.16 Waste**Existing environment**

Management systems are in place at Newstan Colliery for the various non-production waste streams generated by the project.

All general wastes and routine maintenance consumables are collected on a regular basis by a licensed contractor for either recycling or off-site disposal at an approved waste management facility. Waste sorting is completed on-site to remove any recyclable items, such as oil filters, cartridges and scrap metal.

The generation of waste oils and grease is currently limited to the routine maintenance of plant and equipment. Waste oils and greases are stored in tanks and drums within bunded areas at the surface sites for collection by a licensed contractor, along with parts and packaging (for example, filters and waste oil drums) for recycling and/or off-site disposal within a waste facility approved to accept such waste.

Oily water from the vehicle maintenance and equipment storage areas is drained to oil-water separators. A licensed contractor regularly services and maintains the separators, including removing all waste hydrocarbons from the site for recycling.

Sewage and wastewater from the bathhouse and other surface facilities at the Newstan Colliery Surface Site is pumped to an on-site wastewater treatment plant. Effluent from this treatment plant is pumped via a holding tank to an onsite maturation dam.

The treatment of sewage at Awaba Colliery is managed through both a surface and underground system, designed to be self-sustaining. Sewage from the surface buildings is treated through an on-site septic system.

Potential impacts

Waste generated during construction will include timber and packaging, domestic waste, scrap steel, green waste, asphalt and concrete. Operational waste will remain consistent with the current waste streams at Newstan and Awaba Collieries. It will include special waste (e.g. tyres), liquid waste, hazardous waste, general waste, sewage and minor amounts of green waste from landscaping.

Additional waste will be generated from exploration drilling activities. This will include drilling fluids and slurry collected in portable containers.

Proposed assessment approach

The EIS will assess the predicted waste generation impacts during construction, operation and decommissioning of the project, including:

- Classification of wastes and an estimate of the quantity of each waste classification.
- Identification of waste handling procedures, management measures and waste minimisation and reuse opportunities.

The assessment will include consideration of relevant legislations and guidelines, including:

- Waste Classification Guidelines – Part 1: Classification of Waste (EPA 2014a).
- NSW Waste Avoidance and Resource Recovery Strategy (EPA 2014b).
- NSW Sustainable Design Guidelines Version 3.0 (TfNSW, 2013d).
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (DECC, 2008a).

Proposed actions to mitigate impacts

The waste produced on-site will continue to be managed in accordance with the existing waste management system and in accordance with the Waste Classification Guidelines (EPA, 2014a). The construction contractor will also prepare standard environmental management measures based on these guidelines prior to construction.

Drilling wastes from exploration activities will be transported to the Newstan Colliery Surface Site for disposal within the Reject Emplacement Areas approved under the SSD-5145 for the Northern Coal Logistics Project.

5.2.17 Rehabilitation and mine closure

Existing environment and potential impacts

Where appropriate, underground plant and equipment will be removed and the mine accesses filled and sealed. However, a focus will be the surface disturbance areas at Awaba Colliery Surface Site. Following the completion of mining, the Awaba Colliery Surface Site will be decommissioned and the area rehabilitated such that it can support land uses similar to those that occurred prior to mining. It is expected that the Newstan Colliery Surface Site will be decommissioned and rehabilitated as part of closure activities for the Northern Coal Logistics Project in accordance with the requirements of SSD-5145. As such, the decommission and rehabilitation of the Newstan Colliery Surface Site, and other surface features, such as internal roads and water management infrastructure integral to the Northern Coal Logistics Project, do not form part of the project.

Proposed assessment approach and actions to mitigate impacts

A detailed rehabilitation strategy for the project will be developed in consultation with stakeholders and with consideration of the detailed environmental investigations undertaken as part of the EIS. Conceptually, the rehabilitation strategy for the project will include:

- Progressively rehabilitating minor surface disturbance areas (e.g. drill pads, access tracks, surface cracking) to their previous land use.
- Removing underground plant and equipment at the completion of mining.
- Filling and sealing mine accesses (drifts and shafts) in accordance with relevant guidelines and standards.
- Removing mine infrastructure at Awaba Colliery Surface Site and rehabilitating surface disturbance areas.

The final rehabilitation strategy will be developed in consultation with stakeholders and with consideration of the outcomes of other specialist studies completed for the EIS, including the soils and land resources, groundwater, surface water and biodiversity assessments. It will describe the:

- Potential post-mining land uses, with consideration of relevant strategic land use planning or resource management plans or policies.
- Conceptual final landform, including topography, vegetation, drainage, and retained infrastructure.
- Stakeholder engagement strategy to be implemented during mine closure planning to ensure stakeholder views are considered and the potential impacts of mine closure on local businesses, employees and others are understood and managed appropriately.
- Site rehabilitation objectives and completion criteria, consistent with the potential post-mining land uses and conceptual final landform.
- Methodologies proposed to achieve the site rehabilitation objectives.
- Monitoring and maintenance program to be implemented to evaluate progression towards achieving the target rehabilitation outcomes.
- Indicative mine closure planning schedule.

5.3 Scoping only issues

A number of project matters have been classified as ‘Scoping only’ issues during the scoping process. These matters were considered during scoping, but it was concluded, for various reasons, that the proposed project activities are unlikely to have any significant impacts on them. Centennial Newstan does not propose to investigate these matters further in the EIS. A brief summary of each of the identified ‘Scoping only’ issues, and a justification as to why further investigation is not warranted, is presented as follows:

Microclimate

Due to its relative scale, there is limited potential for the project to influence microclimate. The project does not propose large-scale vegetation clearing, extensive landform changes, or the establishment of large water bodies that may influence local climatic conditions. As such, a detailed assessment of the project’s potential to influence microclimate is not considered warranted.

Housing

The project is expected to have a negligible impact on the availability of housing for the following reasons:

- There is sufficient capacity within the local labour market to accommodate the project’s relatively small construction workforce.
- The majority of the proposed operational workforce are current employees of Newstan Colliery who reside locally.
- Due to the project’s relative proximity to extensive residential areas within the Lake Macquarie LGA, any housing shortages associated with an increased construction and operation workforce will be able to be absorbed by the large availability of housing stock locally and regionally.

As such, a detailed assessment of the project's potential to impact housing availability is not considered warranted.

Natural resource use

Due to the proposed extensive use of existing surface infrastructure at the Newstan Colliery Surface Site and Awaba Colliery Surface Site, the extent of natural resource depletion required to construct and operate the project is not considered to be significant. On the contrary, the coal proposed to be extracted within the West Borehole seam is a natural resource owned by the State of NSW and it is in the public interest to optimise the recovery of this resource.

As such, a detailed assessment of the project's potential to deplete natural resources is not considered warranted.

Coastal hazards

The Project Application Area is not located within an area that is susceptible to shoreline recession or coastal inundation, nor is it within the inundation area for the predicted 2050 and 2100 sea level rise benchmarks, as identified in the Coastal Risk Management Guide (DECCW, 2010d). As such, a coastal hazard assessment is not considered warranted.

Notwithstanding, the project's potential direct and indirect impacts to coastal environment areas will be assessed as part of the other detailed assessments completed for the EIS (e.g. surface water, groundwater, biodiversity).

5.4 Cumulative impacts

The environmental assessments for the matters identified in Section 5.2 will include a cumulative impact assessment component. These cumulative impact assessments will:

- Take into consideration past, present and reasonably foreseeable planned developments that are relevant due to their proximity and/or potential to interact with the identified project impacts.
- Outline how cumulative impacts may be managed through strategic planning or policy (e.g. water licensing under the WM Act or offsetting in accordance with the Biodiversity Offset Scheme under the BC Act and BC Regulation).
- Document how cumulative impacts have been considered and, to the fullest extent possible, the project's relative contribution to those cumulative impacts.

6. Community and other stakeholder engagement

6.1 Engagement undertaken to date

Newstan Colliery has been a member of the local community for several years and therefore has well-established local community networks and relationships with landholders and other stakeholders.

The Newstan Colliery Stakeholder Engagement Plan, which was developed to provide a basis for engagement with the community and other stakeholders, has provided a framework on which to build.

Key project stakeholders include:

- Local community.
- Aboriginal groups.
- Centennial Newstan employees.
- Government (Federal, State and Local).
- Infrastructure owners.

Limited stakeholder engagement activities have already been undertaken for the project. A summary of these activities are presented below.

6.1.1 Community

Community consultations regarding the proposed project have been undertaken using a variety of methods, including face-to-face and telephone meetings, presentations, newsletters, forums, and guided site visits. In particular, the following groups have been consulted on the project:

- Newstan and Awaba Community Consultative Committee (CCC).
- Rathmines progress association.
- Five bays sustainable neighbourhood group.
- Fassifern public school parents and citizens committee.

Community Consultative Committee

The CCC comprises representatives from local government and the community, and is independently chaired. The CCC provides a forum for open discussion between representatives of Centennial, the community, Lake Macquarie City Council and other stakeholders on issues directly relating to Newstan Colliery's operations and projects, environmental performance, and community relations. The CCC meets on a quarterly basis.

The CCC was provided with a briefing regarding the project on 12 April 2018 and again on 26 July 2018. No issues or concerns were raised in relation to the Newstan Mine Extension Project during or following these briefings. Consultation with the CCC in regard to the project will continue throughout the preparation of the EIS.

Rathmines progress association

The Rathmines progress association is a local community organisation active in the suburb of Rathmines. The organisation was provided with an introduction to the project on 11 December 2017 via a face-to-face meeting. Consultation with Rathmines progress association will continue for the EIS.

Five bays sustainable neighbourhood group

The Five bays sustainable neighbourhood group is comprised of community members from the suburbs of Teralba, Booragul, Marmong-Point, Bolton Point, Fennell Bay, Fassifern, Blackalls Park and Woodrising.

The group was provided with an introduction to the project on 1 July 2018 via a face-to-face meeting. Consultation with Five bays sustainable neighbourhood group will continue for the EIS.

Fassifern Public School parents and citizen's association

The Fassifern Public School parents and citizen's association (P&C) assists Fassifern Public School to support the local school children and community. The Fassifern Public School P&C meets on the second Thursday of every month.

The Fassifern Public School P&C were provided with a briefing regarding the proposed project on Friday, 27 July 2018 at a face to face meeting. Consultation with Fassifern Public School P&C will continue for the EIS.

6.1.2 Aboriginal stakeholders

Centennial has been undertaking comprehensive consultation with registered Aboriginal parties (RAPs) on the status and progress of mining projects in the Lake Macquarie region since 2010. Six RAPs have previously registered an interest in being consulted on Centennial's Northern Region projects, as follows:

- Awabakal Descendants Traditional Owners Aboriginal Corporation.
- Awabakal Traditional Owners Aboriginal Corporation.
- Biraban Local Aboriginal Land Council.
- Cacatua Culture Consultants.
- Wonnarua Nation Aboriginal Corporation.
- Wonn1.

Project-related consultation with the six RAPs listed above was initiated in 2018. This included fact-to-face meetings and a guided site visit to portions of the Extension of Mining Area. Consultation with these RAPs will continue for the EIS. Additional Aboriginal parties wishing to be consulted will also be given an opportunity to register an interest in the project as part of the EIS.

In 2016, Centennial established an Aboriginal heritage sub-committee for Centennial's Northern Region operations (Mandalong Mine, Northern Coal Logistics Project, Newstan and Awaba Collieries, Myuna Colliery). The Aboriginal heritage sub-committee includes representatives of the various RAPs from each of Centennial's Northern Region operations. The Aboriginal heritage sub-committee meet twice a year to discuss matters relating to cultural heritage within Centennial's Northern Region operations.

On 9 May 2018, a presentation was provided to the Aboriginal heritage sub-committee at which the Newstan Mine Extension Project was introduced. Consultation with the Aboriginal heritage sub-committee will continue for the EIS.

6.1.3 Government agencies

Centennial Newstan has consulted with the following government agencies to present the project and, where relevant, seek feedback on key mine design considerations and areas for investigation during the EIS:

- DP&E.
- Resources Regulator.
- Dam Safety Committee.
- Natural Resources Access Regulator.

DP&E consultation

Project briefing

Centennial Newstan met with DP&E delegates on 23 January 2019 to present an overview of the project, including an indicative timeframe to drafting and lodging the Scoping Report and EIS.

Consultation regarding Origin Energy's proposed augmentation of Eraring Ash Dam

Centennial Newstan provided a letter to DP&E on 7 February 2019 to make comment on Origin Energy's proposed augmentation of Eraring Ash Dam (the Eraring Ash Dam Augmentation Project), which is proposed within Centennial Newstan's mining lease areas. Centennial Newstan raised a number of issues with DP&E regarding the proposed Eraring Ash Dam augmentation and its interaction with future mining activities. These are summarised as follows:

- Origin Energy is proposing a number of mitigation measures for reducing water connectivity between the Eraring Ash Dam and the existing Awaba workings, which are located beneath the proposed Ash Dam augmentation area. These include:
 - Filling of mine voids with stabilised fill material.
 - Excavating and collapsing shallow mine workings.
 - Installing an impervious barrier using clays or suitable stabilised fill materials.

Future mining by Centennial Newstan would be within the West Borehole seam, located approximately 200-230 metres below the disused workings of the Awaba Mine. When mining beneath the workings of the Awaba Mine, the potential exists for there to be subsidence related interactions with the Awaba workings. These interactions could jeopardise the effectiveness of any mitigation measures implemented by Origin Energy designed to reduce the potential for water connectivity between the Eraring Ash Dam and the Awaba workings. Centennial Newstan asserted that any measures to reduce water connectivity should be designed in consultation with Centennial Newstan and the Mine Subsidence Board and be able to withstand subsidence impacts from Centennial Newstan's future mining activities within the West Borehole seam to prevent sterilisation of coal reserves. Further, Centennial Newstan asserted that:

- Origin Energy should ensure that any material used to fill the mine voids is of a benign nature so that it does not adversely impact water quality within the Awaba workings.

- Origin Energy is required to offset the impacts of vegetation clearing associated with the proposed expansion of the Eraring Ash Dam. Origin has identified areas of potential offsets on Crown land to the north of the existing Ash Dam. A large portion of these offset areas are within Centennial Newstan's Extension of Mining Area. Underground mining within this area, as well as impacts associated with ongoing subsidence monitoring, has the potential to impact on these vegetation communities. If areas above future proposed mining areas are offset, the mining operations and associated monitoring activities could be significantly restricted. Potential offset areas are available outside of the proposed future mine workings and a collaborative approach to identifying areas is proposed that precludes the unnecessary sterilisation of coal reserves. Centennial asserted that the proposed offset areas should not be permitted to sterilise coal reserves.

Resources Regulator

On 27 February 2018, as part of the mine planning process, Centennial Newstan consulted with the Resources Regulator's PSE to seek feedback on Centennial Newstan's proposed mining activities and identify any specific mine design requirements. The Resources Regulator's PSE requested that there be no subsidence within an enlarged barrier surrounding the Main Northern Railway. This requirement has been addressed in the mine design.

Dam Safety Committee

The Dam Safety Committee plays a role in determining the type and extent of coal mining allowed in the vicinity of prescribed dams and their storages. Eraring Ash Dam is a prescribed dam under the Dam Safety Act. Centennial Newstan initiated preliminary consultation with the Dam Safety Committee via telephone on 27 February 2019 to seek feedback on Centennial Newstan's proposed mining activities and identify any specific mine design requirements. The Dam Safety Committee recommended that a 35 degree angle of draw be adopted in the mine design to mitigate subsidence impacts on the Eraring Ash Dam wall. This requirement has been addressed in the mine design.

Natural Resources Access Regulator

Centennial Newstan has engaged in regular consultation with the Natural Resources Access Regulator (NRAR) to progress the granting of groundwater licences for the proposed underground mining activities. Centennial Newstan will continue to engage with NRAR to ensure adequate water entitlements are in place for the proposed mining activities.

6.1.4 Infrastructure owners

Infrastructure owners that have been consulted in relation to the proposed project include:

- Sydney Trains / Transport for NSW.
- Origin (owners of the Eraring Power Station and Eraring Ash Dam).

A brief summary of the consultations undertaken with these infrastructure owners is provided in the following subsections.

Sydney Trains / Transport for NSW

Centennial has sought to ensure that the proposed mining activities within the West Borehole seam do not adversely affect the structural integrity of the Main Northern Railway. As such, Centennial has engaged in early consultation with Sydney Trains to seek their feedback on the proposed mine design and identify key issues for consideration during the EIS. A meeting was held on 31 August 2018 where Centennial presented the proposed project and preliminary subsidence predictions to Sydney Trains. The feedback received from that meeting has been taken into consideration in the mine design process and consultation with Sydney Trains will continue for the EIS.

Origin Energy

Centennial attended a face-to-face meeting with representatives of Origin Energy on 29 March 2019. The purpose of the meeting was to present an overview of the proposed project to Origin Energy and identify constraints and opportunities regarding its potential interaction with Eraring Power Station and Eraring Ash Dam.

Key elements discussed during the meeting included:

- Centennial's mine design and project schedule.
- Centennials' proposed gas management for the project.
- Centennial and Origin Energy's proposed geotechnical designs.
- Centennial's proposed exploration activities within the Newstan Colliery Holding Boundary.
- Origin Energy's proposed biodiversity offset areas within the Extension of Mining Area.
- Origin Energy's proposed measures for preventing leachate from the Ash Dam entering the Awaba workings and the potential for water quality changes.

The outcomes of that meeting and future consultations with Origin Energy will be taken into consideration for the EIS.

6.2 Matters raised by the community and other stakeholders

Centennial Newstan has sought and received recommendations for mine design parameters from government agencies to manage direct and indirect subsidence-related impacts to key infrastructure assets such as the Main Northern Railway, Eraring Power Station and Eraring Ash Dam. These recommendations have formed an integral part of the mine design process and these consultations will continue for the EIS.

Whilst project-specific community consultation is in its infancy, community stakeholders consulted to date have indicated they would like to be kept up to date on important project details as more information becomes available.

Many community sentiments are yet to be understood, however, anecdotally there is particular interest in:

- The project's potential subsidence-related interactions with sensitive built and natural features, including the Eraring Power Station and Ash Dam. In particular, there is an interest in the potential for mining activities to create a pathway for leachate from Eraring Ash Dam to enter groundwater aquifers and migrate into Lake Macquarie.
- The potential contribution of the project to cumulative impacts.

6.3 Community and stakeholder engagement program

6.3.1 Stakeholder engagement during EIS preparation

The objectives of Centennial's proposed community and stakeholder engagement program for the project are:

- To provide stakeholders with credible, scientifically based information on the project to facilitate meaningful participation.

- To identify potential impacts associated with the project to inform the SIA and broader EIS program.
- To identify potential strategies for impact management, mitigation and community enhancement.
- To gain valuable feedback from stakeholders as to their concerns with the project so as to put in place mitigation strategies.

Centennial Newstan will lead the stakeholder and community consultation for the EIS. A detailed Stakeholder Engagement Plan will be developed to provide a framework to identify and appropriately consult with stakeholders that may be influenced by or have an interest in the project.

Key stakeholders to be consulted during the EIS include:

- Government (Commonwealth, State and Local).
- Aboriginal groups.
- Community members.
- Infrastructure owners.
- Mine staff and employees.

A stakeholder consultation log will be maintained as a record of the consultation activities undertaken, and the contents of this log will be summarised in the EIS.

Consultation to be undertaken as part of the EIS will include:

- Updates to the CCC.
- Updates to the Five Bays Sustainable Neighbourhood Group.
- Letters to residents and interested stakeholders.
- Project updates provided on the Centennial website.
- Project updates provided in the Lakes Mail.
- Media releases.
- Information sessions.
- Face to face meetings with landowners, infrastructure owners and other regulatory and industry stakeholders.
- A briefing session with relevant government agencies.

Centennial maintains a community complaints and enquiries line for Newstan Colliery which will also be made available for members of the community to obtain up to date and factual information or make complaints regarding the project.

The feedback received from Centennial Newstan's stakeholder engagement activities will help to identify key concerns to be addressed in the EIS and ensure the project optimises environmental, social and economic outcomes.

6.3.2 Stakeholder engagement during future project stages

Opportunities for members of the community and other stakeholders to engage with Centennial Newstan during construction, operation and decommissioning of the project will be provided through a range of mechanisms, as outlined in Table 6-1.

Table 6-1 Stakeholder engagement mechanisms

Mechanism	Overview
Centennial website	Centennial Coal maintains a dedicated website for all Centennial Coal mining operations, including Newstan Colliery. Project updates, environmental monitoring and reporting information will be made available for members of the public to download. A community feedback form will also continue to be made available on the website.
CCC	Quarterly CCC meetings will continue to provide updates to community and other stakeholder representatives throughout all project phases. These meetings will also provide the attendees with an opportunity to communicate community sentiments regarding project activities and raise any issues or concerns with Centennial Newstan personnel.
Personal communications	Phone calls, face-to-face meetings, presentations, interviews and briefings with stakeholders will continue throughout all project phases.
Communication materials	Formal letters and notifications will be issued as required. Newsletters, monthly community bulletins and fact sheets will be distributed locally. Community updates will also be published in local newspapers and emailed to those registered on Centennial Newstan's distribution list.

7. Conclusion

An EIS will be prepared for the project in accordance with the SEARs and with consideration of feedback received during the community and stakeholder engagement program.

It is proposed that the EIS will include the following:

Executive summary	A summary of the project and the key conclusions of the EIS.
Section 1	An introduction to the project and the EIS.
Section 2	A description of the various components and stages of the project.
Section 3	An outline of the strategic planning context and statutory provisions relevant to the project.
Section 4	A description of the consultation and engagement undertaken in relation to the EIS and SIA and ongoing community involvement.
Section 5	Details of the environmental assessment of the project, including a description of the existing environment, an assessment of potential impacts and a description of measures that would be implemented to avoid, minimise, mitigate, offset, manage and/or monitor the potential impacts of the project.
Section 6	A description of the proposed rehabilitation of the project and mine closure.
Section 7	A summary of the proposed environmental management, mitigation, monitoring and reporting in relation to the project.
Section 8	A description of how the project (when compared with other alternatives) is in the public interest and balances impacts, strategic needs, and benefits.
Section 9	A list of the information sources references in Section 1 to 8 of the EIS.
Section 10	Definitions of the abbreviations, acronyms and terms used in Sections 1 to 8 of the EIS.
Attachments	Supporting information for the EIS, such as the Project Application Area, peer review letters and Capital Investment Value estimate.
Appendices	Specialist studies into key environmental matters, as summarised in Section 5 of the EIS.

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Appendix A – Schedule of land

Lot	Deposited Plan	Lot	Deposited Plan	Lot	Deposited Plan	Lot	Deposited Plan
142	DP755207	22	DP35890	166	DP755207	20	DP734860
128	DP755207	267	DP7661	A	DP361988	20	DP840668
123	DP755207	308	DP7661	B	DP361988	211	DP840670
141	DP755207	304	DP7661	2	DP758041	50	DP840671
124	DP755207	288	DP7661	1	DP758041	51	DP840671
145	DP755207	263	DP7661	11	DP758041	21	DP129122
125	DP755207	303	DP7661	10	DP758041	22	DP129122
149	DP755207	289	DP7661	5	DP758041	20	DP129122
8	DP251755	21	DP515646	4	DP758041		SP53617
19	DP8463	22	DP515646	6	DP758041	100	DP847314
227	DP7661	240	DP7661	7	DP758041		SP49740
224	DP7661	314	DP7661	1	DP758041	50	DP849622
223	DP7661		SP64277	8	DP758041	82	DP850081
B	DP438629	3	DP512102	7	DP758041	81	DP850081
A	DP438629	22	DP8463	9	DP758041	395	DP823682
205	DP7661	6	DP12604	6	DP758041	20	DP850599
204	DP7661	12	DP810245	62	DP569340	22	DP851054
206	DP7661	18	DP2707	10	DP758041	21	DP851054
220	DP7661	27	DP8636	91	DP825387	7	DP1097
200	DP7661	26	DP8636	61	DP569340	8	DP1097
221	DP7661	43	DP2505	72	DP554514	9	DP1097
222	DP7661	44	DP2505	8	DP758041	10	DP1097
225	DP7661	10	DP2505	1	DP516039	6	DP1097
228	DP7661	42	DP2505	6	DP758041	5	DP1097
202	DP7661	11	DP2505	174	DP755207	4	DP1097
203	DP7661	41	DP2505	12	DP758041	3	DP1097
226	DP7661	12	DP2505	3	DP758041	2	DP1097
201	DP7661	A	DP405530	7	DP758041	190	DP7661
207	DP7661	13	DP2505	3	DP758041	186	DP7661
120	DP755207	14	DP2505	62	DP603232	189	DP7661
118	DP755207	B	DP405530	5	DP758041	185	DP7661
33	DP755207	27	DP2505	41	DP804985	187	DP7661
11	DP1097	28	DP2505	A	DP371352	188	DP7661
12	DP1097	25	DP2505	42	DP804985	6	DP9800
16	DP1097	29	DP2505	5	DP758041	5	DP9800
4	DP1097	1	DP589430	6	DP758041	2	DP9800
5	DP1097	2	DP589430	9	DP758041	1	DP9800
212	DP602014	25	DP8636	14	DP249535	2	DP852427
25	DP1097	13	DP23230	6	DP758041	1	DP852427
26	DP1097	6	DP23230	5	DP758041	34	DP239161
9	DP1097	18	DP24813	1	DP758041	292	DP853635
10	DP1097	17	DP24813	2	DP758041	291	DP853635
229	DP7661	32	DP739805	9	DP758041	1	DP854050
6	DP1097	16	DP24813	212	DP755207	134	DP755207
7	DP1097	4	DP310136	151	DP755207	132	DP755207
25	DP1097	2	DP310136	150	DP755207	501	DP857797
9	DP1097	3	DP310136	90	DP755218	502	DP857797
10	DP1097	10	DP2707	88	DP755218	32	DP858764
6	DP1097	1	DP11573	89	DP755218	31	DP858764
5	DP1097	5	DP11403	91	DP755218	150	DP859767

18	DP1097	53	DP2707	94	DP755218	1	DP318144
4	DP1097	52	DP2707	102	DP840773	113	DP832854
24	DP1097	1	DP32075	101	DP840773	3	DP926559
7	DP1097	11	DP32075	1	DP758041	2	DP926559
117	DP755207	2	DP32075	1	DP758041	4	DP926559
149	DP728974	7	DP32075	1	DP758041	2	DP981295
95	DP755218	6	DP32075	8	DP758041	425	DP823739
221	DP548001	5	DP32075	397	DP821668	426	DP823739
222	DP548001	10	DP32075	1	DP758041	64	DP755207
98	DP755218	9	DP32075	371	DP723259	1	DP121470
96	DP755218	8	DP32075	100	DP755207	19	DP861577
99	DP755218	4	DP32075	372	DP723259	18	DP861577
100	DP755218	3	DP32075	230	DP755207	12	DP862116
101	DP755218	22	DP22489	99	DP755207	242	DP663777
101	DP709415	23	DP22489	6	DP758041	112	DP866761
97	DP755207	4	DP212507	6	DP758041	111	DP866761
98	DP755207	21	DP22489	8	DP758041	17	DP1031778
277	DP755207	201	DP530759	2	DP615264	2	DP110130
96	DP755207	1	DP209939	201	DP755207	1	DP110130
1	DP350481	1	DP209444	202	DP755207	1	DP981295
22	DP830179	12	DP28378	200	DP755207	6	DP926559
116	DP755207	24	DP28375	198	DP755207	102	DP869715
54	DP755218	6	DP30502	197	DP755207	101	DP869715
2	DP585142	1	DP31028	207	DP755207	5	DP456287
184	DP755218	3	DP31028	208	DP755207	4	DP456287
4	DP6747	2	DP31028	211	DP755207	13	DP456286
1	DP1097	7	DP31028	206	DP755207	14	DP456286
230	DP7661	171	DP840964	9	DP758041	12	DP456286
183	DP7661	2	DP23230	8	DP758041	6	DP6929
184	DP7661	5	DP31028	71	DP616908	1	DP176592
5	DP2469	6	DP31028	72	DP616908	1	DP873289
6	DP2469	4	DP31028	61	DP615460	2	DP873289
143	DP755207	12	DP372470	42	DP625299	6	DP46737
1	DP833614	10	DP28375	41	DP625299	4	DP46737
692	DP803634	12	DP23230	52	DP700659	5	DP46737
B	DP341342	7	DP23230	51	DP700659	1	DP248036
100	DP818417	2	DP24813	9	DP758041	51	DP248036
10	DP2469	1	DP24813	10	DP758041	50	DP248036
11	DP2469	31	DP785595	7	DP758041	52	DP248036
138	DP755207	11	DP23230	8	DP758041	240	DP844413
1	DP503374	15	DP24813	62	DP615460	316	DP857889
122	DP755207	1	DP21303	3	DP758041	315	DP857889
8	DP2469	233	DP231394	1	DP561528	314	DP857889
9	DP2469	3	DP209939	228	DP755207	305	DP857889
A	DP341342	A	DP387011	2	DP561528	306	DP857889
92	DP812541	B	DP387011	11	DP623972	54	DP835633
1	DP102746	E	DP415185	12	DP623972	55	DP835633
14	DP2469	C	DP415589	7052	DP1057169	56	DP835633
15	DP2469	D	DP415589	1	DP758041	57	DP835633
7	DP2469	10	DP30502	4	DP758041	325	DP857889
140	DP755207	3	DP30502	3	DP758041	241	DP844413

5	DP738276	1	DP28375	6	DP758041	471	DP860305
4	DP2469	2	DP28375	7	DP758041	46	DP835633
12	DP2469	7	DP30975	2	DP758041	44	DP835633
13	DP2469	11	DP30502	1	DP758041	45	DP835633
691	DP803634	5	DP11573	8	DP758041	50	DP835633
2	DP2469	1	DP310136	9	DP758041	52	DP835633
3	DP2469	7	DP11877	10	DP758041	53	DP835633
121	DP755207		SP48899	5	DP758041	51	DP835633
135	DP755207	4	DP8636	7	DP758041	10	DP835633
1	DP2469	4	DP2505	209	DP755207	12	DP835633
7053	DP1052818	46	DP2505	199	DP755207	11	DP835633
702	DP516825	18	DP2505	1	DP758041	8	DP835633
8	DP738277	35	DP2505	210	DP755207	7	DP835633
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91	DP812541	19	DP2505	1	DP817297	22	DP835633
131	DP755207	20	DP2505	1	DP585142	21	DP835633
	SP68400	19	DP8636	110	DP755207	20	DP835633
2	DP360044	18	DP8636	173	DP755218	26	DP835633
1	DP360044	A	DP365730	187	DP755218	27	DP835633
1	DP508049	21	DP8636	95	DP755207	19	DP835633
2	DP508049	B	DP365730	1	DP737496	34	DP835633
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116	DP7661	17	DP100641	10	DP6747	251	DP844413
151	DP7661	35	DP8636	3	DP620092	236	DP844413
150	DP7661	3	DP2505	89	DP755207	235	DP844413
139	DP7661		SP35433	87	DP755207	234	DP844413
140	DP7661	45	DP2505	28	DP239161	232	DP844413
155	DP7661	9	DP2505	43	DP239161	231	DP844413
154	DP7661	16	DP28375	48	DP239161	230	DP844413
135	DP7661	1	DP30502	35	DP239161	237	DP844413
136	DP7661	2	DP30502	5381	DP622416	37	DP835633
153	DP7661	C	DP380672	5382	DP622416	38	DP835633
137	DP7661	2	DP30975	11	DP239161	39	DP835633
193	DP7661	1	DP517000	16	DP239161	40	DP835633
194	DP7661	16	DP2707	1	DP349962	220	DP844413
196	DP7661	17	DP2707	1	DP361395	219	DP844413
197	DP7661	2	DP11573	1	DP634222	221	DP844413
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110	DP7661	8	DP2707	40	DP239161	205	DP844413
111	DP7661	1	DP359881	41	DP239161	204	DP844413
112	DP7661	2	DP359881	69	DP239161	203	DP844413
115	DP7661	1	DP11403	2	DP512557	213	DP844413
114	DP7661	1	DP2505	1	DP593599	214	DP844413
113	DP7661	12	DP24813	2	DP206138	215	DP844413
199	DP7661	314	DP255624		SP47353	216	DP844413
145	DP7661	297	DP237530	3	DP12042	223	DP844413
144	DP7661	296	DP237530	7	DP12042	217	DP844413
143	DP7661	13	DP21303	2	DP12042	224	DP844413
146	DP7661	298	DP237530	33	DP9140	222	DP844413
149	DP7661	14	DP21303	34	DP9140	218	DP844413
148	DP7661	279	DP237530	11	DP8179	1	DP578573

141	DP7661	278	DP237530	12	DP8179	11	DP264234
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1	DP808863	1	DP1097	7	DP35890	4	DP1135751
10	DP738276	16	DP1097	6	DP35890	5	DP1135751
21	DP827135	3	DP1097	266	DP7661	6	DP1135751
5	DP786733	13	DP528017	265	DP7661	9	DP1135751
4	DP738277	12	DP36739	24	DP35890	8	DP1135751
5	DP738277	15	DP1097	23	DP35890	259	DP1139078
6	DP738277	16	DP1097	245	DP7661	2	DP1139314
7	DP738277	7	DP1097	298	DP7661	1	DP1139314
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2	DP758041	13	DP35890	1	DP25664	465	DP1138964
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168	DP755207	14	DP35890	B	DP375351	466	DP1138964
167	DP755207	20	DP1097	2	DP558768	475	DP1138964
173	DP755207	17	DP1097	52	DP542285		SP82987
169	DP755207	16	DP1097	4	DP213521	72	DP1147323
172	DP755207	12	DP1097	31	DP662839	71	DP1147323
170	DP755207	11	DP1097	1	DP207836	100	DP1147923
171	DP755207	13	DP1097	5	DP8463	7305	DP1149082
2	DP758041	9	DP1097	B	DP378006	7304	DP1149082
11	DP702043	3	DP1097	2	DP512102	3	DP1150459
12	DP702043	47	DP1097	7	DP8463	1	DP1150459
13	DP702043	12	DP1097	8	DP8463	2	DP1150459
163	DP755207	13	DP1097	20	DP8463	12	DP1150107
165	DP755207	46	DP1097	19	DP8463	11	DP1150107
113	DP802471	14	DP1097	9	DP8463	1	DP1151477
114	DP802471	8	DP1097	3	DP405908	1	DP1152241
183	DP755207	317	DP7661	7	DP8463	93	DP1131485
1	DP239629	316	DP7661	6	DP521787	248	DP1154986
2	DP239629	315	DP7661	8	DP8463	1	DP1147459
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3	DP758041	5	DP1097	B	DP363314	102	DP1149241
2	DP758041	4	DP1097	A	DP377510	101	DP1142064
6	DP758041	40	DP1097	2	DP207836	104	DP1149241

7	DP758041	36	DP1097	5	DP8463	7307	DP1158738
115	DP802471	2	DP1097	6	DP8463		SP22376
160	DP755207	1	DP1097	21	DP8463	7306	DP1159107
161	DP755207	14	DP1097	6	DP8463	63	DP1159769
157	DP755207	17	DP1097	5	DP8463	1	DP1160264
158	DP755207	36	DP1097	7	DP8463	1	DP1160370
132	DP622781	1	DP1097	8	DP8463		SP84878
2	DP758041	2	DP1097	9	DP8463	1	DP1163011
131	DP622781	326	DP614456	A	DP363314	7306	DP1164232
10	DP758041	2	DP609514	171	DP590690	7309	DP1164559
4C	DP376807	280	DP755207	6	DP8463	13	DP1164349
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4A	DP376807	100	DP778203	1	DP35144	17	DP1164349
5	DP758041	4	DP1097	5	DP8463	16	DP1164349
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301	DP755207	4	DP1097	2	DP8463	100	DP1165945
129	DP755207	19	DP1097	26	DP8463	7321	DP1166295
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294	DP755207	11	DP1097	9	DP8463	7320	DP1166295
32	DP557456	12	DP1097	2	DP405908	7327	DP1166380
31	DP557456	15	DP1097	B	DP336962	7329	DP1166478
10	DP239629	16	DP1097	12	DP8463	7319	DP1166061
213	DP755207	181	DP737273	1	DP405908	7326	DP1166356
175	DP755207	28	DP1097	13	DP8463	7325	DP1166356
9	DP758041	1	DP1097	17	DP8463	7317	DP1165927
8	DP758041	2	DP1097	16	DP8463	7318	DP1165927
194	DP755207	27	DP1097	14A	DP403486	7318	DP1165933
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156	DP755207	184	DP736658	B	DP362488	11	DP1031859
152	DP755207	6	DP1097	10	DP8463	616	DP817275
146	DP755207	15	DP1097	A	DP336962	7341	DP1169843
147	DP755207	14	DP1097		SP60681	7335	DP1170004
9	DP758041	4	DP1097	28	DP8463	7339	DP1170025
10	DP758041	5	DP1097	A	DP375563	582	DP1169870
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2	DP758041	12	DP1097	2	DP179011	7336	DP1170023
6	DP758041	315	DP246215	5	DP2707	7338	DP1170024
71	DP554514	82	DP32038	A	DP373015	373	DP723259
3	DP758041	83	DP32038	1	DP201410	1	DP1031859
3	DP239629	84	DP32038	2	DP201410	4	DP1031859
4	DP239629	1	DP214129	13	DP2707	1262	DP1178131
5	DP758041	305	DP237530		SP57867	1261	DP1178131
4	DP758041	304	DP237530	7	DP2707	221	DP1178616
3	DP758041	7	DP248036	6	DP2707	1181	DP1176049
7	DP758041	8	DP248036	1	DP21596	102	DP1179827
B	DP371352	9	DP248036	4	DP2707	3	DP1161004
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7	DP758041	11	DP248036	B	DP373015	2	DP1178325
5	DP758041	50	DP32038	A	DP356376		SP87901
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8	DP758041	189	DP32038	C	DP373015	1	DP1189594
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11	DP758041	10	DP32038	A	DP370711	2	DP1191521
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184	DP755207	113	DP32038	2	DP504925	92	DP1196843
187	DP755207	42	DP740081	C	DP375351	91	DP1196843
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2	DP758041	194	DP32038	14	DP20522	2	DP1199425
1	DP758041	319	DP246215	6	DP25414	1	DP1199425
9	DP758041	137	DP32038	7	DP25414	1	DP1198888
8	DP758041	136	DP32038	10	DP25414	100	DP1199273
219	DP755207	2	DP1097	11	DP25414		SP90339
51	DP622344	100	DP619083	12	DP20522	222	DP1202903
52	DP622344	10	DP1097	13	DP20522	221	DP1202903
164	DP755207	3	DP1097	6	DP20522	2	DP1203598
7	DP239629	13	DP1097	5	DP20522	1	DP1203598
8	DP239629	16	DP1097	B	DP369495	185	DP1203877
4	DP758041	14	DP1097	A	DP369495	801	DP1203404
7	DP758041	43	DP789644	7	DP20522	803	DP1203404
8	DP758041	1	DP1097	8	DP20522	802	DP1203404
192	DP755207	1	DP1097	9	DP20522	11	DP1205679
4	DP758041	2	DP1097	8	DP25414	100	DP1204269
3	DP758041	3	DP1097	9	DP25414	1	DP1202514
8	DP758041	17	DP1097	B	DP404402	412	DP1206749
9	DP758041	1	DP609514		SP68490	411	DP1206749
5	DP758041	2	DP734792	A	DP404402	477	DP1207251
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3	DP516039	9	DP1097	250	DP7661	473	DP1207251
2	DP758041	4	DP1097	255	DP7661	476	DP1207251
3	DP758041	176	DP32038	251	DP7661	478	DP1207251
702	DP1030918	111	DP32038	B	DP364049		SP91468
3	DP758041	10	DP1097	252	DP7661	100	DP1207804
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13	DP249535	250	DP243257	218	DP7661	1	DP1214744
191	DP755207	25	DP248036	217	DP7661		SP91893
148	DP755207	266	DP237530	5	DP521787	3191	DP1218840

159	DP755207	37	DP248036	4A	DP371847	3192	DP1218840
82	DP519603	7058	DP1052031	3	DP8463	333	DP1220757
3	DP758041	21	DP830179	2	DP8463	2	DP1222595
2	DP758041	5	DP247293	A	DP395841		SP94370
3	DP758041		SP45787	D	DP377510	11	DP1219994
9	DP758041	232	DP830653	2	DP12604	14	DP1219994
10	DP758041	11	DP834658	1	DP12604	13	DP1219994
6	DP758041	B	DP958843	5	DP12604	12	DP1219994
7	DP758041	5	DP21303	22	DP808578	100	DP1215739
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15	DP758041	6B	DP399970		SP44764	1	DP1226785
16	DP758041	3	DP28378	10	DP9140	100	DP1229489
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9	DP758041	4	DP28378	181	DP717209	102	DP1228040
10	DP758041	5	DP28378	5	DP17252		SP95697
5	DP758041	6	DP28378	4	DP17252	100	DP1212134
4	DP758041	7	DP28378	3	DP17252	51	DP1235297
10	DP758041	8	DP28378	19	DP2707	52	DP1235297
2	DP758041	7	DP247293	20	DP2707	261	DP1236050
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92	DP825387	15	DP755218	10	DP2707	1	DP1238442
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B	DP357869	16	DP755218	50	DP2707	1	DP1239109
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4	DP758041	7019	DP1050414	48	DP2707	3	DP28375
117	DP802471	7014	DP93169	47	DP2707	4	DP30502
118	DP802471	21	DP532058	10	DP25664	5	DP30502
14	DP758041	1	DP502590	11	DP2707	3	DP11573
10	DP758041	10	DP263605	12	DP2707	4	DP11573
4	DP758041	1	DP626824	9	DP2707	6	DP11877
5	DP758041	1	DP815846	10	DP2707	8	DP11877
8	DP758041	140	DP755218	8	DP12604	9	DP11877
4	DP758041	1	DP34358	18	DP2707	1	DP323051
3	DP758041	2	DP815846	8	DP2707	20	DP2707
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223	DP755207	139	DP755207	6	DP21596	46	DP2505
225	DP755207	2	DP503374	2	DP2707	40	DP2505
221	DP755207	207	DP844413	11	DP810245	15	DP2505
116	DP802471	206	DP844413	2	DP11877	5	DP2505
9	DP758041	249	DP844413	3	DP11877	6	DP2505
1	DP758041	211	DP844413	4	DP11877	37	DP9140
1	DP758041	212	DP844413	5	DP11877	11	DP2707
2	DP758041	227	DP844413	1	DP124234	A	DP958843
2	DP758041	226	DP844413	25	DP2707	3	DP201410
185	DP755207	225	DP844413	1	DP11877	9	DP25664
10	DP758041	228	DP844413	2	DP11403	2	DP25664
9	DP758041	250	DP844413	5	DP21596	7	DP8463
1	DP758041	1	DP442777	21	DP2707	8	DP8463
11	DP758041	1	DP443098	22	DP2707	9	DP8463
7	DP758041	1	DP106780	21	DP2707	18	DP8463
2	DP758041	15	DP264234	2	DP8636	10	DP8463

1	DP758041	14	DP264234	A	DP342824	296	DP7661
10	DP758041	13	DP264234	5	DP8636	305	DP7661
5	DP758041	862	DP528641	6	DP8636	285	DP7661
12	DP758041	861	DP528641	1	DP2505	311	DP7661
13	DP758041	85	DP755207	2	DP2505	269	DP7661
7	DP758041	208	DP844413	49	DP2505	268	DP7661
10	DP758041		SP48514	3	DP2505	21	DP35890
162	DP755207	21	DP734860	392	DP727724	20	DP35890
24	DP8636	332	DP551568	264	DP7661		SP62894
23	DP8636	8	DP31028	241	DP7661	216	DP7661
34	DP8636	4	DP28375	242	DP7661		

Appendix B – EIS Scoping worksheet

Appendix C – SIA Scoping worksheet

Social impact assessment (SIA) scoping worksheet for:			Newstan Mine Extension Project				Date:		Apr-19	
Scoping results from EIS Worksheet						Is there a social impact?		What information will be required to assess the social impact?		
Social and environmental matters Click on a matter below for brief description, or refer to full glossary			Outline of impact (Auto fill from EIS worksheet)	Is a material effect on the matter expected? (Auto fill from EIS worksheet)	Is there community or other stakeholder concerns regarding the impact or activity? (Auto fill from EIS worksheet)	With regard to the matter expected to be impacted, will there be a social impact? Select this cell for brief description, or click link above for further detail		Are impacts on the matter expected to require a non-SIA specialist study? (Auto fill from EIS worksheet, then manually enter non-SIA report type)	Will the non-SIA specialist study address the social impact? Click on link above for further detail on potential classifications (Select from list)	Level of assessment for the social impact in the SIA Click on link above for further detail on potential classifications (Auto fills)
						Yes/No (Select from list)	If yes, outline the social impact (Manual entry, if not already covered in column D) If no, outline why (Manual entry)			
What does the proposal mean for people?	AMENITY	acoustic	Noise at NCL will increase however will comply with existing limits. Construction and operational noise (e.g. traffic, vent fan) is likely to impact Awaba community	Yes	Yes	Yes	Amenity	Noise Impact Assessment	Yes - in part	Standard SIA
		visual	Gas flares and Awaba infrastructure	Yes	Yes	Yes	Amenity	Visual Impact Assessment	Yes - in part	Standard SIA
		odour	Ventilation Fans at Newstan and Awaba	Yes	Yes	Yes		Yes - enter generic title	Yes - in part	Standard SIA
		microclimate								
		other - please specify								
	ACCESS	access to property	No change to land use zonings / access however there may be some restriction to access due to subsidence. Awaba construction activities may affect road access.	Yes	Yes	No	Need to describe that the mine will not restrict access to land	SIA / EIS	Yes - in part	No SIA required
		utilities	All considered in mine design	Yes	Yes			Yes - enter generic title	Yes - fully	Desktop SIA
		road and rail network	No impact to northern railway - considered in mine design	Yes	Yes			Yes - enter generic title	Yes - fully	Desktop SIA
		offsite parking							Yes - fully	Desktop SIA
		other - please specify								
	BUILT ENVIRONMENT	public domain	Crown Land	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		public infrastructure	Rail Line and Crown Roads	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		other built assets	Public infrastructure e.g. Eraring Power Station, transmission lines etc.	Yes	Yes			Yes - enter generic title	Yes - fully	Desktop SIA
		other - please specify	Need to confirm impact on surrounding landuses	Yes	Yes	Yes	Need to confirm impact on surrounding land uses (if any)	SIA / EIS	Yes - in part	Standard SIA
	HERITAGE	natural	Need to confirm impact on items of natural heritage	Yes	Yes	Yes	Need to confirm impact on items of heritage	Heritage Impact Assessment	Yes - in part	Standard SIA
		cultural	Need to confirm impact on cultural heritage	Yes	Yes		Need to confirm impact on items of heritage	Heritage Impact Assessment	Yes - in part	Standard SIA
		Aboriginal cultural	Need to confirm impact on Aboriginal cultural heritage	Yes	Yes		Need to confirm impact on Aboriginal heritage items	Aboriginal Cultural Heritage Assessment	Yes - in part	Standard SIA
		built	Need to confirm impact on items of built heritage	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		other - please specify								
	COMMUNITY	health	Air quality and noise impacts	Yes	Yes	Yes	Amenity / health	Air Quality Impact Assessment	Yes - in part	Standard SIA
		safety	Impacts from subsidence (e.g. cracking / sink holes) that may restrict access	Yes	Yes	Yes	Safety / restrict access	Subsidence Impact Assessment	Yes - in part	Standard SIA
		services and facilities	Any extra demand arising from increased employment negligible within a regional context	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		housing	Potential for opposition	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		cohesion, capital and resilience								
		other - please specify								
	ECONOMIC	natural resource use								
		livelihood	Positive wage effect and multipliers	Yes	Yes	Yes	Positive economic contribution	Economic Impact Assessment	Yes - fully	Desktop SIA
		business opportunity								
		other - please specify								
s the proposal mean for the natural environment?	AIR	particulate matter	Air quality - stockpiles, fan	Yes	Yes	Yes	Air quality impacts - also include Fassifern, Blackalls Park communities and local schools	Air Quality Impact Assessment	Yes - in part	Standard SIA
		gases	Flares	Yes	Yes	Yes	Determine impact of flares	Air Quality Impact Assessment	Yes - in part	Standard SIA
		atmospheric emissions	GHG	Yes	Yes	Yes	GHG Emissions	GHG Assessment	Yes - in part	Standard SIA
		other - please specify								
	BIODIVERSITY	native vegetation	Clearing of undisturbed sites not planned	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		native fauna	Clearing of undisturbed sites not planned	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		other - please specify								
	LAND	stability and/or structure	Subsidence	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		soil chemistry	Sediment and erosion	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		capability	No change in land use	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		topography	Change to creek lines / flows	Yes	Yes			Yes - enter generic title	Yes - in part	Standard SIA
		other - please specify								
		water quality	Erosion to Stony, Kilaben and Stockyard Creeks	Yes	Yes	Yes	Erosion to creeks	Surface Water Impact Assessment	Yes - in part	Standard SIA

Social impact assessment (SIA) scoping worksheet for:			Newstan Extension				Date:		Apr-19		
Scoping results from EIS Worksheet						Is there a social impact?		What information will be required to assess the social impact?			
Social and environmental matters Click on a matter below for brief description, or refer to full glossary			Outline of impact (Auto fill from EIS worksheet)	Is a material effect on the matter expected? (Auto fill from EIS worksheet)	Is there community or other stakeholder concerns regarding the impact or activity? (Auto fill from EIS worksheet)	With regard to the matter expected to be impacted, will there be a social impact? Select this cell for brief description, or click link above for further detail		Are impacts on the matter expected to require a non-SIA specialist study? (Auto fill from EIS worksheet, then manually enter non-SIA report type)	Will the non-SIA specialist study address the social impact? Click on link above for further detail on potential classifications (Select from list)	Level of assessment for the social impact in the SIA Click on link above for further detail on potential classifications (Auto fills)	
						Yes/No (Select from list)	If yes, outline the social impact (Manual entry, if not already covered in column D) If no, outline why (Manual entry)				
What does	WATER	water availability	Subsurface inflows	Yes	Yes	Yes	Inflow to workings (e.e Awaba)	Surface Water Impact Assessment	Yes - in part	Standard SIA	
		hydrological flows	Change in flow and ponding at Stony, Kilaben and Stockyard Creeks	Yes	Yes	Yes	Flood and ponding	Ground Water Impact Assessment	Yes - in part	Standard SIA	
		other - please specify									