



CHAPTER 3.0

Existing Mine Operations



ENVIRONMENTAL IMPACT STATEMENT- AIRLY MINE EXTENSION PROJECT



3.0 EXISTING AND APPROVED MINE OPERATIONS

3.1 History of Coal Exploration and Mining at Airly Mine

A coal exploration program was commenced at Airly Mine in 1984 by Novacoal Australia Pty Limited consisting of 24 boreholes and field surveys of the old Torbane Colliery workings. The program established the economic significance and the extent of the coal resource in the region.

In 1987, a bulk sample operation was established near the existing pit top area to verify the initial exploration data and to determine appropriate underground mining sections and methods. This bulk sampling was completed over six months and produced 26,000 tonne of coal. All coal was loaded onto trucks and transported to the former Western Main Colliery at Blackmans Flat (now the Springvale Coal Services Site, operated by Springvale Coal Pty Limited) where it was tested for quality and washability.

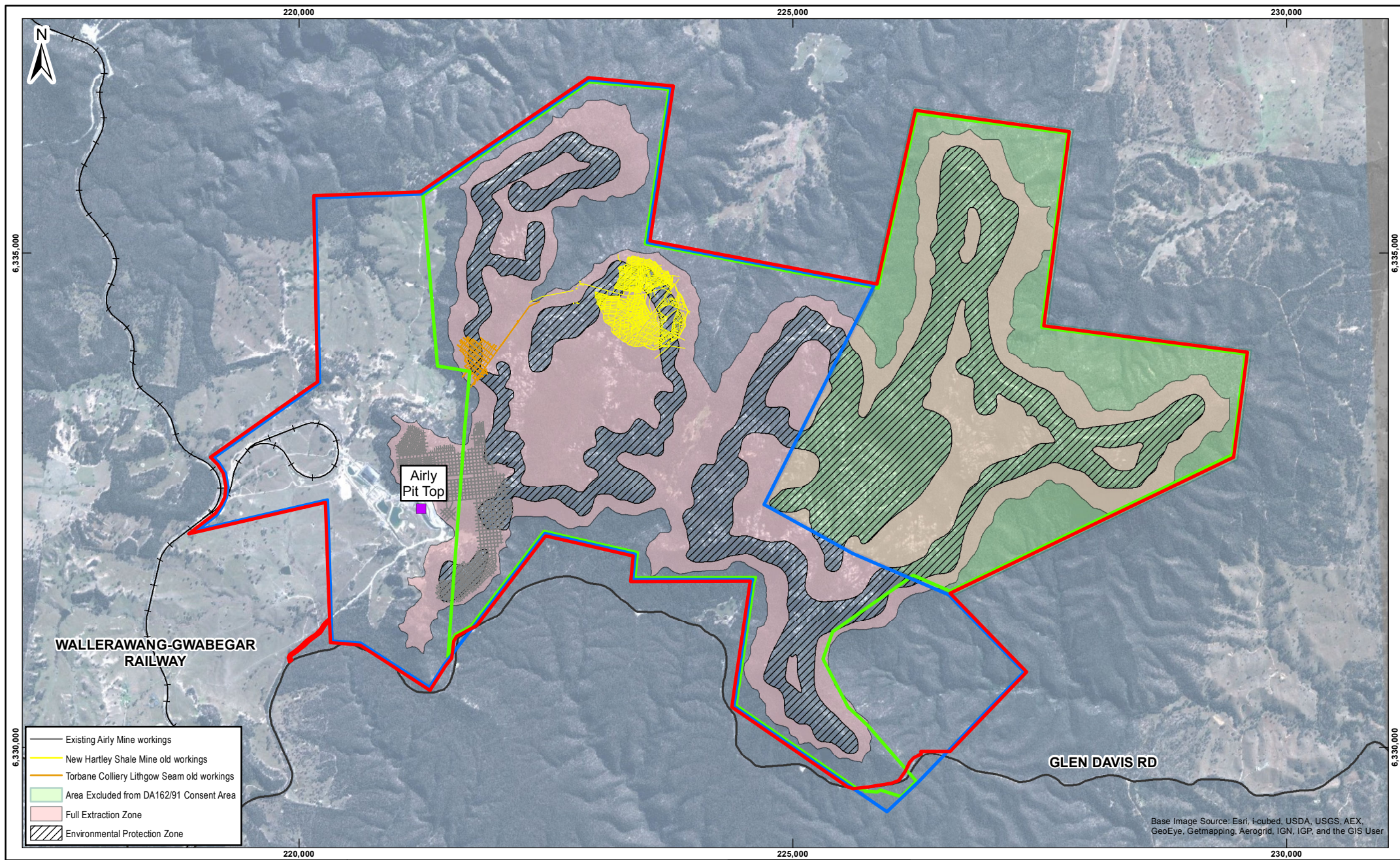
As a result of the initial exploration work and bulk sample program, an *Environmental Impact Statement* in support for a development application for the Airly Coal Project was prepared and submitted to the then Department of Planning on 28 October 1991 by Novacoal Australia Pty Limited (Novacoal 1991). On 15 September 1992 the then Minister of Planning, the Hon Robert Webster MP, established a Commission of Inquiry to examine and make recommendation in respect of the Airly Coal Project development application. An addendum, titled *Supplementary Report to Environmental Impact Statement* (Novacoal 1992) was prepared during the Commission of Inquiry proceedings. Following the Commission of Inquiry, development consent for the Airly Coal Project was granted by the then Minister for Planning on 14 April 1993. However, as part of the Commission of Inquiry process, the eastern part of the proposed mining area for the Airly Coal Project (that would have extended mining beyond 21 years) was removed from the development consent area. This area was identified as being the subject of a potential future separate development application post the 21 year consent expiry. This eastern area is shown in Figure 3.1.

The development consent (DA 162/91) permitted a 1.8 Mtpa production underground mine with transport of coal from the full production mine by rail. It also allowed trial mining at the mine with approval to transport 300,000 tonne of ROM coal by road to the Mount Piper Power Station for twelve months. Centennial Coal purchased the Airly Coal Project in late 1997 and commenced construction on 3 March 1998. In May 1998, the main pollution control ponds, access road, Airly Creek crossing and culverts and the initial pit top facilities were completed. The approved trial mining operation was developed in 1998 and the coal was transported to Mount Piper Station in December 1998. In 1999, the development consent was modified to allow up to 500,000 tonne of coal to be transported by road to Mount Piper Station for a period of two years after which the mine was then placed on care and maintenance.

In mid-2008, Centennial Coal commenced detailed planning for the future development and operation of the mine. In February 2009, the construction of the rail loop and permanent infrastructure to support the mine into its full operational phase commenced. The construction works, undertaken within the approved footprint, took into consideration contemporary environmental standards.

The first full scale coal production occurred on the 14 December 2009, with the first train load of coal leaving Airly on 22 April 2010 destined for export via Port Kembla. Production gradually increased during 2011 with the construction of mine infrastructure, ventilation fans and the underground to surface trunk conveyor.

Coal production continued to increase during 2012 with Airly Mine passing the first million tonnes of coal mined in June 2012. Total production during the 2012 Annual Environmental Management Reporting period was 731,250 tonne (Centennial 2012c). Construction works at Airly Mine has been ongoing. Construction during 2012 included the completion of the pit top bathhouse and administration buildings, and the effluent treatment facility. Figure 3.1 displays the current development consent area and the proposed Project Application Area for the Project.



LEGEND

-  Project Application Area
-  ML1331 Current Lease Boundary (Offset for Clarity)
-  A232 Authorisation Boundary (Offset for Clarity)
-  Rail
-  Main Road

Coordinate System: GDA 1994 MGA Zone 56

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**Figure 3.1:
Approved (DA162/91)
Mining Zones**



PLOTFILE No.



Centennial Coal
Airly

DRG No. 3-3.1

A4



3.2 Existing Approvals

The approvals, authorities and licences under which Airly Mine operates are outlined in Table 3.1. The existing infrastructure at the pit top is shown in Figure 3.1.

Table 3.1: Airly Mine Approvals, Authorities and Licences

Title	Description	Issue/Consent Date	Expiry Date
Lease			
Authorisation No. 232	Covers an area of approximately 3,054 ha and allows for prospecting activities with depth restriction from surface to 900 m below AHD where it is not underlain by ML1331.	1980 Renewed 03/06/10	20/10/14
Mining Lease ML1331	Covers approximately 2,744 ha and generally excludes the surface down to 20 m, but includes the surface down to unlimited depth in the areas where surface infrastructure is present or has been approved.	12/10/93	12/10/14
Consents			
Development Consent (DA 162/91)	The Development Consent DA162/91 as granted, allows for the following activities: ■ the construction and operation of an underground coal mine ■ development of a twelve month Trial Mine to demonstrate new technologies and prove that economic production rates can be achieved ■ full scale mine development following the Trial Mine phase at the rate of 1.8 Mtpa ROM coal from the Lithgow Seam beneath both Mount Airly and Genowlan Mountain ■ extraction of coal by both partial and full extraction techniques beneath defined areas ■ all product coal haulage by rail, except for 300,000 tonnes of which is to be transported via road from the trial mining to Mount Piper Power Station. ■ construction and operation of coal handling and transport systems comprising the pit top area and rail loading facilities as follows: ■ a rail loop linking to the Wallerawang-Gwabegar rail line ■ construction of a coal preparation plant (washery) and the associated coal transfer and storage infrastructure including conveyors, stockpile areas, rail loading bin ■ reject material management facilities on site comprising a tailings dam and the associated settling ponds for fine reject materials and a course Reject Emplacement Area. ■ construction of associated surface buildings and services ■ modifications to facilities at Wallerawang Colliery Siding, by upgrading to a rail loop with unloading facilities ■ establishment of mine access	14/04/93	Limited to 21 years from the granting of the Mining Lease (ML 1331) Expires 12/10/14



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Title	Description	Issue/Consent Date	Expiry Date
	- at the pit top, a rail loop linking to the Wallerawang-Gwabegar rail line - construction of a coal handling and preparation plant, a tailings dam and associated settling pond and a coarse rejects emplacement area. A condition of the consent was to establish the Special Monitoring Committee comprising representatives nominated by: - Lithgow City Council (Chair) - Department of Trade & Investment, Regional Infrastructure & Services - Office of Environment and Heritage (National Parks and Wildlife Service) - Capertee & District Progress Association - Colong Foundation for Wilderness - Colo Committee - Capertee Valley Alliance Inc. - Capertee Valley Environmental Group Inc. - Airly Mine Environmental Officer.		
Consent (DA162/91) MOD 1	The first modification allowed for the following: - extension of the Trial Mine phase from twelve months to two years - increased road haulage of ROM coal from 300,000 tonnes to 500,000 tonnes of ROM coal per year to Mount Piper Station for a maximum period of two years - minor additional modifications in relation to establishment of the access road to the pit top.	07/12/99	Expires 01/07/00
Consent (DA162/91) MOD 2	The second modification allowed for the following: - establishment of a 15 m wide easement for the full length (approximately 3.85 km) of the proposed power-line route - construction of 66 kV power-line with the easement including: - installation of poles and stays, insulators, fittings and conductors - construction of barriers at road crossings - circuit metering yard - connection to the Integral Energy take-off point; - construction of a maintenance track within the easement; - ground disturbance (for excavation of footings, construction, and maintenance track) and tree clearing.	21/08/09	12/10/14
Environmental Protection Licence			
Environmental Protection	Requirements to monitor dust and water discharge quantity/quality from the identified Licensed Discharge Points	Granted 12/12/05 on	12/12/08 (review date)



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Title	Description	Issue/Consent Date	Expiry Date
Licence (EPL) 12374	(LDPs) LDP001.		
EPL 12374 Variation	The licence was varied to allow for the following: ■ alignment of scheduled and fee based activities ■ updating of conditions to reflect current best practice.	18/08/09	12/12/13
EPL 12374 Variation	The licence was varied for the following reason. ■ The Licensee must conduct a site specific Best Management Practice determination to identify the most practicable means to reduce particle emissions.	19/12/11	19/12/16
EPL 12374 Variation	The licence was varied to allow for the following: ■ Category for Mining for coal increased to >500,000 – 2,000,000 tonne ■ Two new additional licenced discharge points (LDP002 and LDP003) ■ pH range changed at licenced discharge points to 6.5 – 9.0.	31/08/12	31/08/17 due for renewal
Groundwater Monitoring Bore Licences			
Licence No.10BL604518	ARP01	14/02/11	Perpetuity
Licence No.10BL604520	ARP02A & ARP03A	14/02/11	Perpetuity
Licence No.10BL604521	ARP04 & ARP05	14/02/11	Perpetuity
Licence No.10BL605352	ARP06, ARP07, ARP08 & ARP09	28/03/13	Perpetuity
Ground Water Extraction Licences			
Water Access Licence (WAL24386)	Extract 158 ML per annum from Sydney Basin North Water Source	17/02/11	16/02/16
Water Access Licence (WAL36565)	Water Access Licence granted to extract 120 ML per annum in the Sydney Basin North Groundwater Source.	16/10/13	Perpetuity
Other Approvals			
Lithgow City Council (LCC) Building Approval	Covering trial mine construction.		Perpetuity
Consent to Destroy Aboriginal Artefacts	Covering a site discovered on the access road route.	13/03/98	Perpetuity
EPBC Act approval 7 May 2009	This approval covered minor tree removal as part of the construction of the rail loop.		Perpetuity
Installation of Surface Water Monitoring Stations	Approval for surface water monitoring stations located in the Mugii Murum-ban State Conservation Area.	24/09/12	Perpetuity
LCC Building	Occupation Certificate for the Administration and Bathhouse	29/11/12	Perpetuity



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Title	Description	Issue/Consent Date	Expiry Date
Approval	buildings.		
Onsite Sewage Management System	Approval to operate the Ecomax effluent treatment system.	18/07/13	18/07/18

Table 3.2 provides an overview and comparison of the existing operations and those approved in the current Development Consent (DA162/91).

Table 3.2: Comparison of Approved and Existing Operations

Key Feature	Approved Operation	Existing Operations
Mine Life	Development consent (DA162/91) is limited to 21 years from the granting of ML1331 and expires on 12 October 2014.	As approved.
Hours of Operation	The mine operates 24 hours per day, 7 days per week, up to 52 weeks per year.	As approved.
Coal Production	Annual extraction limit of 1.8 Mtpa of ROM coal.	As approved.
Site Access	Mine Access Road, off Glen Davis Road at approximately 3 km from Capertee village.	As approved.
Mine Method and Design	The development consent: - stipulates no mining in the 50 m coal barrier (measured horizontally from the outcrop) - allows first workings only where the depth of cover is less than 50m - allows partial extraction beneath Environmental Protection Zones and full extraction in areas outside Environmental Protection Zones with supercritical void widths with: - maximum subsidence of 1.8 m - maximum tensile strains of 25.5 mm/m - maximum compressive strains of 42.5 mm/m - maximum tilt of 85 mm/m.	As approved, but only first workings have been undertaken.
Underground Mine Ventilation	- one upcast shaft (vertical stack) located at the pit top. - air intake via surface portals located at the pit top box cut. - ventilation facilities approved at the approved Eastern Portal.	As approved, apart from the Eastern Portal that was not constructed.
Underground Mine Access	- underground mine access is via a series of portals at the pit top box cut. - eastern portal.	The approved Eastern Portal was not constructed.
Airly Pit Top Infrastructure	- bathhouse, office and assembly building - wash-down facilities - workforce, materials and ventilation portals - store building and training centre	As approved mostly with the exceptions of cable store, store building, roof bolt store and fire station which have not been built.



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Key Feature	Approved Operation	Existing Operations
	■ bulk storage area ■ cable store ■ store building ■ roof bolt store ■ potable water provision ■ sewage treatment plant ■ hardstand areas, haul roads, car-parking areas and helicopter pad ■ diesel, fuel and oil storage area ■ refueling facilities ■ fire station/ compressor and associated fire-fighting equipment ■ compressor room ■ main ventilation fan ■ water management structures (for surface catchment and separation of clean and dirty water) i.e. sedimentation basins for storm water runoff; ■ electrical distribution network sub-station ■ workshop and service building.	
Employment	■ 120 personnel.	As approved.
Coal destination	■ Domestic power stations and overseas export.	As approved.
Coal Stockpiles	■ A 30,000 tonne ROM emergency stockpile ■ A 200,000 tonne Product Coal Stockpile.	As approved.
Coal Handling and Preparation Plant	■ The system of conveyors for ROM coal handling constructed to operate at 500 tph and used for the transfer of coal for the underground to the stockpile areas. ■ Coal Handling and Preparation Plant (CHPP) (500 tph) was approved.	The CHP part of the CHPP was constructed, but the CPP (500 tph) component with a dedicated ROM stockpile area was not constructed.
Reject Material Management	■ Approved for 4.3 Mt coarse REA and a tailings dam of 740,000 tonne capacity for fine reject materials.	The REA and tailings dam have not been constructed.
Electrical Services	■ 66 kV electricity line, Substation 0 and Substation 1	As approved.
Coal Transport	■ Transport of coal to offsite locations via rail. ■ Train loading facilities approved and constructed comprise: ■ a rail loop ■ a train load out station ■ a rail surge bin.	As approved.
Land Preparation	■ Vegetation clearance and land preparation approved for the establishment of the pit top, REA, tailings dam, and Eastern Portal.	Land preparation not undertaken for the approved REA and tailings dam or the Eastern Portal as they were not constructed.



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Key Feature	Approved Operation	Existing Operations
Water Management	■ A system of sediment dams or settling ponds, water storage dams and diversion drains for the separation of clean and dirty water at the pit top. ■ Clean water harvested from the surface run-off used as process water. ■ Process water supplemented from the production bore supply on an as-required basis. ■ Effluent treated on site.	As approved.
Rehabilitation and Final Landform	■ Progressive rehabilitation of disturbed areas no longer required. ■ Creation of a final landform which will be stable, aesthetically consistent with surrounding landforms. ■ Final land form does not preclude possible alternative final land uses.	Progressive rehabilitation as approved, however, life of mine rehabilitation not undertaken as yet.
Exploration activities	■ Exploration activities undertaken within A232 boundary. ■ Activity approval sought under Part 5 of the EP&A Act.	As approved.

3.3 Exploration Program

Airly Mine has an ongoing exploration program used to obtain specific geological information in terms of geotechnical conditions, coal seam quality and thickness, through core sampling. Information obtained is used for the ongoing refinement of the site's existing geological model which then allows detailed mine planning. The exploration program also allows the installation of piezometers in the aquifers of interest for ongoing groundwater monitoring.

All exploration activities are carried out in accordance with the requirements of the *Mining Act 1992*. Approval for the proposed exploration activities is currently sought under Part 5 of EP&A Act from Division of Resources and Energy (DRE) of Department of Trade & Investment, Regional Infrastructure and Services (DTIRIS) following the preparation of Review of Environmental Factors to assess the potential environmental impacts of the proposed activity.

Centennial Airly has developed area-based assessment procedures for the management of exploration activities to ensure that they are conducted in an environmentally responsible manner and with due consideration to the community. This includes a risk-based process for the selection, assessment and environmental management of proposed drillhole sites and access tracks based on environmental, geological, logistical and other operational constraints. The proposed exploration activities, planned outcomes of the program, locations of the drillhole sites and access tracks are reviewed in consultation with the land owner, National Parks and Wildlife Service. Final selection of exploration sites are made after environmental assessments undertaken and relocated to avoid environmental impacts that have been identified as unacceptable during the consultation process with the land owner. Potential impacts considered in the assessment process include:

- Native vegetation with particular focus on threatened or endangered species,
- Fauna species with particular focus on impacts to habitat for threatened or endangered species,
- Indigenous and non-indigenous heritage,
- Access for recreational use of the State Conservation Area,



- Noise from drilling and water delivery operations,
- Access for process water during drilling,
- Removal of waste during and following drilling in
- Ongoing access and monitoring requirements and
- Rehabilitation requirements for sites and access tracks.

Following vegetation clearing at the drillhole site, appropriate erosion and sediment controls are installed and maintained around disturbed areas in accordance with the Blue Book (Landcom, 2004). Felled trees are stockpiled for use in rehabilitation.

A series of above ground tanks are used to allow storage of cuttings and recycling of drilling fluid and process water. The drilling fluid and cuttings are pumped to the largest tank as they emerge from the borehole. Larger cuttings are settled and the drilling fluid cascades into a second tank where finer material is settled. The drilling fluid then cascades into a final container where make up water and additional drilling chemicals are added prior to being recycled down hole. Water required for drilling is sourced from the Airly Mine water management dams or other water storages as permitted by the land holder. Water is transported to the site by either truck or helicopter.

The drilling fluid is continuously pumped to the drill head to facilitate the removal of cuttings, stabilise the borehole, cool the cutting head and lubricate the drill head. All drilling fluid recovered that cannot be recycled is removed from site following OEH's *Waste Classification Guidelines* (DECCW 2009) by a licensed waste transporter to a receiving facility.

Spoils or cuttings generated during drilling are removed from the settling tanks as required and transported by truck to the mine site for storage. The cuttings are tested before being disposed of at a waste facility suitable for the category of material determined from the testing. Sealing of the drill holes is undertaken in accordance with the DTIRIS requirements.

Rehabilitation of the drill site commences soon after completion of drilling activity and follows on from decommissioning of equipment and removal of waste materials. Following re-profiling within the disturbed areas, the stockpiled topsoil is re-spread onto areas requiring rehabilitation, to a minimum depth of 0.1 – 0.3 m, depending on availability. Stockpiled cleared vegetation is spread over the re-profiled areas.

An inspection is conducted with the NPWS following rehabilitation to determine that rehabilitation has been conducted to the satisfaction of the land owner. Further work is carried out as required and land owner sign off is obtained.

3.4 Hours of Operation and Workforce

Airly Mine is approved to operate 24 hours a day, up to seven days per week. The approved workforce at Airly Mine is 120 personnel.

3.5 Site Access

The Airly Mine pit top is accessed via the Mine Access Road, which joins the Glen Davis Road approximately 3 km from the village of Capertee (Photograph 3.1). Glen Davis Road joins Castlereagh Highway in Capertee.

3.6 Land Preparation

Land preparation has been approved at the pit top coarse rejects emplacement area (REA), tailings dam and the eastern portal. All areas required for the construction of the surface facilities at the pit top have been cleared and managed in accordance with the current Airly Mine Mining Operations Plan (Centennial 2012e). The area approved for the REA was used for the construction of the ventilation system for the underground



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mine while the area approved for the tailings dam and the eastern portal remain uncleared as these components have not been established to date.

Land preparation during construction involved the clearing of vegetation, removal and stockpiling of topsoil, establishment of temporary and permanent water management systems, and temporary rehabilitation and surface stabilisation. Only minor clearing involving individual paddock trees was required for the pit top infrastructure.

The land preparation work was undertaken in accordance with a Contractor's Construction Environmental Management Plan (CEMP). The CEMP contained the following Environmental Management Plans:

- soil and water quality management plan
- flora and fauna Environmental Risk Assessment Plan (ERAP)
- air quality ERAP
- noise management plan
- archaeology and heritage control ERAP.



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**Photograph 3.1:
 Intersection of Mine
 Access Road and Glen
 Davis Road**

PLOTFILE No.	
 Centennial Coal Airly	
DRG No. 3-P3.1	A4



3.7 Mining

3.7.1 Trial Mining

As noted in Section 3.1, trial mining was undertaken at Airly Mine between 1998 and 2002. ROM coal up to 300,000 tonnes was transported via road haulage to Mount Piper Power Station over 12 months and this was followed by transport of 500,000 tonnes of ROM coal over an additional period of two years, again to Mount Piper Power Station.

3.7.2 Approved and Current Mining Method

The development consent DA 162/91 allows for the extraction of up to 1.8 Mtpa of ROM coal with the following conditions:

- no mining within the 50 m coal outcrop barrier (measured horizontally)
- first workings only where the depth of cover is less than 50 m where no measurable subsidence would occur
- partial secondary extraction within designated Environmental Protection Zones shown in Figure 3.1, again where no measurable subsidence would occur
- full extraction in remnant areas within the centres of Mount Airly and Genowlan Mountain (Figure 3.1) and where the subsidence was predicted to reach a maximum of 1.8 m.

Areas approved for full extraction are located generally within the centre of the Mount Airly and Genowlan Mountain mesa and include all areas outside the outcrop barrier and Environmental Protection Zones.

The development consent allows for both partial and full extraction areas to be first developed by continuous miners supported by shuttle cars. To date, only development or first workings have been carried out and only in areas with depth of cover of greater than 20 m and up to 160 m. Headings and roadways are developed to allow access to the coal resource.

Airly Mine currently utilises a combination of place changing and super panel development with continuous miners involving first workings to extract coal. Mining operations are designed and carried out with consideration to a number of mine constraints and in accordance with DA162/91 conditions. The principal constraint relates to the protection of designated 'Environmental Protection Zones' in accordance with Schedule 2, Condition 12 of DA162/91, from subsidence (Figure 3.1).

Prior to the commencement of mining, a geotechnical engineered mine design is developed with an appropriate pillar system factor of safety calculation for minimal subsidence impacts within the mining area. The factor of safety is calculated to be appropriate for long term stability after mining has been completed. Mining operations are then managed in accordance with the design developed to ensure that minimal impact occurs to the surface features.

To date the mining activities have consisted of first workings in shallow (less than 160 m depth of cover). Within the designated Environmental Protection Zones, and in other areas where depth of cover is greater than 160 m, partial extraction has been planned but has not been carried out to date.

Subsidence monitoring to date has consisted of surface inspections only due to the low depth of cover and high factors of safety surrounding the first workings used in the current mining areas. Given that no mining other than first workings has taken place under the designated Environmental Protection Zones, the regular surface inspections undertaken to date over the mined areas have been sufficient. These surface inspections have shown no visible impact on the ground surface such as cracking, sink holes or pressure ridges. There has been no indication of impacts on the existing vegetation over the current mining areas.



3.7.3 Mining Sequence

The general sequence of mining to date has been to progress from the mine entrances at the western edge of Mount Airly in an easterly direction and to the south. The existing workings are shown in Figure 3.1.

3.8 Coal Handling, Processing, Stockpiles and Transport

3.8.1 Coal Handling and Processing

Construction of the approved coal handling and preparation plant (CHPP) at the pit top has commenced and to date Stage 1 (coal handling plant) has been constructed (Photograph 3.2). Stage 1 consists of the coal crushing circuit, coal transport system including the underground and surface conveyors, multiple coal stockpiles, a train load-out and rail loop.

The materials handling system is designed to receive up to 1,800 tonnes per hour (tph) of minus 300 mm maximum lump size ROM coal from the underground coal workings. Coal from continuous miners is deposited into shuttle cars for transport a short distance to a feeder/ breaker unit and thence loaded onto a conveyor belt for transport to the pit top via the trunk conveyor (UC01) (Figure 3.2).

UC01 conveyor deposits coal onto the first of the surface conveyors (CV01) where it is elevated for transfer into the crushing and screening plant. The crushing and screening station sizes the coal to less than 50 mm and stockpiles it on the Product Coal Stockpile via a skyline tripper conveyor (CV02). The locations of the infrastructure are shown in Figure 3.2).

Currently ROM coal is stockpiled within the Product Coal Stockpile (Figure 3.2) prior to transfer to the train loading bin for dispatch off site. Three draw points are provided via a tunnel reclaim system, which comprises three stockpile activators with vibrating feeders to feed onto surface conveyor CV03 connecting to the train loading bin. CV03 has been designed with a capacity of up to 2,000 tph ROM coal while the train loading bin has a 500 tonne capacity.

3.8.2 Coal Stockpiles

The Emergency Stockpile (Figure 3.2) with a capacity of less than 30,000 tonne, has been established immediately to the southwest of the transfer point between the UC01 trunk conveyor and CV01 conveyor (Figure 3.2 and Figure 4.1). In the event of the Product Coal Stockpile becoming full, coal from the underground conveyor system is currently placed on the Emergency Stockpile by truck and front end loader. When the Product Coal Stockpile level falls sufficiently, the diverted coal from the Emergency Stockpile is fed back onto CV01 via the hopper on CV01 using a front-end loader. No facility to divert coal directly from UC01 to the Emergency Stockpile has been built to date.

The Product Coal Stockpile accommodates 160,000 tonne of ROM coal and this capacity can be increased to the approved 200,000 tonne with push out by a dozer.

3.8.3 Coal Reject Material Management

Airly Mine does not currently require a REA or a tailings dam for reject (coarse and fine) material management as no coal beneficiation is currently undertaken at the site.

3.8.4 Coal Transport

All coal is transported from Airly Mine by rail. Coal from the Product Coal Stockpile is reclaimed via a reclaim tunnel onto a conveyor, which transfers coal to the rail bin from which coal is loaded into trains for transport off site to domestic and overseas markets.

Centennial Airly was permitted to road haul a total of 500,000 tonnes of coal from trial mining to the Mount Piper Power Station in compliance with the requirements of the Council and the Roads and Traffic Authority. This condition of approval has lapsed and all coal has since been transported off site via rail.



Airly Mine Pit Top



Airly Coal Handling Infrastructure

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Photograph 3.2:
Airly Mine Pit Top
and Coal
Handling Infrastructure

PLOTFILE No.	
 Centennial Coal Airly	
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3.9 Plant and Equipment

Airly Mine uses continuous miners for coal extraction and a range of other ancillary equipment both in the underground workings and during operations at the pit top. Typical underground equipment comprises: shuttle cars, load haul dump vehicles, personnel transporters, electrical distribution equipment, and coal conveyors. Mobile underground plant are regularly maintained and repaired at the surface.

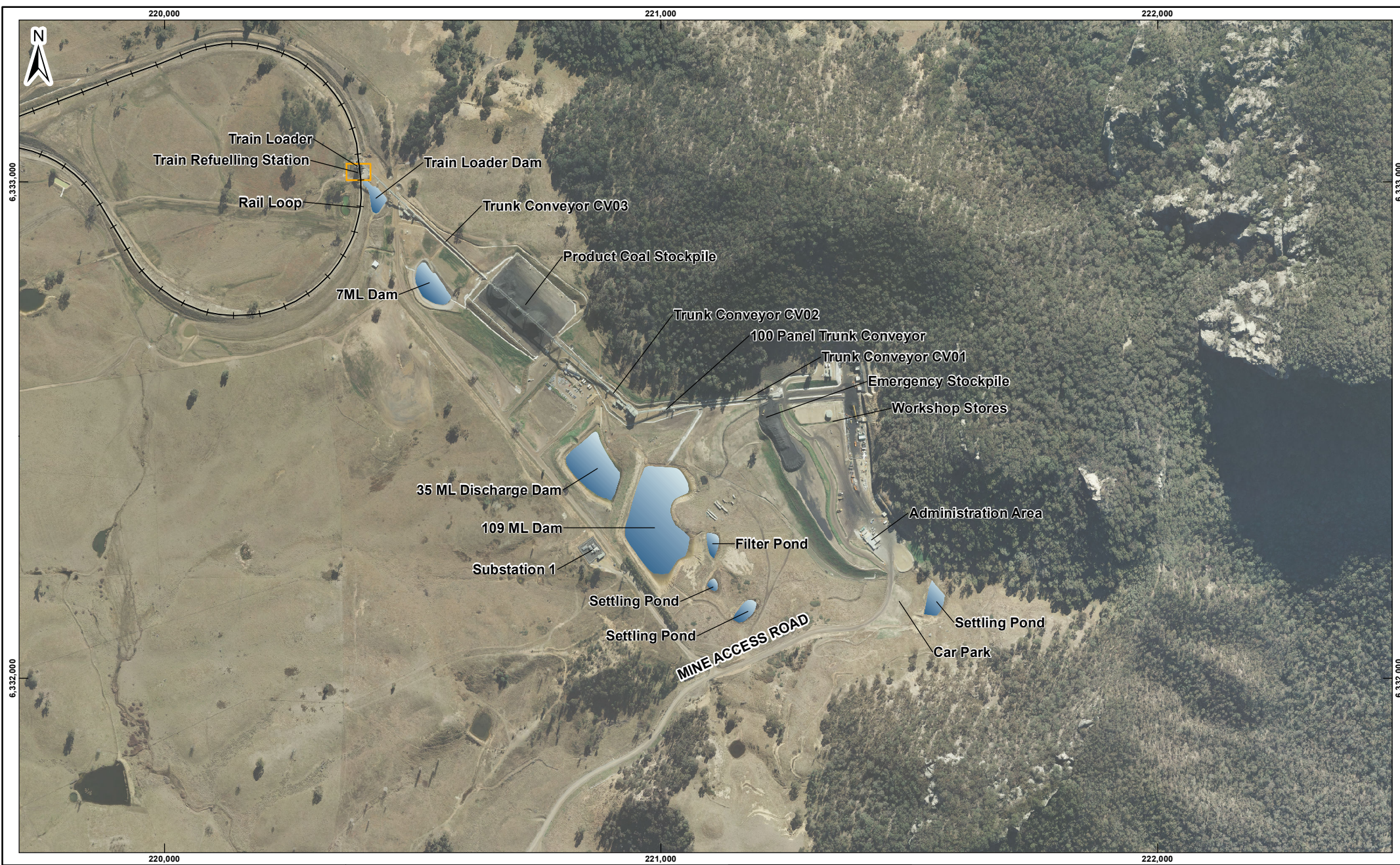
Fixed plant used on the surface is described in Section 3.10. Mobile plant used on the surface includes: bulldozer, front end loader, water cart, off highway haul truck, forklift, telehandler, delivery vehicles and light utility vehicles.

3.10 Mine Support Facilities and Underground Access

Existing surface infrastructure at the pit top is illustrated in Figure 3.2 which supports the underground operations at Airly Mine. Table 3.3 lists this existing infrastructure. Underground mine access is from the pit top via in-seam portals.

Table 3.3: Mine Support Facilities

Functions	Existing Surface facility
Underground access and associated infrastructure	- mine access is via three in-seam portals - ventilation fans for air exhaust (located within the northern-most adit) - portal for the trunk conveyor (UCCV01) from underground workings; - mine services to the underground workings.
Engineering and services	- workshop and service building - electrical distribution network sub-station - water management structures (for surface catchment and separation of clean and dirty water) i.e. sedimentation basins for storm water runoff - dust suppression systems.
Coal handling, preparation and transport infrastructure	- trunk conveyor from underground (UCV01) - surface conveyor system comprising CV01, CV02 and CV03 - crushing and screening station - product stockpile with reclaim tunnel and ROM coal stockpile - Coal handling plant - internal haul roads - train loading bin - rail spur leading from the Wallerawang-Gwabegar rail line.
Support services and administration at the Pit Top	- potable water provision - sewage treatment facility - septic tanks at the Train Loader - train refuelling station - wash-down facilities (partially built) - workforce and materials portals - bath house, office and assembly building - training centre - hardstand areas, haul roads, car-parking areas and helicopter-pad - diesel, fuel and oil storage (partially built).
Non- mine owned infrastructure	- overhead transmission lines - telecommunications network.



LEGEND Rail Waterbody Train Refuelling Station Coordinate System: GDA 1994 MGA Zone 56	CENTENNIAL AIRLY PTY. LTD. <u>THIS DRAWING IS COPYRIGHT</u> NO PART OF IT IN ANY FORM OR BY ANY MEANS (ELECTRONIC, MECHANICAL, MICRO-COPYING, PHOTOCOPYING OR OTHERWISE) BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED WITHOUT PRIOR WRITTEN PERMISSION	<table border="1"> <tr> <td>DATE</td> <td>14/08/2014</td> </tr> <tr> <td>SEAM</td> <td>LITHGOW</td> </tr> <tr> <td>REFERENCE</td> <td>137623024-R Rev 0</td> </tr> <tr> <td>SCALE</td> <td>1:10,000</td> </tr> </table>	DATE	14/08/2014	SEAM	LITHGOW	REFERENCE	137623024-R Rev 0	SCALE	1:10,000		Figure 3.2: Existing Infrastructure at the Pit Top		<table border="1"> <tr> <td colspan="2">PLOTFILE No.</td> </tr> <tr> <td colspan="2" style="text-align: center;"> </td> </tr> <tr> <td>DRG No. 3-3.2</td> <td style="text-align: right;">A4</td> </tr> </table>		PLOTFILE No.				DRG No. 3-3.2	A4
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DRG No. 3-3.2	A4																				



The train refuelling on site is currently undertaken using a fit for purpose fuel tanker that comes equipped with emergency stops and drip trays to minimise any spills. The hose connections between the fuel tanker and the train fuel tanks are of the Banlaw type locking fitting that do not permit flow until the connections have been locked in place. Fuel flow is stopped if the connection separates. A concrete sump is located in the vicinity for the containment and management of any spills.

3.11 Water Management

The water management system is comprised of surface, process, potable and effluent management elements operated in accordance with the Airly Water Management Plan (Centennial 2011a).

Figure 3.3 provides an overall schematic of the Airly Mine water management system and which is described below.

3.11.1 Surface Water Management

The water management structures for the separation and storage of clean and dirty water at the pit top and their respective catchments are shown in Figure 3.3.

The clean water diversion drains have been designed to collect and divert clean water around the site and as needed into water storages. Accordingly, while clean water is caught and diverted, it does join dirty water in storages to provide process water. The diversion drains are concrete lined on steep grades, jute mesh lined on lesser grades or unlined on gentle grades. Energy dissipaters are in place at the discharges of concrete lined drains. The diversion drains are designed to pass runoff from a 1 in 100-year 72-hour storm event.

The sediment or settling dam system, in addition to its primary pollution control function, is used to store clean water harvested from the site.

Dirty water from the pit top hard stand area passes through a coarse sediment dam and the 109 ML Dirty Water Dam prior to discharging into the 35 ML Discharge Dam. The 109 ML Dirty Water Dam receives dirty water runoff and wash-down water from the machinery wash-down bay, hardstand areas, oil storage areas, and maintenance and service workshop, along with stormwater runoff from the workshop areas, administration area and car park. The 7 ML Dam receives dirty water runoff and wash-down water from the CHP and Product Coal Stockpile areas. The Train Loader Dam receives dirty water runoff and wash-down water from the train loader and CV03 areas. Post settling, the water from the 7 ML and Train Loader Dams is pumped into the 109 ML Dirty Water Dam.

The design for all dirty water structures is consistent with the requirements of *Managing Urban Stormwater, Soils and Construction Manual* (Landcom 2004).

In summary, the pit top water management structures comprise:

- a series of concrete lined clean and dirty water diversion drains
- small coarse settling pond for trapping coarse sediment located near the car park and in the vicinity of the 109 ML Dirty Water Dam
- dirty water dams comprising the 109 ML Dirty Water Dam and a 7 ML Dam into which overflows from the Product Coal Stockpile and a Train Loader Dam where fine sediments settle out
- a 35 ML Discharge Dam used for the storage of settled water and which overflows via LDP001 into Airly Creek. It receives surface run-off from non-disturbed areas and either overflow or piped water fed by gravity from the 109 ML Dirty Water Dam following de-silting.



Table 3.4 summarises the clean and dirty water dam storage volumes, and the water storage tanks for the storage of rain water.

Table 3.4: Stored Water Volumes

Water Storage	Storage Volume (ML)
Administration Building Tanks	0.24
Header Tanks	0.04
Process Water Tank	0.75
Settling Pond	3
109 ML Dirty Water Dam	109
35 ML Discharge Dam	35
7 ML Dam	7
Train Loader Dam	0.78

3.11.2 Underground Water Management

No significant inflows of groundwater from the coal seam or surrounding strata have been intersected to date during coal extraction, i.e. there have been no significant accumulations of groundwater. Only minor ingress of water has been noted in seam low points and in a few discrete locations. During operations, accumulation of water only occurred around the working areas due to process water use, for example for dust suppression on travelling roadways underground. No water has been discharged from the mine during operations to date. As such, no underground water management is currently required to remove groundwater to the surface.

3.11.3 Process Water

Process water, used to meet operational requirements is obtained in priority order from the following sources:

- 35 ML Discharge Dam which receives settled water from the 109 ML Dirty Water Dam
- Production Bore (Bore Licence Number 10BL603503) currently licensed to pump up to 278 ML per annum (Table 3.1).

Clean water from the 35 ML Discharge Dam is pumped into the process water tank (part of the water management facility) located on the pit top hard stand area. Process water is distributed via pipeline for dust suppression and fire-fighting supply to both underground and surface facility areas.

Water from the production bore is initially pumped to the 109 ML Dirty Water Dam, then by gravity pipeline to the 35 ML Discharge Dam and then pumped to the process water tank within the water management facility.

3.11.4 Drinking Water and Bathhouse Water

Airly Mine is not connected to a municipal water supply. Drinking water, for offices and underground personnel, is supplied by bottled water which is delivered by local suppliers.

Water for showers in the bathhouse is supplied by harvested water from the rooftops of the administration and facilities buildings. Rainwater is stored in the rainwater tanks. Trucked potable water is used to fill up these Administration Buildings Tanks in order to meet bathing water requirements in the bathhouse.

Water for the toilets in the administration buildings is supplied by the Process Water Tank.



3.11.5 Effluent Management

Sewage and grey water from the bathhouse and offices at the pit top area is treated on site by a sewage treatment facility. The mine's effluent system upgrade was completed during June 2012 and the life of mine Ecomax Effluent Treatment System.

Underground sewage is contained by Alfab activated biological toilets. These toilets are discharged into the Effluent Treatment System for treatment.

Septic tanks have been installed at the Train Loader facility to manage sewage from the toilet located at that location. The sewage is transported by a licensed contractor as required to the onsite Ecomax Effluent Treatment System for disposal.

3.11.6 Licensed Discharge Points and Water Monitoring

EPL 12374 defines the volumetric and concentration limits for discharge of water from the three licensed discharge points i.e. LDP001, LDP002 and LDP003, shown in Figure 3.3. Daily flow monitoring is required at LDP001 while water quality monitoring is required monthly during discharge for various parameters at all three LDPs.

The locations of the LDPs are shown in Figure 3.5 and described as follows:

- LDP001 located at the 35 ML Discharge Dam
- LDP002 located at the 7 ML Dam
- LDP003 located at the Train Loader Dam adjacent to the rail loading point.

The EPL 12374 requires all discharge points to be sampled monthly during discharge for the analytes listed in Table 3.5. This table also provides the limits stipulated in EPL12374. Water discharged at LDP001, LDP002 and LDP003 is analysed for pH, total suspended solids (TSS) concentration, conductivity and oil & grease concentration.

Water quality monitoring has also been carried out since January 2009 in addition to that required by the EPL 12374 to verify the effectiveness of pollution control systems on site. These monitoring sites include the Settling Dams, 109 ML Dirty Water Dam, 35 ML Discharge Dam, 7 ML Dam, Airly Creek, and a tributary of Airly Creek. This monitoring is in addition to that required by EPL 12374.

Table 3.5: Water Quality Monitoring Parameters

Analyte or parameter	EPL 1374 Limit
Oil and Grease concentration	10 mg/L
pH	6.5-9.0
TSS concentration	50 mg/L



3.11.7 Site Water Requirements- Existing

A comprehensive site water balance assessment has been conducted to quantify surface and groundwater budgets for existing (and future) operations. The water balance (Appendix F) reviews the site water requirements, available water storage and discharge volumes for Airly Mine. Total site water requirements for the existing operations are illustrated in Table 3.6. The site water requirements for the approved scenario were also modelled and have been included in Table 3.6.

Table 3.6: Annual Site Water Requirements - Existing and Approved Scenarios

	ML/yr	ML/yr
Direct rainfall onto storages and catchment runoff	114.1	194.5
External bathing and potable water supply	0.3	0.3
Groundwater inflows into underground workings	0.0	598.4 (maximum in mining year 16)
Extraction from production bore	132.6	0.0
In situ coal moisture	46.1	46.1
TOTAL INPUTS (rounded)	293	839
OUTPUTS		
Evaporation	29.7	52.6
Dust suppression	99.8	99.8
Sewage to effluent treatment	1.7	1.7
Discharge through LDP001	5.5	485.9
Discharge through LDP002	0.0	0.0
Discharge through LDP003	0.0	0.0
Discharge through proposed LDP on Reject Settlement Dam	N/A	0.5
Coal product moisture	156.4	142.3
Rejects moisture		56.5
TOTAL OUTPUTS (rounded)	293	839
CHANGE IN STORAGE		
Surface water storages	0.0	0.0
TOTAL CHANGE IN STORAGE	0	0

Table 3.6 shows the following for existing operations (scenario 1).

- The largest source of water is the production bore to supplement water harvested by the surface water system.
- Coal product moisture is the largest output from the site, accounting for approximately 156 ML/yr, followed by water required for dust suppression and evaporation. No water is lost to rejects as none are produced.
- Discharges through LDP002 and LDP003 are not expected to occur.
- Annual discharge through LDP001 is predicted to be approximately 5.5 ML/yr.

Table 3.6 shows the following for approved operations (scenario 2).

- The largest source of water is from underground workings at 598 ML/yr due to predicted increases in vertical and horizontal hydraulic conductivity resulting from the approved mine design.



- Coal product moisture is the largest output from the site, accounting for approximately 142 ML/yr, followed by dust suppression and evaporation. 56 ML/yr will be lost to rejects.
- Discharges through LDP002 and LDP003 are not expected to occur.
- Annual discharge through LDP001 is predicted to be approximately 486 ML/yr.

Discharges from LDP001-LDP003 contribute to the flow of Airly Creek. Discharges through LDP002 and LDP003 are not expected to occur under existing and approved operations and therefore current operations within the reach of Airly Creek receiving discharge from LDP002 and LDP003 are expected to remain the same.

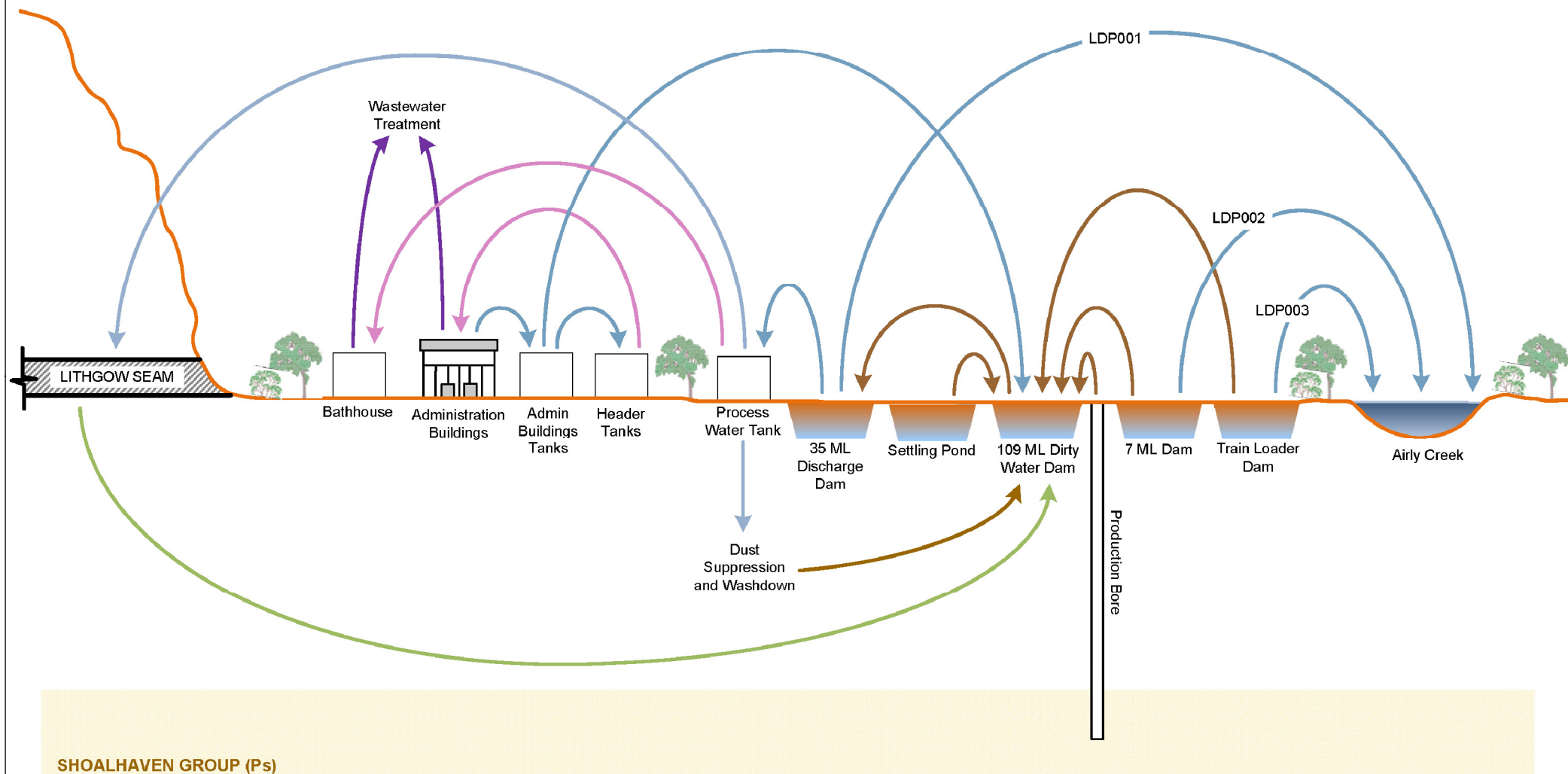
The average annual discharge through LDP001 under existing operations is predicted to be approximately 5.5 ML/yr, which is significantly skewed by high rainfall events and prolonged wet periods. Discharges are predicted to occur under existing conditions on less than 0.3% of days, or approximately 1 day per year. The current EPL 12374 limit of 100 ML/day was not exceeded under the modelled existing conditions.

3.12 Underground Ventilation

All underground coal mines require ventilation, to provide oxygen for personnel and to maintain the atmosphere in a safe condition. For coal mines, the major gases of concern are: methane, which can be explosive within a certain range of methane to oxygen ratio; carbon monoxide, a toxic gas which in excessive concentrations binds preferentially to haemoglobin in lungs thereby causing intoxication of the bloodstream; and carbon dioxide, which in excessive concentration can cause asphyxiation. In NSW, there are statutory requirements for the maintenance of mine atmosphere to remain breathable and non-explosive.

Ventilation is also required to dilute potentially harmful dust concentrations generated from mining activities. In NSW, there are statutory requirements for the maintenance of safe levels of airborne dust in the mine atmosphere. Ventilation also removes heat from mine workings so as to prevent heat stress in persons working underground.

The primary method for managing mine atmosphere is by mechanical ventilation. The main ventilation installation at Airly Mine consists of a two electrically powered centrifugal fans attached to the northern-most access adit at the pit top. These fans are of the exhausting type and draw fresh air from the remaining three access portals, through the workings, and vent the used air to the external atmosphere through the fans.



LEGEND

	Clean Water		Wastewater
	Underground Water		Amenities and Bathhouse Water
	Dirty Water		

Water Management Schematic provided by GHD

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**Figure 3.3:
Water Management
Schematic**

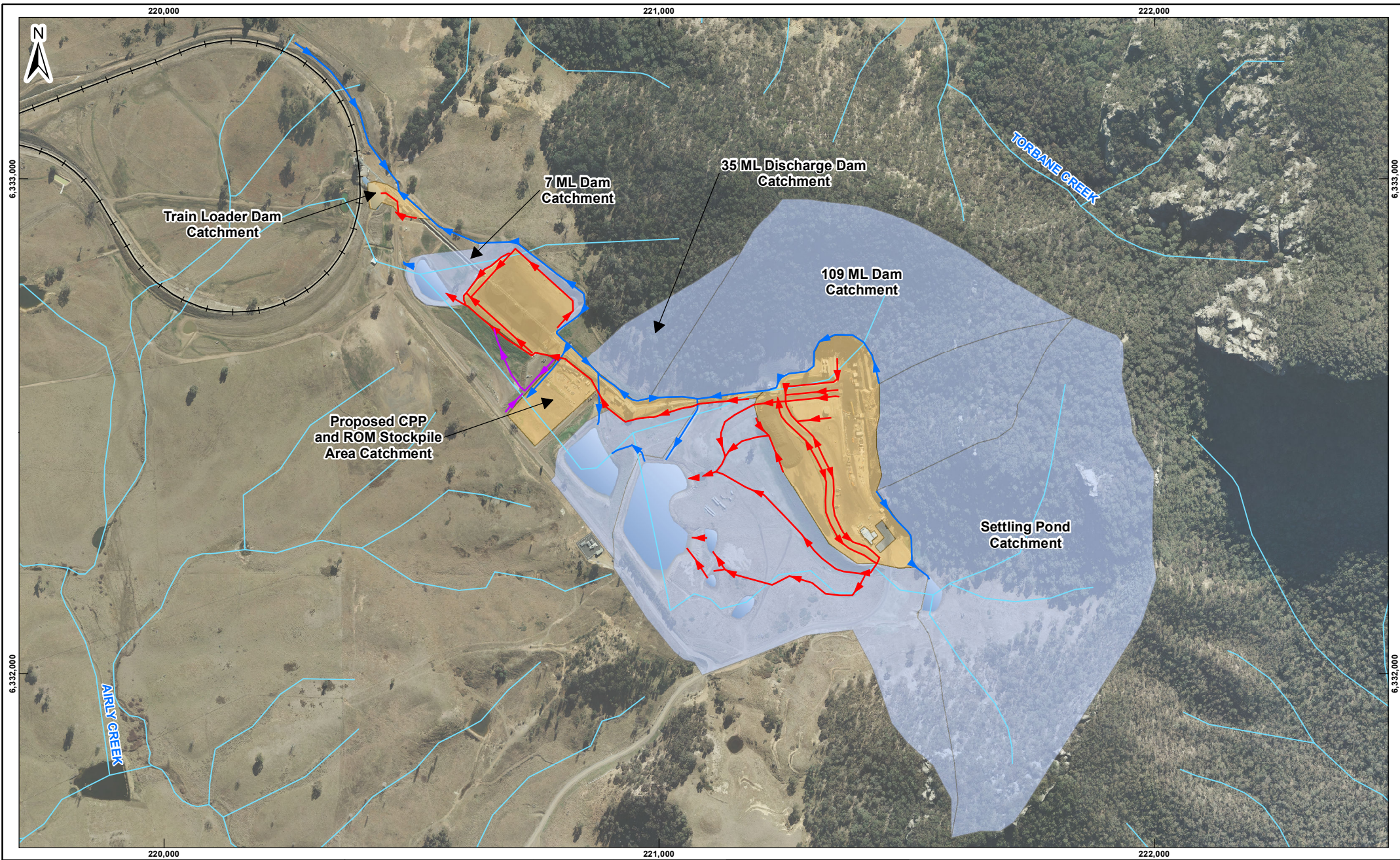
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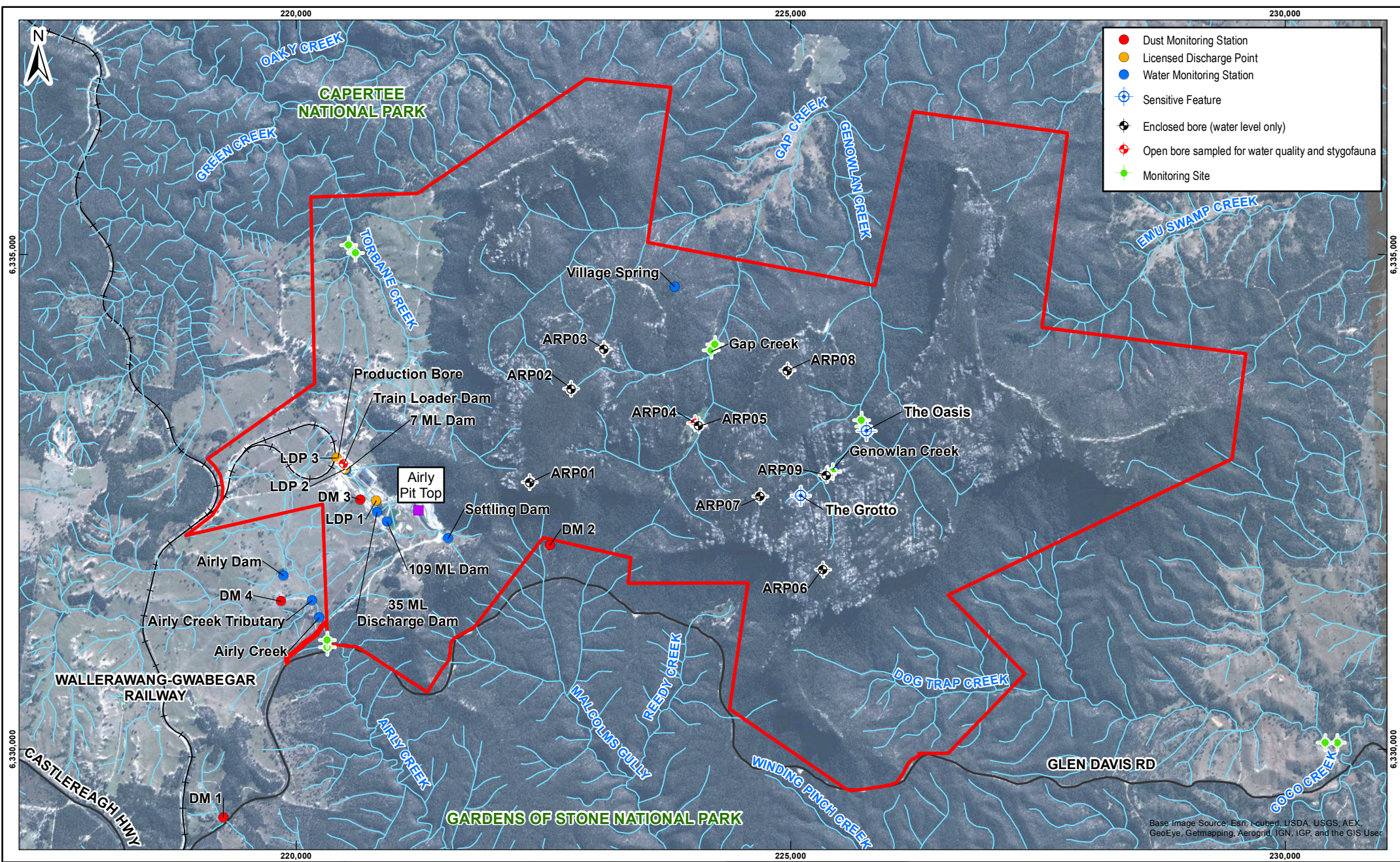
Centennial Coal
Airly

DRG No. 3-3.3

A4



LEGEND - Clean Water Diversion - Dirty Water Diversion - Dirty Water Diversion - Proposed - Rail - Watercourse - Clean Water Catchment - Dirty Water Catchment Coordinate System: GDA 1994 MGA Zone 56	CENTENNIAL AIRLY PTY. LTD. THIS DRAWING IS COPYRIGHT NO PART OF IT IN ANY FORM OR BY ANY MEANS (ELECTRONIC, MECHANICAL, MICRO-COPYING, PHOTOCOPYING OR OTHERWISE) BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED WITHOUT PRIOR WRITTEN PERMISSION	<table border="1"> <tr> <td>DATE</td> <td>17/04/2014</td> </tr> <tr> <td>SEAM</td> <td>LITHGOW</td> </tr> <tr> <td>REFERENCE</td> <td>137623024-R Rev 0</td> </tr> <tr> <td>SCALE</td> <td>1:10,000</td> </tr> </table>	DATE	17/04/2014	SEAM	LITHGOW	REFERENCE	137623024-R Rev 0	SCALE	1:10,000		Figure 3.4: Water Management at the Pit Top	<table border="1"> <tr> <td colspan="2">PLOTFILE No.</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td>DRG No. 3-3.4</td> <td>A4</td> </tr> </table>	PLOTFILE No.				DRG No. 3-3.4	A4
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LEGEND

- Project Application Area
- Watercourse
- Rail
- Main Road

Coordinate System: GDA 1994 MGA Zone 56

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**Figure 3.5:
Environmental
Monitoring and Discharge
Points**

PLOTFILE No.	
Centennial Coal Airly	
DRG No. 3-3.5	A4



3.13 Waste Management

3.13.1 Production Waste

Production waste is not generated at Airly Mine given that no coal beneficiation occurs and no reject materials are produced.

3.13.2 Non-Production Waste

General waste is disposed of to a landfill by a licensed waste contractor. Waste oil collected in the workshop is stored before being removed off site by a licenced recycling contractor. Separate bins for oily rags, oil and diesel filters, damaged chemical anchors and polythene pipe are provided. Expired chemical anchors are taken off site and disposed of by the manufacturer in an approved manner. Waste Management is undertaken in accordance with the existing Airly Mine Mining Operations Plan (Centennial 2012e) with all potentially hazardous material stored and/or banded appropriately in accordance with relevant application standards. Table 3.7 identifies typical wastes and their disposal destinations.

Table 3.7: Typical Waste Streams and Disposal

Waste Stream	Example Waste	Management/Disposal Method
General Solid Waste		
Mixed Solid Waste	Putrescible wastes and non-putrescible wastes. This also includes waste that meet the classification of <i>General Solid Waste under DECCW's Waste Classification Guidelines (2009)</i>	General consumable waste materials are stored in 5 x 3.5 m ³ and 2 x 10 m ³ waste skips and collected regularly by licensed providers for offsite disposal to landfill.
General Solid Waste (Recyclables)		
Paper and Cardboard	Paper and cardboard	Colour coded recycling containers are placed in identified areas for collection of cardboard and paper products. These, and smaller receptacles in the administration and office areas, are collected regularly by licensed providers.
Scrap Steel/Metals	Scrap Steel/Metals	All scrap steel/metal is placed into a dedicated skip and sold to scrap steel merchants for recycling.
Liquid Waste		
Used oil filters and drums	Waste oils/Grease	Used oil filters are stored in designated bins and are taken to a recycling facility by a registered waste disposal company. At the recycling facility, these are crushed to recover all oil and subsequently, both the oil and metal is recycled. Materials still containing liquid are not disposed of to landfill. These materials are removed by licensed contractors for recycling or disposal and a licensed waste management facility. 20 L drums are drained into waste oil collection (drum drainer) and placed into scrap metal recycling bins. Grease cartridges are placed in sealed drums within the bulk oil store, prior to collection by licensed contractors.
Hydrocarbons/Hazardous Materials	Oils, diesel fuels,	Hazardous materials including oils and fuels are stored in accordance with Australian Standards. A spill response procedure is in place which addresses clean-up procedures in an event of a spill of these materials . Hazardous materials that need to be disposed of are stored within an allocated area prior to being removed by a licensed hazardous waste contractor.



ENVIRONMENTAL IMPACT STATEMENT- AIRLY MINE EXTENSION PROJECT

Waste Stream	Example Waste	Management/Disposal Method
Waste effluent	Sewage	Sewage and grey water from the bathhouse and offices at the pit top area is treated on site by a sewage treatment facility. The mine's effluent system upgrade was completed during June 2012 and the life of mine Ecomax Effluent Treatment System caters for the expected workforce. Underground sewage is contained by Alfab activated biological toilets. Septic tanks have been installed at the Train Loader facility to manage sewage from the toilet located at the Train Loader. The sewage is transported by a licensed contractor to the Ecomax Effluent Treatment System for disposal.

3.14 Environmental Management

3.14.1 Introduction

Centennial Airly is committed to continual improvement in the environmental management of Airly Mine's operations and to developing effective community relationships. Centennial Airly recognises the importance of effectively managing the environmental impacts associated with Airly Mine and has developed an Environment and Community Policy that commits to continual improvement in its environmental management and performance.

3.14.2 Centennial Environmental Policy

Airly Mine has adopted Centennial Coal's Environment and Community Policy forming part of a broader Environmental Management Strategy. The Strategy has been developed to ensure the strategic outlook for environmental management is clearly and concisely articulated. The Environmental Management Strategy contains objectives to assist Centennial Airly's operations at Airly Mine in meeting the principles within the Environment and Community Policy. Underpinning the Environmental Management Strategy, Centennial Airly has an established Environmental Management System (EMS) at Airly Mine that reflects the objectives and principles of the strategy and policy.

3.14.3 Environmental Management System and Management Plans

The EMS has been developed in accordance with the *Centennial Coal Environmental Management System Framework* (Centennial 2011b). The EMS sets down procedures and standards for the management of areas of environmental significance and mechanisms whereby the environmental performance of Airly Mine can be measured and assessed, and appropriate action taken where necessary. The EMS has been developed and implemented in accordance with all regulatory requirements, including the International Standard ISO14001, while providing a means for continued improvement in the environmental performance of the Airly Mine.

As part of the EMS, Centennial Airly maintains a number of Environmental Management Plans (EMPs) and procedures as outlined in Table 3.8.

ML1331 requires the preparation of an Annual Environmental Management Report (AEMR) to address environmental management during the year including reporting on the progress of mining activity and the environmental performance at Airly Mine.

The EMPs are supported by an environmental monitoring network, which consists of monitoring of noise, dust, surface water, and groundwater.

The management plans are supported by an environmental monitoring network, which consists of monitoring of noise, dust, surface water, and groundwater.



ENVIRONMENTAL IMPACT STATEMENT- AIRLY MINE EXTENSION PROJECT

Table 3.8: Airly Existing Mine EMPs and Procedures

Management Plan or System	Purpose
Mining Operations Plan	Covers activities at Airly Mine during operations. The document has been prepared in accordance with the <i>Guidelines to the Mining, Rehabilitation and Environmental Management Process prepared by the NSW Department of Mineral Resources, Updated April 2012</i> .
Landscape and Rehabilitation Management Plan	To minimise and manage potential landscape and rehabilitation issues and to return the land to a pre-operation state or better, in line with the relevant consent conditions and in consultation with the key stakeholders.
Environmental Monitoring Plan	Provides details of monitoring and reporting of the various management plans.
Stakeholder Engagement Plan	The objectives are to: ■ effectively communicate with relevant stakeholders ■ define responsible parties within Centennial in respect of the communication paths and forums ■ monitor and manage issues from relevant stakeholders ■ maintain a complaints protocol.
Borehole Construction Environmental Management Plan	Project specific plan developed to ensure appropriate environmental management practices are followed during borehole construction.
Pollution Incident Response Management Plan	Covers the key actions to minimise the occurrence of a pollution incident and to manage a pollution incident if one occurs (during and after a pollution incident). The plan has been prepared for managing the impact to human health (employees and nearby neighbours) and the environment (onsite and offsite).
Air Quality Management Plan	Provides for the monitoring and management of air quality.
Noise Management Plan	Sets out procedures for monitoring, assessing and responding to noise impacts.
Water Management Plan	Coordinates the management of water within the Airly Mine lease area in an efficient and sustainable manner.
Waste Minimisation and Management Plan	To achieve waste minimisation through maximising re-use and recycling, to ensure environmentally responsible disposal of waste materials not suitable for re-use or recycling and to ensure environmental protection throughout all stages of waste handling, storage, collection and disposal.
Contractor Management Plan	This plan aims to ensure that all activities carried out on behalf of Airly by external contracted parties comply with legislative requirements, internal and external practices and guidelines.
Fire Management Plan	Sets out the procedures for reporting fire and for the inspection and maintenance of firebreaks and asset protection zones at the pit top.



Management Plan or System	Purpose
Strata Failure Management Plan	In accordance with Clause 28b (ii) of the <i>Coal Mine Health and Safety Regulation 2006</i> the objectives of this management system are to ensure as far as reasonably practicable the safety of all persons present at the coal operation with regard to underground strata.
Ventilation Arrangements	In accordance with Clause 21 of the <i>Coal Mine Health and Safety Regulation 2006</i> , Airly Mine has implemented Ventilation Arrangements to ensure as far as reasonably practicable the safety of all persons present at the coal operation with regard to mine ventilation.

3.14.4 Monitoring and Reporting

Environmental Monitoring is conducted in accordance with EPL12374, DA 162/91, ML1331, and A232. The EMPs prepared as part of environmental monitoring are consistent with the Centennial Coal's standard *ECMS-006 Monitoring and Evaluation* specifying the environmental sampling standards for all monitoring including collection and analysis.

Compliance against the limits set out in EPL12374 is reviewed monthly and non-compliances documented in the monthly environmental and operations reports. Reporting of non-compliance with EPL12374 licence limits are consistent with the Centennial standard *ECMS-003 Incident Reporting and Investigation*.

The results of the monitoring program described above and identified in Table 3.8 are recorded in the following reports:

- Annual Environmental Management Reports;
- Annual Returns for EPL 12374;
- National Pollutant Inventory reports; and
- Environmental Monitoring Reports.

These reports are supported by an environmental monitoring network, monitoring noise, dust, groundwater, surface water and subsidence. Monitoring locations are illustrated in Figure 3.5. An overview of the monitoring results is provided below and further details of the monitoring results are provided in Chapter 10.0.

An overview of the monitoring undertaken is provided below and further details of the monitoring results are provided in Chapter 10.0. Airly Mine undertakes monitoring of:

- deposited dust
- groundwater – groundwater level and water quality
- surface water – surface flows and water quality
- aquatic ecology and stygofauna
- subsidence.



Deposition Dust Monitoring

Table 3.9 outlines the Dust Monitoring Locations and frequency of monitoring.

Table 3.9: Dust Monitoring Overview

Dust Monitoring Location	Frequency
DM1	Monthly
DM2	Monthly
DM3	Monthly
DM4	Monthly

Groundwater Monitoring

Table 3.10 outlines the groundwater monitoring locations, frequency of monitoring, quality and summary of analytes.

Table 3.10: Groundwater Monitoring Overview

Groundwater Monitoring Location	Frequency	Piezometric Pressure	Quality	Summary of Monitoring Parameters and Analytes
AM2B	Monthly		X	pH, electrical conductivity (EC) Dissolved metals: As, Cr, Cu, Fe, Pb, Mn, Ni, Zn
ARP01	Monthly	X		
ARP02A	Monthly	X		
ARP03A	Monthly	X		
ARP04	Monthly	X		
ARP05	Monthly		X	pH, EC Dissolved metals: As, Cr, Cu, Fe, Pb, Mn, Ni, Zn
ARP06	Monthly	X		
ARP07	Monthly	X		
ARP08	Monthly	X		
ARP09	Monthly		X	pH, EC, Dissolved metals: As, Cr, Cu, Fe, Pb, Mn, Ni, Zn
Village Spring	Monthly		X	pH, EC, Dissolved metals: As, Cr, Cu, Fe, Pb, Mn, Ni, Zn



ENVIRONMENTAL IMPACT STATEMENT- AIRLY MINE EXTENSION PROJECT

Surface Water Monitoring

Table 3.11 outlines the surface water monitoring locations, frequency of monitoring, quality and summary of analytes.

Table 3.11: Surface Water Monitoring Overview

Surface Water Monitoring Location	Frequency	Flow	Quality	Summary of Monitoring Parameters and Analytes
LDP001	Quality – Monthly (when discharging) Flow - Continuous	X	X	pH, EC, turbidity TSS, oil and grease, iron (total and dissolved), manganese (total and dissolved) concentrations
LDP002	Monthly (when discharging)		X	pH, EC, turbidity TSS and oil & grease concentrations
LDP003	Monthly (when discharging)		X	pH, EC, turbidity TSS and oil and grease concentrations
Airly Creek	Monthly		X	pH, EC, turbidity TSS, oil and grease, ammonia, total nitrogen, total phosphorus concentrations Total metals : Al, As, Ba, B, Cd, Co, Fe, Pb, Mn, Hg, Ni, Se, Ag, Zn Dissolved metals: Al, Sb, As, Ba, Be, B, Cd, Cr, Cu, Co, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sn, Ti, V, Zn
Airly Creek Tributary	Monthly		X	pH, EC, turbidity TSS, oil and grease, ammonia, total nitrogen, total phosphorus concentrations Total metals: Al, As, Ba, B, Cd, Co, Fe, Pb, Mn, Hg, Ni, Se, Ag, Zn Dissolved metals: Al, Sb, As, Ba, Be, B, Cd, Cr, Cu, Co, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sn, Ti, V, Zn
The Grotto	Monthly		X	pH, EC, turbidity TSS, oil and grease, total nitrogen, total phosphorus concentrations Total metals: Al, Fe Dissolved metals: Al, Fe, As, Cd, Cr, Pb, Mn, Hg, Ni, Zn
Gap Creek	Monthly	X	X	pH, EC, turbidity TSS, oil and grease, total nitrogen, total phosphorus concentrations Total metals: Al, Fe Dissolved metals: Al, Fe, As, Cd, Cr, Pb, Mn, Hg, Ni, Zn
Genowlan Creek	Monthly	X		Flow
Village Spring	Monthly	X		Flow



Aquatic Ecology and Stygofauna Monitoring

Limited aquatic ecology and stygofauna monitoring has been undertaken at the site to date. An initial site visit to assess the availability of permanent aquatic habitat and select sampling sites was completed on 15 April 2013. Twelve monitoring sites were selected based on available surface water, and to achieve an adequate representation of aquatic habitats present. Measurement of temperature, electrical conductivity, salinity, pH, dissolved oxygen and turbidity just below the surface of the water column and at depth where sufficient water was available were monitored.

Stygofauna samples were collected on 21 May 2013, 11 June 2013 and 4 December 2013 from the existing shallow piezometer (ARP05) near Gap Creek, the Production Bore (AM2B-1) near the coal handling facility and the Old Production Bore (AM2B).

Subsidence Monitoring

As noted in Section 3.7.2 subsidence monitoring to date comprises surface inspections given that only first workings are undertaken in the current mining areas. Regular visual inspections of surfaces over the mined areas are undertaken and this method of gauging subsidence impacts has been deemed to be sufficient. These surface inspections have shown no visible impact on the ground surface such as cracking, sink holes or pressure ridges. There has been no indication of impacts on the existing vegetation over the current mining areas.

3.14.5 Audits and Continuous Improvements

Continuous improvement is achieved through monitoring and review; internal and external communication with stakeholders; implementation of corrective and preventative actions; and tracking progress against objectives and targets.

Audits give an assessment of the implementation of the EMS, compliance, policy, objectives and environmental performance. Internal audits are completed periodically to ensure the EMS is operating in accordance with the Centennial EMS Framework with continuous improvement identified and implemented where feasible.

An external consultant was engaged by Centennial Coal during 2012 to carry out an environmental audit at Airly Mine. The audit was commissioned by Centennial Airly to assess the level of compliance of its operations against its approvals, licences, leases and management plans. Included with this objective was a requirement that the audit provide information to Centennial Coal on environmental compliance to enable site management to identify opportunities for improvement.

3.14.6 Pollution Incident Response Plan

In August 2012 a Pollution Incident Response Management Plan (PIRMP) was developed and implemented at Airly Mine to satisfy the requirements of section 153A of the *Protection of the Environment Operations Act 1997* (POEO Act) which requires the preparation, implementation and publication of a PIRMP. The PIRMP for Airly Mine is available on the Centennial Coal website.

3.14.7 Pollution Reduction Program

In 2011, the NSW Environment Protection Authority required, through a Pollution Reduction Program, that Airly Mine provide a Site Specific Particulate Matter Control Best Practice Assessment report which examined in detail the potential measures which could be employed to further reduce particulate emissions from the mine. The report, prepared by SLR Consulting Australia Pty Ltd, was prepared in accordance with the *Coal Mine Particulate Matter Control – Best Practice: Site Specific Determination Guideline* (EPA 2011) to comply with the EPA specifications as stipulated in the Licence Variation Condition U1 of EPL 12374.

3.15 Rehabilitation and Final Landform

The approved MOP details the proposed rehabilitation objectives to ensure the final landform is commensurate with the surrounding topography and relevant zoning requirements of the time.



Airly Mine has adopted a progressive approach to rehabilitation to reduce and mitigate potential environmental impacts where possible. This comprises of a preliminary rehabilitation strategy, which incorporates both temporary and permanent program in order to maximise surface stability during construction works and establishment of the final emplacement landforms. Temporary rehabilitation works run in conjunction with temporary erosion and sedimentation controls.

Permanent rehabilitation works include the outer face of the detention dams, long-term access roads and permanent fill areas. Permanent rehabilitation is also undertaken, in consultation with the National Parks and Wildlife Service, at exploration drillholes areas as described in Section 3.3.

Rehabilitation at the site is undertaken in accordance with the Airly Mine's Mining Operations Plan (Centennial 2012e) Specific objectives and outcomes of the final rehabilitation programs as described in this Plan are as follows:

- ecological diversity and structure to be compatible with the surrounding forest ecosystem
- control of watershed runoff flow velocities to reduce erosion in the long term
- promotion of native flora and fauna conservation
- improvement of visual amenity.