PRELIMINARY ENVIRONMENTAL ASSESSMENT: Airly Mine Extension Project (SSD 5581)

Secretary's Environmental Assessment Report
Section 89E of the *Environmental Planning and Assessment Act 1979*

August 2015

Cover Photograph: View from Genowlan Mountain northeast to Genowlan Point and the Capertee Valley beyond.

August 2015
NSW Department of Planning & Environment
www.planning.nsw.gov.au

EXECUTIVE SUMMARY

Airly Coal Mine (Airly) is an underground coal mine located in the Western Coalfields of NSW, approximately 40 kilometres (km) north-northwest of Lithgow. Airly is operated by Centennial Airly Pty Ltd, which is a wholly owned subsidiary of Centennial Coal Company Ltd (Centennial).

Airly's existing development consent DA162/91 was granted in 1993, allowing extraction of up to 1.8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal, processing of this coal and dispatch of product coal by rail to domestic and export markets. Trial mining at Airly was undertaken from 1998 to 2002, followed by a period of care and maintenance. The construction of surface facilities was completed in 2009 followed by the first full-scale production of coal in that year. A second period of care and maintenance occurred from January 2013 through to March 2014.

In 2011, the land overlying the approved mining area was declared the Mugii Murum-ban State Conservation Area (SCA). The boundaries of the SCA are generally situated around the mesas of Mount Airly and Genowlan Mountain. These landforms are characterised by high sandstone cliffs and pagodas. The Gardens of Stone National Park (NP) is located to the south of the Mugii Murum-ban SCA and forms part of the Greater Blue Mountains World Heritage Area (GBMWHA).

Centennial proposes to extend Airly's life by 25 years from 2015, including 20 years of mining followed by five years of post-mining decommissioning and rehabilitation. This proposal includes extending mining to the east into A232, increasing employment up to a maximum of 135 full-time employees during operations, constructing a new coal preparation plant, ROM coal stockpile, reject emplacement area and upgrading existing facilities.

The proposed development is State significant development under Section 89C of the *Environmental Planning & Assessment Act 1979* (EP&A Act) as it is 'development for the purposes of coal mining' which is identified in clause 5 of Schedule 1 to *State Environmental Planning Policy (State and Regional Development) 2011.* As more than 25 public submissions in objection were received, the Planning Assessment Commission must determine the application in accordance with the Minister's delegation dated 14 September 2011.

The Airly proposal was also declared to be a 'controlled action' under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as it was likely to have a significant impact on listed threatened species and communities, World Heritage properties, National Heritage places and water resources. Under the updated bilateral agreement between the Commonwealth and NSW Governments (February 2015), the Department must undertake an assessment of these potential impacts under Part 4 of the EP&A Act and make a recommendation to the Commonwealth Minister on whether the controlled action should be approved under the EPBC Act.

The Department made the Environmental Impact Statement which accompanied the development application publicly available from 19 September until 31 October 2014. The Department received 178 submissions on the project, including 11 from public agencies, 12 from special interest groups (including nine in objection and three in support) and 155 from the public. Of the submissions received from the public, 34 were in objection and 121 were in support.

Centennial submitted a Response to Submissions (RTS) on 4 February 2015, which was made publicly available on the Department's website. Supplementary information including an ecotoxicology assessment and revised economic impact assessment were received in March and April 2015. Residual issues from agencies were subsequently addressed by Centennial submitting supplementary information which focussed on the proposed mining system and adequacy of the proposed Cliff Line Zone to protect cliffs, water discharges to Airly Creek and downstream impacts, mining underneath the critically endangered *Pultenaea* sp. Genowlan Point (*Pultenaea*) and the *Genowlan Point Allocasuarina nana Heathland* endangered ecological community (Heathland EEC) and clearing of a small area of poor-quality *White-Box-Yellow-Box-Blakely's Red Gum and Derived Native Grasslands* critically endangered ecological community.

The Department considers that the key issues of the proposed Airly Mine Extension Project relate to:

- subsidence impacts on the surface features and conservation values of the Mugii Murum-ban SCA including cliff lines, steep slopes, pagodas and gorges, and the critically endangered *Pultenaea* and Heathland EEC;
- impacts arising from the discharge of mine-water on the downstream environment of the Gardens of Stone NP, within the GBMWHA; and
- whether the project would generate a socio-economic benefit to the local Lithgow region and the State of NSW.

The Department believes that Centennial's proposed mining system, which involves the use of partial extraction methods with the retention of long-term stable pillars, would provide sufficient protection to surface features and water resources on the site. Mining subsidence would be limited to <125 mm/m. An exception would apply to mining beneath the old workings of the former New Hartley oil shale mine (the 'Interaction Zone') where greater levels of subsidence of between 200 and 500 mm are predicted, depending on the condition of the former workings and the extent and width of existing mining voids. Despite this, sufficient protection would be provided to nearby cliffs in the form of an extended setback to second workings. Minor reductions in catchment runoff would occur in first order drainage lines feeding Gap Creek and some further cracking to nearby pagodas is expected.

Outside of the Interaction Zone, subsidence impacts are not expected to result in unacceptable impacts to steep slopes, pagodas, gorges, Aboriginal and European heritage or biodiversity values. The Department accepts that potential impacts to the visually significant sandstone cliffs are likely to be avoided through Centennial's conservative mine plan and has recommended the imposition of a performance measure requiring Centennial to ensure that mining results in no more than 2% damage to the cliff face area (ie occasional rock falls, displacement or dislodgment of boulders, or fracturing). Centennial would be required to implement adaptive management techniques, based on a program of ongoing monitoring of past mined areas, to ensure that this performance measure is achieved.

Impacts on groundwater aquifers are expected to be avoided and/or minimised by limiting sub-surface fracturing through narrow void widths and leaving coal in the form of long-term stable coal pillars. No impacts are predicted to the highly-productive regional groundwater source which supplies some bore water users in the Capertee Valley.

The consequence of any subsidence impact on the critically-endangered *Pultenaea* and Heathland EEC is likely to be high as Genowlan Point is the only known location for both this species and EEC. However, the Department considers the risk of any such impact is low. This is particularly the case for *Pultenaea*, since Centennial proposes to only undertake first workings within the Cliff Line Zone where it is found. The Department considers that this risk can be further reduced by requiring the Extraction Plan process (which ordinarily only applies to second workings) to also apply to the Cliff Line Zone.

Small volumes of mine-water would be discharged into Airly Creek (annual average of 76 megalitres/year under peak conditions in 2030). Water balance modelling predicts that mine-water discharges would occur only during high rainfall events or prolonged wet periods when additional catchment runoff would reduce the total proportion of mine-water within stream flows and limit potential impacts from discharges entering the Gardens of Stone NP. As mining progresses and groundwater inflows to the mine increase, the quality of water held in the mine's water management system would improve, reducing potential impacts on the downstream environment.

The Department considers that mine-water would be unlikely to result in a greater-than-negligible impact on the downstream aquatic environment within the Gardens of Stone NP. The EPA has advised the Department of its intention to include special conditions in Airly's Environment Protection Licence requiring event-based monitoring and ecotoxicology assessments of water in Airly Creek, during discharges, to ensure that a sufficient level of protection is maintained during the mine's operations. No impacts would occur to the Wollemi NP, which is also part of the GBMWHA, approximately 35 km downstream, as discharged water would constitute a negligible proportion of overall stream flows by the time it reaches this point.

The Department has carefully weighed the residual impacts of the project against its social and economic benefits. This has been informed by expert advice from the Centre for International Economics.

The Airly Mine Extension Project would result in significant social and economic benefits for both the local area as well as the State. These benefits include:

- continued direct employment of 59 employees, increasing up to 135 under full operating conditions;
- employment of an additional 30 full-time equivalent contractors during construction;
- indirect employment of an estimated 550 people across NSW;
- community contribution of up to $200,000 to Lithgow City Council (to reflect three Centennial mines in the Lithgow region);
- a minimum of $80 M to the State in royalty revenue (net present value); and
- $14.8 M in Commonwealth, State and local tax revenue (net present value).

Having considered the costs and benefits of the project, the Department is satisfied that it would deliver economic benefits to the local region and NSW, while avoiding and minimising environmental impacts. Consequently, the Department considers that the Airly proposal is in the public interest and should be approved, subject to strict conditions.

1. INTRODUCTION

Airly Coal Mine (Airly) is an underground coal mine located in the Western Coalfields of NSW, approximately 40 kilometres (km) north-northwest of Lithgow in the Lithgow local government area (LGA) (see **Figure 1**). Airly is operated by Centennial Airly Pty Ltd, which is a wholly owned subsidiary of Centennial Coal Company Ltd (Centennial).

Airly is approved to extract up to 1.8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal, process this coal in a coal handling plant and dispatch product coal by rail to domestic and export markets. The Airly pit top is situated to the north of Glen Davis Road which runs off the Castlereagh Highway. Coal is extracted from the Lithgow Seam using bord and pillar mining methods, processed in the coal handling plant and stockpiled prior to being transported off-site by rail. A rail spur and balloon loop connects the pit top to the Wallerawang-Gwabegar railway line.

In 2011, the land overlying Airly's mining area was declared as the Mugii Murum-ban State Conservation Area (SCA). The boundaries of the SCA are generally situated around Mount Airly and Genowlan Mountain (see **Figure 2**). These two vegetated mesas are dissected by a sandstone gorge, through which Gap Creek runs. The topography around the mesas is steep and rugged and generally characterised by high cliffs, deeply incised gorges, steep slopes and rock outcrops such as pagodas.

The Development Application area (site) is in the Capertee River catchment which is part of the Greater Hawkesbury/Nepean catchment. The Capertee River flows in a southeast direction to its confluence with the Wolgan River to form the Colo River which ultimately joins the Hawkesbury River which empties into Broken Bay. Four ephemeral creek systems drain the site including Emu Swamp, Gap-Genowlan, Torbane-Oaky and Airly-Coco Creeks. Airly Creek enters the Gardens of Stone NP south of the site before joining Coco Creek and the Capertee River. All other watercourses generally drain to the northeast into the Capertee River which enters the Wollemi NP approximately 35 km to the east.

The Capertee National Park (NP) is situated to the north of the mine, Capertee Valley to the east, the Gardens of Stone NP to the south and the Wallerawang-Gwabegar railway line to the west. Both the Gardens of Stone NP and Wollemi NP are part of the Greater Blue Mountains World Heritage Area (GBMWHA).

Land uses in the vicinity of Airly include rural residential, agriculture and grazing, underground coal mining, coal handling infrastructure, historic mining cultural heritage, transport infrastructure, commercial forestry, recreation (including tourism) and nature conservation. The Excelsior limestone quarry operated by Sibelco Australia is situated approximately 5 km to the northwest and the village of Capertee is located 5 km to the southwest of Airly's pit top. The nearest urban centre is Lithgow which serves the higher order retail, commercial and professional service needs of the region.

The majority of land on the site is owned by the National Parks and Wildlife Service (NPWS) with most of the remainder owned by Centennial. A privately-owned residence known as 'Stone Cottage' is located in Airly Gap, across from the Airly camp ground. The Ribbaux family hold permissive occupancy rights over the NPWS-owned Nissen Hut, located on Genowlan Mountain. Another privately-owned residence is located on the southern boundary of the site. Outside of the site, privately-owned residences are generally located to the west of the surface facilities near the railway line and to the southwest around the village of Capertee (see **Figure 3**).

Centennial acquired Airly in 1997 and completed the construction of surface facilities and infrastructure in 1998, so as to enable commencement of trial mining. Airly was placed in care and maintenance in 2002 following the completion of this trial mining. The first full-scale production of coal took place in December 2009. Airly was again placed on care and maintenance from January 2013 until February 2014. In October 2014, the Planning Assessment Commission approved a modification which allowed the extension of Airly's mine life until 31 October 2015 while the Environmental Impact Statement (EIS) for the Airly Mine Extension Project (Airly proposal) underwent assessment.

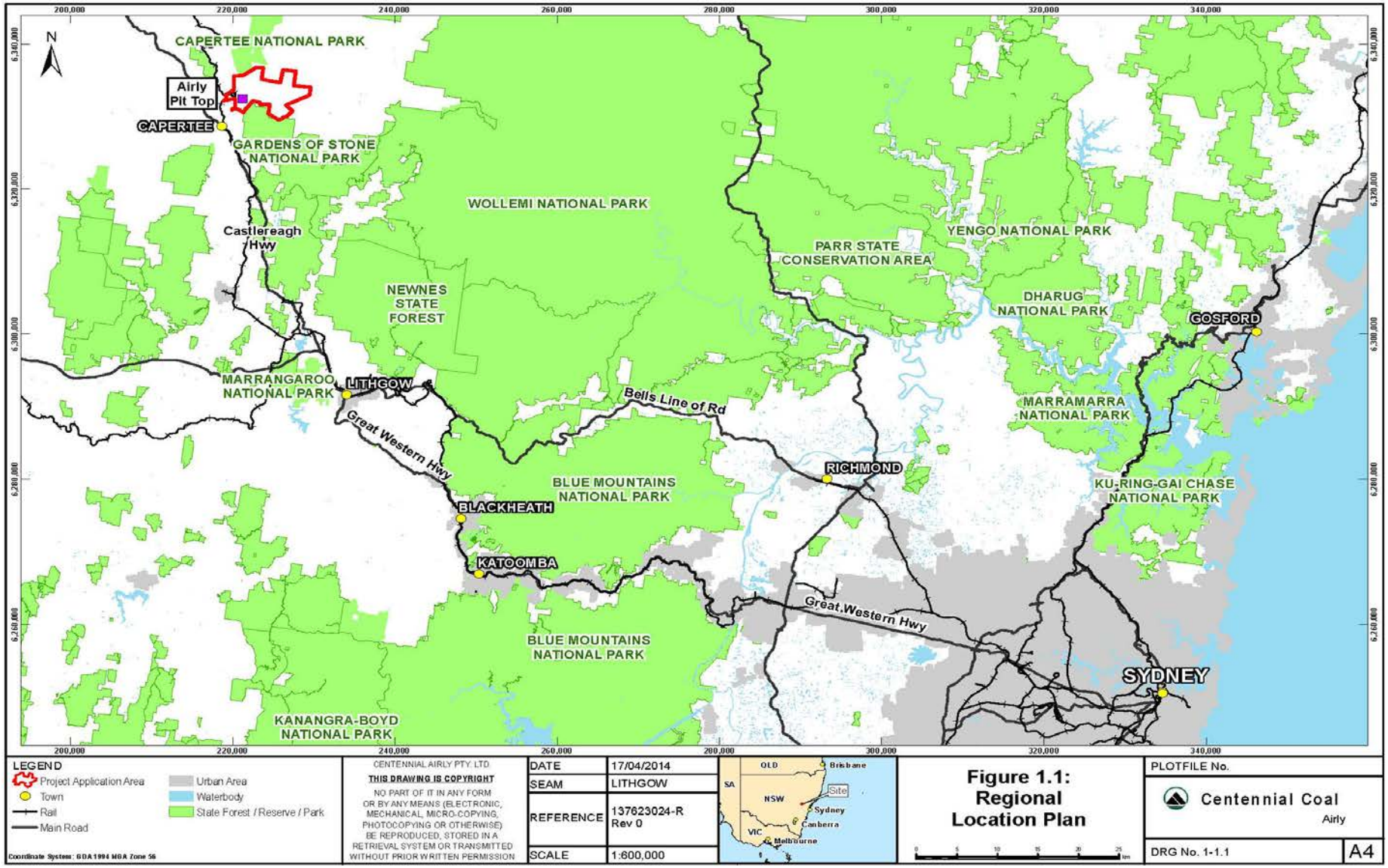

***Figure 1**: Regional location of Airly coal mine*

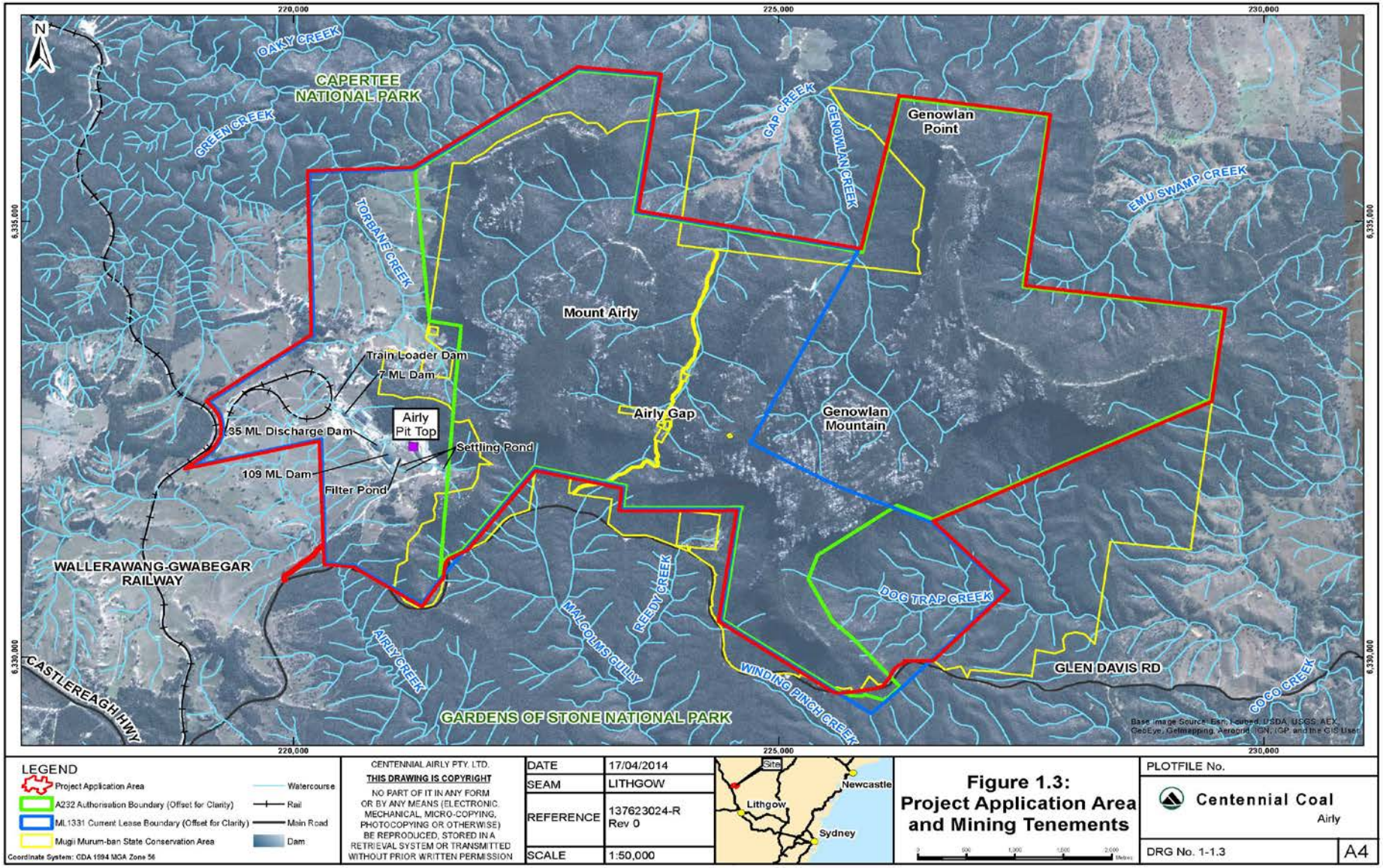

***Figure 2**: Development application area, mining titles and boundary of the Mugii Murum-ban SCA*

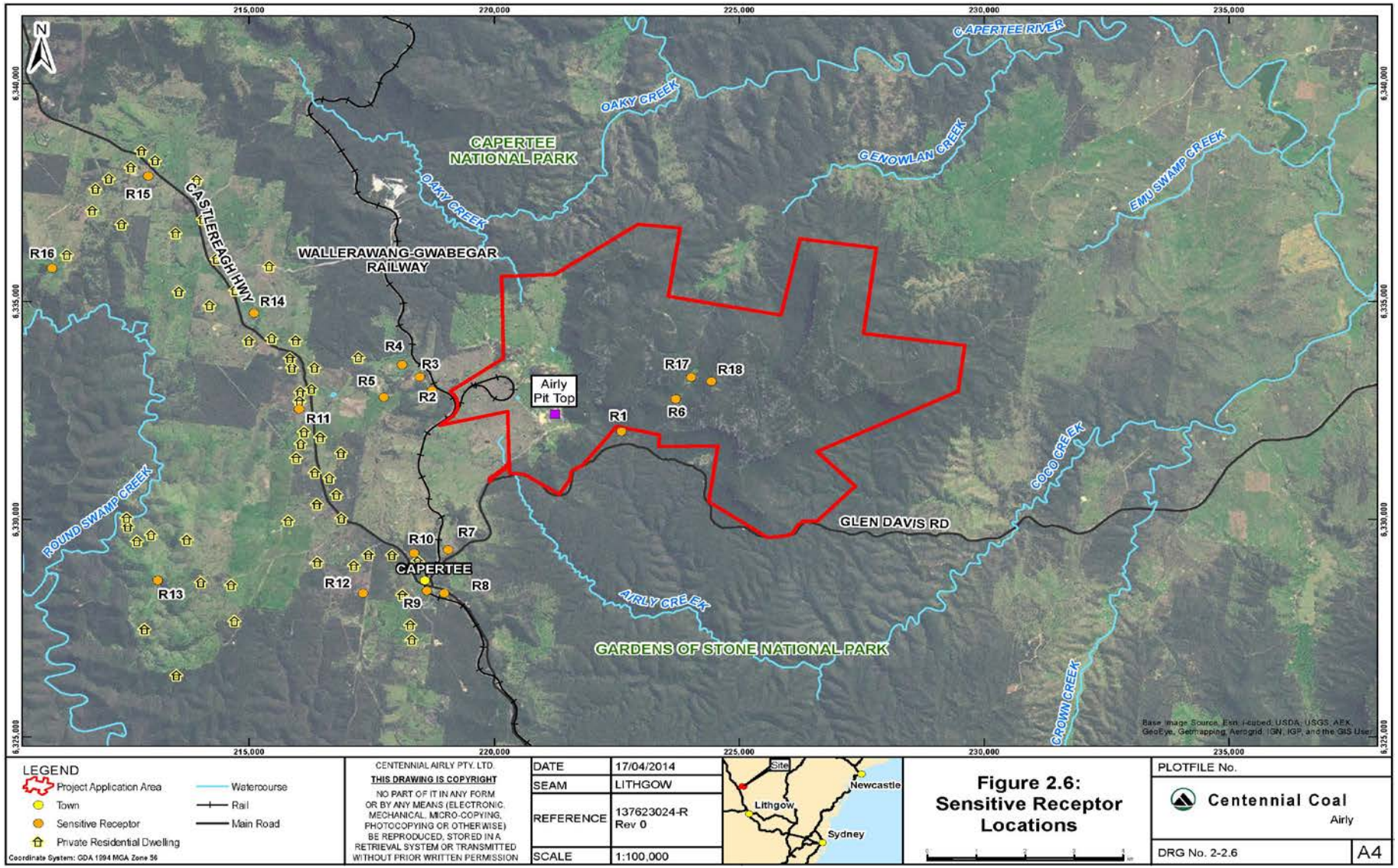

Figure 3: *Privately-owned dwellings and sensitive receptors in relation to Airly coal mine*

2. PROPOSED DEVELOPMENT

The proposal seeks to extend the life of the Airly mine by 25 years, including 20 years of mining followed by 5 years of post-mining decommissioning and rehabilitation. The area of mining would also be extended east from the current mining lease (ML1331) into an exploration licence area (Authorisation Area 232 or A232), subject to approval from the Minister for Resources and Energy. The mine would maintain the existing maximum rate of extraction (1.8 Mtpa) and a new coal preparation plant, ROM stockpile and reject emplacement area would be constructed. Upgrades to other existing infrastructure and facilities would be undertaken where necessary.

The key components of the Airly proposal are outlined in **Table 1** below and existing and proposed surface infrastructure is shown in **Figure 4.**

Table 1: *Key components of the Airly proposal*

Aspect	*Existing Approval*	*Proposed Development*
Development Application Area	ML1331 boundary.	Continue mining in ML1331 and extend east into A232.
Rate of Production	1.8 Mtpa of ROM coal.	No change.
Mine Life	Existing consent (DA162/91) lapses on 31 October 2015.	Extend the life of mine by 25 years from 2015 to 2040, including 20 years of mining and 5 years post-mining decommissioning and rehabilitation.
Hours of Operation	24 hours per day, 7 days per week.	No change.
Operational Workforce	Maximum of 120 employees with current workforce of 59.	• Up to 135 employees with 20 full-time equivalent (FTE) contract positions over the life of the mine; and • 30 FTE contract positions during construction and development in Year 1.
Mine Method and Design	Bord and pillar mining subject to: • No mining in the 50 metre (m) coal barrier (measured horizontally from the outcrop); • First workings only where the depth of cover is less than 50 m; • Partial pillar extraction only beneath Environmental Protection Zones; and • Full extraction outside of Environmental Protection Zones, with supercritical void widths.	Bord and pillar mining subject to: • No mining in the 50 m coal barrier (measured horizontally from the outcrop); • Method of extraction varies to manage subsidence impacts on key environmental features, based on five mining zones, comprising: o Panel and Pillar Mining Zone (PPMZ); o Cliff Line Zone of first workings; o Partial Pillar Extraction Zone (PPEZ); o Shallow Zone; and o New Hartley Mine Interaction Zone ('Interaction Zone').
Subsidence Limits	• Maximum vertical subsidence limit of 1.8 m; • Maximum tensile strains of 25.5 millimetres/metre (mm/m); • Maximum compressive strains of 42.5 mm/m; and • Maximum tilt of 85 mm/m.	• Maximum subsidence levels in all mining zones (except the Interaction Zone): o vertical subsidence limit of 125 mm; o maximum strains of 2 mm/m; and o maximum tilt of 2.5 mm/m. • Maximum subsidence levels in the Interaction Zone: o vertical subsidence of 500 mm; o maximum strains of 1.8-8.3 mm/m; and o maximum tilts of 6.2-16.7 mm/m.
Exploration Activities	Ongoing exploration activities undertaken in A232.	No change.
Underground Mine Access	A series of portals at the pit top box cut; and an eastern portal southwest of Mount Genowlan.	No change to the existing pit top access. Construction of the eastern portal is no longer proposed.
Pit Top Infrastructure	• Bathhouse, office and assembly building; • Wash-down facilities, workshop and service building; • Workforce, materials and	• Construction of new: o workshop, stores building, bulk storage yard, cable store and compressor building; o fire station;

Aspect	*Existing Approval*	*Proposed Development*
	ventilation portals, store building and training centre; • Bulk storage area, cable store; • Potable water provision and sewage treatment plant; • Hardstand areas, haul roads, car-parking areas and helicopter pad; • Diesel, fuel and oil storage and refuelling facilities; • Fire station and associated fire-fighting equipment; • Water management structures; • Compressor room, main fan; and • Electrical distribution network.	o above-ground refuelling facility for pit top and underground fleet; o additional effluent treatment tank; o electricity distribution network and communications for new development; o internal travel roads; o rejects bin, internal haul road and additional conveyors for REA; and o site security gate; • Upgrade existing train refuelling station; and • Minor upgrades to existing facilities.
Coal Destination	Domestic and export steaming coal.	No change.
Coal Stockpile	• 200,000 tonne (t) product coal stockpile. • 30,000 t emergency ROM coal stockpile.	An additional 40,000 t ROM coal stockpile near the proposed CPP.
Coal Handling and Preparation Plant (CHPP)	Approval to construct a CHPP with a capacity of 500 t per hour. Only the coal handling component of the CHPP has so far been constructed.	Construction of the coal preparation plant (CPP) component of the CHPP, equipped with a water recycling facility.
Reject Management	4.3 Mt coarse reject emplacement area (REA) and tailings dam (not constructed).	Construction of a life-of-mine REA near the CPP with capacity of 5.2 million cubic metres (Mm^3).
Train Loading	A balloon loop, train load out facility and rail surge bin.	No change.
Product Coal Transport	All coal to leave the site by rail.	No change.
Ventilation	• Ventilation fans for air exhaust (located within the northern-most adit); and • Ventilation facilities at the eastern portal.	• No change at the northern-most adit. • Construction of ventilation facilities at the eastern portal is no longer proposed, as the eastern portal will now not be constructed.
Water Management	• Manage and treat dirty water through a system of sediment and storage dams; • Divert clean water, collecting some for use in mining activities; • Process water supplemented by a production bore; and • Effluent treated through an on-site system.	• Modifications to existing system to accommodate new infrastructure requirements; • Construction of a run-off dam for the new REA and connection into the existing water management system; and • Additional water tank installed at the effluent treatment system.
Rehabilitation	• Progressive rehabilitation, creation of stable final landform to be integrated with surrounding landforms. • Final landform does not prevent alternative land use.	No change. However, revised strategy includes decommissioning and rehabilitation of new infrastructure and site facilities, such as the CPP, ROM coal stockpile and REA.

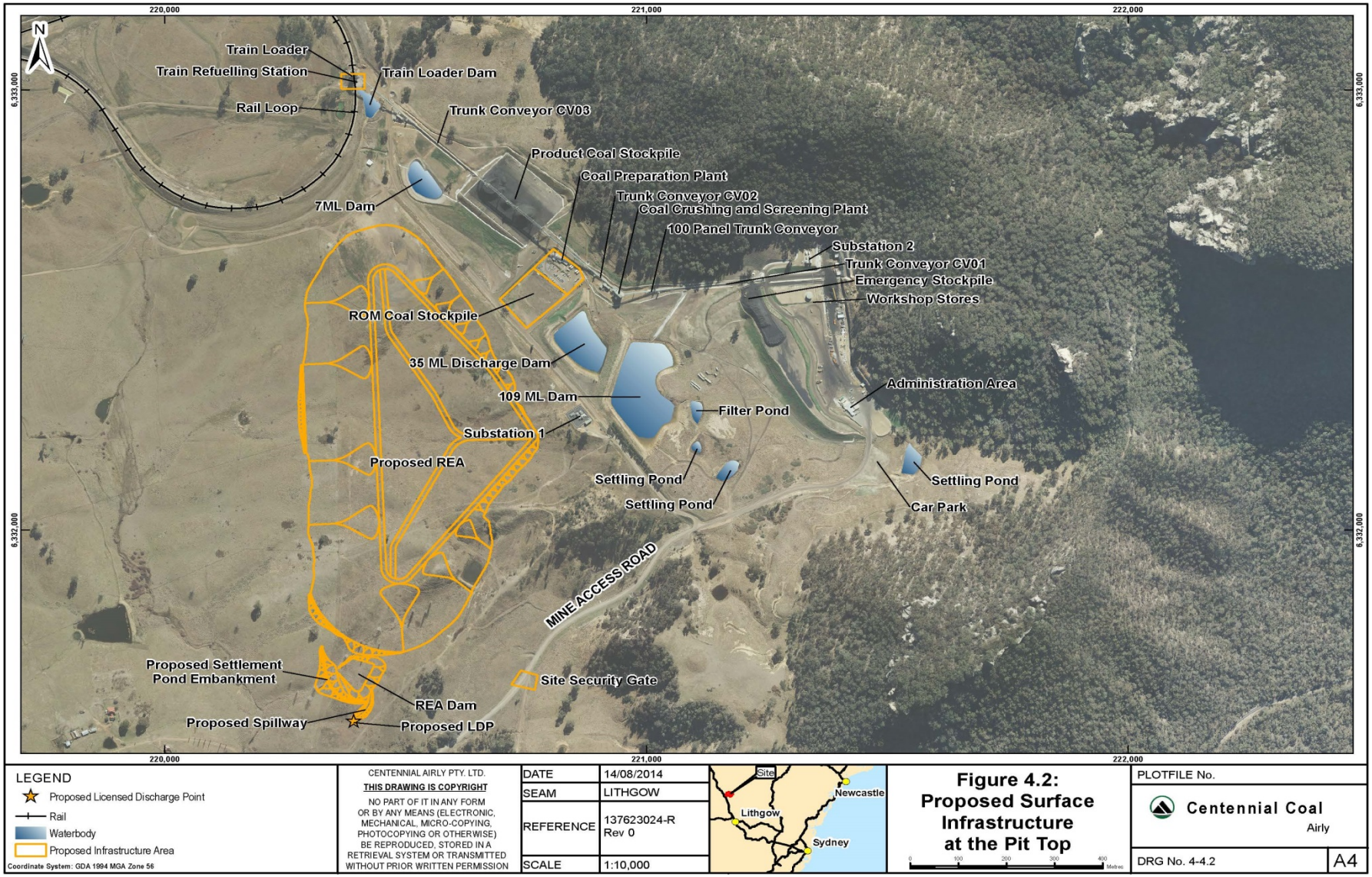

Figure 4: *Existing and proposed pit top infrastructure*

3. STRATEGIC CONTEXT

3.1 Land Use and Population

The Airly pit top and associated coal mining infrastructure is located approximately 5 km northeast of the village of Capertee. The village had a population of 180 in the 2011 census. The area surrounding Airly is characterised by grazing and agricultural land use on the lower terrain, some rural residential properties to the west of the pit top and recreational and conservation activities in the nearby national parks and SCA.

The population in the Lithgow LGA is generally focussed around the urban centre of Lithgow, with the two smaller centres of Wallerawang and Portland providing regional services. Demographic trends identified in the EIS (see **Appendix A**) included young people leaving the area, possibly in search of employment and education opportunities, together with an increase in older people (retirees) moving into rural residential areas such as the Capertee Valley in search of a 'tree-change'.

The Lithgow LGA has a long history of coal mining, electricity generation and industrial enterprises, along with agriculture and forestry. Although there is growing tourism and recreation in the region, mining continues to make a significant contribution to the regional economy and is second only to the retail sector in terms of employment generation (2006 census data).

At the turn of the 20th century, oil shale mining was undertaken at the nearby New Hartley and Genowlan Mines (herein referred to collectively as the New Hartley Mine). The oil shale was refined into petroleum at the Torbane retorts which were fuelled by coal extracted from the Lithgow Seam in the nearby Torbane Colliery. A new village of Airly was planned in Airly Gap to support this mining activity. However, development instead took place more informally along the steep slopes beneath the cliff lines, near the main tunnels and adits. The remnants of past mining heritage are identified as of local significance and are included on the non-statutory register of the National Trust.

3.2 Natural Environment

The site is situated on the northern edge of the Western Coalfield where the high sandstone terrain of the Blue Mountains breaks up into separate mesas and ridges. The Mugii Murum-ban SCA is characterised by the mesa complex of Mount Airly and Genowlan Mountain which sits on the western edge of the Capertee Valley. The SCA contains a number of features including high sandstone cliffs, extensive and intricate pagoda clusters, gorges, canyons and unusual rock formations. These features are considered by the Office of Environment and Heritage (OEH) to create a visual landscape of high scenic value, in its Statement of Management Intent for the SCA. Additional values include the presence of threatened species and native vegetation, cultural importance to some Aboriginal stakeholders, historic ruins from past oil shale mining and opportunities for public recreation. An important distinction between a national park and SCA is that mineral and petroleum exploration and mining may be permitted in a SCA.

3.3 Local Geology

The Lithgow Seam in the Illawarra Coal Measures is the target of coal mining at Airly. The seam outcrops around the edges of the Mount Airly and Genowlan mesas. These mesas are dissected by Gap Creek and the upper reaches of Genowlan Creek; both of which drain to the Capertee River to the northeast. The Lithgow Seam is overlain by approximately 105 m of Permian-age rock strata comprising lower quality coal seams (such as the Lidsdale Seam), claystones and sandstones. Around 200 m of Triassic-age sandstone of the Narrabeen Group sits above the Permian strata with some basalt deposits at the surface. Beneath the Lithgow Seam are interbedded layers of siltsone and sandstone of the Shoalhaven Group, underlain in turn by the regional metamorphic rocks of Devonian age.

3.4 Built Environment

The built environment is largely limited to the remnants of mine infrastructure from the past oil shale mining operations as well as contemporary mine infrastructure around the Airly pit top. Other built features include the Genowlan Trig Station, an emergency services communication tower and associated infrastructure on Genowlan Mountain, Nissen Hut and small outbuilding, one cottage in the Airly village site and another at the southern end of Airly Gap, a copper telecommunication cable and unsealed roads.

3.5 Strategic Regional Land Use Policy

The State-wide *Strategic Regional Land Use Policy* (SRLUP) aims to balance growth in the mining industry with the protection of important agricultural land and water resources. The SRLUP package includes the *NSW Aquifer Interference Policy* (AIP), which contains strict requirements for assessing potential impacts of mining projects on water resources, with clear criteria for judging the acceptability of these impacts. Centennial has assessed the potential water impacts of the Airly proposal against the provisions of the AIP in the EIS. This has been considered by the Department in Section 6 below.

4. STATUTORY CONTEXT

4.1 State Significant Development

The proposed development is declared to be State significant development under section 89C of the EP&A Act as it is 'development for the purposes of coal mining' in accordance with clause 8 and Schedule 1 (item 5) of *State Environmental Planning Policy (State and Regional Development) 2011.*

Consequently, the Minister for Planning is the consent authority for the development. However, as more than 25 public submissions in objection have been received (see **Appendix B**), the Planning Assessment Commission (PAC) must determine the application in accordance with the Minister's delegation of 14 September 2011.

4.2 Permissibility

The proposed development is located in the Lithgow LGA. The *Lithgow Local Environmental Plan 2014* (Lithgow LEP 2014) was gazetted on 19 December 2014. As this development application was made prior to the commencement of this plan, it must be determined as if this plan had not commenced, in accordance with savings provisions under Clause 1.8A of the Lithgow LEP 2014. Therefore, the relevant LEPs applying to the site are the *Lithgow City Local Environmental Plan 1994* (Lithgow LEP) and the *Rylstone Local Environmental Plan 1996* (Rylstone LEP).

Under the Lithgow LEP, the land on which the project is located is zoned Rural (General) 1(a). A small portion of land in the northeastern part of the site is zoned 1(a) (General Rural) under the Rylstone LEP. Development for the purpose of mining is permissible with consent in the Rural (General) 1(a) zone of the Lithgow LEP and the 1(a) (General Rural) zone under the Rylstone LEP.

The proposal is also a permissible land use under clause 7(1) of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*, which allows underground mining to be carried out on any land.

4.3 Requirements of the EP&A Act

Objects of the Act

The Minister is required to consider the objects of the EP&A Act when making decisions under the Act. The objects of most relevance to the Minister's decision on whether or not to approve the development are:

(a) to encourage:
- *(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
- *(ii) the promotion and co-ordination of the orderly and economic use and development of land…*
- *(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
- *(vii) ecologically sustainable development.*

The Department is satisfied that the Airly proposal encourages the proper use of resources (Object 5(a)(i)) and the promotion and co-ordination of the orderly and economic use of land (Object 5(a)(ii)). The Airly proposal would see the efficient extraction of the State's coal resource by utilising existing coal mining, handling and transport infrastructure without compromising the aims and objectives of nearby land uses including recreation, tourism, agriculture and conservation.

The encouragement of environmental protection (Object 5(a)(vi)) is considered in Section 6 of this report. Following this consideration, the Department is satisfied that the potential impacts of the Airly proposal can be suitably mitigated and managed to ensure an acceptable level of environmental performance.

The Department has carefully considered the encouragement of ecologically sustainable development (ESD) (Object 5(a)(vii)) in its assessment of the development application. The EP&A Act adopts the definition of ESD found in the *Protection of the Environment Administration Act 1991,* as follows:

> *"ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:*
>
> *(a) the precautionary principle;*
> *(b) inter-generational equity;*
> *(c) conservation of biological diversity and ecological integrity; and*
> (d) *improved valuation, pricing and incentive mechanisms."*

The Department has considered each of these principles and programs in its assessment (see Section 6). It further notes as follows.

- *Precautionary principle*

The Department has considered the threat of serious or irreversible environmental damage to the environment in its assessment of the proposal (see Section 6). The mine plan proposed by Centennial aims to avoid serious and irreversible damage to the environment including impacts to cliff lines, steep slopes and pagodas, water courses and groundwater aquifers, Aboriginal and cultural heritage and threatened species, populations, ecological communities and their habitats. The Department has recommended a range of performance measures to ensure the protection of the environment together with the preparation and implementation of management plans which would involve ongoing monitoring and adaptive management measures.

- *Inter-generational equity*

The Department acknowledges that coal and other fossil fuel combustion is a known contributor to climate change, which has the potential to impact future generations. However, for the foreseeable future, there is a clear need to continue to mine coal deposits to meet society's energy needs. The Department also notes that climate change is a global phenomenon and that the proposal's contribution to climate change would be very small and that Centennial has considered greenhouse gas mitigation measures and these would be included in an Air Quality Management Plan.

- *Conservation of biological diversity and ecological integrity*

Subject to the conservative mine plan, implementation of recommended conditions of consent and appropriate adaptive management measures, the proposal is expected to result in a low environmental impact that would not jeopardise the health, diversity and productivity of the Mugii Murum-ban SCA or nearby GBMWHA. The proposal would also conserve the biological diversity and ecological integrity in these areas.

- *Improved valuation, pricing and incentive mechanisms*

The Department's assessment has sought to integrate all significant environmental, social and economic considerations in forming and presenting a recommendation to the consent authority. The costs and benefits of the proposal have been carefully considered as part of the assessment. This included an independent peer review of Centennial's revised Economic Impact Assessment and associated cost benefit analysis for the project, which was critical of Centennial's valuation of certain environmental impacts.

Consistent with this principle, Centennial would bear the cost of implementing the necessary management plans to comply with the Department's recommended conditions of consent over the life of the mine. Centennial is also required, and has committed to, rehabilitating the surface facilities and REA following the cessation of mining operations on the site.

Significant effect on threatened species, populations or ecological communities, or their habitats

Sections 5A to 5D of the EP&A Act relate to threatened species assessment and management. In deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats, the consent authority is required to take into consideration:

- the factors listed in subsection (2) of section 5A of the EP&A Act (the 7 part test);
- any assessment guidelines issued and in force under the *Threatened Species and Conservation Act 1995* (TSC Act) or *Fisheries Management Act 1994*; and
- the register of critical habitat identified in Section 5B.

The Department has considered the 7 part tests which have been presented in the EIS and the *Threatened Species Assessment Guidelines* (DECC 2007) in deciding whether there is likely to be a significant effect on threatened species, populations, ecological communities, or their habitats. This consideration has informed the Department's assessment of impacts to threatened species, populations or ecological communities or their habitats which is presented in Section 6.

The Department has also had regard to the register of critical habitat (section 5B of the EP&A Act) which includes the Wollemi Pine. The Wollemi Pine is situated within the Wollemi NP, which is part of the GBMWHA and located 35 km downstream from the Airly pit top facilities. The Department has considered in detail the potential impact of mine-affected water discharges from the site on receiving environments (see Section 6) and no impacts are expected to the values of the Wollemi NP.

Matters for consideration under section 79C

Section 79C (1) of the EP&A Act outlines the matters that a consent authority must take into consideration when determining development applications. These matters can be summarised as:

- the provisions of environmental planning instruments (including draft instruments), development control plans, planning agreements (including draft agreements), the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and any coastal zone management plan;
- the likely impacts of the development;
- the suitability of the site;
- any submissions; and
- the public interest.

The Department has considered all of these matters in its assessment of the proposed development. In summary, the Department believes that:

- the development can be undertaken in a manner that is consistent with the aims, objectives and provisions of the applicable environmental planning instruments, other applicable planning documents and the EP&A Regulation (see below and **Appendix G**);
- the likely impacts of the development can be adequately minimised, managed or offset or compensated for, to an acceptable standard (see Section 6);
- the site is suitable for the development, as it contains thermal coal resources, would involve the use of existing mine infrastructure and is a permissible development on the land. The Department has carefully considered the potential impacts of the proposal on the site and surrounds in its assessment (see Section 6) and is satisfied that the impacts on the environment and the local community can be adequately minimised, managed or compensated for, to an acceptable standard; and
- whilst there has been opposition from the general public and special interest groups there has also been support from the general public for the proposal to proceed (see Section 5). On balance, the development is in the public interest, particularly as it would:
    - involve a low-impact mining operation that is expected to preserve the values of the overlying conservation area;
    - generate significant economic benefits to the State of NSW in the form of royalty and tax receipts which are redistributed in the economy; and
    - facilitate continued direct employment for up to 120 people at the mine and indirect employment of around 550 across NSW.

Environmental Planning Instruments

Consideration of the relevant environmental planning instruments (EPIs) was provided in Section 5 of the EIS and has been further considered by the Department (see **Appendix G**). The Department is

satisfied that Centennial has adequately considered the requirements of the applicable EPIs as part of its assessment of the development, including the:

- *Lithgow City LEP 1994*;
- *Rylstone LEP 1996*;
- *State Environmental Planning Policy (SEPP) (State and Regional Development) 2011*;
- *SEPP (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP)*;
- *SEPP (Infrastructure) 2007*;
- *SEPP No 33 – Hazardous and Offensive Development*;
- *SEPP No 44 – Koala Habitat Protection*; and
- *SEPP No 55 – Remediation of Land.*

- *Mining SEPP*

The Division of Resources and Energy (DRE) within the Department of Trade, Investment, Regional Infrastructure and Services provided an assessment of the significance of the resource, which concluded that the Airly coal resource is significant based on the:

- ability to maintain current coal production from the Western Coalfield over the medium to long-term;
- continued supply of thermal coal for export and domestic markets, which if sold on a 50/50 split to these markets would be expected to generate revenue of up to $1.34 billion in net present value (NPV) terms;
- socio-economic benefits of continued direct (135 jobs) and estimated indirect (550 jobs) employment and associated flow-on effects in the region and NSW; and
- State would receive approximately $80 M NPV in royalty payments or $170 M in undiscounted terms over the life of the mine.

In relation to the Mining SEPP, the existing wording of Clause 12AA requires the significance of the resource to be the consent authority's 'principal consideration' under Part 3 of the SEPP (although not under section 79C of the Act). This provision is currently under review and the Government has proposed that it is repealed.

The Department has considered the proposed changes to Clause 12AA to be a 'draft environmental planning instrument' for the purposes of section 79C. The Department is satisfied that the proposed repeal of clause 12AA would have no bearing on the outcomes of the Department's assessment of the proposed development or the conclusions reached regarding its net overall benefits. The Department remains of the view that the coal resource at Airly is significant and that it would be extracted utilising low-impact mining methods involving partial extraction and the development of long-term stable pillars. This is discussed in detail in Section 6 and the Department's consideration of the other matters under Part 3 of the Mining SEPP is provided in **Appendix G**.

Overall, the Department is satisfied that the Airly proposal can be undertaken in a manner that is consistent with the aims, objectives and provisions of these instruments, subject to a range of mitigation, monitoring and management measures, as proposed in recommended conditions of consent.

4.4 Integrated Approvals

Under section 89J of the EP&A Act, a number of other approvals are not required to be separately obtained for the project. These include certain approvals, permits and authorisations under the *Heritage Act 1977,* the *National Parks and Wildlife Act 1974,* the *Native Vegetation Act 2003,* the *Rural Fires Act 1997* and the *Water Management Act 2000*.

Under section 89K of the EP&A Act, further approvals would be required for the project, but these cannot be refused if they are necessary for the carrying out of an approved State significant development and are to be substantially consistent with the consent granted for that development. These include:

- a mining lease under the *Mining Act 1992*; and
- an environment protection licence (EPL) under the *Protection of the Environment Operations Act 1997*.

The Department has consulted with the relevant public authorities responsible for these other approvals (see Section 5) and has considered the issues relating to these approvals in its assessment of the development (see Section 6). None of the relevant authorities object to the development on grounds related to these other approvals. The Department notes that Centennial must obtain a mining lease over the section of A232 that it proposes to mine prior to being able to mine in this area.

4.5 Commonwealth Approval

The Commonwealth Minister for the Environment determined on 24 December 2013 that the Airly proposal is a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Airly proposal was determined as likely to have a significant impact on controlling provisions and matters protected under the EPBC Act, including:

- listed threatened species and communities, in particular:
  - *Pultenaea* sp. Genowlan Point (*Pultenaea*);
  - Large-eared Pied Bat (*chalinolobus dwyen*);
  - *White box-Yellow box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* critically endangered ecological community (Box-Gum Woodland); and
  - a range of other listed flora and fauna species, where suitable habitat for these species had the potential to occur in the area;
- World Heritage values of a declared World Heritage property (ie the GBMWHA);
- heritage values of a National Heritage place (as above); and
- water resources.

The Commonwealth Government has previously accredited the State's environmental assessment processes under Part 4 of the EP&A Act, via a bilateral agreement between the Commonwealth and NSW Governments. A revised bilateral agreement commenced in February 2015 and the Airly proposal is a transitional project under this new agreement. The potential impacts on controlling provisions continue to be assessed under Part 4 of the EP&A Act and the Department will make a recommendation to the Commonwealth Minister for the Environment on whether the Airly proposal should be approved or refused under the EPBC Act (including potential conditions of approval). The Department's assessment of the potential impact of the Airly proposal on controlling provisions relating to biodiversity and water resources is provided in relevant subsections of Section 6.

As required under the bilateral agreement, the Airly proposal was jointly referred to the Commonwealth's Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC) by the NSW and the Commonwealth governments for advice on surface and ground water impacts, as well as potential impacts on downstream watercourses and receiving environments. The advice provided by the IESC is summarised in Section 5, has been considered by the Department in Section 6 and informed the recommendation presented in Section 8 and, recommended conditions of consent in **Appendix H**.

5. CONSULTATION

5.1 Public Exhibition

The Department made the development application and accompanying EIS publicly available from 19 September to 31 October 2014:

- on the Department's website;
- at the Department's Information Centre in Bridge Street, Sydney;
- at the offices of Lithgow City Council;
- at the Capertee General Store, Capertee; and
- at the Nature Conservation Council's office in Newtown.

Copies of the EIS were also distributed to relevant State government authorities and to environmental and local interest groups. The exhibition was advertised in the Lithgow Mercury, Sydney Morning Herald and the Daily Telegraph.

The Department received 178 submissions in response to the exhibition (see **Appendix B**). Of these:

- 11 were from public authorities;
- 12 were from special interest groups, comprising 9 objections and 3 in support;
- 155 were from the general public, comprising 34 objections and 121 in support.

A summary of the issues raised in submissions is provided below.

5.2 Public Authorities

The **New South Wales Office of Water** (NOW) requested further assessment of the potential impact on groundwater dependent ecosystems (GDEs), basic landholder rights for surface water users and the frequency and intensity of rainfall events that may cause large on-site dams to discharge. NOW also sought clarification on the expected volumetric take of water from mine inflows, water licensing arrangements and confirmation of the period over which modelling was undertaken. NOW recommended monitoring and management be undertaken in accordance with *Groundwater Modelling and Monitoring Plans – Introduction for prospective mining and petroleum exploration activities*, which involves the periodic monitoring of geomorphic conditions of all third order streams on the site and ongoing consultation.

The **Division of Resources and Energy** (DRE) identified that Centennial would be required to obtain a mining lease for the area to be mined within A232 and that further exploration activities must be notified to, and approved by, DRE. In a supplementary submission, DRE questioned the adequacy of the setback distance from secondary extraction (ie the Cliff Line Zone) in ensuring the long-term stability of significant cliff formations.

The **Environment Protection Agency** (EPA) provided comments on the specialist assessments in the EIS and recommended conditions of consent. It also raised issues about the noise assessment including the methodology for determining predicted impacts, application of the correct noise guidelines for drilling operations, use of best practice rolling stock for rail transport, the sound power levels on which noise predictions are based, the content of a Noise Management Plan, application of sleep disturbance criteria and noise limits for passive recreation areas, such as national parks. The EPA was satisfied that dust emissions would be unlikely to exceed relevant criteria at sensitive receivers. It sought clarification on the likely increases to flows in Airly Creek as a result of mining. The mine's existing EPL would need to be updated if consent is granted.

The **Office of Environment and Heritage** (OEH) advised that the poor condition of the Box-Gum Woodland identified on the site of the proposed REA, and other derived native grassland does not warrant an offset. OEH's major concern is the potential for impact on natural features of the SCA including rock falls, the *Pultenaea*, unknown vulnerability of the *Genowlan Point Allocasurina nana heathland* endangered ecological community (Heathland EEC) and thus the importance of regular monitoring of impacts and associated Trigger Action Response Plans. OEH supports the proposed method of subsidence monitoring which aims to reduce reliance on conventional subsidence survey lines in environmentally sensitive areas and also recommends a condition of consent to minimise subsidence monitoring impacts.

NSW Health raised issues with the air quality assessment provided in the EIS. These were about how best to address the lack of locally available background air quality data and the provision of sensitivity analysis based on the data used. NSW Health also requested that cumulative impacts with the Excelsior limestone quarry be further considered and that noise mitigation strategies are required in conditions of consent to minimise potential health effects.

Lithgow City Council (LCC) did not object to the project subject to appropriate controls being put in place and that local contributions from Centennial are secured through a Voluntary Planning Agreement (VPA) or by conditions of consent. LCC supports the proposed limit of 125 mm of vertical subsidence that would apply to most mining areas but considered that the Interaction Zone requires careful assessment due to the higher levels of predicted subsidence (up to 500 mm). Additional comments included the need to minimise dust during construction, implement sediment and erosion controls, minimise visual impacts of the REA, control night-time train movements and consider the Conservation Management Plan for the SCA. LCC also reported issues that had been raised in recent meetings of Airly's Special Monitoring Committee such as night-time lighting, visual impacts of coal stockpiles and train noise impacts during night-time hours.

Crown Lands advised that some parcels of land on which the site is situated are subject to a Public Land Review for inclusion in the Mugii Murum-ban SCA and are currently held under licence by OEH. Ongoing consultation between Centennial and Crown Lands was recommended along with consultation with the relevant Local Land Services.

The **Office of Agricultural Sustainability and Food Security** raised no issues. **NSW Heritage** and **Central Tablelands Local Land Services** advised that they would not be commenting on the application.

The Commonwealth **Department of Environment** (DoE) requested that Centennial consider avoiding mining under the *Pultenaea* (with a sufficient buffer and monitoring and contingency measures also proposed), address the issues and comments made by the IESC, investigate the potential for the New Hartley Mine workings to provide habitat for protected bat species and confirm the extent of the Box Gum Woodland on the site.

5.3 Independent Expert Scientific Committee

The issues identified by the IESC review included:

- uncertainty regarding the potential impact on surface and groundwater resources, particularly Gap Creek, as a result of mining in the New Hartley Mine Interaction Zone;
- the groundwater model did not appear to include fault zones and a finer resolution was needed to analyse surface and groundwater interactions;
- identification of GDEs was lacking, including the number of suitable bores available for stygofauna monitoring;
- conclusions drawn in the EIS regarding potential hydrological and water quality changes in Airly Creek and downstream in the GBMWHA were not supported by sufficient data; and
- the role of structures such as faults in the groundwater model and water balance should be subject to sensitivity testing.

5.4 Special Interest Groups

Birdlife Australia identified the Capertee Valley as an 'Important Bird Area' featuring at least 216 species and comprising the most important breeding area for the Regent Honeyeater; listed as a critically endangered species under both the EPBC Act and TSC Act. It also highlighted the presence of threatened bird species on the site, lack of identification of Needle-leaf Mistletoe (*Amyema cambagei*) and subsidence impacts to cliffs, pagodas and rock features potentially affecting the Sooty Owl and Rockwarbler and other impacts to habitat. It also stated that it does not support the use of biodiversity offsets.

The **Blue Mountains Conservation Society** expressed concerns regarding the need to preserve the values of the Mugii Murum-ban SCA, application of the precautionary principle to the management of the SCA, downstream water impacts on the GBMWHA from mine-water discharges, excessive coal extraction rates (> 50%), subsidence impacts on pagodas, cliffs, deep canyons and gullies and subsidence impacts on the historic ruins of the former New Hartley Mine.

The **Colo Committee** highlighted the significance of the geodiversity of the area and stated that the precautionary principle should apply to ensure the protection of its values. The Committee's key concern is the percentage of coal to be extracted under pagodas, slot canyon areas, high cliffs and the talus slopes that support these cliffs and that the EIS fails to give assurances that Centennial's commitment to extract no more than 50% of coal would be maintained. Other points included: extraction under the oil shale ruins should be limited to first workings only; thoroughness of the flora surveys and inadequate consideration of the risk of extinction of the *Pultenaea*, pagoda description inaccuracies and slot canyon misrepresentation; impacts on surface and groundwater systems; misleading greenhouse gas information and failure to identify an Aboriginal art site.

The **Colong Foundation for Wilderness** advised that whilst it did not have an 'in-principle' objection, the Airly proposal was misleading and should be revised and resubmitted for exhibition. The Mod 3 extension should also be reviewed and cliff lines, mine heritage, pagodas and the Grotto and Valley of the Kings should be defined as sensitive features and protected from subsidence movements. The environmental protection zones from the 1993 consent should not be reduced and Centennial should ensure an ongoing water supply to visitors if surface water sources are impacted by mining. The water management system should separate clean and dirty water streams and discharges to Airly Creek should achieve a neutral or beneficial effect on water quality and downstream ecology. The EPL should be revised to regulate a larger number of pollutants, the REA should be screened from Glen Davis Road, noise levels should be below background and any proposals for surface operations in the SCA should be made available for public comment.

The **Capertee Valley Environment Group Inc** (CVEG) and the **Capertee Valley Alliance Inc** (CVA) jointly engaged the Environmental Defenders Office (EDO) who in turn commissioned consultants to review the EIS. These reviews formed part of CVEG and CVA's submissions in objection and included an aquatic ecology review by Dr Alison Hunt, comments on coal extraction rates, impacts to pagodas, comments on *Pultenaea* and Aboriginal heritage by Dr Haydn Washington, comments on noise from John Bassett, reviews of surface water assessment by Andrew Marr and Dr Ian Wright, subsidence and groundwater comments from Pells Consulting and Dr Andrea Broughton and a copy of The Australia Institute's submission on the economic impact assessment.

In addition, CVEG objected to impacts on the GBMWHA including the Gardens of Stone and Wollemi NPs; impacts on threatened species and ecological communities including bats; significant landscapes and water resources. CVEG was also concerned with adverse social and economic impacts on quality of life, tourism and recreational activities in the Capertee Valley. CVA's additional comments included that the EIS contained significant omissions, inadequacies and defects with respect to environmental, social and economic aspects. Furthermore, that heritage items associated with the former New Hartley Mine were listed by the National Trust and that the mine posed an unacceptable risk and was not in the public interest.

The **Greater Blue Mountains World Heritage Area Advisory Committee** objected to the Airly proposal on the basis that it would significantly damage the Mugii Murum-ban SCA and may impact the adjoining World Heritage area. A greater level of detail should be provided to enable a full understanding of the proposed development, together with all measures that would be taken to ensure the quality of any mine-water discharges. It was concerned about the likely deleterious impacts on fauna and biodiversity should highly saline mine-water effluent be allowed to flow into Airly Creek, the Gardens of Stone NP and the GBMWHA. Water effluent should be treated to a level consistent with the receiving watercourse. The Committee opposed extraction of two-thirds of the coal under the SCA which it judged would threaten pagodas, slot canyons and internal cliffs and called for half of the coal resource to be left in the ground to protect the biodiversity and geodiversity of Airly and Genowlan mesas. It also opposed the 30% extraction of coal under 120 m cliffs such as Genowlan Point and 60% extraction of coal under steep talus slopes. Past mine heritage should also be protected.

The **Running Stream Water Users Association** objected to the proposal based on potential impacts to water resources including baseflows to the Grotto and other seeps and springs. The dependence of Capertee Valley agricultural businesses on water was not given sufficient consideration in the EIS in light of potential impacts and there is a lack of detail around extraction rates which should be limited to 50% beneath the SCA. Additional inadequacies identified in the EIS included failures in identifying the significance of heritage items associated with the former New Hartley Mine and tourism, misrepresentation of slot canyons and details about how the REA would be managed.

The Australia Institute's (TAI) submission specifically commented on the economic impact assessment in the EIS. TAI stated that the assessment does not follow relevant government guidelines for economic assessment, overstates the value of the project by more than $100 million, incorrectly counts wages as a benefit and withholds major costs and benefits such as capital, operating and coal sales revenue. TAI also questions the validity of the studies relied on for the evaluation of environmental costs and states that the assessment does not allow a proper assessment of jobs generated and royalties claimed by Centennial.

5.5 Other Submissions

Three special interest group submissions in support were received on behalf of **Westfund**, **Henbury Sport & Recreation Club Ltd** and **Mark Lilley Plant Hire Pty Limited**. These submissions stated that the Airly proposal would support local jobs in the context of declining regional employment in mining, manufacturing and the government services sector; and would in turn generate positive flow-on effects for the community. Westfund's submission included an attachment highlighting the contribution of the mining and power generation industries to the local and regional economy as well as social benefits to the community. The other two submissions drew attention to adverse impacts to local communities in the event of a potential closure if the project was not supported.

5.6 Community Submissions

121 of the 155 community submissions supported the project, primarily on the grounds of its:

- continued direct and indirect employment opportunities in the local and regional area;
- broader economic benefits for the community, particularly to local businesses and services that rely on spending by Airly or its employees;
- continued support for regional community, schools, sporting groups and charities; and
- previous good environmental performance.

Some submissions also noted that there would be an adverse socio-economic impact on the local community if the Airly proposal was not supported and the mine closed down. It was also suggested that this impact would be significant in light of other recent mine closures, such as Angus Place Colliery which was placed on care and maintenance in November 2014.

34 of the 155 community submissions objected to the project on the basis of:

- adverse groundwater impacts on alluvium, colluvium and deeper aquifers that supply agriculture and other land uses in the Capertee Valley and reductions in base flows to the Grotto, springs and seeps;
- downstream impacts in the Gardens of Stone NP, GBMWHA and associated Wollemi NP and on aquatic ecology and other flora and fauna as a result of mine-water discharges into Airly Creek;
- adverse impacts on the growing tourism industry in the Capertee Valley, which is a globally renowned bird watching location and which includes mining heritage near Airly village and other recreational activities such as camping and bush walking and bed and breakfast establishments;
- subsidence impacts on the visually significant cliff lines, steep slopes and pagodas, slot canyons and internal cliffs and watercourses adversely affecting the values of the Mugii Murum-ban SCA;
- adverse impacts on threatened species and EECs, in particular, the *Pultenaea*, potential bat habitat in the old mine workings of the New Hartley Mine and overhangs on the cliff lines;
- the EIS being inadequate, containing repetitive content, failing to clearly describe the percentage of coal proposed to be extracted in the mine plan and only identifying the old mine workings of the New Hartley mine to be of local significance despite listing on the register of the National Trust;
- excessive coal extraction proposed despite Centennial's commitment to extract only 50% of the available resource;
- subsidence impacts on historically significant mine infrastructure associated with the New Hartley Mine; and
- adverse impacts on the conservation values of the Mugii Murum-ban SCA, which is recommended to be added to the GBMWHA following the completion of mining.

Additional grounds for objection raised on a less frequent basis included visual impacts from the pit top infrastructure and proposed REA; lack of socio-economic benefits to the community; potential noise, dust and contamination impacts; increased traffic on local roads; intergenerational equity of resource use and conservation; overseas profits and impact on property values.

5.7 Response to Submissions

Centennial provided a Response to Submissions (RTS) on 4 February 2015 (see **Appendix C**) with supporting attachments relating to water quality and economic impact assessment received in March and April 2015. The RTS sought to address the issues raised in agency and public submissions. The Department forwarded the RTS to all agencies that had previously provided submissions. The agency comments received on the RTS are set out in **Appendix D**.

OEH, RMS and LCC had no further comments on the RTS. LCC stated that it was continuing to discuss potential community contributions with Centennial. Further information was provided to the satisfaction of NOW and the EPA in relation to water licencing and noise assessment, respectively, for exploration activities. The EPA's additional concerns regarding water discharged into Airly Creek were resolved through supplementary information and conditions requiring event-based monitoring and other measures (see Section 6.3). DRE recommended conditions for rehabilitation and exploration activities as well as advising that an expert panel should be formed to establish setback distances for the Cliff Line Zone. After considering an independent peer review of the subsidence impact assessment, DRE recommended that Centennial undertakes further baseline studies and establish an expert panel to determine appropriate setback distances for secondary extraction to cliffs as part of an Extraction Plan process.

6. ASSESSMENT

In its assessment of the merits of the project, the Department has considered the:

- EIS, submissions from the public, special interest groups, agencies and the IESC;
- Centennial's RTS and related supplementary information (ecotoxicology assessment, subsidence review report, correspondence regarding surface water licensing, noise assessment, flora and fauna studies, community contributions and revised economic impact assessment (April 2015));
- Centre for International Economics' (CIE's) reviews of Centennial's Economic Impact Assessment and revised economic impact assessment;
- Centennial's supplementary information responding to submissions on the RTS (June 2015);
- relevant provisions of the EP&A Act including its objects and requirements of section 79C; and
- relevant provisions of Part 9 of the EPBC Act.

The Department considers the key issues for assessment to include:

- subsidence impacts on the surface features and conservation values of the Mugii Murum-ban SCA including, but not limited to, cliff lines, steep slopes, pagodas and gorges, the critically endangered *Pultenaea* and the Heathland EEC;
- potential impacts from discharge of mine-water on downstream environments, including in the Gardens of Stone NP which is part of the GBMWHA; and
- whether the project would generate socio-economic benefits for the Lithgow region and NSW.

6.1 Subsidence

Mining system

The EIS recognises the need to protect the conservation values of the Mugii Murum-ban SCA and proposes a system of coal recovery based on the variable use of first workings and partial pillar extraction across the site and the use of long-term stable pillars to support key surface features. The mining system design is the primary mechanism by which Centennial plans to avoid otherwise potentially significant impacts such as cliff collapses, large losses in baseflow to surface watercourses and sub-surface fracturing of aquifers. This would be achieved by leaving coal in the form of long-term stable pillars, which together with narrow void widths (61 m) in areas of panel and pillar mining (where up to 67% of coal would be extracted) would support the overlying strata and prevent it from caving.

Based on its experience in implementing a similar system of partial extraction at its nearby Clarence Colliery, Centennial is aiming to limit subsidence at Airly to a maximum of 125 mm with tilts of up to 2.5 mm/m and strains of up to 2.0 mm/m. An exception would apply to mining beneath the old workings of the New Hartley Mine (herein referred to as the 'Interaction Zone') where greater levels of subsidence of between 200 mm and 500 mm is predicted, depending on the condition of the former workings and whether those workings were extracted to either super-critical or sub-critical void widths. However, across the remainder of the site, subsidence is predicted to be < 125 mm (see **Table 2**).

Dr Pells and the Colo Committee proposed that Centennial should target lower levels of subsidence, in the order of 20 – 30 mm, based on the levels reported at Clarence in 2014. The Department understands the desire of some community members to ensure that subsidence is minimised so far as is practicable. However, Centennial has clarified that the information referred to in these submissions quotes an observed average vertical subsidence of 57 mm (post flooding of the mine) and a maximum vertical subsidence of 98 mm over the 611 panel extracted at Clarence in 2008. Based on Centennial's proposed mine plan, which is predicted to result in subsidence <125 mm, the Department believes that a suitable balance has been achieved between allowing efficient coal recovery and ensuring sufficient protection is provided to the environment.

Centennial proposes to apply four mining methods across five zones developed with regard to the potential impact of subsidence on sensitive surface features (see **Table 2** and **Figure 5**), comprising:

- *panel and pillar mining* beneath the plateau areas on Mount Airly and Genowlan Mountain (Panel and Pillar Mining Zone or PPMZ);
- *panel and pillar mining* beneath the New Hartley Mine Interaction Zone;
- *first workings* only, beneath cliff lines and surface features such as the Grotto and internal cliffs (cliff line zone and zone of first workings, herein referred to as the 'Cliff Line Zone');
- *partial extraction of pillars* (involving single or double sided lifts of coal from pillars) beneath steep slopes (Partial Pillar Extraction Zone or PPEZ); and

- *pillar splitting and quartering* in shallow areas (herein referred to as the 'Shallow Zone').

Table 2: *Centennial's proposed application of mining methods and zones across the site*

Mining zones	Application	Mining methods	Overlying sensitive surface features
First Workings only (Cliff Line Zone)	Located beneath cliff lines around the edge of Mount Airly and Genowlan Mountain. Zone defined by a minimum 30 m measured horizontally from the crest and toe of cliff lines (or an 8° angle of draw) to adjacent second workings zones and subject to an approved Extraction Plan.* This setback distance is increased to a minimum of 26.5° angle of draw (or half the depth of cover at the crest of a cliff) to the adjacent PPMZ in relation to cliffs that have been previously affected by New Hartley Mine subsidence.	First workings only with long-term stable pillars designed to a minimum: • factor of safety of > 2.11; and • width to height ratio of > 8.0.	Cliffs, pagodas, steep slopes, the Grotto, Aboriginal and non-Aboriginal heritage sites, groundwater aquifers and listed threatened species and communities (including all *Pultenaea* and some Heathland EEC).
Partial Pillar Extraction (PPEZ)	Adjacent to some areas of the Cliff Line Zone and generally located beneath steep slopes. Zone defined by: • the setback to cliff lines defined by the Cliff Line Zone (ie a minimum of 30 m); • a minimum depth of cover of 80 m; and • a maximum depth of cover of 160 m.	Formation of large pillars followed by the removal or 'lifting' of the edges of some of these pillars, during retreat, to leave long-term stable pillars designed to minimum: • factor of safety ≥ 1.6; • supporting pillar (no lifting) width to height ratio > 8; and • remnant pillar (after lifting) width to height ratio > 4.	Steep slopes, groundwater aquifers, Aboriginal heritage sites and potential habitat for listed threatened species.
Pillar Splitting & Quartering (Shallow Zone)	This zone extends around the edge of the PPEZ and Cliff Line Zone. Zone defined by a: • minimum depth of cover of 20 m; and a • maximum depth of cover of 100 m.	First workings to develop pillars which would be later reduced by driving additional roadways to split or quarter the original pillars subject to: • minimum factor of safety of ≥ 1.6; • minimum pillar width to height ratio of > 4; and • no formation of intersections at depths > 30 m.	Steep slopes, 3rd order and greater watercourses, groundwater aquifers, built features, Aboriginal and non-Aboriginal heritage sites and potential habitat for listed threatened species.
Panel and Pillar Mining (PPMZ)	On the plateau areas above the cliffs. Zone defined by: • the setback to cliff lines defined by the Cliff Line Zone (ie a minimum of 30 m); • a minimum depth of cover of 160 m; and • a maximum depth of cover of 310 m.	Panel and pillar mining would involve a maximum void width of 61 m separated by long-term stable chain pillars (29.5 m x 100 m) designed to a minimum: • factor of safety of ≥ 1.6; and • width to height ratio of > 9.	Cliffs, pagodas, groundwater aquifers, built features, Aboriginal heritage sites and listed threatened species (including remaining Heathland EEC).
Panel and Pillar Mining beneath the Interaction Zone	As above, panels would not commence within a setback defined by half the depth of cover (or a 26.5° angle of draw) to cliffs in proximity to the Interaction Zone. The setback is measured from the crest of the cliff.	As above	Cliffs, pagodas, groundwater aquifers and listed threatened species.

Notes:
**DRE has requested that an expert panel be convened to review the adequacy of the 30 m setback from cliff lines to second workings as part of the Extraction Plan process. Therefore, the 30 m represents a minimum setback which may be increased during the Extraction Plan process.*

Some interest groups were concerned about the definition of a sixth mining zone, Centennial's proposed 'no mining zone' around Gap Creek and the implications of this on mine continuity. Centennial's position is that there is no sixth mining zone, as there is no mining proposed to occur within the proposed setback from the creek line. The Department does not consider that the definition of a sixth mining zone is a material issue. The continuity of the mine plan in relation to Gap Creek is discussed in Section 6.3.

The mining system and zones would be implemented through detailed mine plans developed as part of individual Extraction Plans. As mining progresses from lower areas in the west to the higher cliffs and more extensive pagoda clusters in the east, Centennial would monitor and observe subsidence to calibrate predictions. This would enable adaptive management techniques to be applied in subsequent mining areas, in the event that observations exceed predictions, which may include:

- increasing the size of the Cliff Line Zone by commencing or stopping extraction further away from cliffs than planned;
- moving around sensitive surface features and not conducting extraction activities;
- leaving additional pillars unmined in the seam;
- changing the dimension of pillars or void widths; and/or
- reducing the size and extent of roadways (ie first workings) in the seam.

Surface features

The Mugii Murum-ban SCA, which overlies the majority of the proposed mining area, is described by OEH in its Statement of Management Intent for the SCA to contain *"a number of significant geological features including prominent mesas, extensive and intricate pagoda clusters, numerous deep gorges, canyons and unusual rock formations"*. The geodiversity and visual significance of these features are highly valued by the community, as seen in the submissions received from the public and special interest groups. In addition, the significant sandstone cliffs of the mesas form part of the landscape of the Capertee Valley, which is a tourist destination. The higher and more visually prominent cliffs and pagoda clusters are located in the east of the site, on Genowlan Mountain, and around the narrow canyon of the Grotto. Whilst Mount Airly also features high cliffs that are visually prominent in the landscape, it has fewer (in terms of height and spatial extent) pagoda clusters.

Centennial believes that subsidence effects from its proposed mine layout on cliff lines, canyons, gorges and pagodas would be minimal, and at best, negligible. The exception to this is proposed mining in the New Hartley Mine Interaction Zone. Despite efforts to determine the existing condition of the old workings, uncertainty remains around whether the old voids are sub-critical or super-critical in width. Centennial's proposed extraction of coal from the Lithgow Seam would occur approximately 25 m beneath the old workings and is expected to result in sub-surface cracking which interacts with the old workings. This is predicted to result in subsidence at the surface, generally around 200 mm. However, in the event that there are old pillars in the New Hartley Mine still supporting its roof strata, then this could increase subsidence up to 500 mm, since the sub-surface fracturing is likely to cause partial or complete failure of these old pillars.

There are also numerous historical built features (or remnants of built features) associated with past mining at the New Hartley Mine, generally located on steep slopes on the northern side of Mount Airly and around to Gap Creek. These are identified in the Lithgow LEP 2014 to be of local significance and are also listed on the non-statutory register of the National Trust. Some public submissions suggested that as these items were identified on the NSW Heritage website, and are of State heritage significance. This is not the case. The NSW Heritage website records both local and State heritage items and the ruins of the past mining structures are listed as being of local significance only.

Subsidence predictions

The EIS includes a Subsidence Predictions and Impact Assessment (SPIA) which estimated subsidence levels and potential impacts based on the proposed mining systems and zones. The SPIA builds on work undertaken in 2013 which investigated the likely effects of subsidence on cliff lines.

The SPIA considered the different scenarios of the four mining methods (first workings, partial pillar extraction and panel and pillar mining, see **Table 3**) and potential impacts on sensitive surface features and water resources. Overall, it predicts that the proposed mining would generate maximum subsidence of between 40 – 106 mm/m in areas of panel and pillar mining, but potentially up to

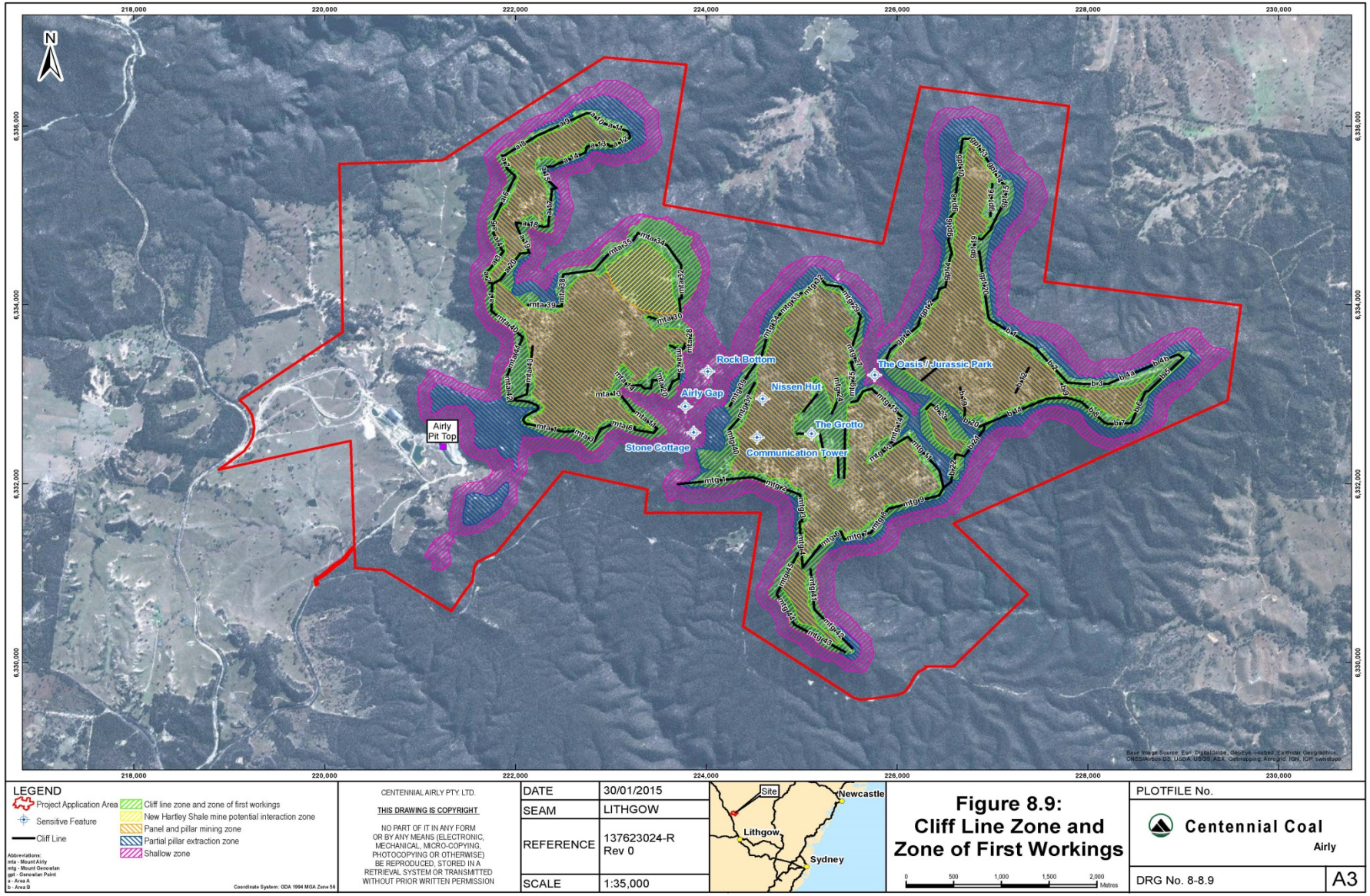

Figure 5: *Proposed mining zones, cliff lines and other surface features*

500 mm subsidence in the Interaction Zone (depending on whether the former workings exist as either sub-critical or super-critical voids). There are two exceedances predicted in the modelling. The first, a 0.6 mm/m exceedance in tilt in the PPMZ, was generated from using an empirical database which has greater width-to-depth ratios (W/H) than those proposed at Airly. The second, a 0.1 mm/m exceedance in tilt in the PPEZ, is regarded in the SPIA as being conservative, even for areas where post-mining flooding within the Airly mine working's is expected. The SPIA therefore expects that these exceedances would be unlikely to occur.

The Department considers these to be minor exceedances which are unlikely to be observed, based on the conservative modelling undertaken. As part of the RTS, a review of the SPIA's subsidence predictions was undertaken by Mine Subsidence Engineering Consultants (MSEC) using an alternate prediction model (uncalibrated). MSEC considered that maximum subsidence would be around 100 mm beneath the maximum depth of cover (DoC), which is consistent with the SPIA's predictions.

Dr Pells questioned whether subsidence predictions would increase as a result of post-mining flooding within Airly's mine workings. Centennial has confirmed that the implications of post-mining flooding were a factor influencing the mine design and plan. The effects of flooding on subsidence have been accounted for in the upper-bound subsidence predictions. Therefore, the EIS's maximum predicted subsidence values represent a worst-case scenario, on which the remainder of the EIS is based.

Table 3: *Predicted subsidence levels across the proposed mining zones (see **Figure 5**)*

	Vertical subsidence (mm)	**Tilt (mm/m)**	**Tensile strain (mm/m)**	**Compressive strain (mm/m)**	**Fractured zone - height above seam (m)**
Proposed Subsidence Criteria – General Limits	125	2.5	2.0	2.0	N/A
First Workings only (Cliff Line Zone)	10 – 65	0.6 – 1.1	0.2 – 0.3	0.2 – 0.5	<10
Pillar Splitting & Quartering (Shallow Zone)	3.5 – 25.5	0.6 – 1.1	0.1 – 0.4	0.2 – 0.6	<10
Partial Pillar Extraction (PPEZ)	25 – 65	0.5 – **2.6**	0.2 – 1.1	0.2 – 1.9	20 – 35
Panel and Pillar Mining (PPMZ)	40 – 106	1 – **3.3**	0 – 1	0 – 2	60 – 70
Interaction Zone *(first workings only)*	10 – 65	0.6 – 1.1	0.2 – 0.3	0.2 – 0.5	<10
Interaction Zone *(below super-critical voids)*	**200**	2.5 – **6.7**	1.0 – 2	0.7 – **3.3**	To surface (pre-existing)
Interaction Zone *(below sub-critical voids)*	**500**	**6.2** – **16.7**	**2.4** – **5**	1.8 – **8.3**	To surface (pre-existing)

Notes:

- *Predicted exceedances of Centennial's proposed general subsidence limits are shown in bold.*
- *The effects of post-mining flooding and double-abutment loading are generally represented by the upper bound values.*

6.2 Subsidence Impacts on Landscape Features

Cliff lines, pagodas, gorges and steep slopes

- *Cliff Line Zone*

Centennial's proposed Cliff Line Zone would protect the majority of cliffs, pagodas and some parts of the steep slopes on the site by limiting extraction to first workings only. Centennial has defined this zone through applying a horizontal setback distance of 30 m measured from both the crest and toe of the cliff to areas of secondary extraction (see **Figures 5 and 6**). The SPIA predicts that this setback from secondary extraction would reduce potential damage to the face area of cliffs to a maximum of 10%. However, Centennial expects that, based on its experience of partial extraction methods elsewhere, this would more likely be < 5% and probably nil. Centennial believes that the level of damage would be similar to the natural rate of rock fall and/or cliff collapse. The EIS describes the likely environmental consequences to consist of limited rock falls resulting in damage up to 10% of the cliff face area. Failure of any cliff face 'en-masse' is not expected to occur.

The Department considers that damage to 10% of the cliff face area would represent an unacceptable impact to the visual significance of the prominent sandstone cliffs that define the SCA and the western edge of the Capertee Valley. It is clear in OEH's Statement of Management Intent for the SCA and in submissions from the public that the visual significance of these mesas and the sandstone cliffs are

important in the regional viewshed. Moreover, the Department acknowledges that the GBMWHA Advisory Committee supports the addition of the SCA to the Gardens of Stone NP once mining activities at Airly have been completed. The Department therefore considers it important to preserve the visual and conservation values of the prominent sandstone cliff lines and proposes to achieve this through a targeted performance measure which would limit damage to no more than 2% of the cliff face area. In order to avoid this measure applying to natural cliff or rock falls, it would only apply to cliffs within 26.5° AoD of total proposed mine workings.

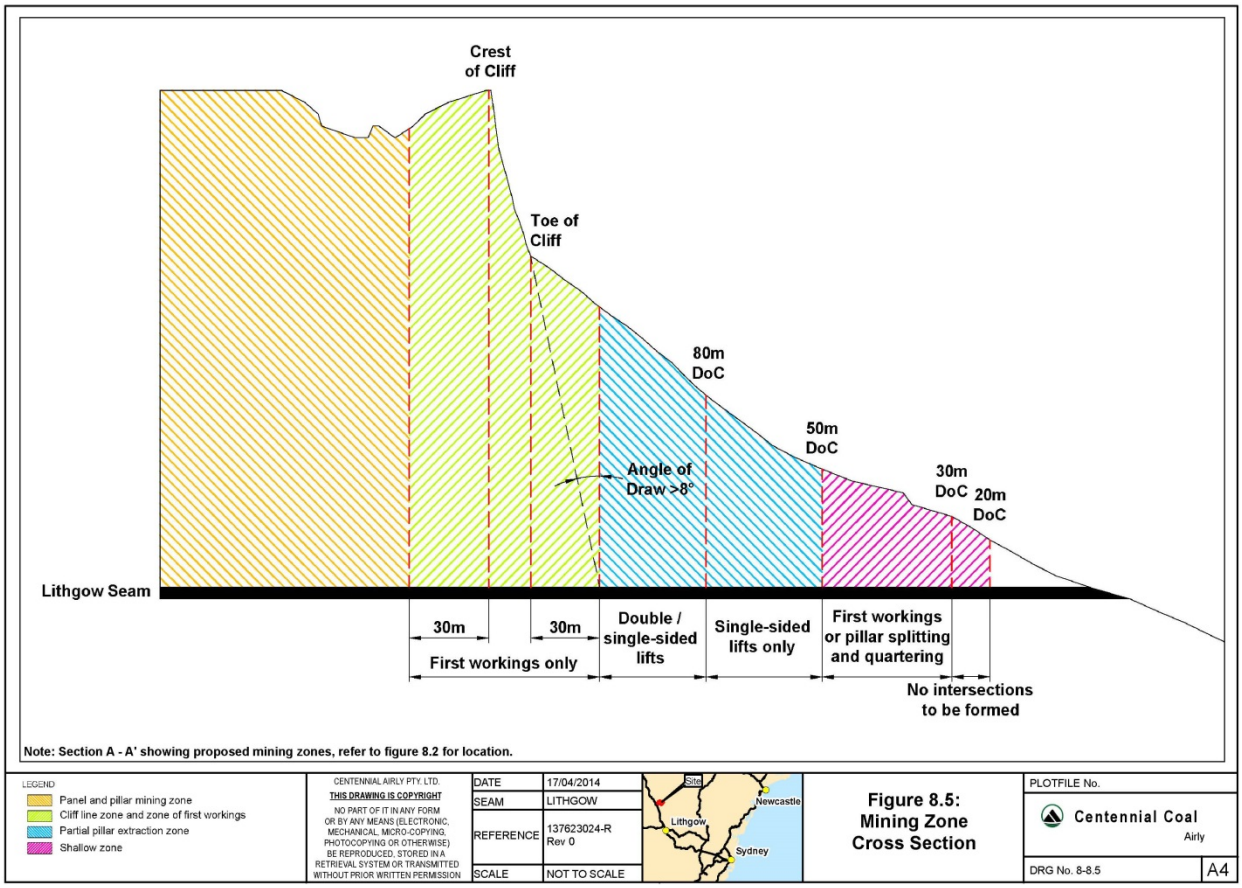

Figure 6: *Indicative cross section through Centennial's proposed mining zones*

The SCA is characterised by a range of both platy and smooth pagodas that vary in height and visual prominence. These are located at the top of cliff lines around the edges of Mount Airly and Genowlan Mountain, above the Grotto and across some plateau areas. The Cliff Line Zone has been extended to also provide protection to the internal cliffs and pagodas around these areas. Therefore, the vast majority of pagodas would be protected by the Cliff Line Zone, in which extraction is limited to first workings, and no surface cracking is predicted to occur. There are some small areas of pagodas, such as on the plateau of Mount Airly and Genowlan Mountain, under which panel and pillar mining would take place. In these areas, subsidence is predicted to range from as low as 40 mm up to a maximum of 106 mm with low tilts and strains. As no surface cracking is expected, the EIS predicts no impacts to these pagodas.

The Department considers that, as many of the pagodas are situated on or in close proximity to the top of cliff lines, they should therefore be subject to the same performance standard as the cliff lines below (ie that mining should not impact more than 2% of the total area of pagodas).

- *The Grotto*

The Grotto is a slot canyon, or narrow gorge, with surrounding internal cliff lines topped by pagoda clusters. Recognising the conservation values of this feature, Centennial extended the Cliff Line Zone to provide additional protection to this feature. The EIS predicts that there would be negligible subsidence impacts on the Grotto.

- *Cliffs outside the Cliff Line Zone*

There are only six cliff lines located outside of Centennial's proposed Cliff Line Zone under which panel and pillar mining is proposed to take place fully or in part in the PPMZ. The EIS predicts the following impacts to these cliffs:

- Mta 43 – upper bound damage to 18% of the cliff face area but expected to be less than 10%;
- B19 – upper bound damage to 13% of the cliff face area but expected to be less than 5%;
- B9 and B12 – upper bound of 2-3% damage but probably nil;
- B15 – upper bound of 5% damage but probably nil; and
- B17 – upper bound of 3% but probably nil.

These six cliffs are not the very high or visually prominent sandstone cliffs that define the boundaries of Mount Airly or Genowlan Mountain, but rather are small cliffs which run in towards the plateau areas, where panel and pillar mining is proposed to be undertaken. Cliff line Mta 43 is situated on the western part of Mount Airly above "Carinya" homestead and the nearby Torbane retorts. The northern-most 175 m of this cliff line (see **Figure 7**) is predicted to experience subsidence of up to 60 mm and tilts and strains of < 2 mm/m. This part of the cliff reduces to between 20-30 m in height and forms a dissected rounded landform with small pagodas.

The Department has weighed up the conservation values of providing additional protection to cliff Mta 43 against the potential implications of reducing the PPMZ. The Department believes that the part of the cliff line potentially affected is small in the context of other cliffs, is of minor visual significance (see **Figure 7**) in the overall context of the high sandstone cliffs in the SCA and notes that it is not readily accessible via an identified track or path. Travellers further north along the Castlereagh Highway may catch fleeting views of this cliff line; however it would not be prominent in such views. Extending the Cliff Line Zone to provide greater protection to this part of the cliff would only reduce the upper bound potential impact from 18% to 10% but would have implications on the efficient recovery of the coal resource by truncating or reducing the size of the PPMZ. The Department therefore considers that additional protection is not warranted and that the overall impact would be limited to a small section of the cliff.

Figure 7: *Cliff line Mta 43 (identified by white arrow) viewed from the vehicle track leading to the "Carinya" homestead. The larger and more prominent cliff line Mta 42/41 is present in the middle ground.*

A lower degree of damage (upper bound of 13%) is predicted to cliff line B19, located on the southern part of Genowlan Mountain. Although Centennial expects that damage would be much lower at < 5%, the Department has assessed the potential worst-case impact. The position of this cliff line means that it is not visually prominent in the surrounding landscape. The other four cliff lines outside of the Cliff Line Zone are expected to experience potential damage to the cliff face area of < 5%, which is similar to the upper bound levels of damage predicted for cliffs protected by the Cliff Line Zone.

Although no further measures to avoid or mitigate impacts are considered necessary, these six cliff lines all would be subject to the recommended performance measure requiring damage to be limited to no more than 2% of the total affected cliff face area. The Department considers that this strict overall performance measure would satisfactorily protect the conservation values of the Mugii Murum-ban SCA.

- *Steep slopes*

Mining involving first workings in the Cliff Line Zone, secondary extraction in the PPEZ or pillar splitting and quartering in the Shallow Zone would take place under the steep slopes at the base of cliff lines (see **Figure 6**). The SPIA states that the mine plan design with large long-term stable pillars and limited extraction spans used in the PPEZ would minimise subsidence to less than 70 mm (typically between 20 – 50 mm) with strains <1 mm/m and tilts ranging between 0.5 – 2.6 mm/m (see **Table 3**). Based on these very small strains, surface cracking is not predicted and the maximum tilt is equivalent to a localised change in slope angle of 0.15°. This would constitute a negligible increase in the risk of landslide or slope impacts. As mining in both the Cliff Line Zone and Shallow Zone would generate lower subsidence levels (including tilts and strains) than those in the PPEZ, the Department considers that there would equally be a negligible risk to landslide and impact to slope in these zones.

- *Interaction Zone*

In the Interaction Zone, greater subsidence is expected to occur. There is existing surface cracking in areas of rock outcrops and pagodas on the plateau of Mount Airly, as well as large boulders and slabs of sandstone cliff located on the steep slopes below the cliff line in this area. Panel and pillar mining in this area is expected to recover 1 Mt of coal. Due to uncertainty around the condition of the old workings of the New Hartley Mine, subsidence of between 200 mm and 500 mm may occur. The SPIA anticipates that this would result in new surface cracking and/or the reactivation of old surface cracks in this area.

There is evidence of past mining-induced subsidence effects on the cliff lines and pagodas in the vicinity of the Interaction Zone including surface cracking and evidence of rock falls. This has been attributed to the former workings in the New Hartley Mine. In order to minimise further impacts to cliffs and associated pagodas near the Interaction Zone, the setback defined by the Cliff Line Zone from the crest of the cliff to second workings would be increased from 30 m up to half the depth of cover (or an angle of draw of 26.5°). This is equivalent to the level of protection afforded to sensitive surface features near full extraction mining methods such as longwall mining. Therefore, it is expected to provide protection to the cliff lines and associated pagodas from the less intensive form of panel and pillar mining proposed. Outside of this setback zone, there would remain some small areas of rock outcrop and pagodas that are around 5 m in height. These areas have already been damaged by surface cracking. This cracking may be reactivated, or new surface cracking may eventuate.

The Department considers that this would be a minor impact since the:

- pagodas are small in the context of more visually prominent pagoda clusters elsewhere that would be protected (eg above the Grotto);
- many of these pagodas and rock outcrops feature surface cracking from past mining in the New Hartley Mine;
- pagodas and rock outcrops are not prominent in regional views of Mount Airly or Genowlan Mountain; and
- 1 Mt of coal recovered from this area would significantly contribute to the viability of the mine and the efficient recovery of the coal resource.

- *Public submissions*

Many interest groups and public submissions commented on the potential impact of mining on cliffs, including that the:

- original cliff protection zones in the 1993 consent, defined by an AoD of 25°, should be retained;
- rate of coal extraction is too high, and contrary to Centennial's previous undertakings to leave 50% of coal in the ground; and
- definition of the Cliff Line Zone could be reworded to improve clarity.

Centennial expects that the AoD from mining in the PPEZ (beneath the slopes below the cliffs, see **Figure 6**) to cliff faces in the Cliff Line Zone would be as low as < 8° and possibly negative, based on its observations at Clarence Colliery. Therefore, the application of a setback to second workings defined by an AoD of 25° would be overly conservative and unnecessarily sterilise part of the coal resource in the PPEZ. Despite the low AoD, Centennial has conservatively applied a 30 m setback measured from the crest and toe of the cliff line to second workings to protect cliff lines.

The extraction rates were clarified in the RTS. Centennial calculated that it would recover around 52% of the total coal resource available beneath the SCA. Whilst the PPMZ zone would see up to 67% of coal recovered, this would reduce to 51% in the PPEZ and Shallow Zones. Only 31% of coal would be recovered in the Cliff Line Zone meaning that 69% would be left beneath cliffs in the form of long-term stable pillars. In all zones, long-term stable pillars would be retained to support the overlying strata, avoid caving and minimise subsidence and potential environmental consequences. The Department is of the view that the proposed mining system is suitably conservative, subject to recommended conditions.

Dr Pells suggested that the setback description for second workings to the cliff lines in the EIS could be improved in the interests of clarity and proposed that: *"The upslope boundary of [the PPEZ] should be no closer than 30 m from the intersection of the scree slope with the base of the cliff line or no closer than defined by an 8° vertical angle from the intersection of the scree slope with the base of the cliff line, whichever is the greater"*. Centennial has confirmed that the 30 m setback was designed around an 8° AoD from the PPMZ to the top of the cliff line. At a lower DoC, such as below the base of the cliff, the 30 m setback to second workings is more conservative than an 8° AoD and would equate to a higher AoD.

Therefore, the Department considers that Dr Pells' suggested wording is unnecessary, since the 30 m setback effectively reflects an 8° AoD above cliff lines, and is more conservative below cliff lines. Moreover, the minimum setback distance would be subject to further review by the independent expert panel (as recommended by DRE) during the Extraction Plan process, which has been proposed as a condition of consent.

- *Performance measures*

The Department is satisfied that the proposed method of extraction should avoid significant impacts and minimise residual effects from subsidence on cliffs, steep slopes, pagodas and gorges. Consistent with other mining operations in NSW which have mined under cliffs and similar surface features, the Department has recommended that strict subsidence performance measures are included within the proposed development consent. A summary of the Department's recommended performance measures to protect cliffs, steep slopes, pagodas and gorges is provided in **Table 4** below.

***Table 4**: Subsidence impact performance measures for cliffs, pagodas, gorges and steep slopes*

Land	
Mugii Murum-ban State Conservation Area (excluding land within the Interaction Zone)	Negligible subsidence impacts or environmental consequences
Mugii Murum-ban State Conservation Area (within the Interaction Zone)	No greater subsidence impacts or environmental consequences than predicted in the EIS
The Grotto	Negligible subsidence impacts or environmental consequences
Cliffs within a 26.5° AoD of underground mine workings	No greater subsidence impacts or environmental consequences than predicted in the EIS *(ie occasional rock falls, displacement or dislodgment of boulders or slabs of less than 30 m^3, or fracturing, that do not impact Aboriginal heritage, EECs or public safety)*, that in total do not impact more than 2% of the total area of such cliffs
Pagodas within a 26.5° AoD of underground mine workings (other than pagodas affected by the Interaction Zone)	No greater subsidence impacts or environmental consequences than predicted in the EIS *(ie occasional rock falls, displacement or dislodgment of boulders or slabs of less than 30 m^3, or fracturing, that do not impact Aboriginal heritage, EECs or public safety)*, that in total do not impact more than 2% of the total area of such pagodas
Pagodas within a 26.5° AoD of underground mine workings (within the Interaction Zone)	No greater subsidence impacts or environmental consequences than predicted in the EIS
Minor cliffs	No greater subsidence impacts or environmental consequences than predicted in the EIS
Steep slopes	No greater subsidence impacts or environmental consequences than predicted in the EIS

DRE has proposed that an expert panel is formed to advise Centennial on preparation of Extraction Plans, such that there is confidence that final mining plans will achieve the performance measures which relate to cliffs and pagoda formations. The Department supports this proposal and has included it in recommended conditions.

Terrestrial ecology

- *Overview*

The EIS's Flora and Fauna Impact Assessment (FFIA), revised as part of the RTS, assessed potential subsidence impacts on threatened species and endangered ecological communities (EECs) listed under either the TSC Act and/or the EPBC Act. The FFIA identified the presence of the following EECs and flora and fauna species across the site:

- two EECs:
  - *Genowlan Point Allocasuarina nana Heathland* (TSC Act); and the
  - *White Box-Yellow Box-Blakely's Red Gum Woodland* (TSC Act) and *White box-Yellow box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (EPBC Act), referred to collectively herein as 'Box-Gum Woodland';
- 394 flora species, including three threatened species:
  - *Pultenaea* sp. Genowlan Point (critically endangered under the TSC and EPBC Acts);
  - Mount Vincent Mint-bush *(Prostanthera stricta)*(vulnerable under the TSC and EPBC Acts); and
  - Capertee Stringybark *(Eucalyptus cannonii)* (vulnerable under the TSC Act); and
- 177 fauna species, comprising 111 bird, 36 mammal, 20 reptile and 10 amphibian species, of which 23 are listed under the TSC and/or EPBC Acts.

- *Endangered flora*

The Department has carefully considered the potential impacts of mining on the *Pultenaea* and Heathland EEC. The *Pultenaea* is a critically endangered flora species located on the northwestern edge of Genowlan Point. The population is very small (15 plants recorded in 2010) and is believed to occur in an area of around 250 m^2 on well-drained, stony soil near a cliff edge. It is the only known population of this species. This area is proposed to be protected from second workings by the Cliff Line Zone wherein only first workings are to be undertaken. This is predicted to generate low levels of subsidence ranging from 10 to 65 mm/m.

The Heathland EEC is a dense low heathland found only on the northern end of Genowlan Mountain. It covers approximately 15 ha and is located close to the *Pultenaea*, but further back from the cliff line and on the sandy soils of the plateau area of the mesa. The EEC is within the PPMZ, where panel and pillar mining is predicted to generate subsidence of 40 to 106 mm/m. Based on its assessments under the TSC and EPBC Acts, the EIS states that the:

- predicted low levels of subsidence would not be substantial enough to impact on the presence of the Heathland EEC or *Pultenaea* and its habitat;
- proposal would be unlikely to affect the lifecycle of the *Pultenaea* such that a viable local population of the species would be placed at risk of extinction; and
- proposal would be unlikely to have an adverse effect on the extent, or modify the composition of the EEC, such that it would be placed at risk of extinction.

The Department has carefully considered potential impacts on the *Pultenaea* and Heathland EEC, including considering the joint National Recovery Plan for the *Pultenaea* and Heathland EEC (see **Appendix F**) and submissions received from the public, interest groups and agencies (including the IESC). The objective of the National Recovery Plan is to ensure the long-term survival of the species and the EEC in the wild. The alteration of habitat following subsidence due to longwall mining is listed as a key threat to the species.

Mine subsidence may result in an increased risk of rock fall, or changes to the hydrological regime and microclimatic conditions. The potential for such hydrological impacts was also discussed by the IESC. The consequence of any subsidence impact on the critically-endangered *Pultenaea* and Heathland EEC is likely to be high, since Genowlan Point is the only known location for both this species and EEC. However, the Department considers the risk of any such impact is low. This is particularly the case for *Pultenaea*, since Centennial proposes to only undertake first workings within the Cliff Line Zone where it is found. The Department considers that this risk can be further reduced by requiring the Extraction Plan process (which ordinarily only applies to second workings) to also apply to the Cliff Line Zone. As mining is proposed to progress from the west to the east of the site, with mining beneath Genowlan Point occurring in the later years of the life of the mine, Centennial can improve confidence around its subsidence predictions and effects on cliff lines by validating its predictions against collected data. This would enable Centennial to enhance confidence that there would be no risk to either *Pultenaea* or the Heathland EEC from the proposed mining.

Accordingly, the Department has recommended performance measures in conditions of consent to require no environmental consequences to the *Pultenaea* and Heathland EEC, which Centennial

would be required to demonstrate it can achieve prior to this area being mined. In addition, the Department has recommended that mining within the Cliff Line Zone (where all *Pultenaea* are located) is subject to an Extraction Plan so that the Government may decide whether the risk can be managed, based on adaptive management, at a time closer to when the proposed mining would occur. On this basis, the Department considers that the likely impacts of the proposal on *Pultenaea* and Heathland EEC are acceptable.

The Mt Vincent Mint-bush occurs in large numbers (> 220) on the plateau of Mount Airly and Genowlan Mountain and the lower slopes to the northeast of the site, which contains 3,451 ha of habitat. The Capertee Stringybark was predominantly identified (78 counts) in the valley between Mount Airly and Genowlan Mountain and in remnant patches of native vegetation in the west of the site. Both these species occur in the Interaction Zone, on well-drained, rocky and unstable soils. The potential impact of tension cracks and soil destabilisation caused by mining-induced subsidence is not expected to significantly affect these species in this zone. Any loss, although unlikely, would be isolated and is unlikely to lead to wider impacts on these species or their habitat.

The Department has considered the approved conservation advice under the EPBC Act for the Mt Vincent Mint-bush (see **Appendix F**) and notes that the main threat includes clearing of habitat for a range of land uses, including mining. No individuals of this species would be cleared as part of the Airly proposal and habitat for this species would only experience minor impacts from the predicted subsidence levels above the Interaction Zone. Taking this into account, approving the proposal would not be inconsistent with the conservation advice. On this basis, the proposal's predicted impacts on the Mt Vincent Mint-bush and Capertee Stringybark are considered acceptable.

OEH has identified the SCA and surrounding lands as comprising a key management site for the Mt Vincent Mint-bush, Capertee Stringybark and the *Pultenaea*. OEH considers that Trigger Action Response Plans (TARPs) and alternate methods of monitoring subsidence would be sufficient to achieve acceptable outcomes. These measures would be included in an Extraction Plan and Biodiversity Management Plan as required by recommended conditions of consent and would need to be consistent with OEH's stated management actions to preserve these species on the site.

- *Endangered fauna*

Sandstone cliffs, rock overhangs and caves associated with pagodas were identified in the FFIA as providing potential habitat for the vulnerable Large-eared Pied Bat (around 1663 hectares (ha)), Broad-headed Snake (around 1793 ha), Brush-tailed Rock-wallaby (around 1694 ha) and the endangered Spotted-tail Quoll (3468 ha).

The Department considered relevant approved conservation advices and National Recovery Plans under the EPBC Act (see **Appendix F**) in assessing the impacts of the Airly proposal on the Broad-headed Snake, Large-eared Pied Bat and Brush-tailed Rock-wallaby. None of the key threats identified in the Broad-headed Snake conservation advice would occur as a result of the proposal. The Large-eared Pied Bat recovery plan states that mine subsidence of cliff lines is a key threat and the Brush-tailed Rock-wallaby recovery plan states that habitat degradation and loss is a key threat.

Pagodas and rocky outcrops within the AoD boundary of the Cliff Line Zone would be protected from subsidence impacts because of the conservative mine plan.

However, there is a chance that habitat outside of this boundary and in the Interaction Zone may experience impacts, including new or reactivated surface cracking and isolated rock falls. Additional targeted searches for the Large-eared Pied Bat within caves and the New Hartley Mine did not record this species and no natural cave structures were identified in this area. Assessments undertaken as part of the FFIA showed that proposed mining in the Interaction Zone would be likely to result in small and isolated impacts to these species' habitat, however given the abundance of pagodas within the site and surrounding area, the impacts on the Large-eared Pied Bat, Broad-headed Snake, Brush-tailed Rock-wallaby and Spotted-tail Quoll are predicted to be negligible.

The proposed conditions of consent reduce the extent of impacts on these species' habitat by limiting impacts on cliff lines and pagodas to 2% of their totals and there would be no direct clearance of habitat as part of this proposal. The Airly proposal would not significantly increase the overall level of threat on these species and is consistent with the overall objectives in the recovery plans. The proposal is therefore generally consistent with the relevant conservation advice and National Recovery Plans for these species.

In terms of water available for species in the site, subsidence in the Interaction Zone may result in surface runoff entering the groundwater system and not being available for fauna in this area. The FFIA does not consider this would result in a greater than negligible impact as the first order drainage lines that exist over the Interaction Zone are ephemeral in nature and surrounded by dry woodland. Accordingly, the Department agrees that the subsidence impact to water security for fauna species would not be significant. On this basis, the Department considers that impacts to the Large-eared Pied Bat, Broad-headed Snake, Brush-tailed Rock-wallaby and Spotted-tail Quoll would be acceptable.

- *Performance measures*

The Department is satisfied that the proposed method of extraction should avoid significant impacts and minimise residual effects from subsidence on listed threatened species and EECs. The Department concludes that the impacts on listed threatened species and EECs are acceptable. Consistent with other mining operations in NSW which have mined under cliffs and similar surface features, the Department has recommended that strict performance measures regulating impacts on biodiversity are included in the consent (see **Table 5**).

***Table 5**: Subsidence impact performance measures for biodiversity*

Biodiversity	
Pultenaea sp. Genowlan Point population and Genowlan Point *Allocasurina nana* Heathland EEC	No environmental consequences
Threatened species, threatened populations, EECs and GDEs (with the exception of those listed above)	Negligible environmental consequences

- *Conclusion with respect to Section 5A of the EP&A Act*

In designing a mining system that would limit subsidence to < 125 mm, Centennial has avoided or else greatly reduced the extent of potential impacts to the habitats of flora and fauna species across the site. Appendices 1 and 2 of the FFIA provide impact assessments under the TSC and EPBC Acts for species identified to be potentially affected by the proposal. The assessments were based on a maximum impact scenario. On the basis of these 7 part tests, the *Threatened Species Assessment Guidelines* (DECC 2007) and the assessment above, the Department considers that the proposal would not be likely to result in a significant effect on threatened species, populations or ecological communities, or their habitats subject to the implementation of the conservative mine plan and strict adherence to the recommended performance measures and conditions of consent requiring the preparation and implementation of management plans featuring adaptive management mechanisms.

Aboriginal and historic heritage and other built features

- *Aboriginal heritage*

Mining would take place under nine Aboriginal sites across the site. Two of these are located in the PPMZ, comprising a rock shelter with art identified to be of high local and moderate regional significance (45-1-2766) and a rock shelter with artefacts identified to be of high local and regional significance (45-1-2768). Based on the low strains and tilts of < 1 mm/m and < 2 mm/m respectively, no surface cracking is expected. Mining is predicted to result in negligible impacts on these sites.

Four Aboriginal sites are located in the PPEZ, including one rock shelter with deposit (45-1-2761) and one artefact scatter (45-1-2746) which are of moderate local significance and low regional significance. The other two artefact scatters (45-1-2762 and 45-1-2763) have low local and regional significance. No surface cracking is expected to these sites, with negligible impacts resulting from predicted subsidence levels of < 50 mm, tilts < 2 mm/m and strains < 1 mm/m.

The one Aboriginal site in the Cliff Line Zone is located in the Grotto, a rock shelter with deposit (45-1-0167) which is identified to be of high local and regional significance. As mining in this zone is limited to first workings with long-term stable pillars, subsidence is predicted to be between 10 to 65 mm/m with tilts < 1 mm/m and strains < 0.5 mm/m. Consequently, negligible impact is expected.

In the Shallow Zone, mining would take place under two Aboriginal sites, including an artefact scatter (45-1-2747) and an isolated find (45-1-2748) both of which have low local and regional significance. This zone would experience negligible levels of subsidence and no impacts are predicted to these Aboriginal sites.

The Department considers that, based on the low levels of subsidence effects expected, Aboriginal heritage sites across the site would experience negligible impacts. Ongoing monitoring would be required as part of a broader Heritage Management Plan (HMP) required as a condition of consent.

- *Historic heritage*

The mine plan would mine under 34 heritage sites. These are primarily associated with the New Hartley Mine (17 sites), adjacent Genowlan Mine (13 sites) and Airly village (4 sites).

Three sites (14, 17 and 18) are located in the Cliff Line Zone and would not be affected, based on the minimal levels of predicted subsidence associated with first workings. The remaining 31 sites are in the Shallow Zone, with DoC generally ranging from 30 – 60 m. Subsidence in this zone is predicted to have a negligible impact on surface structures.

Two sites, site 3 (remnants of a dwelling) and site 24 (double room cave house) have DoC < 30 m and would not be mined under, with minimum setback distances defined by half the DoC in which no mining would occur. The Department recommends that these sites are monitored over the life of the proposal, as part of the HMP.

The submission from CVEG (and Dr Pells) identifies a section of the executive summary of the EIS's Cultural Heritage Impact Assessment (CHIA) which refers to subsidence *"…of between 0 and 10 millimetres…"* and suggests that on the basis of this inconsistency with the SPIA, the conclusions drawn in the CHIA are questionable. Centennial has confirmed in its RTS that the heritage sites of the former New Hartley Mine would be mined under by workings in the Shallow Zone, with subsidence levels predicted to be between 3.5 – 25.5 mm. The Department acknowledges the inconsistency identified in the Pells submission. However, Centennial has also confirmed that the CHIA is based on the correct subsidence predictions (ie 3.5 – 25.5 mm). Therefore, the Department accepts that the CHIA has properly considered the potential impacts of mining-induced subsidence on these heritage items.

- *Other built features*

Non-heritage built features potentially affected by mining induced subsidence (see **Figure 5**) include:

- an emergency services communication tower and associated sheds;
- Nissen Hut and outbuilding;
- State survey mark at Genowlan Trig Station;
- "Rock Bottom", a Centennial-owned cottage near Gap Creek;
- "Stone Cottage", near the upper reaches of Gap Creek;
- a Telstra copper cable; and
- walking and 4WD tracks.

The communications tower and Nissen Hut would be under mined by panel and pillar mining with DoC of around 280 m and subsidence predicted to be around 61 mm with low tilts and strains. No damage is expected to occur and Centennial would develop a plan of management for mining beneath the communication tower in consultation with the infrastructure owner. Due to the poor state of repair of the Nissen Hut, Centennial would prepare a dilapidation report in consultation with the owner and NPWS prior to mining beneath it and its outbuilding. Centennial would also seek permission to mine beneath the State survey mark which is currently overgrown.

To avoid subsidence impacts to Rock Bottom and Stone Cottage, no mining would take place beneath Rock Bottom due to the low DoC (around 20 m) and Stone Cottage would continue to be protected by restricting secondary extraction to no closer than half the DoC on all sides. No impacts are expected to the Telstra copper cable that runs along the old tramway to Rock Bottom. Centennial is the only subscriber that has a connection to this cable. Walking and 4WD tracks are not expected to be affected by subsidence and Centennial would be required to monitor and manage access in and around the SCA during mining operations in consultation with the NPWS. The Department has recommended a condition of consent requiring Centennial to prepare, in consultation with NPWS, a public safety and access management plan to manage this risk.

- *Performance measures*

Proposed mine workings beneath Aboriginal, historic heritage and other built features would be subject to recommended performance measures. These are shown in **Table 6** below.

Unconventional subsidence

Unconventional subsidence impacts such as upsidence, valley closure and far-field horizontal displacements were also evaluated as part of the SPIA. These impacts, associated with large-scale redistributions of horizontal stress, are primarily related to longwall mining. As Airly would involve partial extraction methods, long-term stable pillars and maximum DoC ranging from 280-310 m, the magnitude of unconventional subsidence impacts is expected to be negligible.

***Table 6**: Subsidence impact performance measures for Aboriginal and historic heritage and built features*

Heritage sites	
Aboriginal heritage sites	Negligible environmental consequences
Non-Aboriginal heritage sites	• Negligible environmental consequences • Wherever depth of cover is < 30 m, no second workings to occur within a setback distance defined by half the depth of cover from site 3 and site 24, measured horizontally in the seam
Built Features	***Performance Measures***
Emergency services communication tower and associated sheds and infrastructure	• Always safe and serviceable • Damage must be fully repairable, and must be fully repaired
State survey mark at Genowlan Trig Station, Telstra copper cable and Nissen Hut and outbuilding.	• Always safe and serviceable, unless otherwise agreed with the owner • Damage must be fully repairable, and must be fully repaired
"Stone Cottage"	• No second workings to occur within a setback distance defined by half the depth of cover from the building, measured horizontally in the seam • Always safe and serviceable, unless otherwise agreed with the owner • Damage must be fully repairable, and must be fully repaired, unless otherwise agreed with the owner
Other built features and improvements including Airly Camp Ground, walking and 4WD tracks, fences and gates	• Use should be maintained wherever practicable in consultation with OEH and NPWS • Damage must be fully repairable and must be fully repaired

Monitoring and management

Due to the rugged topography, the use of conventional subsidence monitoring techniques such as surveyed monitoring lines may be impracticable in some parts of the site. OEH also considered that such monitoring could result in further environmental impacts on the conservation values of the SCA, since the line-of-sight survey lines are usually axe-cut. Centennial's EIS proposes an alternate subsidence monitoring regime which would include:

- establishment of conventional surface subsidence monitoring to confirm system performance in the initial stages of mining, as it progresses from less sensitive plateau areas of Mount Airly to Genowlan Mountain which features the highest cliffs, more substantial areas of pagodas and the highly sensitive *Pultenaea* and Heathland EEC;
- underground pillar stress and deformation monitoring arrays to be installed in areas subject to surface subsidence monitoring to develop a correlation between underground observations and surface subsidence results. This would be cross-referenced to the stress and subsidence values predicted in the design and the models calibrated by this actual experience;
- surface subsidence monitoring involving conventional surveyed lines would then be discontinued, in favour of underground monitoring techniques combined with regular surface inspections;
- consideration would also be given to the use of remote station monitoring and remote sensing techniques such as InSAR and LiDAR. These would need to be evaluated for applicability given the small levels of subsidence involved and the densely wooded nature of the surface. Due to the inherent margins of error, techniques such as these may be more suited to the rocky outcrops in the site, rather than vegetated areas; and
- development of TARPs to provide consistent tools for performance management. TARPs would incorporate mining system design parameters, items to be monitored, appropriate trigger values to define normal and abnormal behaviour and actions to be taken to maintain normal behaviour or rectify abnormal behaviour.

The Department and OEH support this approach and the Department's recommended conditions support and enhance these outcomes.

Conclusion

The Department is satisfied that Centennial has avoided the risk of most significant impacts to surface features and threatened species and EECs within the Mugii Murum-ban SCA by proposing a conservative mining system based on methods of first workings and partial pillar extraction. The Department believes that this mining system would ensure the protection of cliff lines, steep slopes and pagodas by leaving more coal in the ground in the form of long-term stable pillars and through applying setbacks from second workings. The design criteria for these long-term stable pillars are highly conservative and would provide an equivalent level of protection as applied to key surface infrastructure elsewhere in NSW. In addition, increased protection is provided through an extended setback to second workings to cliffs near the Interaction Zone (which in turn would protect downslope heritage items from rockfall and cliff collapse).

Overall, subsidence effects would be low, and the impacts on surface features would also be low. The Department has recommended a suite of strict performance measures and comprehensive monitoring and management conditions to regulate mining operations over the life of the mine. This includes DRE's recommendation for a independent panel of experts to provide advice on the development of Extraction Plans and their subsequent implementation with respect to managing potential impacts to cliff lines, steep slopes and associated pagodas.

An important component of the Department's approach is to incorporate an adaptive management approach, especially for the most sensitive features within the SCA. By checking subsidence predictions early in the project, when mining occurs beneath less-sensitive features, increased confidence would be gained before mining under sensitive features, particularly those located on Genowlan Point. If impacts are as predicted, mining would be allowed as proposed. If not, mining methods would be revised (or 'adapted') to meet performance outcomes, including the possibility of not mining certain areas if confidence in predictions was not sufficiently robust.

6.3 Surface Water

Introduction

The EIS includes a Surface Water Impact Assessment (SWIA) which is based on a water and salt balance model, water quality and regional water balance assessment. The SWIA considered the proposal's potential effects on surface watercourses from subsidence impacts and changes in flow regimes or quality, reduction in the catchment of Airly Creek due to the proposed REA, impacts on downstream water users, water licensing requirements and cumulative impacts.

The GBMWHA is an area protected under the EPBC Act. The potential for mine-water to be discharged into Airly Creek and impact on the downstream environment of the Gardens of Stone NP, which is part of the GBMWHA, is a primary issue.

The Department's assessment has considered this issue, in close consultation with the EPA and with regard to the submissions from the public and special interest groups which raised this issue. The Department has also considered specific comments received from Andrew Marr on the water and salt balance model presented in the EIS and from Dr Ian Wright on the development of water quality trigger values and the subsequent licensing of the mine via its EPL. These formed attachments to CVEG's submission and are discussed under relevant sections below. Finally, the Department has assessed the impact of subsidence on surface watercourses and to aquatic ecosystems and GDEs.

Existing water management system

Airly currently operates a water management system (WMS) which aims to manage and treat dirty water (coal-contact and sediment-laden runoff), divert clean water from entering the site and to collect some clean water for use in mining operations. This system comprises a series of dams which collect and retain water on site for re-use. The dam levels are managed and water is transferred between the dams to increase the retention time and the resultant effectiveness of the system in removing pollutants, such as suspended coal fines. The system has three existing licenced discharge points (LDPs) which allow water to overflow and discharge into the upper reaches of Airly Creek, near the pit top, in high rainfall events or during prolonged wet periods. This is reflected in the mine's current EPL which exempts discharges generated by a 95^{th} percentile 5 day rainfall event. As part of the Airly proposal, the WMS would be modified to accommodate proposed and upgraded infrastructure at the pit top, but would generally continue to operate as it currently does.

Water and salt balance modelling

As part of the SWIA, Centennial undertook water and salt balance modelling of the proposed operations (including new infrastructure) over the life of the mine to identify the likely sources and quantities of water and salt inflows that would need to be managed. As mining progresses, groundwater inflows to mine workings are predicted to increase and require pumping to the 109 megalitre (ML) dam at the surface. This water would be retained on-site and re-used as process water for mining operations, together with surface runoff from the immediate pit top catchment. During dry conditions, a backup water supply is available from the mine's existing production bore at the pit top. However, the water balance modelling predicts that this would contribute a very small amount of 1 ML of water per year (if at all).

Although most water would be retained and re-used on site, the modelling predicts that some water would be discharged through LDP 001 (via the 35 ML dam) during high rainfall events or prolonged wet periods. These discharges are expected to be initially low but would increase up to 76 ML/year in 2030 under peak groundwater inflow conditions. This peak would represent discharge occurring for

approximately 31 days during 2030, with volumes remaining below the maximum daily discharge limit of the existing EPL (100 ML/day). The model also predicts 0.5 ML/year of water would be discharged from the proposed new LDP at the REA dam. No discharges are predicted from the other two existing LDPs at the 7 ML and train loader dams (LDP 002 and LDP 003 respectively). Therefore, it is only during high rainfall events, or during prolonged wet periods that discharge from the 35 ML dam via LDP 001 to Airly Creek is predicted to occur. Airly Creek runs south and enters the Gardens of Stone NP 5.5 km downstream.

As part of CVEG's submission, Andrew Marr raised a number of issues with respect to the water and salt balance modelling, primarily focussing on the:

- limited results, which do not enable an assessment of the full range of rainfall sequences and possible groundwater flows under different mining stages (eg Scenario 1 groundwater inflows should be modelled);
- water balance, which has not verified the 10th and 90th percentile exceedance cases;
- salt discharge from LDP 001, which is predicted to be higher when the production bore is used;
- inadequate demonstration that the rainfall data used is representative of local conditions.

Centennial has addressed these issues in its RTS. This included additional modelling to provide an understanding of possible groundwater flows under different mining scenarios. This modelling reinforces the SWIA's assessment that, during dry periods or in the event of a lack of groundwater inflows, water would be sourced from the production bore which would increase the amount of salt entering the WMS.

The 10th and 90th percentile cases were provided for predicted water discharges to Airly Creek in 2030 as this year represented the maximum predicted discharge over the life of the mine. This represents a worst-case potential impact. The use of rainfall data from the Ilford (Warrangunyah) Station has been justified in the RTS on the basis that its location is relatively close to the site (within 30 km), it has a similar elevation and a long data record (114 years). The IESC also noted that this station lies in a separate rainfall district to Airly; however Centennial has shown that the average rainfall totals are similar at the two sites and has calibrated rainfall data with data collected on site since 2010 and found similarities in total cumulative rainfall.

Water discharges to Airly Creek

Water discharges to Airly Creek may result in changes to the hydrology and quality of existing water flows which, in turn, may have an impact on the receiving environment. These potential impacts have been assessed as part of the EIS and SWIA.

In accordance with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC guidelines), Centennial has proposed water quality objectives, or trigger values, to govern the discharge of mine-water. However, due to the ephemeral nature of the upper reaches of Airly Creek upstream of the mine's LDPs, Centennial has been unable to satisfy the requirement for a minimum of two years of ambient monitoring data. In lieu, Centennial has instead used three years of monitoring data from Airly Creek *downstream* of the pit top facilities and LDPs to derive proposed site specific trigger values (SSTVs) under the ANZECC guidelines. These proposed SSTVs are shown in **Table 7** below, and compared with the default trigger values under the ANZECC guidelines.

Table 7: *Site specific trigger values adopted for Airly Creek based on ambient water quality levels*

Parameter	Units	ANZECC/ARMCANZ default trigger values	Proposed SSTVs (Airly Creek 80th percentile)
EC	µS/cm	350	2,998
TSS	mg/l	25	68
Turbidity	NTU	25	83
Total nitrogen	mg/l	0.25	1.88
Total phosphorous	mg/l	0.02	0.24
Barium	mg/l	No data	0.0252

Centennial's proposed SSTVs are much higher than the ANZECC guidelines' default trigger values for EC, TSS, Turbidity, total Nitrogen and Phosphorous, indicating that this watercourse is already in a degraded state. Centennial put forward the proposition that the monitoring results observed in Airly Creek reflect the natural geology of the catchment based on similarities in the chemical composition of water in Airly Creek, and water extracted from the underlying highly saline Shoalhaven Group aquifer in which the production bore is located.

However, Dr Wright's submission considered that the monitoring data indicated that Airly Creek was in a highly degraded and polluted state, and that mining was at least partly responsible for this situation. Also the EIS's Aquatic Ecology and Stygofauna Assessment suggested that Airly Creek's aquatic environment was possibly the result of past land clearing, agricultural activities, mining activities and the ephemeral nature of the catchment. On this basis, Dr Wright believed that it was inappropriate for Centennial to rely on monitoring from an already degraded waterway to justify future discharge limits. The IESC also suggested that an alternate reference site should be used to define more-appropriate water quality trigger values in accordance with ANZECC guidelines.

In the RTS, Centennial presented an additional six months monitoring data from an upstream tributary of Airly Creek to calibrate its existing water quality monitoring. This new monitoring data demonstrated that water from the upstream tributary, which is not affected by flows from the pit top catchment and/or LDPs, had similar water quality to that observed in Airly Creek. All reported parameters fell within the historical minimum and maximum results for the original monitoring location in Airly Creek.

In the Department's opinion, the existing water quality of Airly Creek is possibly the result of several factors including past land clearing, agricultural uses, the ephemeral nature of the waterway and its location in the Shoalhaven Group strata. It is also likely that mining has had an influence on water quality in Airly Creek. However, it is not currently possible to determine the extent of this influence.

In order to manage this uncertainty, Centennial has proposed to revise the SSTVs once two years of monitoring data has been obtained from the upstream monitoring point in Airly Creek. The Department considers that this approach would resolve the uncertainty around the ambient monitoring data and that the SSTVs should be revised based on a reference site not affected by the pit top catchment runoff or LDPs. Conditions requiring that the mine's Water Management Plan is implemented in this fashion have been recommended.

The IESC also considered that additional hydrological data was required with respect to the proportion of total flows that mine-water would constitute in Airly Creek. Centennial provided this information in the form of an estimation of flows in Airly Creek based on a catchment analysis together with an ecotoxicology assessment of water held in the site's existing dams, in Airly Creek and its upstream tributary.

The ecotoxicology assessment and flow information was reviewed in detail by the EPA's Water Science Branch. The EPA raised issues around the level of toxicity found in the smaller dams (including the Train Loader and 7 ML dams), the use of the production bore and the risk this poses to the environment, and whether there would be sufficient flows in Airly Creek under discharge conditions to enable dilution of mine-water before it entered the Gardens of Stone NP and GBMWHA.

The catchment analysis in the RTS estimated that discharges in Airly Creek would reduce the number of 'no flow' days from 89% to 87% in the year, whilst increasing the flow rate by 1.1 ML/year. It was estimated that the increase in waterway flow due to mine-water would be an average of 6% of existing flows at the confluence of Airly Creek and Reedy Creek (within the Gardens of Stone NP and GBMWHA) based on existing mining operations. The ecotoxicology assessment concluded that at a concentration of 17.8% of total waterway flows, protection to 95% of species would be achieved prior to flows entering the Gardens of Stone NP and GBMWHA. The EPA advised that the highest level of protection was warranted on the basis that the downstream environment was of high conservation value and significance. This was also recommended by Dr Wright. The EPA also stated that the mixing zone for dilution was required to be in close proximity to the LDP.

Centennial reviewed its analysis and determined that it would be able to achieve protection of 99% of all species, the highest level of protection required under ANZECC guidelines, 1.4 km downstream of the LDP in Airly Creek and prior to flows entering the Gardens of Stone NP and GBMWHA. Centennial believes that this level of protection would actually be exceeded, based on the additional dilution occurring in Airly Creek under discharge conditions involving high rainfall and prolonged wet periods.

The Department accepts that Centennial would be able to manage discharges in high rainfall events and during prolonged wet periods to ensure that mine-water made up < 7% of total flows prior to reaching the boundary of the Gardens of Stone NP and GBMWHA.

The EPA considers an event-based monitoring regime would allow for calibration of flow predictions with observed data, and that further ecotoxicology assessments would demonstrate that sufficient levels of protection are provided to the downstream environment. The Department agrees that these

proposals would ensure a high level of protection for the downstream environment. In addition, the Department recommends the inclusion of a performance measure requiring Centennial to achieve protection of 99% of all species downstream of LDP 001, prior to flows entering the GBMWHA. On this basis, the Department is satisfied that any mine-water discharged from Airly (after mixing with catchment flows in Airly Creek under high rainfall events or in prolonged wet periods) would be of a quality which would not pose a threat to the environment or the values of the GBMWHA.

The use of water sourced from Airly's production bore has drawn concern from the public, interest groups and the EPA as it is highly saline and has elevated concentrations of some metals which are considered harmful to the environment. The production bore is only proposed to be used during dry periods. During such times, dam levels would be low, and the risk of overflow and discharge to the environment would be low. The water balance model predicts discharges to be limited to times of high rainfall or prolonged wet periods. Centennial would continue to implement its existing management arrangements to minimise discharges.

The water balance model identifies that as mining progresses and groundwater inflows are recycled for use as process water in mining operations, the amount of salts potentially entering the WMS would decrease. Centennial expects that as the quality of water transferred from underground workings is better quality than that which is sourced from the production bore, the quality of water held in the WMS would improve to an average of 600 µS/cm (see **Figure 8**). This is significantly below the ambient water quality observed in Airly Creek and the SSTVs. The Department considers that Centennial should be required to meet this prediction as part of a performance measure over the life of the mine.

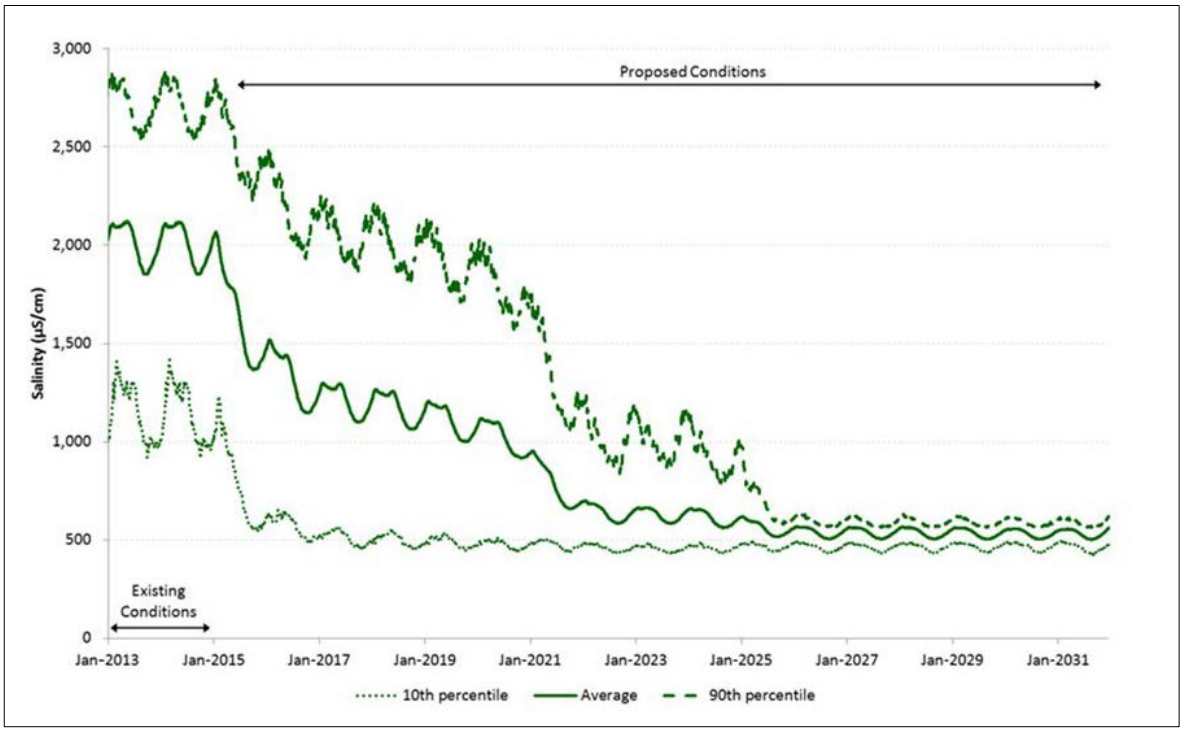

Figure 8: *Predicted salinity levels of water in 35 ML dam over the life of proposed mining*

Overall, the Department considers that the risk to the environment is low and that, subject to management arrangements recommended to be secured through conditions of consent, there would be negligible impact on the downstream environment of Airly Creek within the Gardens of Stone NP and GBMWHA. A range of management and monitoring requirements, together with performance measures, are recommended to be imposed to ensure that sufficient levels of protection continue to apply over the life of the mine.

As the proportion of mine-water in Airly Creek would be sufficiently low to ensure protection to 99% of all species in the Gardens of Stone NP, the Department accepts that it would be further diluted by catchment flows and runoff by the time it reaches the Capertee River and enters the Wollemi NP, some 35 km downstream. On this basis, no impacts in terms of water quality or hydrology are expected to the Capertee River, or receiving environment in the Wollemi NP and GBMWHA.

The proposed new LDP from the new catchment dam at the REA is predicted to discharge very small quantities of around 0.5 ML/year. It would be connected to the WMS to enable water transfers and the

dam to be kept at low capacity. The Department considers that the quantity of water potentially discharged is negligible in the context of the estimated flows of water under high rainfall and prolonged wet conditions in Airly Creek. The quality of water would be managed as part of the Water Management Plan and subject to the requirements of the site's EPL, as with the other existing LDPs.

Subsidence impacts on surface watercourses

The mesas of Mount Airly and Genowlan Mountain are intersected by Gap Creek and the upper reaches of Genowlan Greek which include the areas known as the Grotto and the Oasis. Gap Creek joins Genowlan Creek to the north of the site, which in turn flows to its confluence with the Capertee River. The Department has considered the impact of subsidence on Gap and Genowlan Creeks and the effects of mining on seeps and springs which occur throughout the site, such as the well-known Village spring identified in the EIS and submissions from the public (see **Figure 9**).

Mining in the Interaction Zone is expected to generate the greatest potential impacts on these surface watercourses, due to subsidence being expected to result in surface cracking. This is expected to redirect surface runoff from the Gap Creek catchment to the groundwater system. This would affect two first order drainage lines which run to the west and east of the Interaction Zone and into Gap Creek. These contribute approximately 5.5% and 4% to this catchment respectively. Due to uncertainty as to the full extent of impact on these first order drainage lines, the SWIA has conservatively assumed that all surface water runoff would be lost due to subsidence. This would reduce total catchment runoff at the confluence of Gap and Genowlan Creeks by 2%.

The SWIA states that water lost to the groundwater system may reappear further downstream and, if so, the overall catchment loss would be negligible. The IESC considered, and the Department agrees, that there is insufficient evidence to support this conclusion. However, the Department notes that it is likely that catchment runoff losses would be a total of < 9.5% to Gap Creek, and < 2% at its confluence with Genowlan Creek. The full impact of this is discussed below in relation to catchment and baseflow losses.

Figure 9: *Airly Village spring (piped and usually covered).*

Additional impacts from subsidence on water include localised changes to quality due to an increase in erosion associated with the reactivation of existing, or new, surface cracking in the Interaction Zone. This may see a short-term increase in total suspended solids (TSS). However, the EIS expects, and the Department considers likely, that this would be negligible and within the limits of natural variability based on the small flows potentially affected.

Outside of the Interaction Zone, no surface cracking is predicted to occur. However, subsidence has the potential to affect the geomorphology of watercourses. In order to avoid potential impacts on the 3rd order watercourses of Gap and Genowlan Creek, a general setback of 20 m from mine workings to Gap and Genowlan Creeks would be applied wherever DoC is < 40 m. This would mean that no mining would be undertaken beneath Gap Creek, except in its upper reaches beneath 1st order

drainage lines, and no impacts on bed and bank stability are expected due to mining-induced subsidence. Mining is proposed to take place under part of the 3rd order watercourse of Genowlan Creek (1,200 m) where the DoC is > 40 m by workings in the Shallow Zone. Subsidence of up to 25.5 mm is predicted together with tilts of up to 1.1 mm/m. Due to the existing gradient of the watercourse this would have a negligible impact on bed and bank stability. No surface cracking would occur.

Dr Pells contends that this setback is a 'no mining zone' which would break the mine plan as the 205 panel beneath the upper reaches of Airly Creek would have insufficient depth of cover to satisfy this requirement. The Department acknowledges that a small part of the 205 panel would extend beyond the 40 m DoC contour, but remain > 30 m DoC in the extreme upper reaches of Airly Creek beneath a first order drainage line. In this area, pillar splitting and quartering is proposed as part of the Shallow Zone with predicted subsidence of 25.5 mm. This is close to the limit of measurement (ie 20 mm) and within natural variability. The Department is therefore satisfied that, although the DoC would be < 40 m in a small section of the 205 panel, it would not lead to additional reductions in waterway flow or surface cracking based on the SPIA. The Department has further concluded that, based on the very low levels of subsidence in the Shallow Zone elsewhere, and the setback to creeks with < 40 m DoC, that there would be negligible impacts to the geomorphological conditions of these waterways.

The EIS describes an unquantified number of springs and seeps where groundwater seeps from the outcropping strata throughout the site. The most well-known of these seeps is referred to as Airly village spring. This spring is a source of water for bushwalkers and hikers and flora and fauna. This spring is likely to be the product of sub-surface fracturing and subsidence associated with the New Hartley Mine. Although there is some uncertainty, Centennial expects that flow from this spring would either reduce or else cease entirely, as a result of the reactivation of sub-surface fracturing and subsidence in the Interaction Zone. Although this spring has been used as a water source for hikers and bushwalkers in the past, the continued supply of this water, regardless of whether mining does or does not occur, is uncertain. Accordingly, the Department does not consider the loss of this water source, should it occur, to be an unacceptable impact of the proposed mining operation.

Overall, the Department considers that mine subsidence impacts on Gap and Genowlan Creeks have been largely avoided by ensuring that potential sub-surface cracking would not impact on these waterways and by limiting subsidence to very low levels. Impacts on the geomorphology of these creeks are expected to be negligible.

Subsidence impacts on aquatic ecology, GDEs and stygofauna

The EIS has assessed, through specialist studies, potential subsidence impacts on aquatic ecology, GDEs and stygofauna. The proposed mining system limits impacts to these environmental values.

Gap and Genowlan Creeks are ephemeral within the site and therefore have limited aquatic ecology. In order to avoid further impacts to these watercourses, a 'no mining zone' would be implemented where the DoC is < 40 m. In addition, extraction beneath the Grotto and the Oasis, which are believed to provide surface and alluvial water flows to Genowlan Creek, would be limited to first workings and pillar splitting and quartering, respectively. These measures minimise the potential drawdown and loss of baseflow in these watercourses and avoid impacts on the aquatic environment. Despite this, the EIS recognises that some baseflow losses may lead to increased loss of flows and stagnation of pools during dry periods which would affect the aquatic environment. The Department considers that this would be a minor impact, which would be suitably managed through flow monitoring as part of the Water Management Plan.

No high priority GDEs were identified on the site. Four vegetation communities were identified within or near alluvial drainage lines, such as in moist sheltered gullies and creek lines. However, as these communities were also observed to occur on dry slopes, they were defined as 'facultative GDEs'.

Some localised drawdown is expected in Gap and Genowlan Creeks which may lead to minor impacts to the structure and composition of these vegetation communities on a local scale. The EIS considers that this impact would be negligible, based on the small area of vegetation potentially affected, the presence of these communities elsewhere on the site and the ability of these non-EEC communities to exist without reliance on groundwater. The Department agrees with this assessment and notes that these would be monitored over the life of the mine as part of the Water Management Plan.

No stygofauna were found in any of the samples taken from bores across the site but the assessment identified that sampling design was spatially and temporally limited. This was also noted in a review by Dr Alison Hunt which formed part of CVEG's submission. The EIS, in applying the precautionary

principle, assumed that stygofauna occurred in all groundwater aquifers. However, the most likely habitat would be the shallow alluvial and Narrabeen Group aquifers. As the mine plan avoids sub-surface fracturing in these groundwater sources, and minimises potential groundwater drawdown to low levels, no impacts are expected to stygofauna, should they exist. The EIS proposes to undertake further monitoring for stygofauna and hyporheic fauna to improve data and the robustness of the assessment and to monitor creek bed geomorphology and aquatic ecosystems. Both Dr Hunt and the IESC made similar recommendations.

Additionally, Dr Hunt identified that an assessment of impact on the Macquarie Perch (listed as vulnerable under the EPBC Act), based on the Commonwealth's significant impact guidelines, was not provided in the EIS. Centennial has since provided this assessment and concluded that the Airly proposal would be unlikely to have a significant impact on known Macquarie Perch populations in the Capertee River as there would be no downstream impacts. The Department has considered the approved conservation advice under the EPBC Act for the Macquarie Perch (see **Appendix F**). On the basis that no habitat exists on site and that nil downstream impacts are predicted, approving this proposal would not be inconsistent with the conservation advice.

The Department is satisfied that the Airly proposal would be unlikely to affect the aquatic ecology, stygofauna and facultative GDEs in the site. The Department has recommended monitoring and management measures which would be included as part of a broader Water Management Plan required as a condition of consent.

Impacts on catchment flows and baseflows

Centennial expects impacts from mining on catchment flows and baseflows to include limited groundwater drawdown, surface cracking in the Interaction Zone (see Section 6.2), catchment changes as a result of the construction of new infrastructure and increases in flow from water discharges to surface water courses (see **Figure 10 and Table 8**).

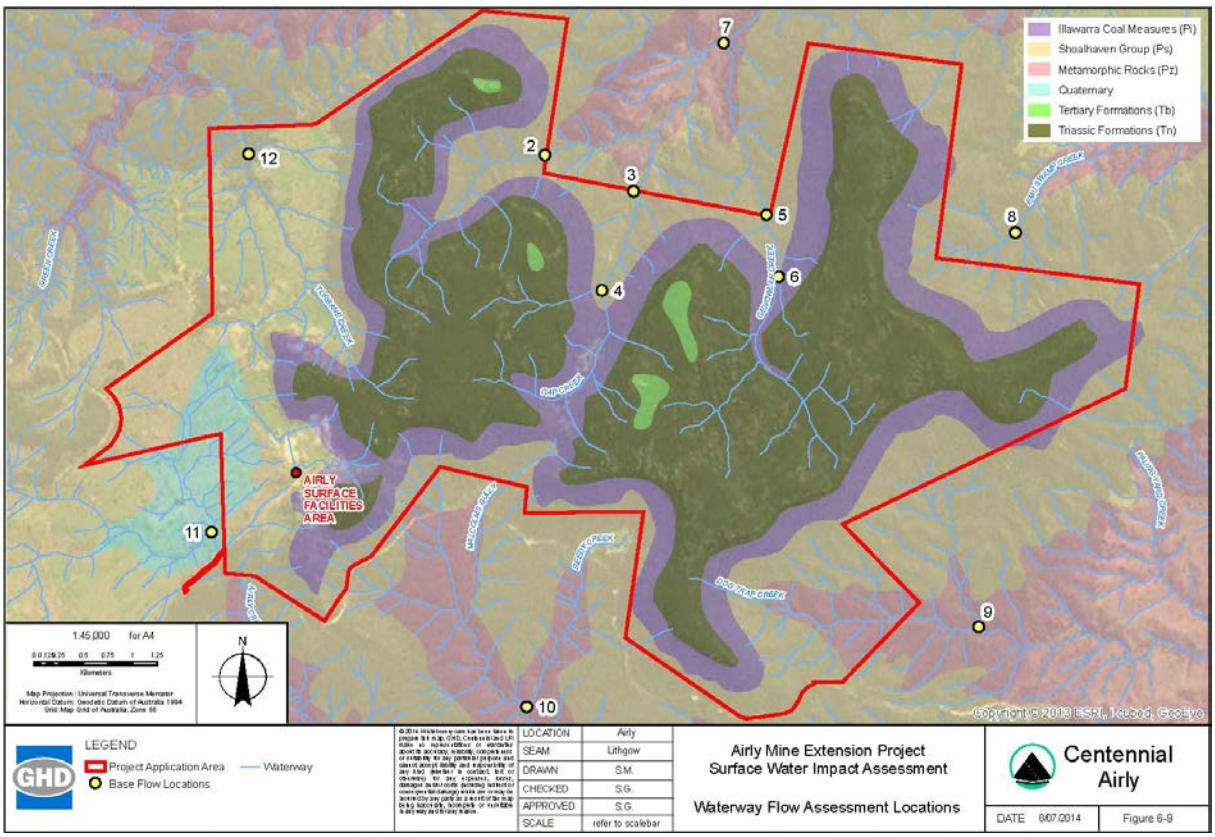

Figure 10: *Waterway flow assessment locations across the site.*

The catchments of Gap and Genowlan Creeks (locations 2-7 in **Table 8**) would experience the greatest reduction in total waterway flows. This is attributed to some limited areas of drawdown in the alluvium together with the loss of catchment runoff due to surface water flows entering the groundwater system due to surface cracking in the Interaction Zone. Total waterway flow is predicted to reduce by approximately 9% in Gap Creek and 6.5% in Genowlan Creek. At the confluence of these two creeks, the total waterway flow would reduce by up to 5%.

Table 8: *Predicted change to waterway flow at assessment sites*

Location	Change to baseflow (ML/year)	Change due to surface cracking (ML/year)	Change due to REA catchment loss (ML/year)	Change to LDP 001 discharge (ML/year)	Total predicted change to waterway flow (%)
2	-3.6	-7.7	0.0	0.0	-9.0
3	-6.2	-5.7	0.0	0.0	-6.5
4	-2.3	-3.4	0.0	0.0	-5.3
5	-3.8	0.0	0.0	0.0	-2.1
6	-1.9	0.0	0.0	0.0	-1.4
7	-27.1	-13.4	0.0	0.0	-5.0
8	-6.1	0.0	0.0	0.0	-3.2
9	-6.9	0.0	0.0	0.0	-2.1
10	-12.4	0.0	0.0	0.0	-3.0
11(a)	-0.8	0.0	-14.3	16.0	0.2
11(b)	-0.8	0.0	-14.3	70.5	14.5
12	-4.0	0.0	-11.4	0.0	-7.4

Notes:

- *11(a) represents minimum predicted discharges whilst 11(b) represents maximum predicted discharges from LDP 001 into Airly Creek.*
- *Site 12 is affected by an alternate REA location that no longer forms part of the Airly proposal and therefore the catchment reduction (-11.4 ML/year) would no longer occur.*

Additional groundwater drawdown predicted in the Permian strata is expected to reduce waterway flows to Emu Swamp Creek, Dog Trap Creek and Malcolms Gully by 3.2%, 2.1% and 3.0% respectively. Based on these low levels of predicted impact, and the ephemeral nature of these waterways in the upper reaches, this is not expected to result in observable impacts (ie negligible).

The proposed REA, located in the Airly Creek catchment, would result in a temporary reduction in catchment runoff, the construction of a drainage dam and new LDP discharging into Airly Creek. This catchment would experience a loss of runoff in the order of 14.3 ML/year. This loss of flows during rainfall is expected to be offset by the increased flow from discharges from LDP 001 and therefore is a minor impact.

The cumulative waterway flow in Airly Creek (location 11 in **Table 8**) is expected to increase as a result of the higher frequency and volume of discharges from LDP 001. Discharges are estimated to increase from 16 ML/year under average rainfall conditions up to 70.5 ML/year towards the end of mining. These increases would be slightly offset by a reduction in the size of the runoff catchment to Airly Creek as a result of the construction of the proposed REA. Under average rainfall conditions, Airly Creek would experience an increase of 0.2% in total waterway flow, which is considered to be within natural variation. However, under moderate to high rainfall events, flows could increase up to approximately 14.5%. The Department has considered the potential impacts from discharges into Airly Creek and believes that these would not lead to a significant impact to downstream environments.

Downstream surface water users

There are three licensed surface water users potentially affected by the proposal. One potentially affected surface water user is located adjacent to Genowlan Creek, downstream of the site. Waterway flow is predicted to reduce to 3.8% in Genowlan Creek at this site. However, based on the conservative nature of predicted baseflow reductions and catchment runoff loss, the impact is likely to be within the natural variation of the Creek's pre-existing ephemeral nature.

The remaining two lots are located well downstream of the site and at the confluences with other waterways, thereby dissipating any project-related impact on the quantity and quality of available water resources. The Department accepts that potential impacts are likely to be within the bounds of natural variation, based on the ephemeral nature of the watercourses, and that this would constitute a negligible impact. Notwithstanding, Centennial would be required to provide a compensatory water supply to downstream surface water users for any impact other than a negligible impact, as required by a recommended condition of consent.

Erosion and sediment control

Existing sediment and erosion control measures would be upgraded to accommodate the proposed new surface facilities, including the new ROM coal stockpile, CPP and REA. Works would involve upgrading the capacity of the active filter pond and the construction of a 20 ML erosion and sediment control dam as part of the REA water management system.

Surface water licensing

Centennial also collects surface water runoff from catchments around the pit top for use in mining activities. It is expected that up to 128 ML/year would be required in excess to the mine's harvestable rights under the *Greater Metropolitan Region Unregulated River Water Source Water Sharing Plan* (GMRU WSP). Centennial has demonstrated, to the satisfaction of NOW, that there are tradable Water Access Licences (WALs) within the relevant water source sufficient to cover this water take.

Cumulative impacts

Centennial has undertaken a regional study of water and salt balances for the major water users in the Western Coalfields over a period of 25 years from 2013. Airly is located in the Capertee River Management Zone of the Hawkesbury and Lower Nepean Rivers Water Source covered by the GMRU WSP. Other coal mines with the potential to discharge into this water source include Clarence, Angus Place and Springvale mines. Angus Place and Springvale are predicted to do so only on an emergency basis. Clarence Colliery is expected to discharge between 3,000 and 5,000 ML/year up to 2026. By comparison, Airly is predicted to discharge up to 180 ML/year (90^{th} percentile), only during high rainfall events towards the end of mining (around 2030) and would therefore make a minor contribution to this water source.

Impacts on the values of the GBMWHA

The listed heritage values (both world heritage and national heritage) of the GBMWHA include:

- outstanding examples of ongoing ecological and biological processes significant in the evolution of Australia's highly diverse ecosystems and communities of plants and animals, particularly eucalypt dominated ecosystems; and
- significant natural habitats for the *in situ* conservation of biological diversity, including the eucalypts and eucalypt dominated communities, taxa with Gondwanan affinities, and taxa of conservation significance.

The potential impact on the world heritage values of the GBMWHA and national heritage values of the Gardens of Stone NP is related to mine-water discharges to Airly Creek which may impact on downstream aquatic flora and fauna values. The Department's assessment of this matter has determined that mine-water would be unlikely to affect downstream ecosystems in the GBMWHA and that the values of the Gardens of Stone NP and Wollemi NP as part of a world heritage area and national heritage place would be preserved. The Department has recommended a suite of performance measures, monitoring and management requirements and conditions of consent to regulate the mine and protect the world heritage area and national heritage place.

Performance measures

The Department is satisfied that the Airly proposal would be unlikely to result in measurable environmental consequences to Airly Creek in the Gardens of Stone NP and GBMWHA. Consequently, the Department has recommended that Centennial should meet performance measures of 'negligible' environmental consequences for Airly Creek, where it enters the Gardens of Stone NP.

As a lower level of protection would apply in Airly Creek upstream of the GBMWHA, and these upper reaches would provide the mixing zone for the dilution of mine-water in the catchment, the Department considers that a lower performance measure of 'no greater impact or environmental consequence than predicted in the EIS' is appropriate for this section of Airly Creek. This would allow for minor impacts associated with mine-water making up a greater proportion of flows, and a slightly lower water quality before entering the GBMWHA 5.5 km further downstream.

Similarly, the performance measure of 'no greater impact or environmental consequence than predicted in the EIS' is recommended for the minor changes predicted to flows in Gap and Genowlan Creeks, thus allowing for the predicted low levels of baseflow losses and catchment losses which are expected to reduce stream flows. For aquatic and riparian ecosystems, Centennial would be required to maintain or improve baseline channel stability.

The Department has recommended the following performance measures to guide mining beneath watercourses on the site:

- *for Gap and Genowlan Creeks:*
  - wherever depth of cover is < 40 m, no first or second workings within 20 m of the edge of the creek bed, measured horizontally in the seam;
  - negligible environmental consequences to water quality and to bed and bank stability; and

  - no greater environmental consequences than predicted in the EIS to water flows (including baseflow);
- *for all other watercourses:* no greater subsidence impacts or environmental consequences than predicted in the EIS.

Finally, standard performance measures relating to the construction and operation of infrastructure, sediment dams, mine-water storages, the REA, and chemical and petroleum storage have also been recommended to be included in the consent.

Monitoring and Management

The Department has recommended a suite of monitoring and management measures aimed at further calibrating and validating the predictions and impact assessment within the SWIA and later documentation. These would require Centennial to undertake:

- event-based monitoring of water flows and ecotoxicology under discharge conditions to calibrate predictions;
- achieve an improvement in the quality of water held on site in line with predictions made in the EIS (see **Figure 8**);
- review and revise SSTVs, once two years of monitoring data upstream of Airly mine has been obtained, in accordance with the ANZECC guidelines and undertake any necessary measures to ensure that the revised SSTVs are met;
- further surveying for stygofauna; and
- develop and implement a comprehensive Water Management Plan, including adaptive management techniques to minimise any adverse impacts on watercourses.

The Department is satisfied that these monitoring and management measures would enable Centennial to demonstrate that the predictions made in the EIS are achieved, and that a high level of protection is provided to the GBMWHA over the life of the mine. The Department considers that the event-based monitoring would be required until such time as Centennial is able to demonstrate that the GBMWHA is protected to the satisfaction of the Department and EPA.

Dr Wright's submission was generally critical of the lack of monitoring parameters applied to EPLs in NSW and considered that for Airly, a detailed suite of limits and monitoring parameters should be applied. As the Department does not issue the EPL, this has been referred to the EPA for its consideration in varying the mine's EPL. The EPA has advised the Department of its intention to vary the mine's EPL to include special conditions which would reflect its recommendations for monitoring and management.

Conclusion

The Department considers that discharges from LDP 001 would have negligible impacts on the hydrology and quality of water flowing in Airly Creek within the GBMWHA. This is based on the small quantities of predicted discharges, dilution from catchment runoff during high rainfall events and prolonged wet periods and the expected improvement in water quality in water storages on the site (and potentially discharged) over the life of the mine. Performance measures have been recommended which reflect the high level of protection required for the Gardens of Stone NP and GBMWHA, together with a monitoring and management regime required as part of the mine's Water Management Plan. The Department considers that the impacts to world and national heritage values would be acceptable, provided the action is undertaken in accordance with the recommended conditions.

The Department is also satisfied that other surface watercourses in the site would experience small levels of baseflow and catchment runoff losses resulting in negligible to minor impacts which would dissipate outside of the site and further downstream. Based on the low levels of reduction in total waterway flows, and the ephemeral nature of the majority of these watercourses on the site, the Department believes that these impacts would be minor and are likely to be entirely negligible further downstream.

6.4 Groundwater

The EIS includes a Groundwater Impact Assessment (GIA) based on a groundwater model constructed with reference to the AIP and the *Australian Groundwater Modelling Guidelines*. The groundwater model was peer reviewed by Dr Noel Merrick who noted that, although the model could be made more robust, it was considered to be fit for purpose with respect to the AIP. This peer review was considered by NOW and the IESC in the formulation of their advice on the proposal.

Specialist comments regarding groundwater issues were included in CVEG's submission, from Dr Pells and Dr Broughton (including regarding the peer review of the groundwater model). These comments questioned:

- whether the existing network of groundwater monitoring bores was adequate to provide sufficient data to inform the GIA;
- whether the rainfall data had been sourced from a representative station and used to reflect multiple scenarios of climate variability to inform the groundwater model;
- whether mine dewatering and subsidence may impact on the ability of the local groundwater systems to transmit groundwater, in particular during drought conditions;
- whether reduced baseflow recharge to Quaternary alluvium and creeks, which overlie and recharge the lower Shoalhaven and Devonian group aquifers, may impact on groundwater users, particularly if there is good hydraulic connection between local and regional groundwater aquifers;
- the source for the additional WAL required by Centennial has not been published;
- there is no need for Centennial to hold a groundwater WAL covering 278 ML/year when peak requirements are estimated to be 199 ML/year;
- piezometric modelling and permeability measurements which are key to predictive groundwater modelling are not available for review; and
- groundwater modelling results for depressurisation in the Narrabeen strata are unexpectedly low, which indicate a modelling error. It is believed that drawdown in the Narrabeen strata would be much higher, and likely to result in greater impact to seeps and springs and baseflow to creeks.

Groundwater system and model

The groundwater system comprises two independent sources including the local and deeper regional groundwater sources (see **Figure 11**). These include:

- local groundwater sources, as follows:
  - alluvial groundwater in Quaternary strata which provides baseflow to Gap and Genowlan Creeks (and is believed to supply the Grotto and Oasis), potential habitat to vegetation, stygofauna, GDEs and downstream users of surface water in Genowlan Creek;
  - hard rock aquifers in the underlying Narrabeen Sandstone which provide potential habitat to stygofauna and feeds seepage areas and springs around the site; and
  - hard rock aquifers in the Permian Illawarra Coal Measures which provide baseflow to Gap and Genowlan Creeks and to seepage areas around the site; and
- deeper regional groundwater sources:
  - hard rock aquifers in the Shoalhaven Group which provide brackish to saline water to a small number of registered users, including Centennial's production bore located at the pit top; and
  - hard rock aquifers in the deeper Devonian strata which provide a fresh to brackish regional groundwater source to registered groundwater users in the Capertee Valley, east of the site.

The local groundwater system is predominantly made up of the Quaternary alluvium associated with Gap and Genowlan Creeks and the weathered and/or fractured sandstone and coal seams that occur within Mount Airly and Genowlan Mountain. These are classified as less productive under the AIP due to their low yield rates and poor water quality. The Shoalhaven Group groundwater source is also less productive as it is highly saline to brackish. The deeper regional groundwater system in the Devonian strata is classified as highly productive under the AIP and is the source of many registered groundwater users east of the site in the Capertee Valley. There was some consensus between Drs Merrick, Broughton and Pells in the conceptualisation of the groundwater system; however Dr Broughton was concerned that anecdotal evidence from landowners suggested that groundwater bores were sourcing water from the Shoalhaven Group, and not the highly productive water source in the Devonian strata. This matter is discussed in relation to the highly productive groundwater source below.

In relation to whether sufficient data had been obtained to inform the construction of the model and subsequent assessment, the IESC considered that *"…groundwater data has been largely collected to a satisfactory standard and over an appropriate timeframe"*.

Centennial has committed to installing a further four monitoring bores and four vibrating wire piezometers to improve the extent of groundwater monitoring across the site. Dr Broughton considered that this should have already occurred and been used to inform the assessment. The Department considers that there is sufficient data available for the assessment but agrees that data from the additional monitoring bores should inform the development of the mine plan, via adaptive management. This would occur through recommended conditions requiring the mine to calibrate the groundwater model as part of the Water Management Plan and to use this data to inform adaptive management practices in Extraction Plans as mining moves from the west to the east of the site.

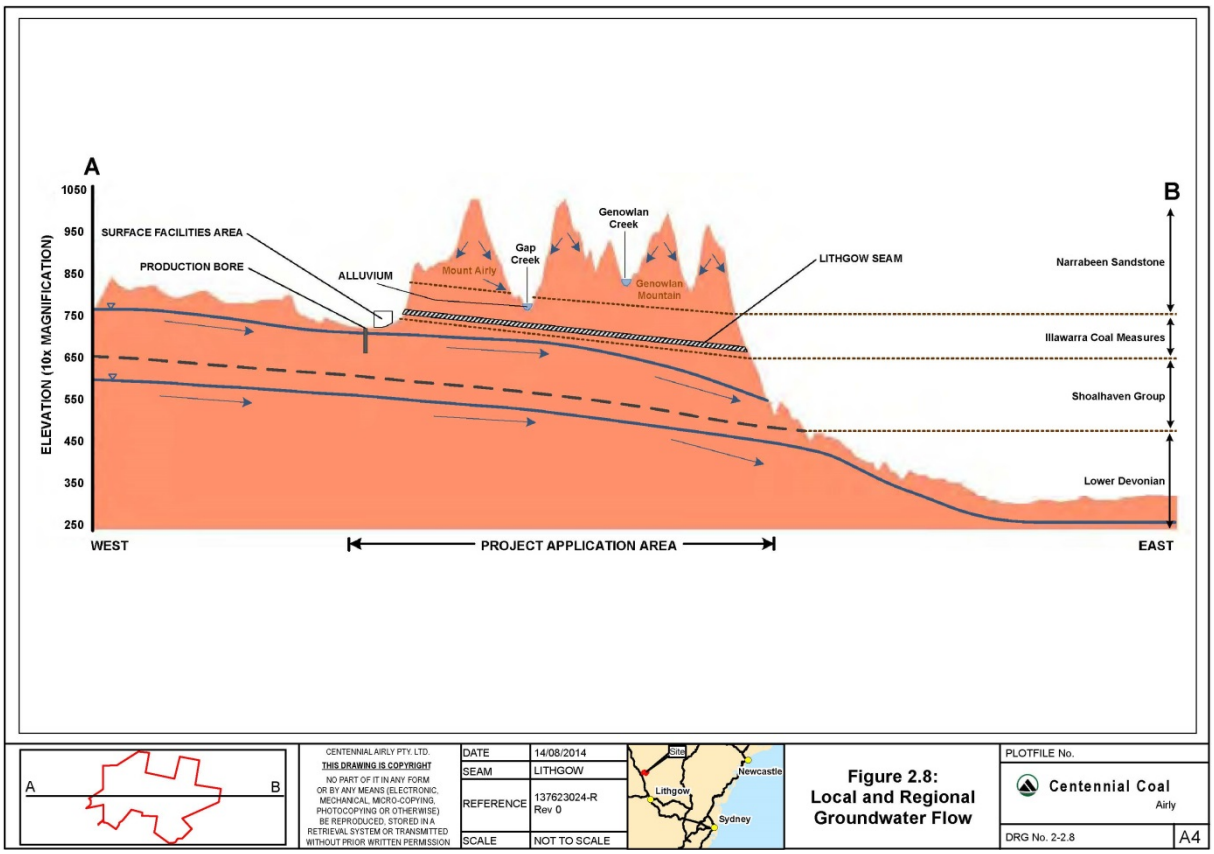

Figure 11: *Conceptualisation of local and regional groundwater sources in the site.*

The local groundwater sources are essentially isolated to the mesas of Mount Airly and Genowlan Mountain (see **Figure 11**). The local groundwater sources are therefore limited in extent and are characterised by a largely closed hydrological system of rainfall recharge and seepage. Groundwater monitoring indicates a vertical hydraulic gradient with unsaturated conditions in the Lithgow Seam and relatively low piezometric head across the site. This indicates that, although groundwater flows in a downwards direction, it is directed horizontally within strata to outcrops where it discharges in the form of seeps or baseflow to surface water systems. Based on differences in the quality and chemical composition between the less productive local and highly productive regional groundwater sources, there would appear to be minimal inter-aquifer hydraulic connectivity.

The IESC recommended that the influence of structural features (particularly geological faults) should be considered in the groundwater model. In its RTS, Centennial described that it had predicted, and observed, groundwater flows perpendicular to the main northwest and north-south trending faults which it believes demonstrates the significant influence of the extensive network of fractures and joints through the site on groundwater flows. These fractures and joints facilitate groundwater movement to seepage areas across the slopes of Mount Airly and Genowlan Mountain where the strata outcrop and accounts for the low piezometric head in the site and unsaturated conditions of the Lithgow Seam. The influence of these fractures and joints has been accounted for in the groundwater model.

Drawdown within the shallow alluvial groundwater source

The alluvial groundwater source in the Quaternary strata is predicted to experience drawdown of between 2.5 – 3.5 m beneath Gap Creek and up to 1.1 m beneath Genowlan Creek. However, the spatial extent of the drawdown is limited and would not extend beyond the site (see **Figure 12**). Drawdown would not occur beneath the Grotto or Oasis which are believed to be fed by rainfall recharge held in the alluvium.

Centennial considers these predictions to be conservative as drawdown would be less in areas of alluvium with greater hydraulic conductivity. The recovery time to equilibrium is dependent on rainfall and could therefore range from five to 60 years, with an expected median of 20 to 30 years. The EIS has assessed the impact of this drawdown on water quality and beneficial use categories for both Gap and Genowlan Creek and considers that there would be no impacts as a result of alluvial groundwater drawdown. Centennial has previously monitored drawdown of 3.5 m in the Gap Creek alluvium due to climatic conditions between August 2012 and April 2013, with no change in groundwater quality.

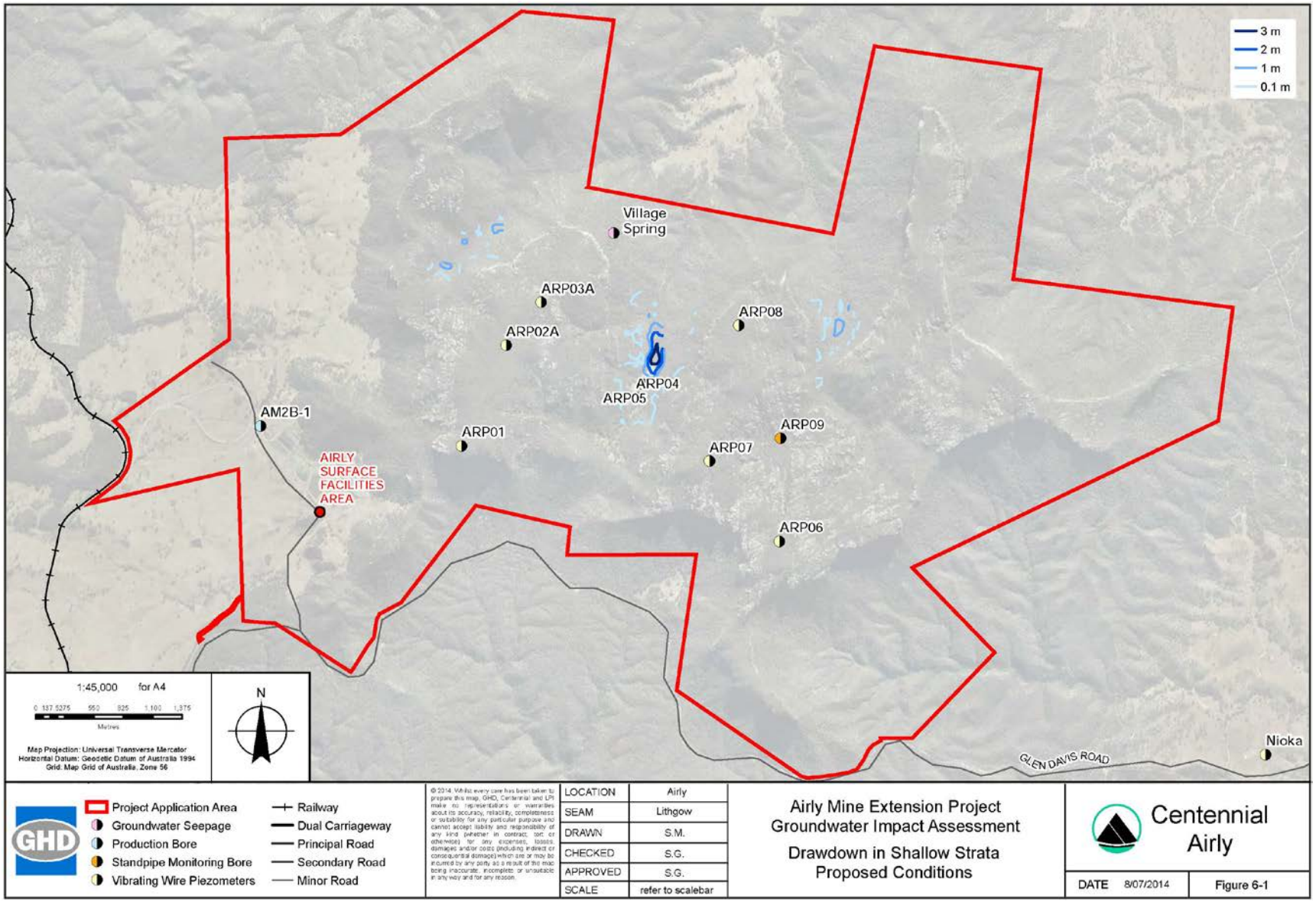

Figure 12: *Predicted drawdown in the shallow alluvial strata*

The Department considers that there would be no change in water quality to Gap or Genowlan Creek, or to the beneficial use categories of these creeks as a result of predicted levels of groundwater drawdown. No high priority GDEs or groundwater users would be affected and baseflow losses would be minor (see Section 6.3). Accordingly, impacts to alluvial groundwater sources are less than the Level 1 minimal impact consideration under the AIP.

Drawdown within the less productive porous and fractured rock groundwater sources

The porous and fractured rock groundwater source includes the Narrabeen Sandstone, Illawarra Coal Measures and the Shoalhaven Group strata. The groundwater model predicts depressurisation of the Narrabeen Sandstone to be negligible with some localised drawdown of up to 2 m at the interface of the underlying Permian strata. Dr Pells considered this to be an unlikely conclusion and attributed this to the potential for the modelling software to underestimate the impact of drawdown within the Narrabeen strata from dewatering of the underlying Permian coal measures associated with the extraction of coal. Dr Pells expected greater levels of depressurisation in the Narrabeen Sandstone, resulting in greater impact to seeps, springs and baseflow reductions to creeks.

Centennial believes that the reason for the low modelled level of depressurisation is the result of the unsaturated condition of the Narrabeen Group strata, resulting from groundwater seeping through the network of fractures to outcrop across the slopes of Mount Airly and Genowlan Mountain. At the interface of the Narrabeen Group and Permian strata, some depressurisation has been predicted. However, there is limited impact to groundwater flows within the Narrabeen Group as a whole. The Department notes that the predicted height of sub-surface fracturing would not extend beyond the Permian strata and therefore sub-surface fracturing in the Narrabeen Group, which would lead to increased vertical flow of groundwater and depressurisation, is not expected to occur.

Groundwater inflows into mine workings are expected to flow primarily from above the Lithgow Seam with some contribution from the underlying Marrangaroo Formation. The Illawarra Coal Measures which overly the Lithgow Seam would experience drawdown ranging from 4.6 m up to 7.5m. The Marrangaroo Formation which lies beneath the Lithgow Seam would also experience up to 6 m of depressurisation. The Shoalhaven Group regional groundwater source which is below the Illawarra Coal Measures is predicted to experience only 0.1 m drawdown within the site.

Dr Broughton also raised concerns over potential implications of mine dewatering and subsidence on the hydraulic flow of groundwater. The Department is satisfied that Centennial has designed a mining system which has limited, as far as is reasonable and practical, the predicted height of fracturing to be generally constrained to within the Permian strata (except in the Interaction Zone). Whilst this is likely to generate groundwater inflows from above and below the Lithgow Seam, the fractures and joints in the overlying strata would continue to direct groundwater flows horizontally to the surface water system where the strata outcrops, rather than to the mine workings and regional groundwater sources below. Accordingly, inter-aquifer connectivity between the local and regional groundwater sources is not expected to occur as a result of mining-induced subsidence or sub-surface fracturing.

The New Hartley Mine workings resulted in surface cracking which is believed to have generally drained the overlying groundwater sources (primarily the Narrabeen Sandstone) into the workings. This view is backed up by Centennial's piezometric data, which indicate general depressurisation of the aquifer in the Interaction Zone. Based on this, the EIS does not predict additional drawdown in the Narrabeen Group in the Interaction Zone, except in the case of localised remnant groundwater lenses.

Centennial believes that rainfall recharge in the Interaction Zone migrates through the pathways created by surface cracking and sub-surface fracturing, accumulates within the New Hartley Mine workings and then seeps out of Mount Airly (such as at Airly village spring). Mining in the PPMZ in the Interaction Zone is expected to result in subsurface fracturing draining this water from the New Hartley Mine workings into the proposed Lithgow Seam workings. This mine-water would be pumped out to the surface water management system or else seep from Mount Airly, as at present. As Airly village spring is believed to be fed by water accumulating in the New Hartley workings, mining under these workings is expected to see the reduction or cessation of flows at the spring.

There are no high priority GDEs or groundwater supply works which would be affected by the proposed levels of drawdown. Water quality is not expected to be affected since there is no predicted increase in connectivity between the low quality groundwater in the Permian and Shoalhaven Group strata and the higher quality water in the overlying Narrabeen Sandstone and alluvium or the underlying Devonian groundwater system. The Department agrees that the proposed depressurisation and drawdown would be within the Level 1 minimal impact consideration under the AIP.

Drawdown within the highly productive porous and fractured rock groundwater source

There are 36 groundwater bores within 5 km of the site used for domestic, stock, irrigation or testing (see **Figure 13**). The majority are located to the east of the site in the Capertee Valley and extract from the regional groundwater source, which is generally believed to be held in the Devonian strata. Some registered bores are also located to the northeast of the site in the Genowlan Creek alluvium.

Many submissions received during exhibition identified concerns regarding the potential impacts of mining on the quality and quantity of groundwater.

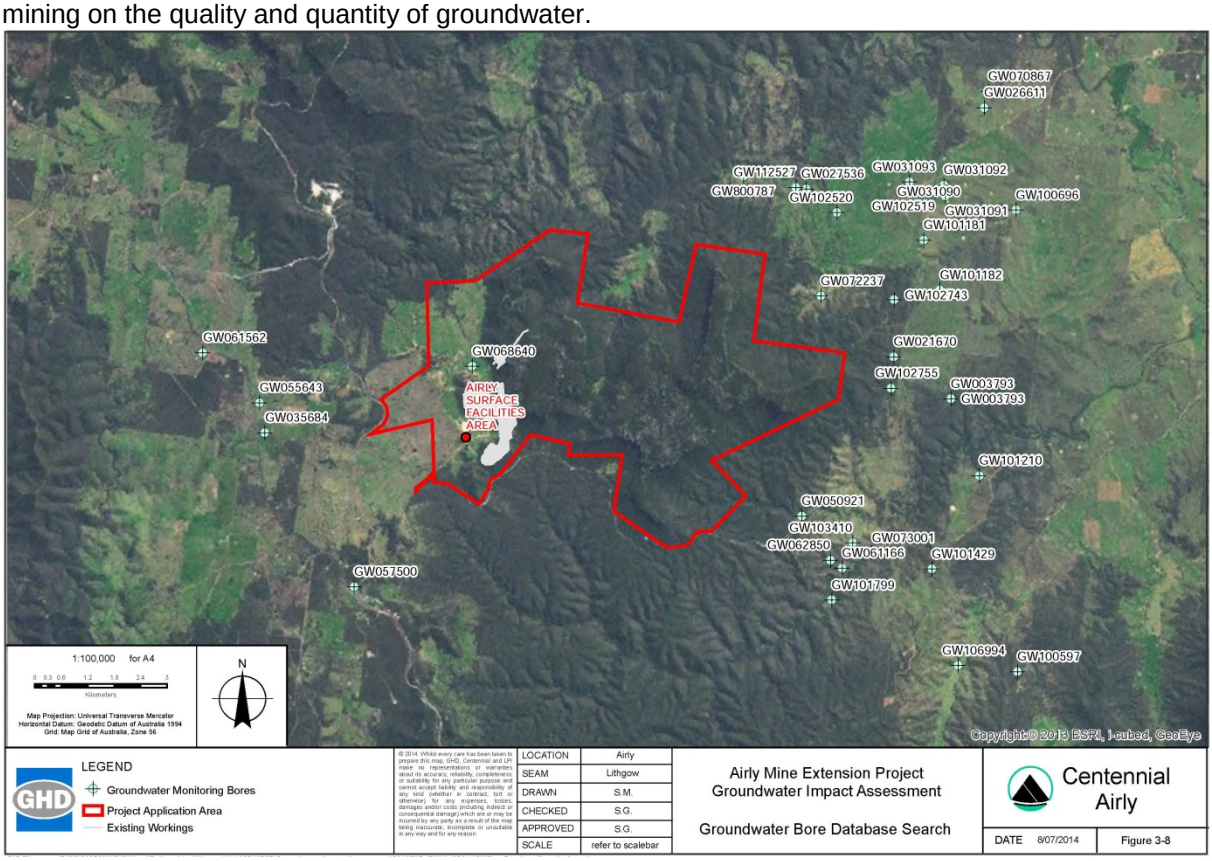

Figure 13: *Registered groundwater bores near the site*

As there are no impacts predicted to the groundwater source in the Devonian strata, there are no impacts expected for groundwater users. Dr Broughton stated that anecdotal evidence from landholders suggests that their bores are actually located in the Shoalhaven Group, and that if this is not the case, then it would appear to be possible that groundwater recharge to the Devonian aquifer was occurring from the overlying Shoalhaven Group. The Department considers that as there is minimal drawdown of 0.1 m predicted in the Shoalhaven Group that there is unlikely to be any impact to groundwater users who may extract from this groundwater source.

Groundwater licensing

Groundwater interception and extraction from the Sydney Basin North groundwater source over the life of the project is projected to peak at 199 ML/year (90th percentile) with approximately 46 ML/year of water extracted as coal moisture. Centennial currently holds a WAL for the Sydney Basin North groundwater source allowing extraction of up to 278 ML/year. The projected water take is well within Centennial's existing WAL and no new licence would be required for the Airly proposal.

Centennial responded to questions from Dr Broughton regarding its WAL requirements. It confirmed that the additional entitlement referred to in the EIS was obtained by the company through a tender process made available by the NSW Government in 2013. It also confirmed that the company was required to hold the WAL for the life of the mine and after mining ceases (while groundwater take may still be occurring) in accordance with the AIP and the *Water Management Act 2000*.

The Department accepts that Centennial has obtained and would hold sufficient WALs, as required by relevant legislation. NOW was also satisfied with the proposed water licensing arrangements for groundwater take.

Monitoring and Management

Centennial proposes to develop a Groundwater Monitoring and Management Plan which would observe piezometric height, groundwater quality and flow and volumes transferred from underground workings to the WMS. An additional four boreholes would be installed to improve monitoring coverage across the site.

The Department believes that the additional monitoring bores would improve the coverage of groundwater monitoring across the site and enable greater calibration of the groundwater model and predicted impacts as part of the mine's Water Management Plan. In addition, this information would be incorporated in the Extraction Plan process and inform adaptive management practices as mining progresses from west to east across the site. The Department has recommended a condition of consent requiring the development of a comprehensive Water Management Plan which would include a Groundwater Monitoring and Management Plan prepared in accordance with NOW's requirements.

Conclusion

There is general consensus amongst experts and agencies who have commented on the EIS regarding Centennial's conceptualisation of the groundwater system. The Department has considered submissions received and advice from the IESC and NOW, and believes that the EIS and RTS provide sufficient assessment of potential groundwater impacts. The Department considers that the predicted levels of drawdown in the alluvium are acceptably low, and that there would be no significant drawdown in the Narrabeen Group due to the overriding influence of fractures and joints which would continue to direct groundwater flow to the surface in the form of seeps, springs and baseflow.

Whilst greater levels of drawdown are expected to occur in the Illawarra Coal Measures, this is not expected to extend to the underlying Shoalhaven Group, which is predicted to experience 0.1 m drawdown. No drawdown at all is predicted to the deeper regional groundwater source in the Devonian strata. Accordingly, no impacts to the quality or yield rates of water are expected to groundwater users to the east of the site who extract from this regional groundwater source. The Department considers that the impacts to water resources would be acceptable provided the action is undertaken in accordance with the recommended conditions.

Centennial would hold sufficient WALs to cover its predicted water take for the duration of mining and thereafter as necessary. The Department has recommended a comprehensive Groundwater Monitoring and Management Plan as part of its proposed conditions of consent which would require additional monitoring of groundwater in the east of the site to calibrate the groundwater model and inform subsequent mining practices through Extraction Plans and adaptive management.

6.5 Socio-economic Assessment

Introduction

The EIS includes an Economic Impact Assessment (EIA) prepared by Aigis Group and a Social Impact Assessment (SIA) prepared by James Marshall & Co. The Department's Chief Economist reviewed the economic predictions in the EIA. In addition, the Department engaged the Centre for International Economics (CIE) to undertake a peer review of the EIA, focusing on cost-benefit analysis (CBA) and the value of environmental impacts associated with the project. In summary, both the Chief Economist and CIE found that the EIA did not provide an adequate assessment of the costs and benefits of the project.

Consequently, Centennial provided a revised EIA, which included a State-level CBA as well as a revised assessment of the impact of the project on local and regional communities. The revised EIA, also prepared by Aigis Group, was received in late March 2015. The Department obtained a final review of the revised EIA by CIE which reported that there remained a number of aspects of the EIA's valuation of social and environmental costs where adjustments or clarification should occur, including:

- cost of some environmental impacts (eg subsidence) have been overestimated on the assumption that some management and mitigation measures may be unsuccessful and result in a greater than predicted environmental impact (and cost);
- adjustment (increase) of the valuation of air quality and greenhouse gas emissions to account for revised estimates based on updated information;
- cost of avoidance, management and mitigation should not be deducted from the overall environmental costs of the project, but rather is more appropriately accounted for as a cost to the company; and
- removal of the value of 'royalties foregone' (estimated at $16.9 M) from implementing a lower impact mining system (which recovers less coal and therefore generates less royalties), which was included as a deduction to the economic costs of the Airly proposal.

CIE's peer review reports (dated January and June 2015) are provided in **Appendix E**. The Department's consideration of the socio-economic implications of the Airly proposal on the local region and the State of NSW follows.

Economic benefits

The revised EIA identified that the project would result in:

- a net benefit of $125 M in NPV terms over the life of the project to State and regional economies, which represents a benefit to cost ratio of 3;
- direct employment of 120[1] full-time equivalent (FTE) employees, equating to a NPV of $55.8 M;
- total NSW Government royalties of $116.4 M; and
- Commonwealth, State and local tax revenue and other charges of $14.8 M (NPV).

Royalties

DRE considers that the proposed development is likely to generate up to $13 M in royalties for the State of NSW per annum. This is expected to generate around $170 M in royalties over the life of the mine, which in NPV terms is around $80 M. This is $36.4 M less than the estimated royalties in the revised EIA.

DRE's lower estimate is based on what it considers to be the most likely coal price scenario for both domestic and export coal as at the time of its advice (April 2015). This includes an assumed average price of $60 per tonne for domestic thermal coal over the life of the project together with a medium-term price of $90-105 per tonne (to the end of 2025) and long-term price of $106-$117 per tonne (post 2025) for export thermal coal. DRE has also assumed a 50/50 split between domestic and export coal.

Based on the Commonwealth Department of Industry's Resources and Energy Quarterly (REQ) (December 2014) and current exchange rates, the contracted export price for thermal coal is expected to be around $92 per tonne in 2015 (based on the Japanese Fiscal Year starting April 1). This remains current under the June 2015 REQ. On this basis, DRE's estimated royalty of $80 M represents the minimum economic benefit expected to be received by the State of NSW.

Social and environmental costs

The revised EIA also estimated the costs of the key impacts of the project. The Department notes that there are inherent difficulties associated with allocating monetary values to environmental and social impacts. The EIA considered that the project's major social and environmental costs were in relation to soil and land capability (ie the temporary loss of grazing land and its subsequent rehabilitation), subsidence impacts, surface and groundwater impacts and heritage. Total costs were estimated by Aigis to be $100.7 M. As indicated above, the Department and its independent consultant CIE both consider that it is very unlikely this estimated environmental cost of the proposal would be realised. Centennial has since advised the Department that Aigis's approach to valuing environmental costs has been to generally overestimate predicted impacts. CIE notes that, in many instances, the EIS and supporting information indicate that there would be no, or negligible environmental impacts. Overall, the Department believes that the environmental cost for the proposal would be low.

Local and regional impacts including employment and expenditure

The Department recognises that Lithgow has a history of mining and power generation. LCC's *Lithgow Economic Development Strategy 2010-2014* (Lithgow EDS) identifies the energy sector as the economic base of the region, employing 10% of the resident workforce (second only to retail trade at 11.2%), based on the 2006 census. This has since increased to 11.6% of the workforce in Lithgow LGA, based on 2011 census data. The mining sector makes the largest contribution to Lithgow's Gross Regional Product (GRP), estimated to total around $194 M (or 27% of GRP) in 2006-2007.

Therefore, the continued employment of existing staff, together with the potential increase of up to 120 FTE staff under full operating conditions would make a positive contribution to the regional economy. Based on surveys undertaken by Centennial at its Springvale and Angus Place mines, its local employees are believed to spend around 30% of their weekly incomes in the local region.

[1] A further 15 FTE jobs and 20 contractor positions may become available over the life of the mine. However, as the timing of these positions is uncertain, Aigis Group has conservatively omitted this potential economic benefit from its analysis. The Department's socio-economic assessment is based on this conservative approach adopted by Aigis Group, however it should be noted that the full employment scenario (ie 135 FTE staff and 20 contractor positions) proposed by Centennial is reflected elsewhere in this report.

Many of the existing employees at Airly transferred from Centennial's recently-closed Charbon Colliery, situated in the Mid-Western Regional Council (MWRC) LGA. The Department therefore recognises that the socio-economic benefits of this project are likely to be spread across a broader region encompassing the two LGAs. Similar to the Lithgow LDS, the MWRC's *Land Use Strategy 2010* identifies the significant contribution of the mining sector to the regional economy.

In addition, 30 temporary contractor jobs would also be created during the construction phase. In economic terms however, these contractors may more readily find alternate work and this benefit is therefore discounted to zero in the revised EIA.

The capital investment value (CIV) for the project is estimated to be $86.63 M. However, the majority ($77 M) of this is attributed to the acquisition of 'industry specific mining plant & equipment' which the Department considers may be unlikely to be sourced from the Lithgow region. This investment (and any flow-on effects) is instead expected to occur elsewhere in the State of NSW or overseas, or a combination of both. The Department believes that it is more probable that the remaining $9.63 M represents the likely capital investment that may occur in the Lithgow region, which may in turn generate positive flow-on effects. Centennial aims to direct its investment spending to locally-based businesses and allows them to identify themselves as such in its tendering process. At its Springvale and Angus Place mines, Centennial spent approximately $35 M with Lithgow-based businesses and an additional $2.3 M with businesses in neighbouring LGAs in the 2013-14 financial year. While the precise quantum of local spending is uncertain, the Department has no doubt that the project would make a significant contribution to the local economy.

Other benefits

Centennial provides financial support to the Capertee Public School, Glen Alice Public School, Capertee Bike Challenge and the Capertee and District Progress Association. Centennial has committed to make a community contribution to Lithgow City Council of three cents per tonne of total saleable coal produced from its Airly, Springvale and Angus Place mines up to a maximum of $200,000 per year. This would be used for long-term activities and projects to be agreed on by both parties and reported publicly.

Other sectors

The Lithgow EDS identifies a growing tourism and recreation industry based around areas of natural scenic quality, conservation areas and national parks. The Airly proposal would involve mining beneath a SCA, which is located on the edge of the Capertee Valley. Many of the submissions in objection identified this area as an important bird habitat attracting bird watchers from around the world, and providing for a range of recreational activities including bush walking, 4WD tracks, camping grounds and bed and breakfast establishments. The proposed development is not expected to detract from the conservation values of the Mugii Murum-ban SCA, including the high cliffs which are visible on approach to and from the Capertee Valley. In addition, the Airly proposal is not expected to result in any long-term restriction in the use of the SCA for public recreation purposes. Therefore, the Department considers that the proposed mining would not significantly detract from the growing tourism and recreation industry. As part of its management regime, Centennial would liaise with OEH and NPWS to prepare and implement a public access management plan for visitors to the SCA during the life of the mine. This has been reflected in the Department's recommended conditions of consent.

Social impact assessment

The EIS's Social Impact Assessment (SIA) reported on Centennial's stakeholder engagement plan which found that, whilst some residents support the mine, many of those living in rural areas outside of the main urban centre of Lithgow and the towns of Wallerawang and Portland do not identify with Lithgow's past mining and power generation heritage. This is consistent with emerging demographic trends which suggest an increase in the average age of the population in the Lithgow LGA, together with the location of new or additional dwellings in non-urban and rural areas. The SIA attributes this trend to an increasing 'tree-change' movement to the Lithgow LGA.

Whilst there are some residents and stakeholders in the community who value the area for its scenic, geodiversity and botanical values and believe that mining is incompatible with these values, there are others who do not view the mine as impinging on their rural lifestyles. This can be seen in the large number of submissions in support of the project from residents of the Lithgow LGA. Although some of these submissions have been received from employees or relatives of persons employed at Airly or by Centennial, their socio-economic contribution to the local region (as reviewed in the preceding discussion) is significant. The Department considers that they are a valid stakeholder group and has considered their submissions evenly together with submissions in objection to the Airly proposal.

The Department believes that Centennial's proposed mining system, which has been designed to avoid significant impacts to cliff lines, surface watercourses and groundwater systems and to minimise residual environmental impacts, would not result in an unacceptable social impact on the residents, employees, tourists and other visitors to the Lithgow region.

Rather, the Department is of the view that the continued operation of Airly mine would ensure that positive socio-economic benefits from this significant sector of the regional economy would continue to occur over the life of the mine. This would result in positive social outcomes as attested to in the submissions received in support of the Airly proposal.

Conclusion

Overall, the Department believes that the Airly proposal would make a positive socio-economic contribution to the economies of the Lithgow region and State. The benefits over the life of the mine are projected to include:

- continued direct employment of 59 FTE staff, increasing up to 120 during full operations, and an additional 20 contractors over the life of the mine;
- employment of around 30 contractors during construction;
- indirect employment of around 550 people across the State of NSW (based on DRE's estimate);
- community contribution of up to $200,000 to Lithgow City Council (in combination with the other Centennial mines in the Lithgow region);
- total estimated NPV economic benefits which include:
  - $55.8 M in operational phase incomes;
  - $80 M to the State of NSW in royalty revenue (at a minimum); and
  - $14.8 M in Commonwealth, State and local tax revenue.

6.6 Surface infrastructure and operations

The Airly proposal involves the construction of the CPP, new ROM coal stockpile, new REA and associated water management structures, upgrade of the train refuelling station and a new security gate. Ongoing borehole drilling for geotechnical exploration and groundwater monitoring is proposed over the life of the mine. Potential impacts arising from these works are discussed below.

Land clearing

Two alternative locations were investigated by Centennial for the new REA. The proposed location (REA 2) was selected on the basis that it would result in a lesser impact on vegetation communities than the alternate option (REA 1). The proposed location consists of 9.15 ha of disturbed land, 25.49 ha of derived native grasslands and 3.27 ha of the *White Box-Yellow Box-Blakely's Red Gum Woodland EEC*, listed under the TSC Act. This community is also listed under the EPBC Act, as the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC*. Approximately 484 ha of this community, collectively referred to as 'Box-Gum Woodland', is present on the site. 3.27 ha of Box-Gum Woodland have been identified in the proposed REA location. Impacts to larger and more diverse patches of the community have been avoided by Centennial.

However, the classification of Box-Gum Woodland at the REA site is considered to be conservative, as it is based on dominant groundcover species (as there is little to no remaining canopy cover) and soil fertility analysis. The area of the proposed REA site is in a highly modified state due to past land clearing and grazing of livestock which has prevented groundcover species diversity. The Box-Gum Woodland patches identified are small and are spread across three separate locations with poor connectivity. Dense thickets of Blackberry were also recorded in these areas.

The fauna habitat significance of the proposed REA is also considered to be low. There are four hollow-bearing trees consisting of seven small, one medium and two large hollows. These occur as isolated paddock trees, which restricts their use to mobile bird species and arboreal animals such as the Common Brushtail Possum. Only one threatened fauna species, the Diamond Firetail, was recorded using the cleared lands around the mine's surface facilities. It is not expected that the proposed REA would impact on the habitat of this species as it uses both cleared lands and woodlands on the lower slopes of the site and there is better quality habitat elsewhere in the site. This also applies to other fauna species identified on the site.

OEH advised that, based on the condition of the Box-Gum Woodland, no offset would be required. Following the consideration of further information from Centennial, DoE advised that it was satisfied with the EIS's conclusions and that, on the basis of a small area of low quality CEEC, the impact would not be significant. The Department agrees that the conservation significance of the Box-Gum

Woodland present in the proposed REA location is low and that no offset is warranted. Taking all of this into account, the Department considers that the impacts to Box-Gum Woodland would not be likely to result in a significant impact and would be acceptable.

There is a National Recovery Plan for Box-Gum Woodland (see **Appendix F**), which aims to promote recovery and minimise the risk of extinction of the community. It is estimated that there are around 405,000 ha of Box-Gum Woodland remaining, in varying condition, across Australia. The plan states that Box-Gum Woodland has been historically subject to clearing as it occurs on fertile soils that are desirable for agricultural land uses. Clearing and fragmentation as a result of development, along with inappropriate management and weed invasion, remain ongoing threats to this community. The Airly proposal would not increase the level of threat as the area to be cleared is set within a largely cleared and degraded area in close proximity to the existing mine pit top. Therefore, the Airly proposal is consistent with the overall objectives of the National Recovery Plan.

The construction of the CPP and ROM coal stockpile would not require the clearing of any native vegetation or habitat of threatened species as they are proposed to be located on disturbed/improved land near the pit top. The location of the security gate has been positioned so as to avoid potential clearing of nearby derived native grassland.

Ongoing exploration drilling would be undertaken over the life of the mine for geological and mine management purposes. In addition, four new groundwater monitoring boreholes are proposed in the eastern part of the proposed mining area. However, the number and location of both exploration drillholes and groundwater monitoring boreholes is not (and cannot be) known currently.

As part of these activities, Centennial would engage ecological and heritage experts as part of the site selection process for new borehole drill pad sites to avoid impacts on threatened species, hollow bearing trees, EECs, Aboriginal or European heritage and to minimise impacts.

Exploration drilling activities would also continue to be regulated by DRE as part of Airly's Mine Operations Plan. In addition, the Department has included a condition of consent which requires the preparation of a plan of management to be implemented prior to any clearing being undertaken for the installation of minor surface infrastructure such as exploration drillholes, groundwater monitoring bores and/or associated access tracks.

Aboriginal heritage sites

The CHIA identified four artefact scatter sites (45-1-2767, 45-1-2772, 45-1-2773 and 45-1-2747) and one art site (45-1-2766) that may be potentially impacted due to their proximity to vehicle and walking access tracks. In order to avoid potential surface impacts to these sites, fencing and sediment and erosion control measures would be implemented as part of the Cultural Heritage Management Plan proposed under conditions of consent. The Department considers that this would reduce the risk of impact at these sites to negligible levels.

Conclusion

The Department believes that the surface disturbance associated with the Airly proposal would not result in a significant impact on EECs, threatened species or the values of the Mugii Murum-ban SCA as a result of surface disturbance and operations. The proposed REA has been located to avoid and minimise impacts as far as is reasonable and practicable. Centennial would undertake progressive rehabilitation of all disturbed areas and would aim to return sites to a soil capability classification similar to pre-mining land use. The Department has recommended conditions requiring a Biodiversity Management Plan to govern the operation of the mine.

6.7 Other Issues

The Department has considered other issues relevant to the proposed development, and has summarised its assessment of these issues in **Table 9**.

Table 9: *Other issues*

Issue	*Assessment*	*Conclusion and Recommendation*
Traffic and Transport	Traffic movements would increase as a result of additional employees under proposed full operations, for temporary construction (10 months) and from the delivery of construction equipment and materials. A Traffic Impact Assessment concluded that Glen Davis Road	Traffic impacts would be managed through a TMP which has been included in the recommended conditions of consent.

	would operate at 103% capacity towards the end of the construction phase when full operation of the mine would also be occurring. Mitigation measures would be implemented, as part of a Traffic Management Plan (TMP), in order to manage this short-term impact. Following completion of construction, operating capacity of Glen Davis Road would drop to 92%. The approved rate of extraction would remain the same and no increase in the existing approved levels of train movements would occur.	
Air Quality	The EPA confirmed that the Air Quality Impact Assessment (AQIA) had been undertaken in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*. The AQIA considered four operating scenarios with Scenario 3 representing maximum construction and mining operations. No exceedances were predicted to occur at either privately-owned residences or Airly camp ground. Centennial currently implements measures to minimise coal dust lift-off from train wagons, including maintaining moisture content of coal at 9% and staff training. Although there would be no change to existing train movements, coal dust lift-off would not exceed the 24-hour average PM_{10} criteria of 50 $\mu g/m^3$. The Department is satisfied that the issues raised in NSW Health's submission have been resolved in the RTS. The worst-affected privately-owned residence would experience negligible incremental air quality impacts. These do not require mitigation or management under the Department's Voluntary Land Acquisition and Mitigation Policy (VLAMP). Centennial proposes to implement all feasible and reasonable measures to reduce air quality emissions despite the proposal's expected low impacts.	The Department is satisfied that the Airly proposal would not result in air quality emissions that would exceed Government policy or impact on privately-owned residences or Airly camp ground. An Air Quality and Greenhouse Gas Management Plan would be required under recommended conditions of consent.
Greenhouse Gases	The EIS includes a Greenhouse Gas Emissions (GHGEs) assessment which predicts that a total of 9.01 million tonnes $CO_{2\text{-}e}$ ($MtCO_{2\text{-}e}$) would be generated over the life of the proposed extension. This is equivalent to 0.015% of NSW and 0.004% of Australia's annual emissions (in 2010). The vast majority (95%) of these emissions are Scope 3 emissions, associated with the eventual use of coal mined at the site. The assessment indicates that total GHGEs from the Airly proposal are a very small proportion of current and global GHGEs. Considered in isolation, the project would make a negligible contribution to global warming/climate change. Centennial has indicated that it would identify and implement cost effective measures to improve energy efficiency, minimise fuel consumption through regular plant maintenance and consider energy efficiency of new plant and equipment in the selection phase.	The Department accepts that the GHGEs predicted to result from the project are minor on a State, national and international scale. The Department has recommended conditions of consent requiring Centennial to manage its emissions as part of an Air Quality and Greenhouse Gas Management Plan.
Noise and vibration	The operational, construction, road and rail traffic noise generated by the proposal has been assessed in a Noise and Vibration Assessment NVA), undertaken in accordance with relevant government policies. Questions were raised in a submission as to whether the background noise levels (RBLs) measured in 2009 remained current. The RBLs remain valid, since they have resulted Project Specific Noise Levels (PSNLs) being adopted for the project which are the lowest possible under the *NSW Industrial Noise Policy* (INP) (ie 35 dBA). The noise modelling predicts that compliance with these PSNLs would be achieved, under all operating scenarios, at all privately-owned residences. The NVA assessed the project's night-time noise emissions against the INP's sleep disturbance criteria, which were also found to be satisfactory. The noise model confirmed that no exceedances would occur at Airly camp ground or the Nissen Hut. No cumulative noise impacts were predicted from the	The Department is satisfied that the NVA has been undertaken in accordance with applicable government policies. The project would not result in exceedances of noise criteria for any receiver. The Department is further satisfied that Centennial has addressed issues raised in submissions regarding the NVA and no noise mitigation measures are required under the VLAMP.

	concurrent operation of Airly and the nearby limestone quarry. Construction, road and rail noise is predicted to meet the relevant criteria established under the *Interim Construction Noise Guidelines*, *NSW Road Noise Policy* and *Rail Infrastructure Noise Guidelines*. The Department notes that Centennial had applied the more stringent criterion for rail passby levels in its assessment based on construction of a new rail line. However, as the rail loop servicing the mine is already constructed, lesser criteria apply and trains operating on the Wallerawang-Gwabegar line would exceed the rail passby level by < 2 dBA at residential receivers within 25 m of the line. As the frequency of train movements is not proposed to increase, the Department considers this impact to be acceptable. Centennial demonstrated that exploration drilling proposed to occur over the life of the mine would comply with the INP's noise criteria, subject to a minimum setback of 665 m to any receiver. Based on the sparsely populated site, the Department expects that Centennial would be able to readily comply with this requirement, which is recommended as part of its Noise Management Plan. An assessment of potential vibration impacts concluded that construction and mining operations would not result in impacts to any receiver.	The Department has recommended that a Noise Management Plan is prepared for the project. This would include requirements to use only approved and best practice rail rolling stock and that operations must be undertaken to minimise noise emissions as far as is reasonable and practicable.
Visual	The existing pit top and infrastructure area are situated in a landscape of sloping hills, ridgelines and cliffs with moderate to dense tree cover. A Visual Impact Assessment (VIA) found that the use of dark-toned and non-reflective materials and finishes, combined with the separation distances, undulating land and tree cover, generally screens views of the pit top. The visual appearance of the proposed REA would be minimised to travellers on Glen Davis Road through progressive rehabilitation and the planting of trees at the basal area to act as visual screening. There is one residential dwelling which currently experiences partial and glimpsed views of the pit top area. There are no prominent views of the mine and its infrastructure from lookouts such as Pearson's Lookout or from nearby national parks or the SCA. Low level night time lighting would be regulated through the imposition of a condition of consent requiring compliance with the relevant Australian Standard. The Department considers that the additional impact of new infrastructure would be negligible based on the progressive rehabilitation and tree screening measures that would be undertaken by Centennial.	The Department is satisfied that the Airly proposal would not result in adverse visual impacts to any nearby residential receiver, local lookouts, SCAs or national parks. Centennial has committed to undertaking tree screen planting as part of the proposal.
Land Resources	The proposed REA would temporarily prevent 37 ha of land from being used for its current land use, which is grazing. The REA would be designed and then rehabilitated to achieve a safe, stable, non-polluting and free-draining landform with batter slopes no more than 14°. All coarse and fine reject material would be encapsulated under non-saline and low-sodicity inert material. This design would enable the eventual return of the land to its pre-mining use. However, due to increased slope, the final Rural Land Capability Class would decrease from V to VI. The Office of Agricultural Sustainability and Food Security considered that there would be no impacts to agriculture.	The Department supports return of land to its pre-mining use. It considers that the recommended rehabilitation conditions, to include a Rehabilitation Management Plan, would ensure this outcome.
Waste	Waste would be managed in accordance with the site's existing waste management system. This includes the use of licensed contractors to remove waste, and separating oil and grease from runoff from the workshop and refuelling activities.	A Waste Management Plan would be required by a condition of consent.
Hazards	Airly has an existing hazard management system and an established pollution incident response plan. Centennial has	The SoC, including its hazard minimisation and

	committed to ensuring hazards are minimised to the greatest extent possible as outlined in its Statement of Commitments (SoC).	management measures, has been incorporated in conditions of consent.
Bushfire	Airly has an established Fire Management Plan together with asset protection zones (APZs). No additional vegetation clearing is required for the proposed new infrastructure or upgraded facilities. The REA would have a cut-off drain system which would act as a fire break around the structure. The existing Fire Management Plan also applies to exploration drill sites. The Plan would be updated to reflect the proposed construction and operation of the CPP, ROM stockpile and REA.	A Bushfire Management Plan would be required by a condition of consent.
Decommissioning and rehabilitation	After completion of mining, all surface facilities would be decommissioned and infrastructure removed from the site. A contamination investigation would be undertaken and any dams not proposed to remain would be drained and remediated. Progressive rehabilitation of the REA would involve the outer batters being trimmed, capped and vegetated on an ongoing basis over the stages of its development. Following the end of mining, open forest would be established on disturbed areas of the pit top near the SCA. The pre-mining land use of grazing would be re-established on the REA. In the early post-mining years, grazing would be limited until the REA landscape stabilised. DRE advised that the proposed decommissioning and rehabilitation plans were acceptable and could be included in a Rehabilitation Management Plan.	The Department is satisfied that Centennial's decommissioning and rehabilitation strategy is suitably comprehensive and would return the land to an acceptable post-mining land use. This would be secured through rehabilitation objectives and a Rehabilitation Management Plan required under conditions of consent.

7. RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of consent for the proposed development (see **Appendix H**). These conditions are required to:

- prevent, minimise, and/or offset adverse impacts of the development;
- prevent, minimise, and/or offset impacts on controlling provisions and matters protected under the EPBC Act;
- ensure standards and performance measures for acceptable environmental performance;
- ensure regular monitoring and reporting; and
- provide for the ongoing environmental management of the development.

The recommended conditions are typical of other contemporary development consents that apply to underground coal mines in NSW where sensitive surface features are present. In this regard, a range of strict subsidence performance measures to protect natural and built features, including but not limited to cliff lines, steep slopes and pagodas, water resources and historic heritage; have been proposed. In addition, each stage of mining involving second workings (as well as all workings within the Cliff Line Zone, where all *Pultenaea* are located) would be governed by Extraction Plans in which adaptive management measures, including any necessary refinement of the mine plan, would be required in order to meet all subsidence performance measures.

The Department has also recommended performance measures for water impacts, including but not limited to event-based monitoring of discharged water from LDP 001 and the application of protection criteria for receiving environments downstream in the Gardens of Stone NP and GBMWHA. These special conditions have been included in order to ensure sufficient protection is provided to the downstream environment of the Gardens of Stone NP and the GBMWHA. Other conditions would regulate noise and air quality emissions over the life of the mine, including the construction of new and/or upgraded infrastructure at the existing pit top. The conditions incorporate the recommendations of relevant government authorities where applicable.

The Department also considers that approval under the EPBC Act for the proposed action to be undertaken, subject to the recommended conditions of approval, would not be inconsistent with the Commonwealth's requirements under the EPBC Act.

8. CONCLUSION

To inform the PAC's review, the Department has completed its preliminary assessment of the merits of the project.

The Department has assessed the development application, EIS, RTS and all agency and public submissions on the project. In addition, the Department has obtained independent expert advice on the economic impact assessment. The Department has carefully considered all environmental, social and economic impacts of this proposal, in accordance with the relevant requirements of the EP&A Act. It has also undertaken an extensive consultation process with agencies.

The Department's assessment has concluded that the Airly proposal is a logical continuation of a previous development consent which allowed the recovery of the coal resource beneath the Mugii Murum-ban SCA. The Airly proposal would make use of existing surface facilities and infrastructure and provide continued economic and social benefits for the Lithgow region and to NSW, including:

- the continued direct employment of 59 FTE staff increasing up to 120 under full operations and 30 contractors during construction;
- the indirect employment of around 550 people across NSW;
- community contribution of up to $200,000 to Lithgow City Council (in combination with other Centennial mines in the Lithgow region); and
- total estimated economic benefits in excess of $150 M (NPV), which includes:
  - $55.8 M in operation-phase incomes;
  - $80 M to the State of NSW in royalty revenue (based on a low coal price assumption); and
  - $14.8 M in Commonwealth, State and local tax revenue.

With regard to subsidence impacts, Centennial has proposed a conservative mining system which aims to avoid potentially significant environmental impacts and reduce overall levels of subsidence to < 125 mm. The Department has recommended performance measures that would guide ongoing mining operations and require Centennial to implement adaptive management measures to limit damage to no more than 2% of the total cliff area. Although greater subsidence of between 200 mm – 500 mm is expected in the Interaction Zone, Centennial would implement an increased setback to second workings to avoid further impacts to cliff lines, steep slopes and pagodas. Despite the greater levels of subsidence, the assessment found that there would be minimal impact on threatened species, surface watercourses and other pagodas in this area.

The Department's assessment of the potential subsidence impacts on the critically endangered *Pultenaea* and Heathland EEC found that although the risk of impact would be low, the consequence of any impact may be high due to the single location of species and community. The Department considers that the risk of impact can be managed through the Extraction Plan process which would allow Centennial to calibrate subsidence predictions from other mining areas prior to undermining these species. Monitoring and management requirements would also be required in consultation with OEH.

In relation to water discharges from the mine into Airly Creek entering the downstream environment of the Gardens of Stone NP and GBMWHA, the Department accepts that this water would be unlikely to be of a quality, or proportion of total flows, that would result in an impact on the receiving environment. The Department has recommended, in consultation with the EPA, that event-based monitoring involving ecotoxicology assessment is undertaken under discharge conditions in order to ensure sufficient dilution of mine-water occurs to protect downstream environments. The Department is satisfied that there would be limited impacts on groundwater resources and that Centennial holds sufficient licences to cover predicted groundwater inflows into underground workings. Furthermore that the potential loss of surface water baseflows as a result of the project is relatively minor and would not result in any significant environmental consequences.

Finally, based on the advice of OEH and DoE, the Department's assessment of land clearing for the proposed REA concluded that the loss of small patches of low quality Box-Gum Woodland EEC would not require an offset.

The Department is satisfied that Centennial has designed the Airly proposal in a manner that achieves an appropriate balance between maximising the recovery of coal resources whilst minimising potential impacts on the environment and community. A detailed set of conditions of consent have been drafted to ensure that the Airly proposal complies with applicable criteria and standards, and to ensure that

the predicted residual impacts are effectively minimised and mitigated. No offsets or property acquisitions are necessary. The Department believes these conditions reflect current best practice for the regulation of underground coal mining projects in NSW.

On balance, the Department believes that the project's benefits outweigh its residual impacts and that it is in the public interest and should be approved, subject to strict conditions (see **Appendix H**).

Following the PAC review, the Department will finalise its assessment of the project taking into consideration the findings of the PAC review. It will then refer the development application for the project to the PAC for determination. The Department's recommendation to the Commonwealth Minister will be included in its final assessment report.

Howard Reed
Director 14.8.15
Resource Assessments

David Kitto 14/8/15
Executive Director
Resource Assessments and Business Systems

APPENDIX A: ENVIRONMENTAL IMPACT STATEMENT

See the Department's website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5581

APPENDIX B: SUBMISSIONS

See the Department's website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5581

APPENDIX C:
RESPONSE TO SUBMISSIONS (RTS)

See the Department's website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5581

APPENDIX D: SUBMISSIONS ON RTS

See the Department's website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5581

APPENDIX E: ADDITIONAL INFORMATION

Review of the EIS's economic assessment, by the Centre for International Economics (January 2015).

Review of the revised economic impact assessment, by the Centre for International Economics (June 2015).

See the Department's website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5581

APPENDIX F: APPROVED CONSERVATION ADVICES AND NATIONAL RECOVERY PLANS

Approved conservation advice under the EPBC Act for the

- *Prostanthera stricta* (Mount Vincent Mint-bush);
- *Hoplocephalus bungaroides* (Broad-headed Snake); and
- *Macquarie australasica* (Macquarie Perch)

Recovery Plans under the EPBC Act for the

- *Pultenaea* sp. Genowlan Point (Genowlan Point *Pultenaea*);
- *Chalinolobus dwyeri* (Large-eared Pied Bat);
- *Petrogale penicillata* (Brush-tailed Rock-wallaby); and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

APPENDIX G: CONSIDERATION OF ENVIRONMENTAL PLANNING INSTRUMENTS

State Environmental Planning Policy (State and Regional Development) 2011
The Airly proposal is 'development for the purpose of mining that is coal mining' under clause 5 of Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011*, and is therefore classified as State significant development requiring consent from the Minister for Planning.

SEPP No. 33 – Hazardous and Offensive Development
This SEPP governs the assessment of development for the purpose of a 'potentially hazardous industry' or 'potentially offensive industry'. Hazardous materials would be managed in accordance with the mine's existing management practices and updated where procedures do not yet exist for a proposed work activity.

SEPP No.44 – Koala Habitat Protection
A flora and fauna assessment was undertaken as part of the EIS and found that whilst there were Koala feed tree species on the site, they do not occur in the density required for any part of the site to be defined as 'potential' or 'core' Koala habitat. Additional targeted searches did not reveal evidence of Koalas near these tree species. These findings are consistent with records of the nearest Koala sighting being over 10 km from the site. The Airly proposal therefore would not result in the loss of potential or core Koala habitat, and consequently is not inconsistent with the aims, objectives and requirements of SEPP 44.

SEPP No.55 – Remediation of Land
The SEPP requires the consent authority to consider whether or not land on which development is proposed to be carried out is contaminated. The EIS has identified that the Airly pit top and surface facilities were constructed relatively recently (in 2009) and the site has not previously been used for industrial purposes and therefore the potential for contamination is low. The Department notes that potential contamination may exist as a result of past land use activities such as the former New Hartley Mine and associated oil shale production and handling equipment. However, the SEPP does not prevent a consent authority granting consent to a development on land that may potentially be previously contaminated.

The construction and operation of the surface facilities at the pit top would involve storage and handling of hydrocarbon fuels. Centennial would implement best practice management for hydrocarbons including the construction of all pipework and tanks to Australian Standard 1692 and implementation of health and safety systems to ensure the potential for contamination remains low.

The Department is satisfied that the Airly proposal is generally consistent with the aims, objectives and provisions of SEPP 55.

SEPP (Infrastructure) 2007
The Infrastructure SEPP requires a consent authority to notify relevant public authorities about developments that may affect public infrastructure or public land. OEH's comments have been considered in relation to the Mugii Murum-ban SCA (which is public land). No public infrastructure would be affected as a result of the Airly proposal.

SEPP (Mining, Petroleum Production and Extractive Industries) 2007
Under the Mining SEPP, there are a number of matters that must be considered by the consent authority prior to granting development consent:

1. Clause 7 (1) (b) makes mining permissible with consent on any land where development for the purposes of agriculture or industry may be carried out (with or without development consent). Consequently, the proposed development is permissible with consent, and the consent authority may determine the application.
2. Part 3 of the SEPP requires the consent authority to consider the following:
    a. the significance of the coal resource
    b. compatibility of the Airly proposal with other land uses;
    c. the voluntary land acquisition and mitigation policy;
    d. natural resource management and environmental management;

e. resource recovery;
f. road transport; and
g. rehabilitation.

In relation to the Mining SEPP, the existing wording of Clause 12AA requires the significance of the resource to be the consent authority's 'principal consideration' under Part 3 of the SEPP (although not under section 79C of the Act). This provision is currently under review and the Government has proposed that it is repealed.

The Department has considered the proposed changes to Clause 12AA to be a 'draft environmental planning instrument' for the purposes of section 79C. The Department is satisfied that the proposal repeal of clause 12AA would have no bearing on the outcomes of the Department's assessment of the proposed development or the conclusions reached regarding its net overall benefits. The Department remains of the view that the coal resource at Airly is significant and that it would be extracted utilizing low-impact mining methods involving partial extraction and the development of long-term stable pillars. This is discussed in detail in Section 6.

In relation to the other matters for consideration under Part 3, these have been considered as follows:

- *Compatibility with other Land Uses (Clause 12)*

The Department's assessment has considered the potential impacts of the proposal on other land uses in the locality including the overlying Mugii Murum-ban SCA, the Gardens of Stone NP and GBMWHA. In addition, it has considered the potential for impact to water resources of farming and agricultural land uses located in the Capertee Valley and noise, air quality, transport and visual impacts on residents to the west around the village of Capertee. The Department's assessment indicates that there would be minimal disruption to recreational uses in the SCA and nearby GBMWHA and NP. No impacts are predicted to regional water quality and the proposal has been assessed to be within acceptable amenity levels for surrounding residential land uses having regard to Government policy. Overall, the Department is satisfied that subject to recommended performance measures and the implementation of adaptive management as mining progresses, that residual impact would be minimised and mitigated to achieve an acceptable environmental and amenity outcome.

- *Voluntary Land Acquisition and Mitigation Policy (Clause 12A)*

The Department's assessment has considered the NSW Government's *Voluntary Land Acquisition and Mitigation Policy* (December 2014), and concludes that no acquisition and/or mitigation rights to surrounding receivers are required.

- *Compatibility with Mining, Petroleum and Extractive Industries (Clause 13)*

The Department is satisfied that the proposal has been designed in a manner that is compatible with, and would not adversely affect nearby current or future mining-related activities.

- *Natural Resource Management and Environmental Management (Clause 14)*

The Department has recommended a number of conditions aimed at ensuring the proposal is undertaken in an environmentally responsible manner, including, but not limited to conditions in relation to subsidence, water resources, threatened species and biodiversity, and greenhouse gas emissions.

- *Resource Recovery (Clause 15)*

The Department has considered resource recovery in its assessment of the proposal and is satisfied that the development can be carried out in an efficient manner. The Department has recommended conditions requiring Centennial to implement reasonable and feasible measures to minimise waste.

- *Transport (Clause 16)*

The proposal involves the transport of coal by rail only. A condition has been imposed to require Centennial to implement a Traffic Management Plan to manage staff and contractor vehicles during peak mining and construction operations when staff access to the site will coincide with the delivery of construction materials. RMS raised no objections to the proposal.

- *Rehabilitation (Clause 17)*

The Department has recommended a number of conditions aimed at ensuring the rehabilitation of land that would be affected by the proposal. These include requirements on Centennial to prepare and implement a Rehabilitation Management Plan to effectively manage waste, and to meet a number of

rehabilitation objectives including ensuring that the mine site as a whole is safe, stable and non-polluting and to ensure public safety.

Overall, the Department is satisfied that the Airly proposal is generally consistent with the requirements of Part 3 of the Mining SEPP.

Lithgow City Local Environmental Plan 1994 and the Rylstone Local Environmental Plan 1996

The site is predominantly zoned 1(a) Rural (General) under the *Lithgow City Local Environmental Plan 1994* (Lithgow LEP) with the exception of a portion of land in the northeastern corner of the site zoned 1(a) (General Rural) under the *Rylstone Local Environmental Plan 1996* (Rylstone LEP). The Department has considered Centennial's review of the relevant provisions of the two applicable EPIs.

The aims of the Lithgow LEP and Rylstone LEP relevant to the Airly proposal are identical and include:

"…to encourage the proper management, development and conservation of natural resources and the built environment within the City of Lithgow by protecting, enhancing or conserving:

- *prime crop and pasture land;*
- *timber, minerals, soil, water quality, stream environment and other natural resources;*
- *places of significance for nature or heritage conservation; and*
- *places or features of high scenic or recreational value…"*

The proposed development is consistent with the aims of the Lithgow LEP and Rylstone LEP as it:

- would be developed in such a manner that would minimise and mitigate potential impacts on natural resources (including soil and water), rural lands and areas of Aboriginal and non-Aboriginal heritage significance;
- would operate a low-impact mine plan and design that seeks to protect the special features of the Mugii Murum-ban SCA including cliff lines, pagodas, canyons and steep talus slopes;
- has been designed to avoid and mitigate potential impacts on native threatened species, populations and ecological communities; and
- would not result in the permanent removal or sterilisation of pasture land.

The Department has also considered the compatibility of the proposed development with the zoning objectives that apply to the land within the site. Under both applicable land use zonings, development for the purpose of a mine is permissible with consent. Overall, the Department is satisfied that the Airly proposal can be undertaken in a manner that is generally consistent with the aims, objectives and provisions of the Lithgow LEP and Rylstone LEP, subject to the recommended conditions of consent.

APPENDIX H:
RECOMMENDED CONDITIONS OF CONSENT

See the Department's website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5581