REF SSD 12-5581
Submission of Capertee Valley Alliance with respect to Centennial Airly Pty Ltd Airly Mine Extension Proposal ("the Airly proposal") EIS ("the EIS")

Capertee Valley Alliance ("CVA") submits that, in the various respects identified and traversed in the submission below, and in other submissions to which the submission refers, the EIS contains significant omissions, inadequacies and defects with respect to environmental, social and economic elements of the proposal, the cumulative impact of which is that the Airly proposal constitutes an unacceptable risk, and not in the public interest.

CVA supports the submission of Capertee Valley Environment Group ("CVEG"), and relies upon the expert opinion evidence contained in such submission with the knowledge and consent of CVEG, and the authors of such expert reports. In the interests of brevity, and to avoid repetition, CVA's submission does not refer expressly to the entirety of the expert opinion evidence presented by CVEG.

Introduction

Capertee Valley Alliance Inc. **Background**

Mission Statement

Capertee Valley Alliance Inc. is an incorporated community group dedicated to assisting the Capertee Valley Community.

Statement of Purpose

The Capertee Valley Alliance Inc. is the coming together of the people of Capertee Valley and surrounds. We are privileged to live and work in, and enjoy a place of great natural beauty and special significance. Its environment has tremendous biodiversity and it is an important Bird Area world-wide. CVA strives to maintain strong supportive links with the extended community and represent the community on issues that affect the sustainability and enjoyment of this unique place.

The Alliance endeavors to inform residents on issues that affect the community, and is willing to work closely with residents and the local community groups to:

- Assess, represent and communicate the interests and desires of the whole Capertee Valley Community including residents, ratepayers, business owners and their employees to government and other organisations and agencies at all levels.
- Research, develop and maintain plans programs and undertake or sponsor projects where appropriate ensuring that the Capertee Valley Community and its unique environment become safer, stronger, sustainable and proper.
- Provide a non- profit entity to seek funding, encourage sponsorship and receive contributions and government grants for community enhancement and facilities in the Capertee Valley as identified in the above statements of purpose.

The members of the public most directly impacted by the proposal are those represented by Capertee Valley Alliance Inc. and CVEG. The members living in the valley carry on business in the fields of eco tourism, farming, grazing, environmental conservation and heritage preservation. Capertee Valley Alliance Inc. submits that, in the various ways identified and discussed in the expert reports relied upon by Capertee Valley Alliance Inc., CVEG and others in their submissions, the proposals articulated in the EIS expose each

of those activities and the persons dependent upon them to unacceptable risks of environmental harm, with consequential risks of social and economic harm

Heritage significance of area potentially impacted by the Airly proposal

The National Trust Register in its Industrial Heritage Site Listing Report dated 31 July 2014 describes the Airly mines and remains of the Torbane Refinery as "significant" in the history of oil-shale mining, and the Airly township as a "rare example of an abandoned mining town uncompromised by later development". The Torbane refinery is "significant" for its "role in the development of retorting technologies…and for the prototyping of retorts later used at Newnes".

The full report of the National Trust, upon which CVA relies, is attached to this submission as attachment "A".

Hydrogeology concerns

CVA relies upon the opinions and concerns articulated by Dr Phillip Pells in the report which appears in the CVEG submission.

CVA also relies upon the hydrogeology report of Dr Andrea Broughton dated 29 October 2014. Dr Broughton's full report is attached to this submission as attachment "B".

In the Executive Summary to her report, Dr Broughton articulates a number of significant defects in the hydrogeological model advanced in the EIS which are more fully advanced in the report. The absence of a published peer review of the model is submitted to be a significant defect in the model, for the reasons Dr Broughton records.

The absence of data, or acceptable or sufficient data identified by Dr Broughton is submitted to be a significant defect in the groundwork monitoring network relied upon by the proponent. The basic nature of the defects is submitted to be of grave concern to CVA members, both with respect to the security of the water resources of the Capertee Valley, and the trustworthiness of the proponent. The anomalies in the Airly proposal identified and explored by Dr Broughton, and absence of engagement with them by the proponent are submitted to further support the concerns of CVA, and render more problematic the proponent's disputed social licence aspirations.

Dr Ian Wright's report dated 30 October 2014 with respect to the surface water assessment relied upon in the EIS is relied upon by CVA as further evidence militating against acceptance of the EIS. As with the expert opinions of Dr Broughton, Dr Wright identifies serious inadequacies, inconsistencies and defects in the water assessment documents relied upon by the proponent. A copy of Dr Wright's report is attached to this submission as attachment "C".

CVA submits that, unless and until the proponent satisfies the requirements of the IESC guidelines, and satisfactorily addresses the issues articulated by Dr Broughton and Dr Wright, it cannot credibly contend that the Airly proposal does not constitute an unacceptable risk to water resources in the Capertee Valley. Dr Broughton's "conclusions" identify significant environmental risks posed by the Airly proposal, and support CVA's concerns with respect to the proponent's integrity, and commitment to the protection of water resources upon which survival in the valley is dependent. Those concerns find further support in the evidence of Dr Wright.

CVA submits that landholders in, and occupants of the Capertee valley are owed both common law and statutory (Civil Liability Act, 2002, NSW, Protection of the Environment Operations Act 1997 NSW, Water Management Act 2000 NSW, and Environment Protection Biodiversity Conservation Act 1999 Cth.) duties of care by the Department of Planning in the context of the department's assessment of and response to expert criticisms of the EIS. The risk of significant harm is readily foreseeable on any view of the submissions made to the department. CVA submits that no statutory authority acting reasonably could fail to respond to the expert criticisms of the EIS referred to in this, and other submissions to it with

respect to the EIS. CVA will look to the department to compensate its members for and in respect of any damages suffered as a result of the department's failure to take reasonable precautions to prevent that harm.

Environmental features having heritage and special significance

CVA relies upon the report of the Colong Foundation for Wilderness Ltd dated 31 October 2014, a copy of which is attachment "D" to this submission, and supports the conditions to be imposed if the Airly proposal is to be further considered.

CVA relies upon the report of Dr Haydn Washington dated 31 October 2014, a copy of which is attachment "E" to this submission, and to the "conclusion and recommendation" appearing at pages 15-16 of Dr Washington's report.

CVA contends that, unless and until the proponent satisfactorily addresses the concerns for the environment identified by Mr Muir and Dr Washington, and unequivocally commits to conditions of approval, and binding protocols to implement them, the Airly proposal should not be further considered. (Ian, do you want us to attach all reports that CVEG has acquired through EDO)

Although not attaché to this submission, as noted above, CVA relies upon the reports presented by CVEG namely –

- Airly Mine extension Proposal, Rod Campbell, October 2014, The Australian Institute.
- Review of Noise Management, Section 10.5 of Airly Mine extension EIS, John Bassett
- Pells Consulting, Airly Mine Extension – EIS, Philip Pells
- Airly Mine extension Project, Review of Surface water Assessment, Andrew Marr, October 2014
- Dr Alison Hunt & Assoc Pty Ltd.

Conclusion

CVA submits that the expert reports relied upon by it, and other entities which have made submissions with respect to the EIS comprehensively demonstrate that approval of the Airly mine proposal cannot be seriously contemplated unless and until the various cogently articulated concerns emerging from those reports are credibly addressed. As the experts have identified, the EIS contains many omissions, inaccuracies, and potentially misleading and deceptive statements, and a concerning absence of transparency, and intellectual rigour.

The proponent has relied upon reports provided by experts retained and paid to deliver the evidence which the proponent perceives that it requires. These experts are not, and cannot be independent". Against that background, the apparent reluctance of the proponent to subject those reports to independent scrutiny is concerning on a number of levels, including the potential harm which the proposal represents, the integrity of the proponent, and the absence of its entitlement to a social licence to proceed with the proposal. The concerns are heightened when regard is had to the qualifications and experience of the truly independent expert reports relied upon by entities criticising the EIS.

In addition to the various environmental, economic and social concerns articulated in the expert criticisms of the EIS, the department will be aware that the proponent has a demonstrated history of placing its mines in care and maintenance whenever it is considered economically advantageous to do so, without apparent regard to the social disruption, and financial hardship which its actions visit upon its workers, and the communities in which they live. I recent days, the proponent has announced its intention to place another of its Lithgow mines in care and maintenance, resulting in the loss of approximately 130 jobs. There is submitted to be a demonstrated divide between the economic benefits asserted in the EIS, and those which have historically been generated.

Further to the concerns for the environmental sustainability of the Capertee Valley, upon which its social and economic sustainability depends, the EIS offers grossly inadequate security for the environmental damage which the recent report into CSG by the Chief Scientist suggested was "inevitable".

CVA thus submit that the independent expert reports with respect to the EIS reveal unacceptable risks of environmental, social and economic harm of such magnitude as to preclude further consideration of the Airly proposal unless and until each of those risks has been addressed by appropriate independent expert evidence.

Donna Upton
Secretary
Capertee Valley Alliance Inc.

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NATIONAL TRUST REGISTER

INDUSTRIAL HERITAGE SITE LISTING REPORT

CITY/SUBURB/TOWN	NAME OR IDENTIFICATION OF SITE	ADDRESS or LOCATION
Capertee	**AIRLY SHALE MINES AND TORBANE REFINERY REMAINS**	**Glen Davis Road, Mt Airly, via Capertee**

LGA:	Lithgow City	ABORIGINAL NATION:	Wiradjuri Nation
POSTCODE:	2846	LOT/DP:	See Appendix A
COMMITTEE:	Industrial Heritage Committee	GRID:	Lat: -33.10623 Long: 150.042018
AUTHOR:	Tony Brassil	LISTING DATE:	31 July, 2014

STATEMENT OF SIGNIFICANCE:

The Airly Mines and remains of the Torbane Refinery are significant in the story of oil-shale mining in NSW. The site has relationships to most of the other significant oil-shale mining and refining sites in NSW, especially Joadja, Hartley Vale and Newnes. The remains of the transportation systems, both tramways and ropeways, provide evidence of the technologies of the period and the level of investment in oil-shale in the late nineteenth century.

The Airly township is a rare example of an abandoned mining town uncompromised by later development and the remains of the miners' houses are both technically interesting and evocative of the hardships endured by miners in these locations. The Torbane refinery was significant for its role in the development of retorting technologies in the early twentieth century and for its prototyping of retorts later used at Newnes.

DESCRIPTION:

Sites and relics are scattered throughout the overall Airly Mines area and various elements are recorded by different authors. Mills (op cit) identified nineteen discrete sites within the Airly Shales Mines area:

1. The Skipway from Airly Village to the Torbane Tunnel
2. Airly Village Precinct
3. Church
4. Ventilation Shaft
5. Stone Dwelling
6. Spring Shaft and stone house
7. 'Big Rock' cave dwelling
8. 'The Bakery'
9. Potts Point Stone and Cave dwelling complex
10. Managers House and Water Trough
11. Magazine, spring and cave dwelling
12. Brick Ventilation chimney
13. Visible skipway on dry stone wall

14. Entrance to Martin's Tunnel and Ventilation Shaft
15. Boiler and Engine
16. Flying Fox cables
17. 'Groom's House' and Incline to Torbane Tunnel
18. Torbane Retort Complex
19. Railway Cutting

Eardley and Stephens note five major relics plus the locations of the major transport routes. These are:

1. Self-acting incline.
2. Horse tramlines.
3. Site of the Winding engine.
4. Airly Gap.
5. Site of the 60 ft turntable.
6. Burnett's Farm

Remains include a brick ventilation chimney, used to ventilate the mines, ruined miners' cottages of random masonry with mud chimneys, a boiler set in English bond brickwork foundations (boiler 4' diam. x 20'4" long), miners' cave houses dug into overhanging rocks with mud walls and windows (now filled in), the Torbane tram (coal) tunnel about 1,600 yards long, abandoned wire rope cables, remnants of cable winding wheels, numerous adits, caved in, and tramway roads built up around the edge of the mountain. Generally, this listing covers all relics and physical remains of the shale mining industry surviving in the Airly/Torbane vicinity which are associated with these mines.

HISTORY:

The following historical information is largely based upon:
Mills, R; *A Preliminary Heritage assessment of Airly Shale Oil Mining Complex*; Report for IEC; 1998.

General Background

Oil shale is a fine textured sedimentary rock containing organic matter known as kerogen, from which oil can be distilled through the application of heat. The process for the extraction of oil from shale was first carried out in Great Britain in 1694, however, the first commercial plants did not come into existence until1838 in France and1850 in Scotland. With James Young's patented process for the dry distillation of coal and shale and its subsequent refining with sulphuric acid and caustic soda (patented in 1850), shale oil became the basis for a major industry for the various products which could be distilled and extracted, including kerosene, paraffin wax, ammonia, lighting oils, lubricants and, after the turn of the century, motor fuel.

The first oil shale deposits in NSW were discovered in 1815 during the construction of the first road across the Blue Mountains. In 1824, a French expedition led by Commander Duprey reported the mining of deposits of stratified lignite by early settlers who used it as fuel. Other early reports of mining activity in the area were made by Surgeon Cunningham in 1827 and Count de Strzelecki in 1840 and 1845, Buckley in 1854 and Brown in 1862. Production began on a small scale at American Creek on the south coast and at Hartley Vale, near Lithgow, in 1865 and at Bathgate (Kerosene Vale) in 1866. However, production increased rapidly and, in 1866, the Pioneer Kerosene Works mine at Mt Kembla produced more than 1000 tonnes and for the next 10 years produced more than 3000 tonnes per year. Production at Hartley Vale was substantially larger. With the opening of Joadja mine in 1873-7 4, total production was unaffected by the closure of Mt Kembla Mine in 1878. Joadja and Hartley Vale together produced between 19000 and 50000 tonnes of shale between 1878 and 1889. Joadja mine declined after 1892 when the easiest part of the seam had been mined out but production at the Glen and Ruined Castle mines at Katoomba compensated for the reduced production from Joadja.

As the Katoomba seam was waning, a rich seam was identified in Airly Mountain and Genowlan Mountains near Capertee. The Australian Kerosene Oil and Mineral Company of Joadja and Katoomba acquired the southern lease at Genowlan Mine in 1895 and the Hartley Vale Company (NSW Shale and Oil Company) leased the northern outcrop in 1896 and named the mine New Hartley. From 1896-1903, more than 144,000 tonnes were extracted from these two mines.

In the first decade of the 20th century, however, mining of shale effectively ceased at all the established mines, to be replaced by production at Newnes, where the Commonwealth Oil Corporation began mining in 1906, and Murrurundi, which started production in 1907.

By 1912, Newnes was producing up to 67000 tonnes of shale per year. However, the Commonwealth Oil Corporation went into bankruptcy in 1912 and the plant ceased production until 1914 and, despite continuing labour problems and the loss of American markets, continued functioning until1922.

With the closure of the Newnes plant, shale mining in NSW effectively ceased until the 1940s, when the wartime oil requirements encouraged the development of the torbanite seam at Marrangaroo and Barigan and the construction of an entire new processing plant at Glen Davis. The end of the War and crude oil imports from the Middle East meant that the plant at Glen Davis could not survive and the complex closed in June 1952.

Much of the equipment at any of the mining sites was reused from other mining sites that had closed. While new retorts were erected at Newnes, other equipment was being brought from Torbane, which had previously been brought to Torbane from the Glen Mine at Katoomba. Genowlan Tramway equipment had come from Katoomba and the entire Kerosene Plant at Newnes had previously been used at Hartley Vale. In 1920, a whole group of houses was transferred from Torbane to Newnes. Later, when Newnes closed, its firebricks went to the Clyde Refinery at Duck Creek. When Glen Davis was built in 1939, the retorts and steam engines were taken from the deserted Newnes site.

Not all the raw shale processing was carried out in Australia. Till 1911, up to 570,000 tonnes of raw shale had been exported to Britain, Europe and America. Joadja shale was exported to America and England from 1879; Hartley Vale shale from 1880 and Genowlan deposits were held by a German syndicate and mined exclusively for export to Germany. First grade ores from Newnes and some from Joadja were used to supply the Australian Gas Light Company.

History of the Airly Shale Mines
The Genowlan Mine
The first official report of the discovery of shale oil in the Airly Mountain area was recorded in the Under-Secretary for Mines' Report for 1883. The lease on the southern portion of the Airly shale deposit was taken up by the original prospecting party of Messrs Melliday, Massey, Bulkeley, Nicholson and Larkin in 1883. However, the group failed to meet the necessary labour conditions and the lease lapsed. A new lease of 420 acres was taken up by Mr D. Wilson in late 1890. This lease was purchased by Genowlan Shale Company a short time later.

The Genowlan Shale Company was a Sydney based firm whose interest lay in exporting shale to England and the Continent. To advertise the high quality of their product, the Company entered samples of the mineral in the World's Colombian Exposition in Chicago in 1893. During this early period of the mine's history (1892-1894), an approximately 2.4km track was cut from the mine site to the Government road to Capertee. The shale was carted from the mine in drays drawn either by horse or bullock teams along this track to Capertee Railway station, from where it was transported to Germany for gas enrichment purposes.

Between 1892 and 1894, approximately 10,000 tons of high-grade shale was extracted and sent to market. During financial difficulties experienced by the company in 1894, Andrew Anderson, the largest shareholder in the Genowlan Shale Company, obtained a six months option of purchase on the leases. Anderson formed a company registered as the Australian Shale Syndicate with a group of English investors and, on 3rd December 1894, Anderson purchased the mine on behalf of the new company.

By the mid 1890's, the supply from the Joadja deposits controlled by the Australian Kerosene Oil and Mineral Company (AKO&M) was beginning to tail off and, after the Australian Shale Syndicate offered the lease of Genowlan mine on a tribute basis, a five year contract was signed in 1896. Although AKO&M had an option to purchase the property, this was not taken up.

The small private village of Airly was surveyed on 28th June 1897 by James Dawson, Surveyor. Public buildings were constructed adjacent to the tramway and remains of the Church, hotel and post office are still present, however, it appears that few houses were actually built. Many mine workers appear to have chosen to live closer to the sites of the mining adits. Their houses, constructed from local stone within rock overhangs, do not appear to conform to any recognised street alignment but were placed wherever a level patch of ground or a convenient rock overhang could be found.

The Genowlan shale seam was a dangerous place to work, as shale at the site exhibited a tendency to explode horizontally from the working face when the breaking irons were hammered in. Miners countered this dangerous situation by wearing protective breast boards fashioned from bark. More formalised protective clothing was developed over the years (strong wooden breast plates and full wire-gauze masks).

AKO&M's strategy for Genowlan mine was to ship only export grade shale from the mine, thereby partially relieving Joadja from this role. This was reflected in the marked drop in the dispatch of shale by rail form Joadja from 1894 onwards, which was almost entirely compensated for in volume by an equivalent increase of dispatches from the Capertee siding.

Initially, AKO&M used the road cartage route installed by the Genowlan Shale Company. To cut costs, an alternative route was surveyed which reduced the distance to be traversed to about 5 km and eliminated the steep and dangerous road descent by means of a self-activating, inclined way from the crest of the Airly Gap ridge to the level of the main road to Capertee Railway station.

The section from the Genowlan mine to the start of the tunnel operated as a single-line horse tramway. It then changed to a double line cable tramway and passed west through a tunnel cut in the mountain, a little west of the Airly Turret, down the valley and up the other side to the Torbane Railway station. The rope tramway was clearly a formidable piece of engineering. Details of the engines and drive mechanisms of the tramway are not known. It is thought that the cable tramway became operational towards the end of 1897, as railway shipment figures for that year are large and all shale for the following year was recorded as having passed through Torbane siding.

As the mine's focus was to meet export orders, which tended to be rather intermittent in nature, large reserve stocks were often built up. This policy of stockpiling gave the company great flexibility in fulfilling the irregular foreign orders while keeping the miners working on a reasonably regular basis.

In September 1900, the miners demanded an eight hour day in line with above-ground workers. This dispute appeared to be settled quickly, however, the resultant changed working conditions resulted in a decrease in working hours and an associated cut in wages. Miners’ representatives requested an increase in rates but the board of AKO&M would have

no part of it and this resulted in at least a quarter of the work force leaving the site. A new rate was finally negotiated in mid-November and work resumed. Towards the end of 1902, declining profits from the Genowlan mine led to a further reduction in the wages of shale cleaners and miners. Shortly thereafter, operations ceased and AKO&M gave up further attempts to extend their lease.

The Australian Shale Syndicate took up additional property on the southern side of the Genowlan leases towards the boundary of New Hartley in April 1907. Some exploratory work was done in an adit which became known as Dogtrap Tunnel in mid 1908. It is unclear whether or not this was a new lease or part of the existing Genowlan complex and no information is available to date on this tunnel.

King's Mine

This mine on Airly Mountain was named after its lease holder, Frances William King, who took up the original Nicholson and Larkin lease which had expired in 1883. The lease holder, along with his brother, Mr R.J. King, developed the Airly shale mine to produce a moderate output of export shale. Little is known of these activities, which continued until at least the early part of 1896. Between April and September 1896, the mine was leased for an indefinite period to NSW Shale and Oil Company.

The New Hartley Shale Mine

At Hartley Vale, the shale mines operated by the NSW Shale & Oil Company were running towards the end of their useful lives and the Airly seam appeared to offer good quality export shale which retorted at an average yield of 52 gallons to the ton. The retorting shale at Airly, however, was significantly different from that at Hartley Vale, as it held a much greater concentration of extractable nitrogen suitable for the manufacture of fertiliser. The Airly shale also required more prolonged heating during the retorting process; consequently, a new retort design was required.

When NSW S&O took over the Airly lease in 1896, they renamed it the New Hartley Shale Mine. Access was an acknowledged problem at the time of purchase and the manager, William Hall, assessed a new movement route for raw material at the site. Hall proposed to move the shale to the proposed Torbane retorting works by a light railway which passed through a tunnel in the narrow central section of Airly Mountain. At Torbane, the shale and crude products would be transhipped to the standard gauge line, which ran to the newly created Torbane Station on the Government railway. The haulage skipway from the mine to Torbane was completed in 1898 and the standard gauge railway branch line to Torbane Railway Station completed in 1900. A telephone line was added to assist management in coordinating the activities of the company.

Mining at New Hartley was suspended in the early months of 1900 pending completion of the oil shale retorts and Torbane and extension of the rail connection. When miners returned to work in September 1900 an industrial dispute rapidly developed over the issue of weighing shale produced. This dispute closed the operation until 29 October after proceedings were brought against the company under Section 28 of the Coal Mines Regulation Act.

The Torbane retorts provided a steady minimum demand for shale but the peak work force of 80 miners was sometimes on half time only and occasionally ran down to as few as twenty men. However, a contract with the Australian Gas-Light Company guaranteed a minimum throughput. Coal found with the shale seam was not exploited commercially.

Poor export demand and good reserves led to a progressive shut-down of the mine in mid 1902 and only a small work force was retained. The miners declared this to be a lockout and went on strike. They held out for 21 weeks, receiving only minimal strike pay raised from union reserves and a 5% levee from the Genowlan miners and some outside donations. The shale stocks were depleted and the directors agreed to the pay demands of the miners,

allowing work to recommence. Between 1904 and 1907, the miners' wages were restricted and, from 1905 to 1907, intermittent strikes occurred. By 1907, the miners' case was stronger, as shale prices were high. A demand for a 25% pay rise was rejected by management and the subsequent strike was long and bitter. In February 1908, a few non-unionists commenced working, under continuous police guard to dodge the angry picket line. The dispute was finally settled in a special Arbitration Court convened at Torbane on May 16th 1908. The new mining agreement was for a three year period and was honoured by both parties. After this period, Federal industrial legislation came into existence and there were no industrial stoppages at Torbane after May 1908.

When the mines at Newnes entered full scale production in approximately 1908, the quantity of shale exported from Torbane dropped to a mere trickle. In June 1912, the Commonwealth Oil Corporation announced it was closing the New Hartley Pit, as the supply of shale from the mine was showing signs of rapid decline as the seam approached exhaustion. After closure of the pit, there was only some sorting of surface heaps to meet Government orders for gas-making shale. This was consumed by various railway workshops including Eveleigh and Newcastle. Commonwealth Oil Corporation went into liquidation in 1913 and its interest in Genowlan mines was purchased by Commonwealth Oil Federation. The mines continued working on an intermittent basis until August 1918 when a formal notice of discontinuance was provided to the Department of Mines. In 1930, the Airly-Torbane haulage system was dismantled by Albert Lamb and the adits in the Genowlan Valley had their portals "blown down" to prevent access to the underground workings.

In the 1940's, some prospecting took place within the Tramway Tunnel near the crest of Airly Ridge. A short length of wooden-railed tramway was laid along the tunnel floor so that the spoil could be dumped over the cliffs at the portal. However, no further mining was commenced.

The Torbane Retort Complex

The Torbane site was chosen for the retorts because it was a relatively flat area which was located between the mine site and the proposed rail siding on the main Wallerawang-Mudgee Line. This was significant as it allowed the crude oil and benzene to be transported from the retorts to the Hartley Vale refinery. Once the location had been confirmed, the construction of the transport link was commenced immediately and completed by 1900.

This transport link involved the construction of a single-track railway from the Torbane retorts to Torbane siding, a distance of 1 mile and sixty eight chains. From Torbane siding, the track curved over an embankment to the north-east, traversing the gentle lower slopes of the Airly Creek valley. After passing through a cutting excavated to a maximum depth of 15m in the clay shale, the track crossed the embankment which supported two 400 gallon square shaped ship's tanks which supplied water to the Company's locomotive. A small steam driven pump was mounted at the base of the tank structure to elevate water from the dam to the tanks. From here the track ran in a northerly direction into the retort complex where it terminated beneath an elevated staith devoted to the loading of export shale.

During 1899, the land was cleared and the first dwellings erected for employees. However, no further work took place until a contract was signed with the Australian Gas Light Company at the end of the year. From January 1900, large quantities of bricks were burnt at Torbane to supplement the supply from NSW S&O kilns at Hartley Vale. Construction of the industrial plant and the immediately adjacent township of Torbane proceeded simultaneously. The Torbane retorts were built in a single bench, twenty units long by two wide. Construction of the brickworks was well advanced by the time the principal castings arrived in July 1900. The retorts were first fired on 16th November, 1900 and oil was dispatched to Hartley Vale a fortnight later.

The Torbane plant was purchased by Commonwealth Oil Corporation (COC) in April, 1906. Operations continued throughout 1906 and 1907 but ceased during the New Hartley miners strike of 1908. COC also had a financial interest in the untapped shale deposits at Newnes in the nearby Wolgan Valley, where mining was due to begin. Purchase of the Torbane complex provided the opportunity for low-cost testing of new technology and making any necessary modifications to the equipment prior to installation at Newnes. The Torbane retorts were expanded to incorporate a half-bench of Scottish Pumpherston retorts alongside the existing improved Hall and Palmer Units. All other plant was modified to the standards planned for Newnes. Overall improvements cost $30,000, which was nearly as much as the purchase of the Torbane works but a mere 2.75% of the estimated profits from Newnes.

The selection of the Scottish retorts was significant for three reasons:

- It was the first importation of plant since the English retort bodies had been purchased for Joadja almost 30 years earlier.
- The bench was the first in NSW to be intentionally and exclusively heated by combustion from its own waste gases.
- The combustion of permanent gas eliminated all industrial use of solid fuel.

The plans were drawn up by Mr David Sutherland, who had an international reputation and a sound background in the Scottish shale oil industry. The architecture and design for both the extensions at Torbane and the Newnes Complex are virtually identical to that of Scottish Shale plants.

Extensions to the Torbane works were completed in 1907. The retorts required approximately 350,000 ordinary and 150,000 fire bricks. The total output of crude oil increased to 140,000 gallons per month and the quantities of ammonia and benzene also increased proportionally. Each retort bench had its own ammonia and benzene scrubbing towers. The crude oil and benzene were both dispatched in tank wagons to the Hartley Vale refinery and the ammonia went to the manufacturers of anhydrous ammonia for the refrigeration industry.

Following an accident in which a tanker of crude benzene caught fire and exploded upon arrival at Hartley Vale, it was decided to build a separate benzene refining plant at Torbane. This was built to the east of the main engine house and became operative in 1909. Other additions to the complex in 1909 included an engine shed and workshops at the end of the siding near the site of the export shale exchange and the installation of an acetylene-gas generating plant for lighting the retorts.

By 1913, it had become clear that the supply of shale from New Hartley Mine was coming to an end. In June 1913, the receivers and managers of COC decided to close the plant and cease trading. The Torbane retorts were shut down on 3rd June 1913. Salvageable items were removed to Newnes. Railway records indicate that, by April 1920, the various company houses were being dismantled and their components sent to Newnes for re-erection. Further dismantling of the plant occurred in 1925-26, when a large quantity of fire bricks and other material were loaded into the company's "Dreadnought" bogie high-sided wagons and sent to the oil refinery near Duck Creek at Clyde. By 1930, dismantling activities at the retorts had been completed, including removal of the rails from the Torbane private railway.

In 1924, a Victorian firm known as the Torquay Anglesea Company was formed and a plant based on a Schultz Retort was erected at Torbane siding. Shale was conveyed from the Airly site to the retort by tramway. Work on this project did not continue for long and the plant was subsequently stripped and sold.

In July 1925 an aerial ropeway was constructed from Torbane siding to the coal mines at New Hartley. A large loading staith was erected to the north of Torbane Station, where the coal was graded for size and quality. In December 1926, the project was purchased by the

"Renown" Company, however in the following year, production ceased and the ropeways were demolished.

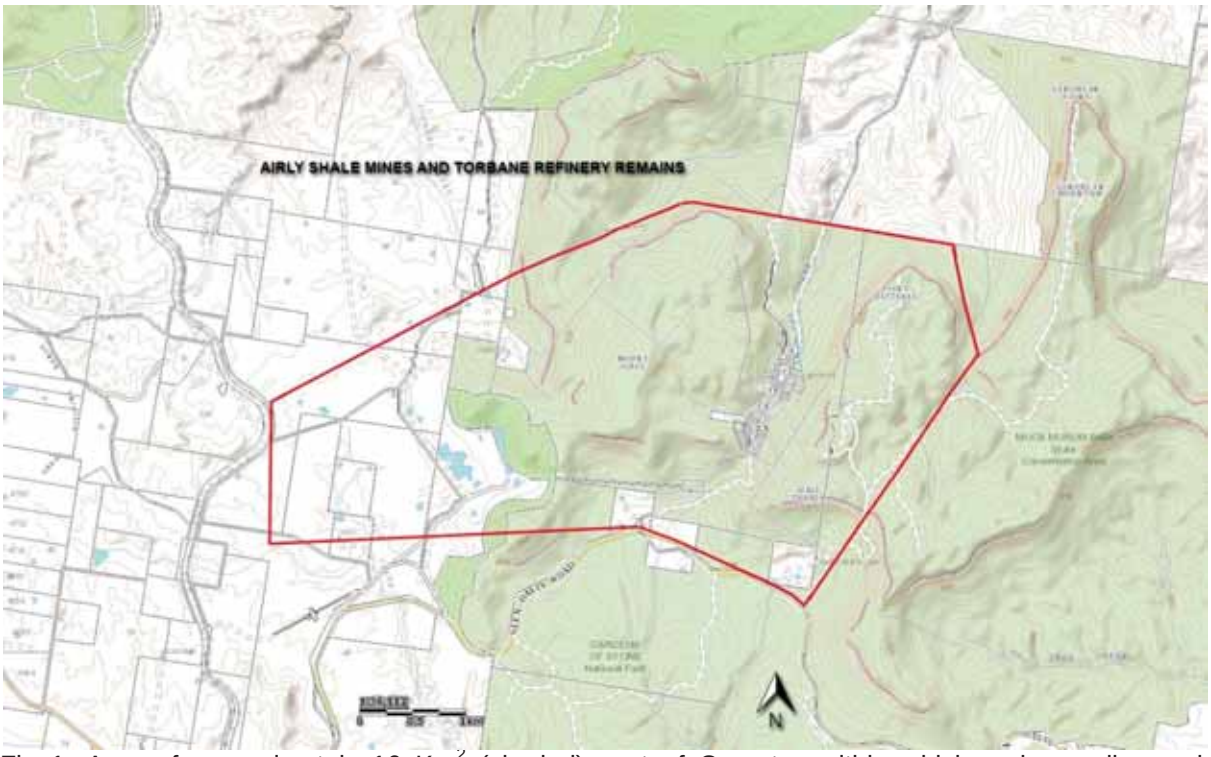

Fig 1. Area of approximately 16 Km^2 (shaded) east of Capertee within which various relics and evidence of the Airly Shale Mines occurs.

Fig 2: Aerial Photograph of the area east of Capertee (shaded) within which various relics and evidence of the Airly Shale Mines occurs

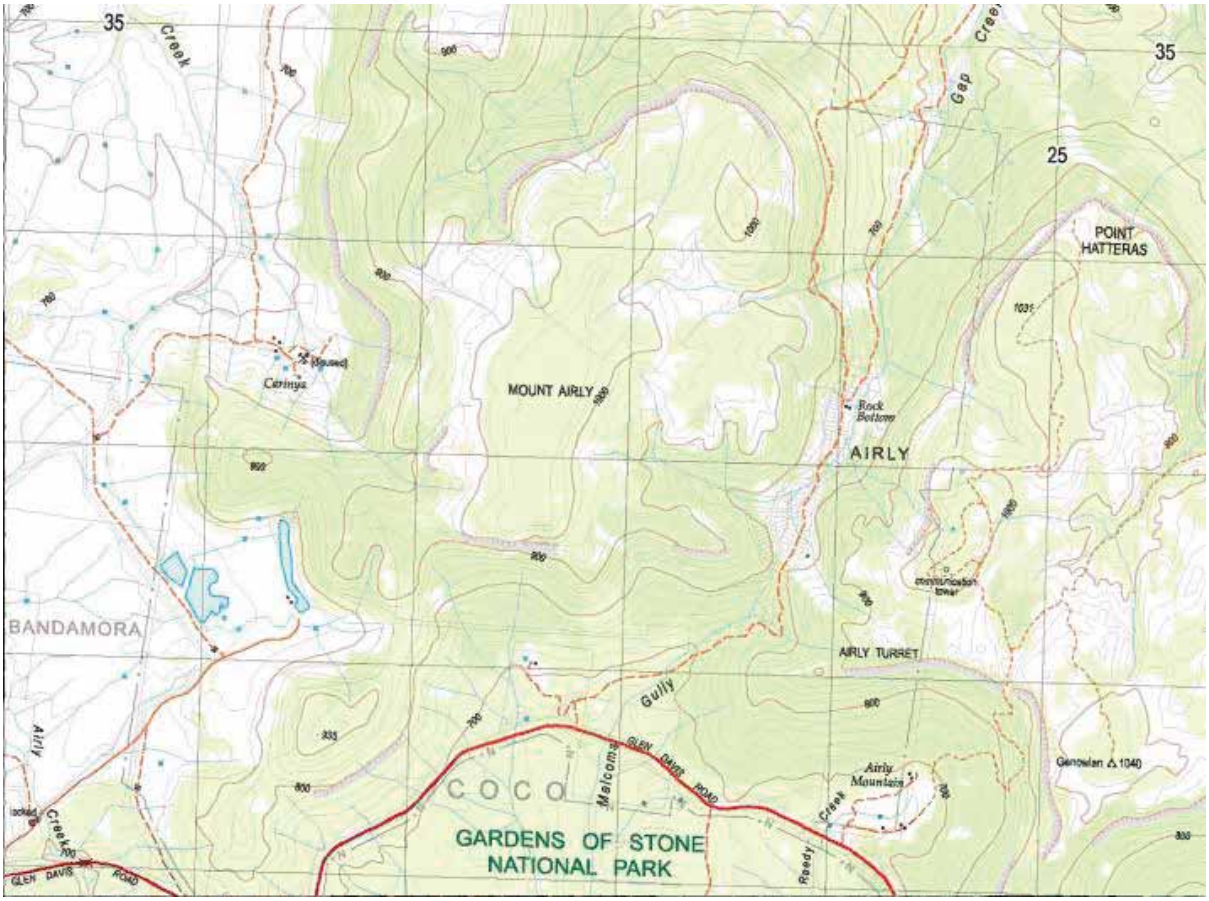

Fig 3: Extract from Topographic Map Glen Alice 89314N showing the area east of Capertee associated with the shale Mines at Airly. The '*Carinya*' Homestead at the centre left occupies the site of the former Torbane Refinery

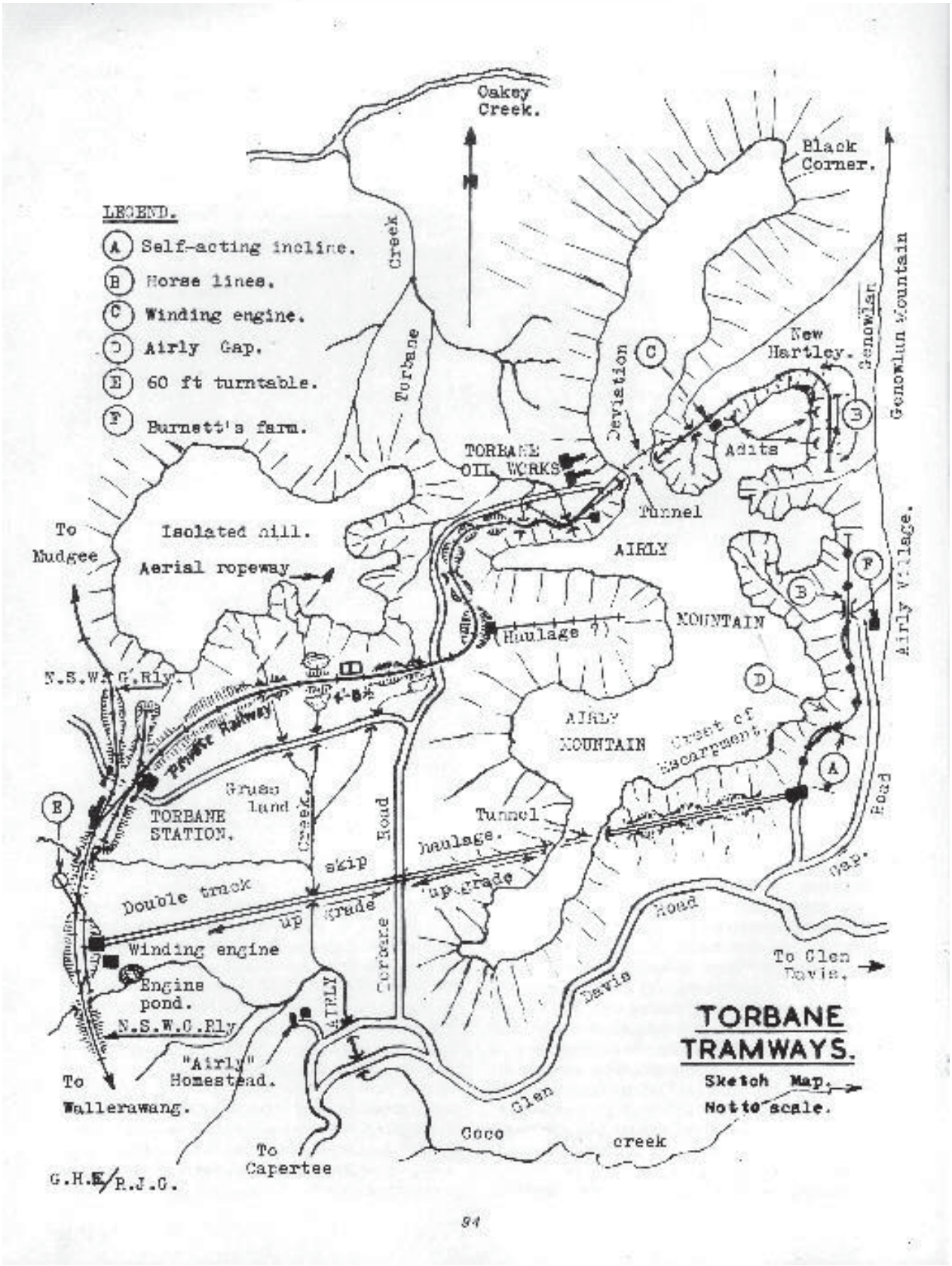

Fig 4: Map of the Torbane Tramways, from: EARDLEY, Gifford H. & STEPHENS, E. M; *The Shale Railways of New South Wales;* Australian Railways Historical Society; 1974.

Fig 5: Location of sites recorded in the survey

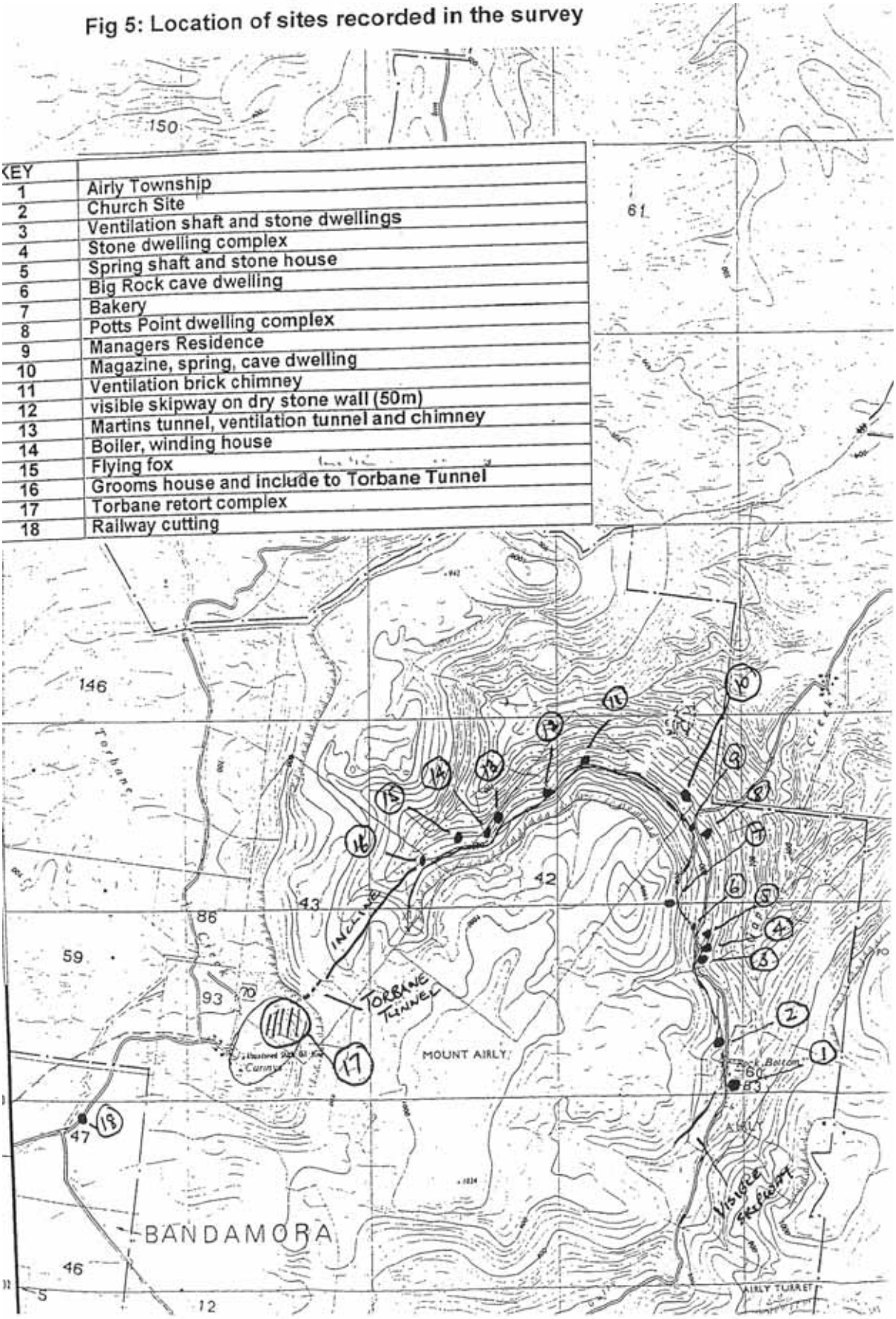

Fig 5: Map of Sites recorded by Robynne Mills (1998), from: Mills, R; *A Preliminary Heritage assessment of Airly Shale Oil Mining Complex*; Report for IEC; 1998

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Mills, R; *A Preliminary Heritage assessment of Airly Shale Oil Mining Complex*; Report for IEC; 1998

BOUNDARY OF LISTING:

The various relics, sites and remnant landscapes associated with the shale mines in the vicinity of Airly are scattered across a wide area (approximately 16 Km^2) east of Capertee (see approximate area in Figures 1 & 2 above). This listing is not of a discrete area of land but of the evidence of the shale mines where it occurs within this overall area. Parts of the land encompassed within this area are privately owned and permission must be sought from the owners prior to any attempt to visit the site.

Appendix 1 - Airly Shale Mines and Torbane Refinery Remains – Land Title Details

Part Lot 2		DP 577478
Lot 3		DP 577478
Part Lot 22		DP 650039
Lot 9		DP 655050
Part Lots 158/159		DP 722293
Lot 11		DP 755757
Lots 33/34		DP 755757
Part Lots 42/43		DP 755757
Part Lot 59		DP 755757
Lot 60		DP 755757
Lot 70		DP 755757
Lot 78/83		DP 755757
Part Lot 86		DP 755757
Lot 87		DP 755757
Lot 89/91		DP 755757
Part Lot 93		DP 755757
Lots 94/110		DP 755757
Lot 112/121		DP 755757
Lot 123/126		DP 755757
Lot 139		DP 755757
Part Lot 8		DP 755758
Part Lots 45/47		DP 755758
Part Lot 55		DP 755758
Lots 1/10	Section 1	DP 758011
Lots 1/6	Section 2	DP 758011
Lots 15/17	Section 2	DP 758011
Lots 1/9	Section 3	DP 758011
Lot 5		DP 986083
Lot 7020		DP 1029319
Lot 7025/7026		DP 1050399
Lot 7022/7024		DP 1050402
Lot 7021		DP 1050431
Lot 7019		DP 1050747
Lot 7018		DP 1051447
Lot 7001		DP 1057060
Lot 7013		DP 1057515
Part Lot 7014		DP 1057712
Lot 7015		DP 1057714
Part Lot 7002		DP 1058210
Part Lot 7016		DP 1114802
Lots 7033/7034		DP 1116073
Part Lot 7031		DP 1116097
Lot 7032		DP 1116097
Part Lots 7035/7036		DP 1117631
Lot 7038		DP 1117632
Lot 7037		DP 1117633
Lot 10		DP 1118781
Lots 7/14		DP 1118784
Lot 18/24		DP 1118800
Lots 12/15		DP 1118801
Lot 7300		DP 1130282
Lot 7303/7304		DP 1130566
Part Lots 1/2		DP 1152312
Lot 1		DP 1190721
Lot 1688		DP 1191655

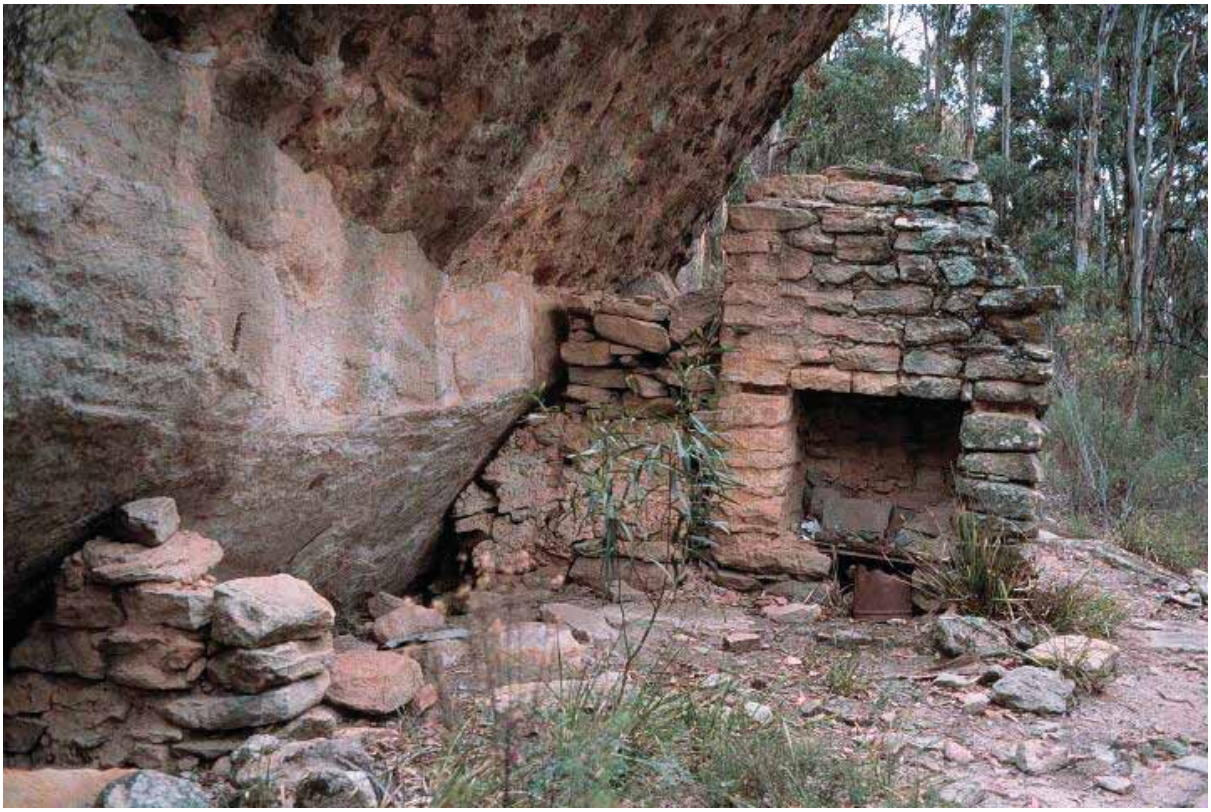

Figure 6: Remains of a Miners Hut under a cliff overhang at Airly Gap (Source: Ayling, B op cit)

Figure 7: Remains of the Mine Managers House at Airly Gap (Source: Ayling, B op cit)

Figure 8: Egg-end boiler associated with the Cable tramway haulage system (Source: Ayling, B op cit)

Figure 9: Remains of the Torbane Refinery and transport terminal. The Works Managers House at centre is now privately owned and occupied. (Source: Ayling, B op cit)

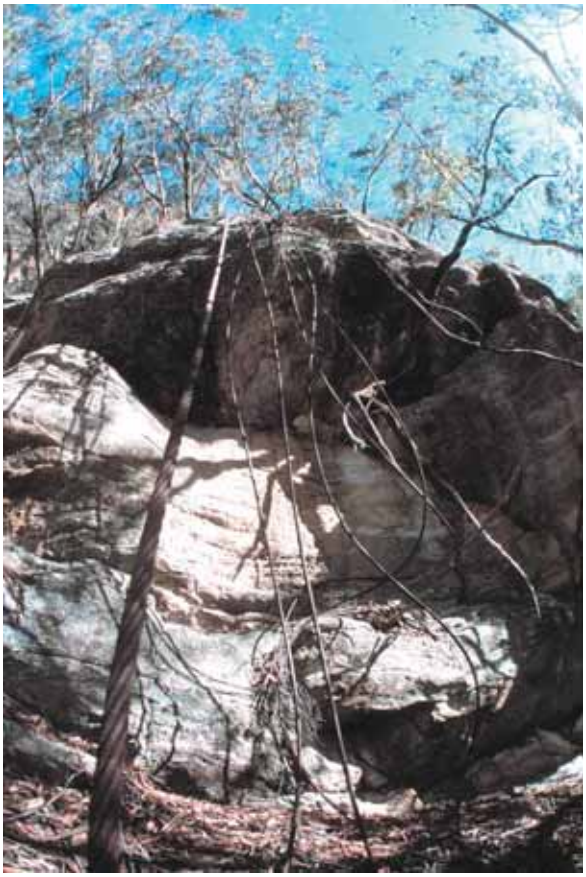

Figure 10: Remains of a Haulage Cables (Source: Ayling, B op cit)

Figure 11: Mine Ventilation Chimney (Source: Ayling, B op cit)

Figures 12 & 13: An abandoned skip (left) and overgrown winding drum (right) (Source: Ayling, B op cit)

GROUNDWATER SOLUTIONS INTERNATIONAL

115 Tasman Street, Mt Cook,

Wellington 6021

NEW ZEALAND

29 October 2014

NSW Government

Department of Planning & Environment

Dear Sir/Madam,

Reference Number: SSD 12-5581

Title: Centennial Airly Pty Ltd Airly Mine Extension Project, Environmental Impact Statement (EIS)

I am an Independent Contract Hydrogeologist operating as a sole trader under the name Groundwater Solutions International, New Zealand.

I have worked as a Hydrogeologist and Geologist in the environmental and mining sectors, both in government and private consultant practices, in New Zealand and Australia since 1989.

Since 2006 I have been contracted by NSW community groups as an Independent Reviewer of groundwater impacts of mining and CSG operations on the environment. I remain an active interested party with respect to any hydrogeological investigations, and other relevant scientific studies, undertaken in New South Wales, Australia.

Please find attached my submission for the Airly Mine Extension Project.

Yours sincerely

Andrea Broughton

Independent Hydrogeologist

Groundwater Solutions International

Executive Summary

The purpose of this review is to highlight any concerns that have arisen from the groundwater technical documents that require further consideration. The concerns are as follows:

1. A Peer Review of the Hydrogeological Model has not been published in the Environmental Impact Statement, Groundwater Impact Assessment or the Hydrogeological Model Report. This is required in accordance with the Australian Groundwater Modelling Guidelines. As part of the Director General's Requirements the Peer Review is required for assessment by the Independent Expert Scientific Committee (IESC) under the federal *Environment Protection and Biodiversity Act 1999* (IESC, 2013).

2. The Groundwater Monitoring Network does not represent all the areas of interest in the Coal Mine project area. The nine bores used are not adequate to fulfill the data requirements for the Groundwater Model for the whole model domain. The proposed new monitoring bores for Authorisation 232 should have been completed and used as part of this Environmental Impact Assessment, including two years of monitoring data.

3. Overall the Environmental Impact Assessment was light on data supporting conclusions made by GHD.

4. Mine dewatering and subsidence may alter the hydraulic ability of the local groundwater system to transmit groundwater.

5. Reduced baseflow recharge to the Quaternary alluvium, and Creeks, directly overlying and recharging the shallow Shoalhaven and Devonian Formation aquifers is of great concern to groundwater users.

6. If Centennial Airly bought an 'Additional Entitlement' WAL 36565 for 120 ML/year from the Sydney North Basin from another catchment, then how can this be reconciled with the lack of water availability in the Capertee Catchment? The source for this allocation has not been published.

7. Once the mine reaches its peak requirements of 199 ML/year and is recycling 80% of this produced water there will be no need to have a 278 ML/year groundwater allocation.

Given the above concerns the author does not consider the groundwater model is robust enough to provide data, assumptions and conclusions for surface water and subsidence modelling at this point.

1.0 Introduction

The Centennial Airly Coal Mine is an existing underground coal mine located in the Central West of New South Wales, east of the Blue Mountains Dividing Range and approximately 40km north-west of Lithgow. The Centennial Airly Mine Extension Project covers an area defined by Mining Lease ML1331 (2,774 ha) and Authorisation A232 (3,096 ha) and is located in the Mugii Murum Ban State Conservation Area. The underground coal mine is currently operating under Airly Mountain with intentions to extend under Mt Genowlan, both mesas in the Capertee Valley.

The proposed mining area contains 10% of Australia's biodiversity including rare flora, fauna and geological features (e.g. platey pagodas). The mining area is adjacent to the Gardens of Stone National Park to the south. The Genowlan Creek flows through the Capertee Valley providing water to the Wollemi World Heritage Area to the north.

The Centennial Airly Coal Mine: Environmental Impact Assessment, prepared by Golders Pty Ltd, is supported by the following groundwater assessment reports:

- GHD (July 2014) Airly Mine Extension Project: Groundwater Impact Assessment, Centennial Airly Pty Limited (Golders Environmental Impact Assessment: Appendix E)

- GHD (July 2014) Airly Mine Extension Project Hydrogeological Model Report, Centennial Airly Pty Limited (GHD Groundwater Impact Assessment: Appendix B).

The purpose of this review is to highlight any concerns that have arisen from the groundwater technical documents that require further consideration.

2.0 Background

Centennial Airly have submitted an Environmental Impact Statement as part of obtaining approval for the extension of their Airly Mine into Authorisation A232 under Mt Genowlan. The Airly Mine Extension Project will continue to extract up to 1.8 Mtpa of ROM coal from the Lithgow seam underlying the Project Application Area, extend the life of mine by 25 years from the date of consent, extract coal using partial extraction methods with the mining lease (ML1331) and extend the mining area to the east of the existing workings into Authorisation 232 (A232) area.

Any activity which intercepts and potentially removes water from the recharge areas of the upper reaches of a surface water system will impact on the groundwater system, or potentially allows cross contamination of poor water quality from the coal seams, workings and rejected piles, should be scrutinised in light of these potential risks.

Any degradation of the Quaternary shallow alluvial/colluvial unconfined aquifer and the Devonian metamorphic fractured rock aquifer beds may result in significant consequences to these highly valuable water supplies.

3.0 Director Generals Requirements (DGRs)

The groundwater assessments are required to be prepared in accordance with the Director Generals Requirements (DGRs) and additionally in accordance with the following requirements and guidelines:

- NSW Office of Water (NOW) Environmental Assessment Requirements Airly Mine Extension Project (SSD 5581)
- Independent Expert Scientific Committee's *Information Guidelines for Proposals Relating to the Development of Coal Seam Gas and Large Coal Mines where there is a Significant Impact on Water Resources,* Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, April 2014.

The Groundwater Impact Assessment was undertaken based on the requirements for assessment by the Independent Expert Scientific Committee (IESC) under the federal *Environment Protection and Biodiversity Act 1999* (IESC, 2013).

The following have not been supplied in the EIS documentation:

1. Detailed monitoring **bore completion logs and geological logs.**
2. A **Peer Review** of the Groundwater Model in accordance with the Australian Groundwater Modelling Guidelines.

4.0 Groundwater Monitoring Bore Network

Monitoring bores provide the critical data required to formulate conceptual hydrogeological models. They provide the opportunity to test individual aquifers to determine aquifer hydraulic properties and the inter-relationships between the hydrostratigraphic units.

Baseline monitoring data is required by NSW Office of Water to be collected for at least two years to enable Steady State Flow calibration. Five years of monitoring data is required to carry out a Transient State calibration so that long term predictions of aquifer drawdown by mine dewatering and aquifer interference effects can be made.

Centennial Airly started their monitoring bore network in 2012, although they have been operating with a license since 2009. In that time, they have drilled 9 monitoring bores and suggest the bores represent adequate coverage of the groundwater aquifer conditions in the mining lease area. The only data GHD present regarding monitoring bore details is given in Table 4.1 That is depth to geological formation e.g. Narrabeen Sandstone below ground level. GHD also mention approximate depths to groundwater at the time of bore installation.

The bore monitoring network is not considered to be representative of the mining lease extension area. There is not enough detail to form a conceptual hydrogeological model. There was not enough monitoring data (2 years) to calibrate the numerical groundwater model for Steady State Flow.

GHD presented groundwater hydrographs for seven Vibrating Wire Piezometers (VWP monitoring bores). These groundwater hydrographs show no response to rainfall recharge and were not useful in calibrating the transient

groundwater model (see section 7). Given rainfall is the main aquifer recharge mechanism in the local groundwater system the author would expect to see at least a lag time effect from rainfall recharge events. The details of

monitoring bore construction cannot be verified as they have not been included in the groundwater reports. Important details omitted from the groundwater reports include:

- Detailed VWP monitoring bore geological logs.
- VWP monitoring bore completion logs detailing at what interval the Vibrating Wire Piezometers (VWP) are measuring; and whether they were installed as clustered, nested or multilevel VWPs; there is no information on the hydrostratigraphic unit being monitored for groundwater pressure fluctuations. Are the VWPs sufficiently separated using packers or bentonite plugs? At what interval?
- Hydraulic test data (packer and falling head test) collected during drilling.

In addition shallow alluvial monitoring bore information did not include height datum at the piezometer surface; drilling method used; detailed geological logs; screen interval within the alluvial/colluvial aquifer.

The monitoring bore network should also have included monitoring baseflow conditions in the upper catchment tributaries, for Genowlan Creek; and be used to characterise surface water and groundwater connectedness.

The author understands Centennial Airly is drilling an additional 5 monitoring bores to better cover the proposed extension into Authorisation 232. The EIS should have included these bores along with two years of monitoring data.

5.0 Conceptual Groundwater Model

GHD's conceptual hydrogeological model essentially consists of two groundwater systems effectively operating independently of each other – the local and regional groundwater systems, both of which are located within the Sydney Basin North groundwater source.

The local groundwater system is described as: 'predominantly within Quaternary alluvium associated with Gap Creek and Genowlan Creek, weathered and/or fractured sandstone and coal seams that occur within Mt Airly and Genowlan Mountain. They are classified as 'less productive' in accordance with the criteria specified in the NSW Aquifer Interference Policy' and are confined to 'the Project Application Area since their outcrop boundaries occur entirely within this area'.

Monitoring bore groundwater pressure and water level data indicate a downward hydraulic gradient in the local groundwater system. This suggests groundwater flows downwards and seeps out along joints and fractures or directly into the creeks, as observed.

This hydrogeological conceptual model of the local groundwater system does not allow for baseflow in the shallow colluvial deposits and highly weathered sandstone in the **upper reaches** of the Creeks, as seen at the Grotto. GHD acknowledge it occurs but it is not apparent in the building of their Conceptual Hydrogeological Model.

The regional groundwater system is described as: 'occurring within the Shoalhaven Group below the target coal seam, as well as within the underlying Devonian rocks, and extend beyond the Project Applicant Area' where it is considered there would be minimal inter-aquifer hydraulic connection between the Shoalhaven Group and lower Devonian metamorphic formations regional groundwater sources, based on differences in groundwater chemistry.

GHD's Model Boundary Conditions are logical and reasonable. The model assumptions and limitations are noted.

6.0 Numerical Groundwater Model – Steady State Flow

The *Environmental Impact Assessment (EIS)* relies on the outcomes of the *Groundwater Impact Assessment (GIA)*, which in turn relies on the outputs of the *Hydrogeological Model Report (HMR)*.

The Hydrogeological Model forms the basis from which critical decisions are made by Centennial Airly and the NSW Government in determining whether the Airly Coal Mine Extension will impact on the environment.

The outcomes of the Hydrogeological Model are based on the Conceptual and Numerical Hydrogeological Model and the inputs into these models.

Groundwater Model was calibrated for Steady State flow using two years of groundwater pressure and water table data from Centennial Airly's nine monitoring bores, and a sensitivity analysis undertaken. The results were comparable with observed groundwater level data, however, aquifer parameters required a bit of massaging to achieve the calibration targets.

The author does not consider the data obtained from the nine monitoring bores to be sufficiently representative of the proposed extension area in Authorisation 232. GHD have proposed five more monitoring bores will be drilled by the end of 2014, but these should have been included in this Environmental Impact Assessment Groundwater Model, along with two years of monitoring data collected.

GHD have used average rainfall data as input into the groundwater numerical model. The data is from daily rainfall data obtained as SILO Patched Point Data for Bureau of Meteorology (BOM) Ilford (Warragunyah) Station (No. 62031). This BOM station is located 29km north-west of Airly Mine. This station was chosen based on the length and quality of the data record and proximity to the site. Although the station clearly receives rainfall through most of the months, with summer months receiving predominantly more than winter months, the rainfall patterns at Ilford Station are not similar to Mt Airly and Genowlan Mountain. Rainfall in the upper tributaries of the Genowlan Creek is scarce for the majority of the year, punctuated by localised, intense rainfall. The use of Ilford Station rainfall data will impact on the Water Balance calculations and overestimate aquifer recharge. It will also impact on the salt load calculations in the surface water environment. Salt will be more concentrated in the talus 'break of slope' areas and remobilized in baseflow during rainfall in higher concentrations. Using average rainfall from Ilford Station may underestimate the salt load as it will be continually leached back into the surface water at lower concentrations.

7.0 Groundwater Model Predictions

The Steady State model was converted into a Transient State model using annual stress periods and actual rainfall data from 2009 to 2014. Calculated initial groundwater heads from the Steady State model was used. Storage parameters, hydraulic conductivity values and net recharge coefficient were varied to try and simulate groundwater levels in shallow alluvial bore APR05. The range of groundwater levels reported over time in APR05 were achieved, but not in the timeframe expected. There should have been a more rapid response in groundwater levels to rainfall. This indicated the alluvium should have a higher hydraulic conductivity. GHD may not have an appropriate

conceptual model of the shallow groundwater system. GHD intend to refine the transient model. However the model was run using the lowest hydraulic conductivity value for the alluvium from the steady state flow calibration.

This is a conservative approach. The model predicted no groundwater flow into the mine workings over this period which GHD say was consistent with observations.

Potential changes in baseflow were assessed from 11 locations throughout the model domain to determine whether any baseflow reductions occurred at the model boundary and at the confluence of Gap and Genowlan Creeks. No assessment locations were used in the upper tributaries of the model domain. Predicted changes in baseflow and groundwater drawdown as a result of proposed mining operations is so sensitive to hydraulic conductivity values assigned to both the alluvium and Permian strata. However, there is little real data used to calibrate the transient model and to check on the model predictions.

8.0 Groundwater Model Peer Review

The groundwater numerical model was not independently Peer Reviewed in accordance with the Australian Groundwater Modelling Guidelines. I understand this was requested by Capertee Valley Alliance (CVA) at the Planning Assessment Commission (PAC) meeting on 30 September 2014. The independent Peer Review has not been exhibited on the Department of Planning & Infrastructure website and is not included in Centennial Airly's Environment Impact Assessment and supporting documents. Given the independent Peer Review is an important process for determining whether a Groundwater Model is realistic and working, this is a critical omission. The author would like the opportunity to address the independent Peer Review and be able to make further submissions in light of its contents, as a matter of procedural fairness.

9.0 Domestic, Stock and Irrigation Groundwater Users

Dewatering and subsidence, due to Airly Coal Mine operations, may alter the hydraulic ability of the local groundwater system to transmit groundwater to the talus slope colluvium flanking Mt Airly and Genowlan Mountain. This may result in reduced baseflow recharge to the Quaternary alluvium and to Gap Creek, Genowlan Creek and Emu Creeks. Reduced recharge to the Quaternary alluvium directly overlying and recharging the shallow aquifers in the Shoalhaven and Devonian Formation (Regional Aquifers), and the lack of baseflow recharging the creeks, is of great concern.

The regional aquifers are directly overlain by the Quaternary alluvial sediments along Gap Creek, Genowlan Creek and Emu Creek. If the hydraulic gradient is downwards, that is, if the overlying alluvial aquifers are able to locally recharge the underlying regional aquifer system, then there is a possibility the bores in the catchment may be affected.

GHD have not collected enough monitoring data and have not adequately set up the groundwater model to determine how realistic this scenario may be. This is a serious omission on GHDs behalf.

10.0 Centennial Airly Coal Mine Water Allocations

GHD state 'extraction and interception from the Sydney Basin North groundwater source over the life of The Project (proposed conditions) is predicted to peak at 199 ML/year (90th percentile)'.

Since the beginning of the *Water Sharing Plan* for the *Greater Metropolitan Region Groundwater Sources* in 2011 Centennial Airly have two groundwater licenses:

- Production Bore WAL 24386 for 158 ML/year at a maximum rate of 5 L/s. This allocation comes from the Sydney North Basin and is from the Shoalhaven aquifer system in the Airly Creek Catchment. It is used for mining operations.

- 'Additional Entitlement' WAL 36565 for 120 ML/year. This allocation comes from the Sydney North Basin following a 'controlled allocation order'. This author is not sure what this means, however, has been led to believe that this allocation has not come from buying a license in the Capertee Catchment. The source for this allocation has not been published. The use for this water is to cover any groundwater that is intercepted during coal mine workings.

If the 'additional entitlement' WAL 36565 was bought from another catchment how can that be reconciled with the lack of water availability in the Capertee Catchment? Given 80% of the mine water will be recycled then why would 278 ML be required each year? Surely once the mine reached its peak requirements from recycling 80% then the groundwater allocation from the Water Sharing Plan for the mine works could be ramped down?

11.0 Conclusions

Overall this Environmental Impact Assessment lacks quality data that spatially represents the Project Area. The lack of data, including bore logs, aquifer tests and bore completion logs, is a concern when calibrating the groundwater model for steady state flow.

The author is concerned the shallow groundwater system has not been effectively conceptualised and therefore not represented appropriately in the groundwater model.

Mine dewatering and subsidence may alter the hydraulic ability of the local groundwater system to transmit groundwater to the talus slope colluvium, as baseflow, flanking Mt Airly and Genowlan Mountain.

Reduced baseflow recharge to the Quaternary alluvium, and Creeks, directly overlying and recharging the shallow Shoalhaven and Devonian Formation aquifers is of great concern to groundwater users.

Furthermore since the Groundwater Model has not been independently Peer Reviewed by expert modelers, the author is wary of how sensitive this model is to hydraulic conductivity inputs.

The transient model is not 'fit for purpose' to predict baseflow reduction and groundwater drawdown over long periods of time due to groundwater dewatering from mine activities. There is not enough quality data to input to the transient model and the use of Ilford Station rainfall data may not be representative of the Project Area.

Could the Ilford Station rainfall data not be checked against local property rainfall records just to get some verification?

The proposed five groundwater monitoring bores should have been completed at the same time as the APR 01-APR09 to provide a complete data set to assess groundwater conditions in the extension area. The Environmental Impact Assessment should have included them, with two years of monitoring data. This was a great oversight.

Centennial Airly bought an 'Additional Entitlement' WAL 36565 for 120 ML/year from the Sydney North Basin following a 'controlled allocation order'. This author has been led to believe that this allocation has not come from buying a license in the Capertee Catchment. The source for this allocation has not been published.

If the 'additional entitlement' WAL 36565 was bought from another catchment how can that be reconciled with the lack of water availability in the Capertee Catchment?

Once the mine reaches its peak requirements of 199 ML/year and is recycling 80% of this produced water will NSW Office of Water seek to reduce this groundwater allocation?

This submission has been prepared solely for the purpose of commenting on the following reports:

GHD (July 2014) Airly Mine Extension Project: Groundwater Impact Assessment, Centennial Airly Pty Limited (Appendix E of the Golders Pty Ltd Environmental Impact Assessment 2014); and

GHD (July 2014) Airly Mine Extension Project: Hydrogeological Model Report, Centennial Airly Pty Limited (Appendix B of GHD Groundwater Impact Assessment 2014).

Neither this report nor its contents may be referred to or quoted in any statement, study, report, application, prospectus, loan, other agreement or document, without the express approval of Andrea Broughton, Groundwater Solutions International.

Disclaimer

The information contained in this desktop review is based on the contents of *Airly Mine Extension Project: Groundwater Impact Assessment (GHD, July 2014)* which forms Appendix E of the *Airly Mine Extension Project Environmental Impact Assessment (EIA), Golders Pty Ltd*; and *Airly Mine Extension Project: Hydrogeological Model Report (GHD, July 2014)* which forms Appendix B of the *Airly Mine Extension Project: Groundwater Impact Assessment (GHD, July 2014)* and my own professional experience. I accept no responsibility for the results of actions taken as a result of information contained herein and any damage or loss, howsoever caused, suffered by any individual or corporation.

The findings and opinions in this report are based on a desk top review undertaken by myself, Andrea Broughton, Independent Hydrogeologist, Groundwater Solutions International (BSc (Hons) Geology, MAppSci Hydrogeology and Groundwater Management).

30 October 2014

NSW Government
Department of Planning & Environment

Dear Sir/Madam,

Submission to Airly Mine Extension Project

I am an independent environmental scientist working as an Environmental Lecturer at University of Western Sydney. One of my research interests is freshwater pollution ecology and a second is the regulation of water pollution. This current proposal is of practical interest to me on both fronts and I will be watching this case with great interest.

Please find my attached submission to the proposed Airly mine extension.

Yours sincerely

Dr Ian A Wright
Lecturer (Environmental Science)
University of Western Sydney

Personal submission on the proposed Airly Mine Extension Project

Dr Ian A Wright (Environmental Science Lecturer, University of Western Sydney)

30 October 2014

I am an environmental scientist, educator and researcher and have worked as an environmental scientist with industry for more than 25 years. My qualifications include a Master of Science and a PhD degree. I am an advocate for sustainable water and catchment management and I strongly support multi-disciplinary projects. I seek to manage industry problems with evidence-based science. My scientific expertise covers many fields: freshwater ecology, water chemistry, pollution ecology of waters, freshwater macroinvertebrates as pollution indicators, impact of urban development, sewage effluent, agricultural, and mine waste impacts on streams and rivers. The greater majority of my research has been conducted on waterways, or topics, in the Hawkesbury-Nepean catchment and Sydney basin. I have expertise in the sampling design of environmental science studies and statistical analysis of environmental data. I have published (as senior or junior co-author) 39 peer-reviewed scientific publications. My research and industry experience has led to requests for my participation in voluntary reviews of research manuscripts for academic journals. I have also provided independent expert testimonies for environmental science matters for the NSW Land & Environment Court.

Summary

The surface water assessment documents provided for the Airly Mine Extension Project clearly highlight the importance of water pollution as a major environmental issue associated with the current mining activities and the proposed mine extension. The current coal mining operation is generating waste water that is highly saline and is also enriched with ecologically hazardous concentrations of metals and nutrients. The EIS documentation indicates that larger volumes of waste water are likely to be discharged to local waterways from three discharge points as part of the extended mine operation. The waterway currently receiving mine waste water (Airly Creek) from the current mine operation is a highly polluted waterway with degraded ecosystem health. The cause of this pollution is unclear, but is at least partly due to the current and previous mining activities. The EIS documents propose the use of '*site specific trigger values*' that in my opinion are inappropriate and seek to legitimise ongoing water pollution from the current mining operation to the expanded mine operation. The existing EPA licence held by the mine for discharge of contaminated mine water currently applies no effective limits for pollutants identified in the surface water assessment. Although the EIS documentation identifies the presence of many water quality pollutants at ecologically hazardous (and probably toxic)

concentrations in the current and expanded mine waste water, there are no discharge limits on these pollutants (e.g. salinity, nitrogen, phosphorous, ammonia, turbidity, zinc, nickel) in the EPA waste discharge licence (EPL #12374). In my opinion, the expanded mine operation appears likely to continue to generate environmentally damaging waste water that will be unregulated with an ineffective EPA environmental protection licence. Inadequate information is also presented on the likely adverse impacts on such water pollution to downstream waterways in the Hawkesbury-Nepean catchment and local and regional water users (agriculture, human recreation, conservation and biodiversity). Potential adverse impacts on Greater Blue Mountains World Heritage area streams and rivers from the current, or future extended, mine operation is a serious omission from this EIS documentation.

Site Specific Trigger Values

A major shortcoming of the '*Airly Mine Surface Water Impact Assessment*' (July 2014 documents) are the 'Site Specific Trigger Vales' that have been calculated and are presented in Table 1-8. The ANZECC (2000) water quality guidelines is quoted as the source of the methodology used to derive these trigger values. I am very familiar with the ANZECC (2000) methodology recommended for calculation of local water quality guidelines. I have used this methodology, with research colleagues, to derive local guidelines (or trigger values) for the Georges River catchment waterways (Tippler et al., 2012). The ANZECC (2000) methodology for calculating local trigger values (see Chapter 3 of the ANZECC guidelines – section 3.1.4 'Defining a reference condition') relies on the use on non-impacted local waterways. I strongly disagree that the approach used in this documentation is consistent with ANZECC (2000) methodology.

I do not believe that water quality results from Airly Creek can be reasonably used to represent 'reference condition' as this is defined in ANZECC (2000), section 3.1.4. It is my professional experience that Airly Creek ranks as one of the most polluted waterways that I am aware of (from my 25 years of experience as a water scientist in the Hawkesbury-Nepean catchment). It is consistent with a waterway that is highly degraded from coalmine wastes (e.g. Banks et al., 1997; Younger, 2003; Johnson, 2003). The July 2014 Surface Water Impact Assessment used only data from Airly Creek as the source of water quality data on 'reference condition'. In my opinion this is unacceptable and generates misleading information that will downplay the environmental hazards posed by coal mine wastewater to the local and regional environment.

The Surface Water Assessment provided limited and inadequate water quality data on a wider range of regional waterways. However, the Aquatic Ecology and Stygofauna Assessment (Cardno) provided more detailed information on regional water quality and confirmed that Airly Creek had the most degraded water quality and aquatic ecosystem in their survey of local waterways. This report also supports my belief that mining activities are as least partly

responsible for the water pollution in Airly Creek. See the following text extract from the Aquatic Ecology report (Cardno):

'Initial sampling of the aquatic ecosystem indicated that the highest level of biological impairment generally occurred at sites on Airly Creek followed by Torbane Creek. Biological impairment at these sites is likely to be a result of extensive deforestation and use of land in the catchment for agriculture and mining activities.' *(extract of text from section 4.8.3 of the Aquatic Ecology Assessment).*

In my professional experience the water quality data summarised from Airly Creek in Table 1-8 of the Surface Water Assessment represents highly contaminated water. The table below (Table 1) illustrates some examples of water quality variables and also includes 'site specific trigger values' as presented in the EIS documents (Surface Water Assessment). Calculation of 'site specific trigger values' should be based on water quality at 'reference' creeks in the local waterways, away from any coal mining operation. I expect the water quality in Airly Creek is strongly reflective of the current coal mining activities in the area, and thus it appears illogical to me to use highly contaminated water quality to be used as a basis of comparison, to protect local water quality from coal mine water pollution. My concerns are supported by reviewing the ANZECC (2000) text on calculation of site specific trigger values.

Table 1 Comparison of Site Specific Trigger Values nominated in the Airly Mine Surface Water Assessment to the Environmental Protection Licence (EPL 12374) currently used by EPA to regulate water pollution from the discharge of Airly mine wastewater.

	SSTV nominated in Surface Water Impact assessment (Table 4-5)	EPL Licenced Discharge Limits (LDP001; LDP002; LDP003)
pH (pH units)	6.5 – 9.0	6.5 – 9.0
Electrical conductivity (µS/cm)	2998	-
Total Suspended Solids (mg/L)	68	50
Oil & Grease (mg/L)	-	10
Turbidity (NTU)	83	-
Ammonia (mg/L)	0.9	-
Total Nitrogen (mg/L)	1.88	-
Total Phosphorus (mg/L)	0.24	-
Nickel (mg/L)	0.099	-
Zinc (mg/L)	0.072	-
Copper (mg/L)	0.013	-
Arsenic (mg/L)	0.024	-

Environment Protection Licence 12374

A second linked concern is that the proposed expanded mine operation seeks to continue use of the current NSW EPA 'Environment Protection Licence' (EPL) #12374 (see section 4.8.2 of the Surface Water Assessment).

The current Airly mine operation holds an EPA Environment Protection Licence (EPL #12374). The only pollutants that are permitted to be discharged from the Airly Mine (according to EPL 12374) are:

- Oil and Grease (10 milligrams per litre)
- pH (6.5-9 pH)
- Total Suspended Solids (50 milligrams per litre)

See Table 1 which shows a range of water quality attributes (as per the SSTV nominated values) that represent a range of the most serious and environmentally hazardous pollutants in Airly Creek, and in the current and expected mine waste water. These pollutants (salinity and metals in particular) have been linked to coal mine waste water pollution in the Sydney and Blue Mountains area (Belmer et al. 2014; Wright and Graham, 2012; Wright and Burgin, 2009) and internationally (e.g. Banks et al. 1997; Johnson, 2003; Younger, 2004). This table also lists the current EPL 12374 discharge conditions. The disconnection between the pollutants and the EPA licence is obvious and of great concern. This is a major issue that needs to be addressed as part of this proposed development.

I regard the three pollutant discharge limits, currently in EPL 12374, as being inappropriate and ineffective if the true purpose of the EPL is actually to protect the water quality of Airly Creek, and other waterways downstream of the waste discharge as is clearly defined in the guiding legislation: *Protection of the Environment Operations* Act (1997). Section 45 of this legislation covers matters that the EPA needs to consider when issuing an EPL and in my opinion the current EPL #12374 does not reflect S.45 part (c) of POEO Act:

'*the pollution caused or likely to be caused by the carrying out of the activity or work concerned and the likely impact of that pollution on the environment'.*

Having environmentally appropriate discharge conditions for a mine's EPA Environmental Protection Licence is the most important means for regulating the water pollution impacts from this mine and its extended operation. They will 'drive' industry to treat waste water to the level required to discharge to local waterways. Contaminated water is routinely treated by industry to meet stringent EPL conditions.

In my opinion EPL 12374 needs to specify pollutants in contaminated waste water from the coal mine, with discharge limits that conform to the ANZECC (2000) water quality guidelines and protection of downstream water uses and ecosystems. Given the high conservation value of waterways in the downstream Greater Blue Mountains World Heritage Area this should be based on protection of 99% of species (as per Table 3.4.1 of Chapter 3 'Aquatic Ecosystem' in ANZECC, 2000).

The inappropriate use of Environmental Protection Licences (EPL) is a highly controversial issue and is generating increasing community concern (Graham and Wright, 2012). For example, recently the NSW EPA has progressively modified the EPL held by Endeavour Coal (West Cliff Colliery at Appin) from a licence that was very similar to the one currently held for Airly mine (EPL 12373)(Wright, 2011). The West Cliff EPL (EPL 2504) has been modified to include the actual pollutants in the mine waste water that are likely to contribute the environmental damage caused by the mine discharge. This current development assessment is an ideal opportunity for the Minister of Planning to address such an important issue that will have such long-term benefit for the sustainable management of water pollution from this proposed mine expansion. Addressing this issue as part of the current development assessment process is of obvious importance.

A very important statement appears on page 6 of Appendix C 'Airly Mine Surface Water Impact Assessment. This statement explains the potential expected water quality expected to be discharge to waterways of the Airly Creek catchment. The production bore was reported in the Appendix C to have highly elevated salinity (median of 4735 µS/cm); and ecologically hazardous levels of two metals (results for other metals was not available) Nickel (median of 0.29 mg/L) and Zinc (median of 0.251).

'Sites LDP001, production bore and 35 ML Discharge Dam represent the quality of current and future discharges to the Airly Creek catchment.' (page 6 of Appendix C)

This information highlights how the expanded mine operation is likely to generate larger volumes of highly polluted waste water that is likely to worsen the already degraded water quality and ecological health of Airly Creek, and extend the negative impact further downstream.

In my professional opinion, the EPL 12374 for this current mine operation needs to be modified to include at least six additional pollutants (salinity, nitrogen, phosphorus, turbidity, ammonia, zinc and nickel) and impose meaningful limits that actually protect downstream waterways from pollution. The SSTV nominated in the Surface Water are inappropriate for the reasons explained previously.

The current water quality and stream ecology information provide inadequate information to make a detailed and informed assessment about the downstream implications of water pollution

likely to be generated from the extension of the Airly mine operation. The waterways further downstream (in the Colo River catchment) are of extreme environmental significance, and as such the Colo River is listed as a 'Wild River' in NSW and a large part of the area is protected as part of the Greater Blue Mountains World Heritage Area (UNESCO, 2009). Recent research has shown that another mine (Clarence Colliery) is generating damaging water pollution that extends at least 20 km downstream of that mine's discharge into the Greater Blue Mountains World Heritage Area (Belmer *et al.*, 2014). Previous research has shown that mine pollution in the Blue Mountains area can persist for extended periods of time following a mine closure (Wright and Burgin, 2009). I am concerned that this mine may also be causing adverse impacts into conservation areas, including the World heritage Area further downstream. Inadequate data is presented in the EIS to make an informed assessment on this matter.

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Friday 31st October, 2014

Mining and Industry Projects
NSW Department of Planning & Infrastructure
GPO Box 39
Sydney NSW 2001

Dear Sir/Madam,

State Significant Project - Airly Mine Extension (SSD 12_5581)

Position of the Colong Foundation

The Colong Foundation does not have an in principle of objection to this mine extension but there are many matters that are of concern that should be addressed before this project could be approved.

The proposal is also misleading (e.g. cliff protection and mine water discharge standards). Several contributors to this process may have been misled by this EIS. The proposal and its EIS should be withdrawn, revised and resubmitted for public exhibition with its flaws corrected and its confusing elements clarified.

The review of this proposal (SSD 12_5581) should ensure all activities regulated under the existing development consent are reviewed, including in particular the recent modification to extend the 1993 development consent for one year. This extension allows mining in shallow areas under streams where apparently no mining is now proposed (in SSD 12_5581) due to potential stream impacts.

This new SSD proposal reveals precisely why it is inappropriate for a proponent to bring forward a proposal before all the environmental studies are done. The Department of Planning should reissue consent for the 2014-15 extension area now that the studies are done. Future consents for short-term extensions of this nature should contain such a general caveat, i.e. the departmental consent to a mine modification can be immediately varied once the environmental studies are released.

The Colong Foundation seeks consent conditions for this project that will:

- Ensure that the historical New Hartley Oil Shale Mine are defined as sensitive heritage of special significance that must protected from any subsidence movement and impacts;

- ensure that high cliffs (including those at Point Hatteras and Genowlan Point), pagodas, the Grotto and the Valley of the Kings are defined as sensitive heritage of special significance and fully protected from any subsidence movement and impacts;
- allow the angle of draw of 25 degrees to be retained so that the 'environmental protection zone' (for subsidence) in the existing consent is not reduced in width by about 50% as is currently proposed;
- minimise the toxic mine effluent by separating clean runoff from the toxic cocktail of mine water make, bore process water and runoff from the mine site;
- require the proposed coal preparation plant to use chemically polluted water stored on site in the restricted release zone until exhausted before using other water sources;
- given that this proposed project is an allegedly a dry mine, establish a 'restricted release zone' that ensures there is a neutral or beneficial effect on water chemistry and aquatic life (particularly macroinvertebrates) in the waterways of the World Heritage Area and in Capertee National Park;
- chemically treat any toxic mine effluent discharged from the mine to a level that will ensure there is no a neutral or beneficial effect on water chemistry and aquatic life in downstream national parks and the World Heritage Area;
- revise the EPL for this mine so that the key pollutants in mine dischargs that could harm the World Heritage Area downstream are regulated to ensure there is a neutral or beneficial effect on water chemistry and aquatic life;
- as the responsible land owner, assess and adequately rehabilitate the exposed mine waste dumps associated with historical oil shale mining in the head catchment of Torbane Creek to reduce pollution runoff to acceptable levels;
- ensure all arrangements between the mining company and National Parks and Wildlife in relation to Mugii Murrum-ban State Conservation Area regarding surface operations are subject to public comment and review;
- ensure any lands currently owned by Centennial Coal suitable to be transferred to the NPWS are appropriately transferred at a time that is satisfactory to both parties; and
- ensure noise levels emitted from the mine at the Airly Gap area and other important areas of quiet recreation is below background noise level to protect natural quiet.

Mining impact on cliffs and Oil Shale Heritage is unacceptable

The Colong Foundation agrees with the position put forward by the Colo Committee that the cliff falls along 10 per cent of cliffs in the so-called panel and pillar zone and 5 per cent in the cliff line zone are highly inappropriate.

There are two problems with the proposed panel and pillar zone. The void width of 61m producing recovery rates of 67% is too great, as the degree of cliff collapse generated indicates and must be reduced to prevent significant cliff damage in that zone. Secondly, this zone also needs to stand further back from the cliffs in the cliff zone to ease tilts and strains on cliff lines in the adjoining zones. This additional stand back consideration is particularly important for the very high cliffs at Point Hatteras and Genowlan Point where mining should be restricted to first workings.

In relation to standing the panel and pillar zone back from cliffs, the Angle of Draw shown in Figure 32 of Appendix D and Figure 8.5 (page 220) in the main report is shown to be 8 degrees. The width of cliff protection is far less than in the 1993 consent of 140 metres, at approximately 70 metres wide, or half the width. This is unacceptable. Cliff protection must not be reduced as it will expose cliffs to excessive tilts and stains arising from both the interior panel extraction area and the partial pillar extraction zone under the talus slope.

Reducing the angle of draw to 8 degrees will cause avoidable cliff falls resulting in the predicted collapse of 5 per cent of cliffs.

The protection generated by the 25 degree angle of draw is necessary for not only internal and external cliffs but also for the Valley of the Kings and the Grotto, as protected by the initial consent. It is not appropriate for the environmental protection of cliffs in the Valley of the Kings and the Grotto to be reduced in what is now a state conservation area. The angle of draw set the width of the original protection zone for cliffs and this should not be reduced by an argument over what is the true angle of draw.

Maintaining the angle of draw at the 25 degrees standard will eliminate the partial pillar extraction zone, simplifying the very complex mine design currently proposed and removing subsidence where it tends to have the greatest impact upon cliff falls.

In regard to the proposed mine design based upon Clarence Colliery, the Clarence mine operates in the Katoomba Seam and so is operating in different geology to the Lithgow Seam. Mining at Clarence does not generate anything like the degree of surface subsidence that is proposed at Airly, although I do not know why this is the case. If Centennial Coal wants the Airly Mine to emulate Clarence Colliery then the degree of subsidence achieved at Clarence should be its subsidence design criterion. This is not proposed, and there is no likelihood that the Airly mine will have the limited cliff and pagoda damage achieved by the Clarence Mine.

There is no analogue between Airly and Clarence mines and no empirical data can be drawn from Clarence to apply to Airly regarding possible impacts. The Airly mine will have much greater cliff and pagoda damage than the Clarence Mine. Seeing that the Airly mine is in a state conservation area, this comparison confirms that the likely outcome in cliff and pagoda damage from this proposal will be unacceptable.

Due to the anticipated amount of cliff damage it is inappropriate for the panel and pillar mining zone to operate in or close to areas with cliffs, pagodas, caves, overhangs and cultural heritage sites as indicated in the EIS.

The Colong Foundation believes that the significance of the New Hartley site is national, not local. To claim the site is of local significance is not credible given the unique character of the dwellings associated with the site and its scenic location.

The Colong Foundation finds it hard to comprehend how subsidence design criteria limited to 125mm can have up to 5% cliff damage and for six cliffs up to 10% cliff damage. Surely the proposed flexible design plan can and should ensure no damage to cliff lines in a state conservation area. The objective of mining should be to minimise or eliminate damage, not to allow 10% cliff damage. It should definitely aim for a better cliff protection outcome than that at the Clarence Colliery, not poorer outcome as proposed.

The Colong Foundation draws the Department's attention to the remarks by Golder Associates on page 77, Appendix D where four levels of impact are defined. The worst level of impact is described as significant, defined as "relatively large in quantity, size and degree." "Rock falls ... affective >5% of the total length of cliffs" (page 77). So, it would seem that instead of avoiding impact, the proponent is planning for significant impacts over panel and pillar zone that covers the majority of the project area.

The Colong Foundation cannot understand why Centennial Coal should consider this to be an acceptable proposal for this zone when it is clearly stated by their subsidence consultants that it is not.

Golder Associates also recommended (which the proponent apparently ignored) that in the case of Airly, minor impacts would warrant reconsideration of setback distances from cliff lines to the extraction areas associated with panel and pillar mining (page 77). So why did the proponent ignore this advice and choose to half the barrier protection for the cliffs? The proponent is silent on this point.

The proposed subsidence of 500mm, which will produce strains of up to 8.3mm/m and tilts of 16.7 mm/m in the area of old workings is unacceptable because the area adjoins the oil shale ruins. The movements are likely to cause cliff collapses that will fall onto the New Hartley heritage area below it. Cliff collapse occurs from the base of the cliffs, not by toppling, and the inward strains and tilts will almost certainly produce cliff falls into the heritage area. The proponent should prevent this from happening by reconfiguring mining operations to minimise strains and tilts at the base of the cliffs.

The true extent of old underground oil shale workings is unknown and it is possible that large areas of the project in the panel and pillar zone will be subject to 500mm subsidence, as well as strains and tilts as mentioned above. Golder and Associates state that subsidence in the areas of multi-seam mining is unknown and there are no precedents to support the subsidence model. This is a clear warning from the consultant.

The angle of draw model is not sufficiently conservative to ensure cliff protection where mining is proposed near or to the cliff edge.

The reference on page 222 of Volume 1 to 'panel and pillar mining to the edge of the cliffs without impact because of a zero or even a negative angle of draw' is a major concern. It indicates that there is a flaw on angle of draw considerations based on earth subsidence (and upsidence) only, and not stresses and tilts as well. Stresses and tilts are more important factors for generating cliff falls than the vertical movements of subsidence. It is certain that stresses and tilts will not be zero in above instance and the angle of draw method to determine cliff protection in these circumstances is highly misleading. The Colong Foundation recommends that the angle of draw remain at least 25 degrees for cliff protection, pagodas the Grotto and the Valley of the Kings.

The proponent may be inaccurate when they claim that half a metre of subsidence in the New Hartley Oil Shale precinct 'will not generate significant additional impacts beyond those already existing' (pg iii). Surely Centennial Coal is referring to similar impacts as those arising from the 18th century cliff collapse and pagoda fractures their consultants have recorded, which seems an odd argument to make.

Further, the Colong Foundation does not accept that cliff falls happen at a rate of one every four years. It may be that these cliff falls reflect structural damage arising from past oil shale mining, which probably occurred under Genowlan Mountain, as well as Mount Airly. If that rate of attrition were a fact then surely the mesa would have eroded completely from the Capertee Valley long ago. The rate estimate is contrary to the geomorphological evidence that the Blue Mountains landform is OLD, ten times older than the Grand Canyon in the United States of America.

The proponent discounts the value of the mining heritage at New Hartley, which is disappointing as mining heritage should be protected and celebrated and offers important lessons to future generations.

There should be no further subsidence impacts in the oil shale heritage area. Mining should be limited to first workings as can be achieved by retaining the existing angle of draw.

Significance of the New Hartley Oil Shale Ruins

The EIS does not refer to the listing of this area by the National Trust in July 2014 in Appendix J or in the main report. The Industrial Heritage Committee of the National Trust of NSW finds that the 'Airly Mines and remains of the Torbane Refinery are significant in the story of oil-shale mining in NSW.' Their statement indicates that the sites have more than local heritage value, contradicting the conclusion of the proponent (see Trust listing - Attachment 1).

The Trust considers Airly township a rare example of an abandoned mining town uncompromised by later development and that the remains of the miners' houses are both technically interesting and evocative of the hardships endured by miners in these locations. The Torbane refinery was significant for its role in the development of retorting technologies in the early twentieth century and for its prototyping of retorts later used at Newnes.

Replacement of lost springs and stream flow for visitor use

Centennial should provide alternative water resources where these are lost, such as at the Village Spring in the oil shale ruins precinct. A small roofed area with storage tank should be provided at a suitable site at the ruins to provide park visitors with an alternative water source. Without water, the ability to visit the area becomes restricted.

Structure established near 'the Ruined Castle' in Blue Mountains National Park for provision of rainwater for park visitors (shown here under construction)

It is interesting that even low impact coal mining is predicted to cause a drawdown in groundwater below Gap Creek of up to 3.5 metres (pg iv), while for Angus Place and Springvale SSDs, Centennial argues that there will be no impacts on nationally significant swamps. It is hard to understand how the latter mining would not have a greater impact on surface waters than the Airly mine.

As recommended by the EIS, this indicates that there should be no mining under Gap Creek to prevent such drawdown.

Water management needs to be redesigned

The current water management system is unsatisfactory as it mixes clean surface water with site runoff water and also combines these with mine effluent from the underground workings. This is a most unsatisfactory arrangement and contrary to any standard practice for water management that I have seen in the last thirty five years. The arrangements are clearly illustrated on pages 100 and 101 of Volume 1 of the EIS. The production bore water goes into the large dirty water dam, along with the water from the CPP because of its high salinity, when it surely should instead go directly into mine process water.

Centennial Coal does not adequately explain its existing water management in section 3. Why are clean and dirty waters mixed with process water and mine effluent in the largest storage on the site? It is a better practice to minimise the dirty water and the mine effluent, so that these waste waters can be used as a first priority for operational process water.

Runoff collected from the proposed reject emplacement area is first proposed to go the 109ML large storage dam before discharge by the 35ML discharge dam. It would be better for the water collected from the REA to go to process water directly rather than being diluted with runoff water.

The water management plan needs to be rethought so that the dirty water is sorted and stored SEPARATELY and used in preference as direct feed for mine process water. Any overflows from these separate storages should then be chemically treated and then diverted to the large storage dam. This would be a far better arrangement to minimise discharge of toxic water from the site, rather than risk maximising the discharge of it, albeit in a diluted form.

If the toxic water were minimised it could then be chemically treated before being introduced into the large storage dam and then the discharge dam. This approach enables a restricted release zone to be created for the mine around the dirty process water and mine water, rather than having an open system as is currently the case.

Further, the lessons from the Clarence Colliery regarding the EPL licence reflecting the actual contaminants in the mine water make and process water have not been learnt. The EPL is defective because it does not contain the pollutants in the mine process water and production bore that can cause serious environmental harm to the World Heritage Area downstream. The EPL must be revised to ensure the downstream environment can be protected from the environmentally harmful water pollutants found the mine.

Airly Creek sample site is impacted already by Airly Mine,
and is not an appropriate background level

The pollutants contained in the mine's effluent are polluting the downstream environment of Airly Creek. The production bore water is highly saline, and has elevated nickel and zinc levels. It is undeniable that Airly Creek has received mine effluent, and this goes a long way to explain the elevated salinity levels at the sampling point. The creek is badly polluted when compared to the ANZECC trigger level and unpolluted creeks nearby. Airly Creek should not be used to derive the site specific trigger levels. This is setting water pollution standards on the pollution levels and is the wrong approach.

The Colong Foundation has serious reservations about the alleged background salinity, alkalinity and metal levels in Airly and Torbane Creeks. In the case of Airly Creek these so-called background levels seem to be significantly influenced by the existing mine and historical mine operations.

The claimed lack of impact by the proposed and the existing mine is incorrect. Cardno should thoroughly sample downstream on Airly Creek into the World Heritage Area to ascertain the extent of impact from the existing mining operation, and compared macroinvertebrate levels of more pristine equivalent streams (say Coco Creek) with Airly Creek as a background level. Water quality parameters should also be examined at these sites.

Note also that the Airly Mine does not appear to be a dry mine as stated in the Modification 3 PAC assessment report. According to this EIS, 'Airly Creek is predicted to experience a maximum cumulative increase of 14.5% in flow' (pg iv) due to the proposed mining project. This increase of toxic effluent discharge has not been minimised or, as may be possible at this site, eliminated.

Note also that Cardno Ecology Lab state on page 58 of Appendix G that initial sampling of the aquatic ecosystem indicates that the highest level of biological impairment generally occurred at sites on Airly Creek followed by Torbane Creek. Torbane Creek is believed to have large amounts of oil shale ash and coal ash dumped in its headwaters without any remediation. As Airly Creek is more polluted than Torbane Creek, these ecological results suggest that water management at the existing mine is already seriously impacting on Airly Creek headwaters, which then flows into the Greater Blue Mountains World Heritage Area.

The water management system needs to minimise and chemically treat discharge of dirty water flows and aim to achieve mitigation not by dilution alone as proposed but by treatment as well.

The water management plan in the EIS does not explain the overall water management strategy, which seems to be more about storing as much water on site in the so-called dirty water large dam than it does pollution control. It also seems to be aimed at diluting highly saline bore production water before use.

Proposed Reject Emplacement Area

The sizing analysis of the 30 metre high reject emplacement area is hard to follow, although the volumes are provided. No clear representation of the impacts of the proposed emplacement area on views from Glen Davis Road is provided or in Appendix P. Figure 4.5 and 4.6 on pages 133 and 134 respectively do not give any impression of how intrusive this REA location is when viewed from the Glen Davis Road. This is probably the most sensitive view point, yet is not considered in any detail by the proponent.

The proposed reject emplacement area and the rest of the mine area seen should be adequately screened from Glen Davis Road by appropriate bunds vegetated with native trees of local provenance so that it does not detract from the views enjoyed by those using this Road.

Noise management

The noise generated by the mining operation will impact upon the quiet enjoyment of recreation activities in the state conservation area.

There seems to be no sensible noise criteria for quiet recreation in a reserve established under the *National Parks and Wildlife Act*. A standard for noise in these areas should be 'background' at key visitor recreation sites, such as picnic grounds or camping grounds. The standard should be equivalent to noise standards established for large national parks in developed countries, such as national parks in the United States of America.

The standard applied in the noise assessment is for an area with substantial background noise, such as may occur at a commercial camping ground with facilities, and is not appropriate to be applied to most parks and reserves in NSW that are remote from facilities.

The erosion of natural quiet is a serious matter as people visit parks to enjoy peace and natural quiet without the intrusion of noise pollution.

While outside the scope of commentary on an EIS, the EPA should establish an appropriate noise standard for reserves under the *National Parks and Wildlife Act* that protects natural quiet enjoyed by park visitors. The standard used will not protect natural quiet and is inappropriate.

Thank you for the opportunity to comment.

Yours sincerely,

Keith Muir
Director
The Colong Foundation for Wilderness Ltd

NATIONAL TRUST

NATIONAL TRUST REGISTER Attachment 1

INDUSTRIAL HERITAGE SITE LISTING REPORT

CITY/SUBURB/TOWN	NAME OR IDENTIFICATION OF SITE	ADDRESS or LOCATION
Capertee	**AIRLY SHALE MINES AND TORBANE REFINERY REMAINS**	**Glen Davis Road, Mt Airly, via Capertee**

LGA:	Lithgow City	ABORIGINAL NATION:	Wiradjuri Nation
POSTCODE:	2846	LOT/DP:	See Appendix A
COMMITTEE:	Industrial Heritage Committee	GRID:	Lat: -33.10623 Long: 150.042018
AUTHOR:	Tony Brassil	LISTING DATE:	31 July, 2014

STATEMENT OF SIGNIFICANCE:

The Airly Mines and remains of the Torbane Refinery are significant in the story of oil-shale mining in NSW. The site has relationships to most of the other significant oil-shale mining and refining sites in NSW, especially Joadja, Hartley Vale and Newnes. The remains of the transportation systems, both tramways and ropeways, provide evidence of the technologies of the period and the level of investment in oil-shale in the late nineteenth century.

The Airly township is a rare example of an abandoned mining town uncompromised by later development and the remains of the miners' houses are both technically interesting and evocative of the hardships endured by miners in these locations. The Torbane refinery was significant for its role in the development of retorting technologies in the early twentieth century and for its prototyping of retorts later used at Newnes.

DESCRIPTION:

Sites and relics are scattered throughout the overall Airly Mines area and various elements are recorded by different authors. Mills (op cit) identified nineteen discrete sites within the Airly Shales Mines area:

1. The Skipway from Airly Village to the Torbane Tunnel
2. Airly Village Precinct
3. Church
4. Ventilation Shaft
5. Stone Dwelling
6. Spring Shaft and stone house
7. 'Big Rock' cave dwelling
8. 'The Bakery'
9. Potts Point Stone and Cave dwelling complex
10. Managers House and Water Trough
11. Magazine, spring and cave dwelling
12. Brick Ventilation chimney
13. Visible skipway on dry stone wall

14. Entrance to Martin's Tunnel and Ventilation Shaft
15. Boiler and Engine
16. Flying Fox cables
17. 'Groom's House' and Incline to Torbane Tunnel
18. Torbane Retort Complex
19. Railway Cutting

Eardley and Stephens note five major relics plus the locations of the major transport routes. These are:

1. Self-acting incline.
2. Horse tramlines.
3. Site of the Winding engine.
4. Airly Gap.
5. Site of the 60 ft turntable.
6. Burnett's Farm

Remains include a brick ventilation chimney, used to ventilate the mines, ruined miners' cottages of random masonry with mud chimneys, a boiler set in English bond brickwork foundations (boiler 4' diam. x 20'4" long), miners' cave houses dug into overhanging rocks with mud walls and windows (now filled in), the Torbane tram (coal) tunnel about 1,600 yards long, abandoned wire rope cables, remnants of cable winding wheels, numerous adits, caved in, and tramway roads built up around the edge of the mountain. Generally, this listing covers all relics and physical remains of the shale mining industry surviving in the Airly/Torbane vicinity which are associated with these mines.

HISTORY:

The following historical information is largely based upon:
Mills, R; *A Preliminary Heritage assessment of Airly Shale Oil Mining Complex*; Report for IEC; 1998.

General Background

Oil shale is a fine textured sedimentary rock containing organic matter known as kerogen, from which oil can be distilled through the application of heat. The process for the extraction of oil from shale was first carried out in Great Britain in 1694, however, the first commercial plants did not come into existence until1838 in France and1850 in Scotland. With James Young's patented process for the dry distillation of coal and shale and its subsequent refining with sulphuric acid and caustic soda (patented in 1850), shale oil became the basis for a major industry for the various products which could be distilled and extracted, including kerosene, paraffin wax, ammonia, lighting oils, lubricants and, after the turn of the century, motor fuel.

The first oil shale deposits in NSW were discovered in 1815 during the construction of the first road across the Blue Mountains. In 1824, a French expedition led by Commander Duprey reported the mining of deposits of stratified lignite by early settlers who used it as fuel. Other early reports of mining activity in the area were made by Surgeon Cunningham in 1827 and Count de Strzelecki in 1840 and 1845, Buckley in 1854 and Brown in 1862. Production began on a small scale at American Creek on the south coast and at Hartley Vale, near Lithgow, in 1865 and at Bathgate (Kerosene Vale) in 1866. However, production increased rapidly and, in 1866, the Pioneer Kerosene Works mine at Mt Kembla produced more than 1000 tonnes and for the next 10 years produced more than 3000 tonnes per year. Production at Hartley Vale was substantially larger. With the opening of Joadja mine in 1873-7 4, total production was unaffected by the closure of Mt Kembla Mine in 1878. Joadja and Hartley Vale together produced between 19000 and 50000 tonnes of shale between 1878 and 1889. Joadja mine declined after 1892 when the easiest part of the seam had been mined out but production at the Glen and Ruined Castle mines at Katoomba compensated for the reduced production from Joadja.

As the Katoomba seam was waning, a rich seam was identified in Airly Mountain and Genowlan Mountains near Capertee. The Australian Kerosene Oil and Mineral Company of Joadja and Katoomba acquired the southern lease at Genowlan Mine in 1895 and the Hartley Vale Company (NSW Shale and Oil Company) leased the northern outcrop in 1896 and named the mine New Hartley. From 1896-1903, more than 144,000 tonnes were extracted from these two mines.

In the first decade of the 20th century, however, mining of shale effectively ceased at all the established mines, to be replaced by production at Newnes, where the Commonwealth Oil Corporation began mining in 1906, and Murrurundi, which started production in 1907.

By 1912, Newnes was producing up to 67000 tonnes of shale per year. However, the Commonwealth Oil Corporation went into bankruptcy in 1912 and the plant ceased production until 1914 and, despite continuing labour problems and the loss of American markets, continued functioning until1922.

With the closure of the Newnes plant, shale mining in NSW effectively ceased until the 1940s, when the wartime oil requirements encouraged the development of the torbanite seam at Marrangaroo and Barigan and the construction of an entire new processing plant at Glen Davis. The end of the War and crude oil imports from the Middle East meant that the plant at Glen Davis could not survive and the complex closed in June 1952.

Much of the equipment at any of the mining sites was reused from other mining sites that had closed. While new retorts were erected at Newnes, other equipment was being brought from Torbane, which had previously been brought to Torbane from the Glen Mine at Katoomba. Genowlan Tramway equipment had come from Katoomba and the entire Kerosene Plant at Newnes had previously been used at Hartley Vale. In 1920, a whole group of houses was transferred from Torbane to Newnes. Later, when Newnes closed, its firebricks went to the Clyde Refinery at Duck Creek. When Glen Davis was built in 1939, the retorts and steam engines were taken from the deserted Newnes site.

Not all the raw shale processing was carried out in Australia. Till 1911, up to 570,000 tonnes of raw shale had been exported to Britain, Europe and America. Joadja shale was exported to America and England from 1879; Hartley Vale shale from 1880 and Genowlan deposits were held by a German syndicate and mined exclusively for export to Germany. First grade ores from Newnes and some from Joadja were used to supply the Australian Gas Light Company.

History of the Airly Shale Mines
The Genowlan Mine
The first official report of the discovery of shale oil in the Airly Mountain area was recorded in the Under-Secretary for Mines' Report for 1883. The lease on the southern portion of the Airly shale deposit was taken up by the original prospecting party of Messrs Melliday, Massey, Bulkeley, Nicholson and Larkin in 1883. However, the group failed to meet the necessary labour conditions and the lease lapsed. A new lease of 420 acres was taken up by Mr D. Wilson in late 1890. This lease was purchased by Genowlan Shale Company a short time later.

The Genowlan Shale Company was a Sydney based firm whose interest lay in exporting shale to England and the Continent. To advertise the high quality of their product, the Company entered samples of the mineral in the World's Colombian Exposition in Chicago in 1893. During this early period of the mine's history (1892-1894), an approximately 2.4km track was cut from the mine site to the Government road to Capertee. The shale was carted from the mine in drays drawn either by horse or bullock teams along this track to Capertee Railway station, from where it was transported to Germany for gas enrichment purposes.

Between 1892 and 1894, approximately 10,000 tons of high-grade shale was extracted and sent to market. During financial difficulties experienced by the company in 1894, Andrew Anderson, the largest shareholder in the Genowlan Shale Company, obtained a six months option of purchase on the leases. Anderson formed a company registered as the Australian Shale Syndicate with a group of English investors and, on 3rd December 1894, Anderson purchased the mine on behalf of the new company.

By the mid 1890's, the supply from the Joadja deposits controlled by the Australian Kerosene Oil and Mineral Company (AKO&M) was beginning to tail off and, after the Australian Shale Syndicate offered the lease of Genowlan mine on a tribute basis, a five year contract was signed in 1896. Although AKO&M had an option to purchase the property, this was not taken up.

The small private village of Airly was surveyed on 28th June 1897 by James Dawson, Surveyor. Public buildings were constructed adjacent to the tramway and remains of the Church, hotel and post office are still present, however, it appears that few houses were actually built. Many mine workers appear to have chosen to live closer to the sites of the mining adits. Their houses, constructed from local stone within rock overhangs, do not appear to conform to any recognised street alignment but were placed wherever a level patch of ground or a convenient rock overhang could be found.

The Genowlan shale seam was a dangerous place to work, as shale at the site exhibited a tendency to explode horizontally from the working face when the breaking irons were hammered in. Miners countered this dangerous situation by wearing protective breast boards fashioned from bark. More formalised protective clothing was developed over the years (strong wooden breast plates and full wire-gauze masks).

AKO&M's strategy for Genowlan mine was to ship only export grade shale from the mine, thereby partially relieving Joadja from this role. This was reflected in the marked drop in the dispatch of shale by rail form Joadja from 1894 onwards, which was almost entirely compensated for in volume by an equivalent increase of dispatches from the Capertee siding.

Initially, AKO&M used the road cartage route installed by the Genowlan Shale Company. To cut costs, an alternative route was surveyed which reduced the distance to be traversed to about 5 km and eliminated the steep and dangerous road descent by means of a self-activating, inclined way from the crest of the Airly Gap ridge to the level of the main road to Capertee Railway station.

The section from the Genowlan mine to the start of the tunnel operated as a single-line horse tramway. It then changed to a double line cable tramway and passed west through a tunnel cut in the mountain, a little west of the Airly Turret, down the valley and up the other side to the Torbane Railway station. The rope tramway was clearly a formidable piece of engineering. Details of the engines and drive mechanisms of the tramway are not known. It is thought that the cable tramway became operational towards the end of 1897, as railway shipment figures for that year are large and all shale for the following year was recorded as having passed through Torbane siding.

As the mine's focus was to meet export orders, which tended to be rather intermittent in nature, large reserve stocks were often built up. This policy of stockpiling gave the company great flexibility in fulfilling the irregular foreign orders while keeping the miners working on a reasonably regular basis.

In September 1900, the miners demanded an eight hour day in line with above-ground workers. This dispute appeared to be settled quickly, however, the resultant changed working conditions resulted in a decrease in working hours and an associated cut in wages. Miners' representatives requested an increase in rates but the board of AKO&M would have

no part of it and this resulted in at least a quarter of the work force leaving the site. A new rate was finally negotiated in mid-November and work resumed. Towards the end of 1902, declining profits from the Genowlan mine led to a further reduction in the wages of shale cleaners and miners. Shortly thereafter, operations ceased and AKO&M gave up further attempts to extend their lease.

The Australian Shale Syndicate took up additional property on the southern side of the Genowlan leases towards the boundary of New Hartley in April 1907. Some exploratory work was done in an adit which became known as Dogtrap Tunnel in mid 1908. It is unclear whether or not this was a new lease or part of the existing Genowlan complex and no information is available to date on this tunnel.

King's Mine

This mine on Airly Mountain was named after its lease holder, Frances William King, who took up the original Nicholson and Larkin lease which had expired in 1883. The lease holder, along with his brother, Mr R.J. King, developed the Airly shale mine to produce a moderate output of export shale. Little is known of these activities, which continued until at least the early part of 1896. Between April and September 1896, the mine was leased for an indefinite period to NSW Shale and Oil Company.

The New Hartley Shale Mine

At Hartley Vale, the shale mines operated by the NSW Shale & Oil Company were running towards the end of their useful lives and the Airly seam appeared to offer good quality export shale which retorted at an average yield of 52 gallons to the ton. The retorting shale at Airly, however, was significantly different from that at Hartley Vale, as it held a much greater concentration of extractable nitrogen suitable for the manufacture of fertiliser. The Airly shale also required more prolonged heating during the retorting process; consequently, a new retort design was required.

When NSW S&O took over the Airly lease in 1896, they renamed it the New Hartley Shale Mine. Access was an acknowledged problem at the time of purchase and the manager, William Hall, assessed a new movement route for raw material at the site. Hall proposed to move the shale to the proposed Torbane retorting works by a light railway which passed through a tunnel in the narrow central section of Airly Mountain. At Torbane, the shale and crude products would be transhipped to the standard gauge line, which ran to the newly created Torbane Station on the Government railway. The haulage skipway from the mine to Torbane was completed in 1898 and the standard gauge railway branch line to Torbane Railway Station completed in 1900. A telephone line was added to assist management in coordinating the activities of the company.

Mining at New Hartley was suspended in the early months of 1900 pending completion of the oil shale retorts and Torbane and extension of the rail connection. When miners returned to work in September 1900 an industrial dispute rapidly developed over the issue of weighing shale produced. This dispute closed the operation until 29 October after proceedings were brought against the company under Section 28 of the Coal Mines Regulation Act.

The Torbane retorts provided a steady minimum demand for shale but the peak work force of 80 miners was sometimes on half time only and occasionally ran down to as few as twenty men. However, a contract with the Australian Gas-Light Company guaranteed a minimum throughput. Coal found with the shale seam was not exploited commercially.

Poor export demand and good reserves led to a progressive shut-down of the mine in mid 1902 and only a small work force was retained. The miners declared this to be a lockout and went on strike. They held out for 21 weeks, receiving only minimal strike pay raised from union reserves and a 5% levee from the Genowlan miners and some outside donations. The shale stocks were depleted and the directors agreed to the pay demands of the miners,

allowing work to recommence. Between 1904 and 1907, the miners' wages were restricted and, from 1905 to 1907, intermittent strikes occurred. By 1907, the miners' case was stronger, as shale prices were high. A demand for a 25% pay rise was rejected by management and the subsequent strike was long and bitter. In February 1908, a few non-unionists commenced working, under continuous police guard to dodge the angry picket line. The dispute was finally settled in a special Arbitration Court convened at Torbane on May 16th 1908. The new mining agreement was for a three year period and was honoured by both parties. After this period, Federal industrial legislation came into existence and there were no industrial stoppages at Torbane after May 1908.

When the mines at Newnes entered full scale production in approximately 1908, the quantity of shale exported from Torbane dropped to a mere trickle. In June 1912, the Commonwealth Oil Corporation announced it was closing the New Hartley Pit, as the supply of shale from the mine was showing signs of rapid decline as the seam approached exhaustion. After closure of the pit, there was only some sorting of surface heaps to meet Government orders for gas-making shale. This was consumed by various railway workshops including Eveleigh and Newcastle. Commonwealth Oil Corporation went into liquidation in 1913 and its interest in Genowlan mines was purchased by Commonwealth Oil Federation. The mines continued working on an intermittent basis until August 1918 when a formal notice of discontinuance was provided to the Department of Mines. In 1930, the Airly-Torbane haulage system was dismantled by Albert Lamb and the adits in the Genowlan Valley had their portals "blown down" to prevent access to the underground workings.

In the 1940's, some prospecting took place within the Tramway Tunnel near the crest of Airly Ridge. A short length of wooden-railed tramway was laid along the tunnel floor so that the spoil could be dumped over the cliffs at the portal. However, no further mining was commenced.

The Torbane Retort Complex

The Torbane site was chosen for the retorts because it was a relatively flat area which was located between the mine site and the proposed rail siding on the main Wallerawang-Mudgee Line. This was significant as it allowed the crude oil and benzene to be transported from the retorts to the Hartley Vale refinery. Once the location had been confirmed, the construction of the transport link was commenced immediately and completed by 1900.

This transport link involved the construction of a single-track railway from the Torbane retorts to Torbane siding, a distance of 1 mile and sixty eight chains. From Torbane siding, the track curved over an embankment to the north-east, traversing the gentle lower slopes of the Airly Creek valley. After passing through a cutting excavated to a maximum depth of 15m in the clay shale, the track crossed the embankment which supported two 400 gallon square shaped ship's tanks which supplied water to the Company's locomotive. A small steam driven pump was mounted at the base of the tank structure to elevate water from the dam to the tanks. From here the track ran in a northerly direction into the retort complex where it terminated beneath an elevated staith devoted to the loading of export shale.

During 1899, the land was cleared and the first dwellings erected for employees. However, no further work took place until a contract was signed with the Australian Gas Light Company at the end of the year. From January 1900, large quantities of bricks were burnt at Torbane to supplement the supply from NSW S&O kilns at Hartley Vale. Construction of the industrial plant and the immediately adjacent township of Torbane proceeded simultaneously. The Torbane retorts were built in a single bench, twenty units long by two wide. Construction of the brickworks was well advanced by the time the principal castings arrived in July 1900. The retorts were first fired on 16th November, 1900 and oil was dispatched to Hartley Vale a fortnight later.

The Torbane plant was purchased by Commonwealth Oil Corporation (COC) in April, 1906. Operations continued throughout 1906 and 1907 but ceased during the New Hartley miners strike of 1908. COC also had a financial interest in the untapped shale deposits at Newnes in the nearby Wolgan Valley, where mining was due to begin. Purchase of the Torbane complex provided the opportunity for low-cost testing of new technology and making any necessary modifications to the equipment prior to installation at Newnes. The Torbane retorts were expanded to incorporate a half-bench of Scottish Pumpherston retorts alongside the existing improved Hall and Palmer Units. All other plant was modified to the standards planned for Newnes. Overall improvements cost $30,000, which was nearly as much as the purchase of the Torbane works but a mere 2.75% of the estimated profits from Newnes.

The selection of the Scottish retorts was significant for three reasons:

- It was the first importation of plant since the English retort bodies had been purchased for Joadja almost 30 years earlier.
- The bench was the first in NSW to be intentionally and exclusively heated by combustion from its own waste gases.
- The combustion of permanent gas eliminated all industrial use of solid fuel.

The plans were drawn up by Mr David Sutherland, who had an international reputation and a sound background in the Scottish shale oil industry. The architecture and design for both the extensions at Torbane and the Newnes Complex are virtually identical to that of Scottish Shale plants.

Extensions to the Torbane works were completed in 1907. The retorts required approximately 350,000 ordinary and 150,000 fire bricks. The total output of crude oil increased to 140,000 gallons per month and the quantities of ammonia and benzene also increased proportionally. Each retort bench had its own ammonia and benzene scrubbing towers. The crude oil and benzene were both dispatched in tank wagons to the Hartley Vale refinery and the ammonia went to the manufacturers of anhydrous ammonia for the refrigeration industry.

Following an accident in which a tanker of crude benzene caught fire and exploded upon arrival at Hartley Vale, it was decided to build a separate benzene refining plant at Torbane. This was built to the east of the main engine house and became operative in 1909. Other additions to the complex in 1909 included an engine shed and workshops at the end of the siding near the site of the export shale exchange and the installation of an acetylene-gas generating plant for lighting the retorts.

By 1913, it had become clear that the supply of shale from New Hartley Mine was coming to an end. In June 1913, the receivers and managers of COC decided to close the plant and cease trading. The Torbane retorts were shut down on 3rd June 1913. Salvageable items were removed to Newnes. Railway records indicate that, by April 1920, the various company houses were being dismantled and their components sent to Newnes for re-erection. Further dismantling of the plant occurred in 1925-26, when a large quantity of fire bricks and other material were loaded into the company's "Dreadnought" bogie high-sided wagons and sent to the oil refinery near Duck Creek at Clyde. By 1930, dismantling activities at the retorts had been completed, including removal of the rails from the Torbane private railway.

In 1924, a Victorian firm known as the Torquay Anglesea Company was formed and a plant based on a Schultz Retort was erected at Torbane siding. Shale was conveyed from the Airly site to the retort by tramway. Work on this project did not continue for long and the plant was subsequently stripped and sold.

In July 1925 an aerial ropeway was constructed from Torbane siding to the coal mines at New Hartley. A large loading staith was erected to the north of Torbane Station, where the coal was graded for size and quality. In December 1926, the project was purchased by the

"Renown" Company, however in the following year, production ceased and the ropeways were demolished.

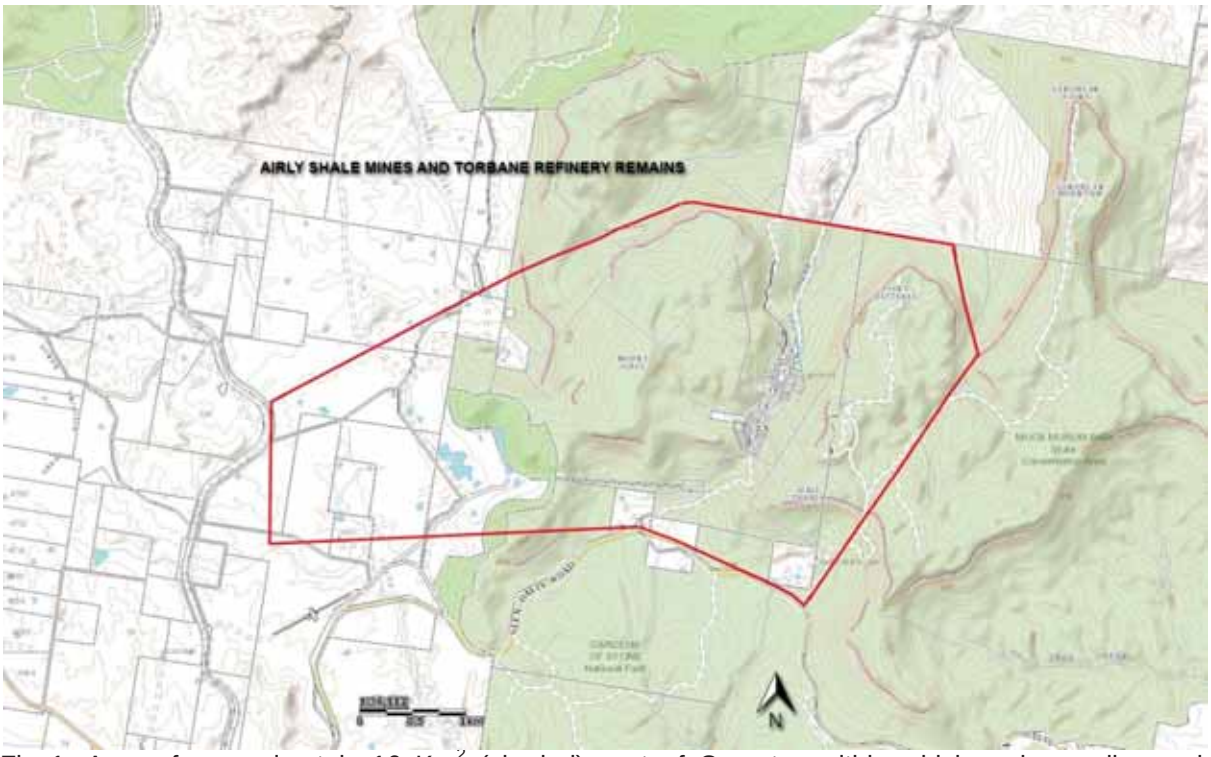

Fig 1. Area of approximately 16 Km^2 (shaded) east of Capertee within which various relics and evidence of the Airly Shale Mines occurs.

Fig 2: Aerial Photograph of the area east of Capertee (shaded) within which various relics and evidence of the Airly Shale Mines occurs

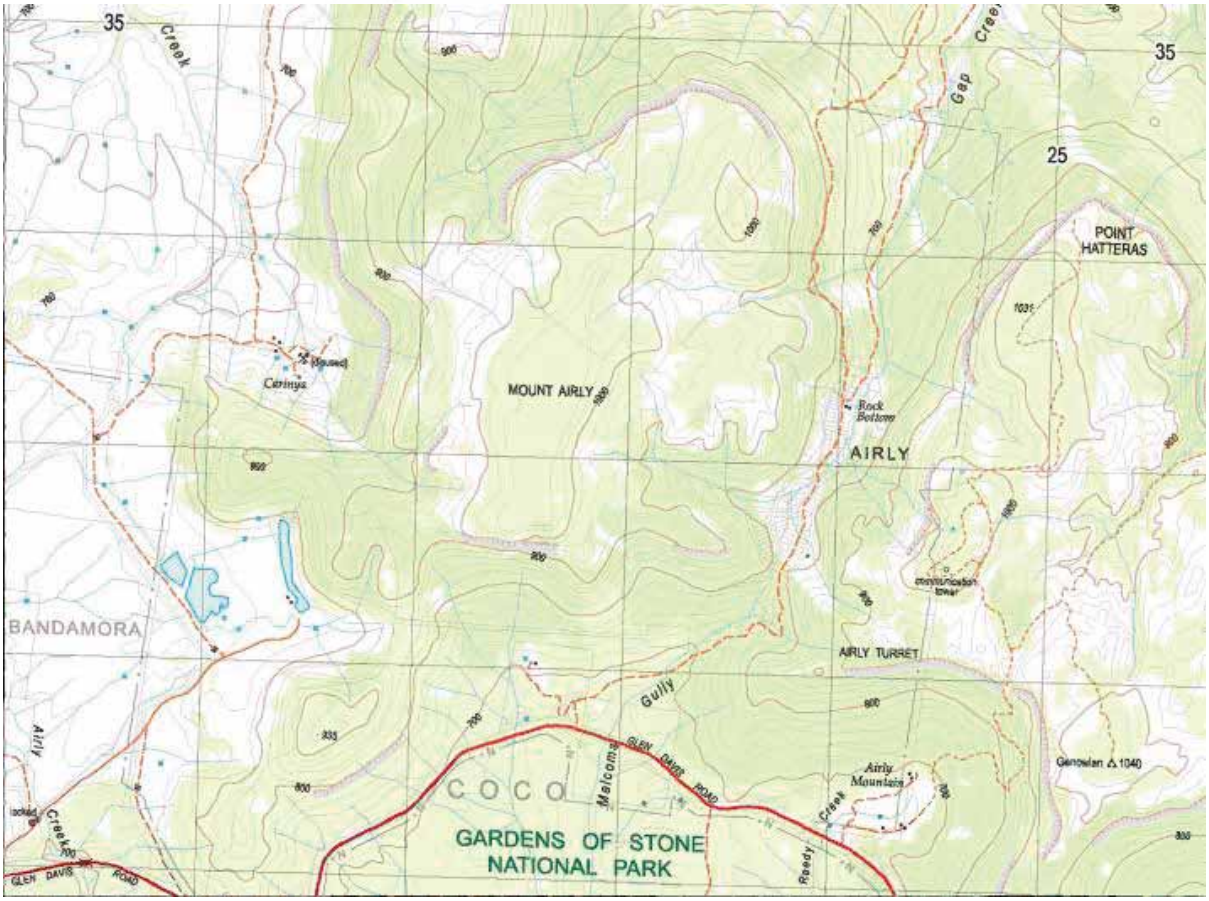

Fig 3: Extract from Topographic Map Glen Alice 89314N showing the area east of Capertee associated with the shale Mines at Airly. The '*Carinya*' Homestead at the centre left occupies the site of the former Torbane Refinery

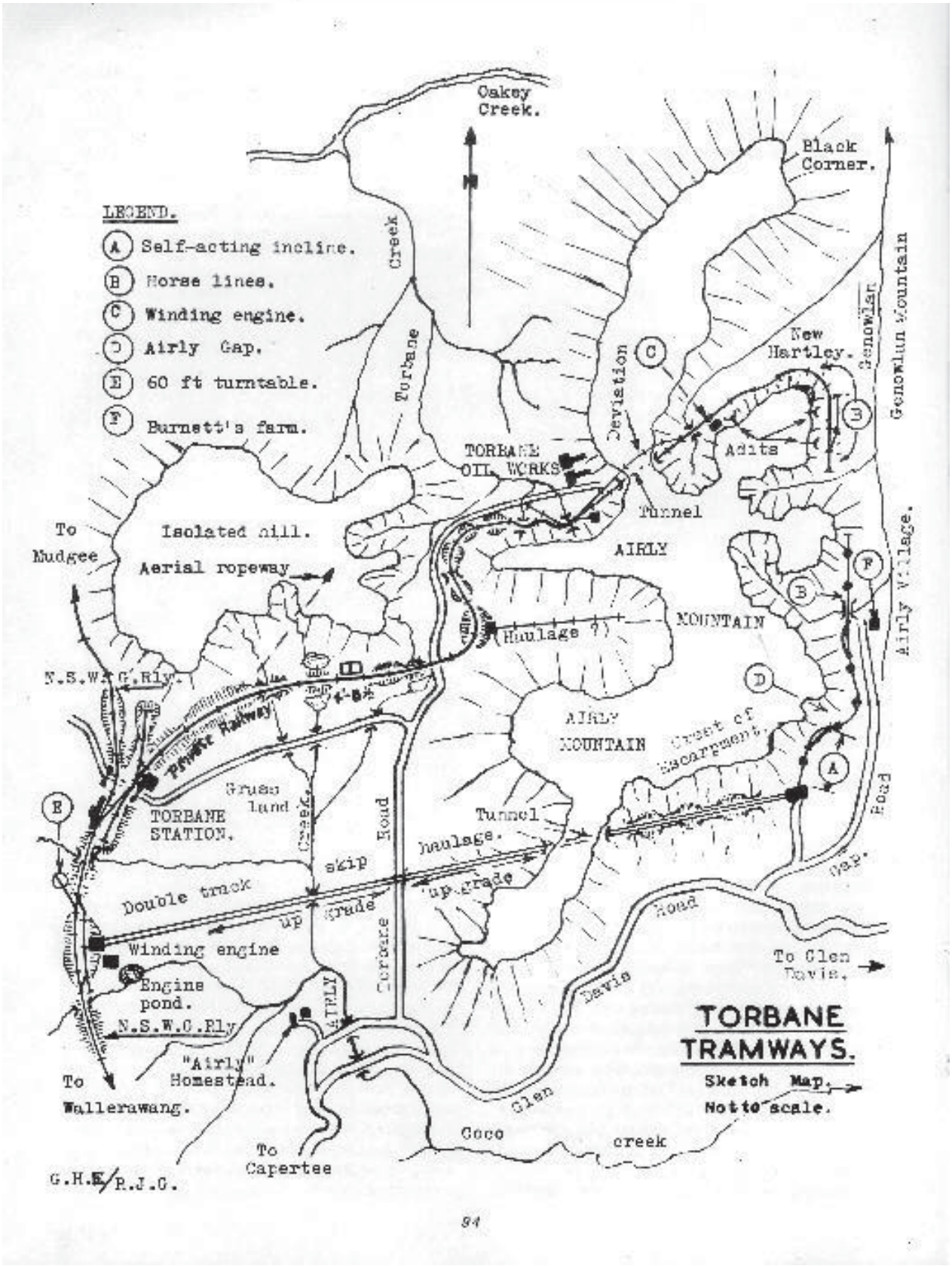

Fig 4: Map of the Torbane Tramways, from: EARDLEY, Gifford H. & STEPHENS, E. M; *The Shale Railways of New South Wales;* Australian Railways Historical Society; 1974.

Fig 5: Location of sites recorded in the survey

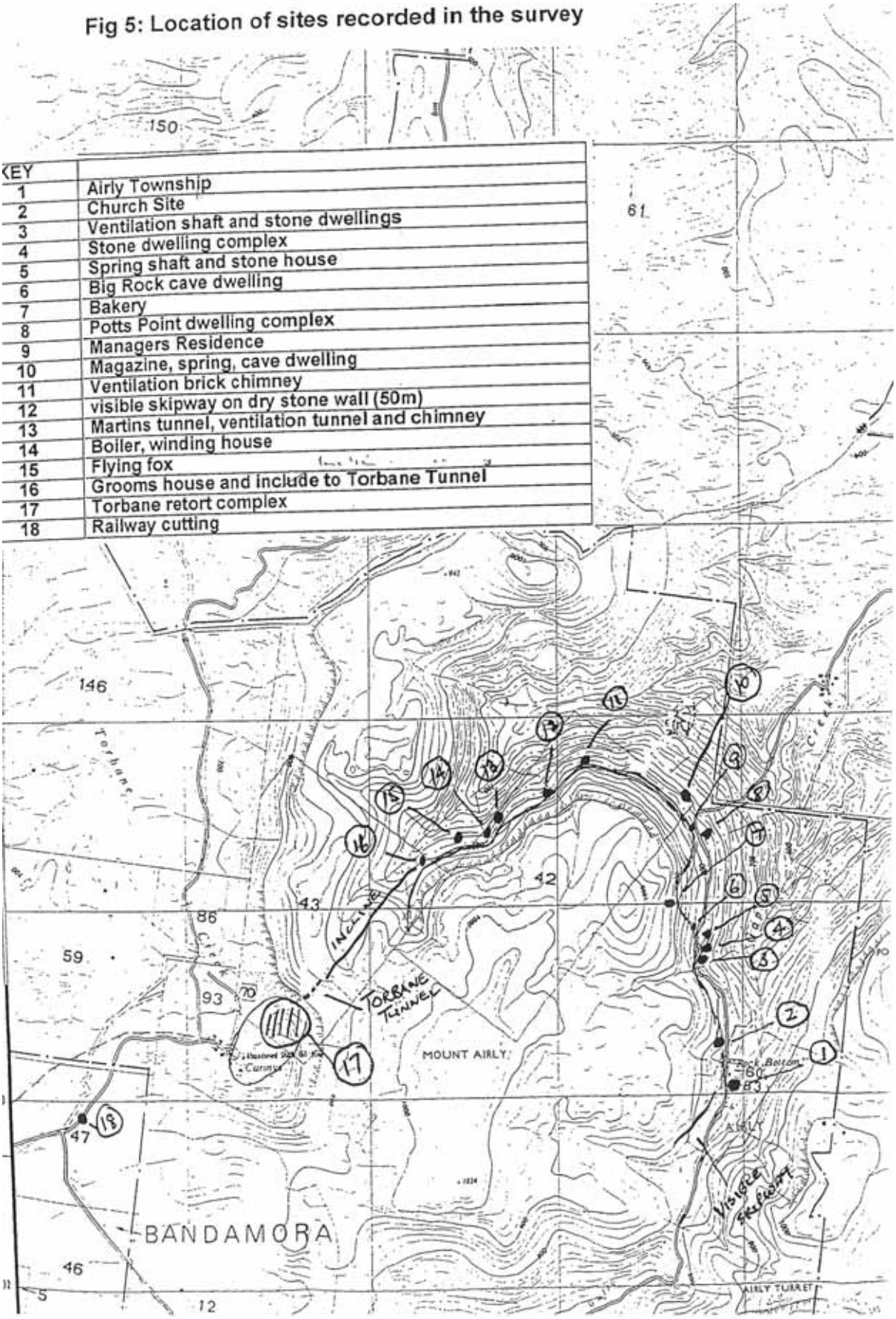

Fig 5: Map of Sites recorded by Robynne Mills (1998), from: Mills, R; *A Preliminary Heritage assessment of Airly Shale Oil Mining Complex*; Report for IEC; 1998

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Mills, R; *A Preliminary Heritage assessment of Airly Shale Oil Mining Complex*; Report for IEC; 1998

BOUNDARY OF LISTING:

The various relics, sites and remnant landscapes associated with the shale mines in the vicinity of Airly are scattered across a wide area (approximately 16 Km^2) east of Capertee (see approximate area in Figures 1 & 2 above). This listing is not of a discrete area of land but of the evidence of the shale mines where it occurs within this overall area. Parts of the land encompassed within this area are privately owned and permission must be sought from the owners prior to any attempt to visit the site.

Appendix 1 - Airly Shale Mines and Torbane Refinery Remains – Land Title Details

Part Lot 2		DP 577478
Lot 3		DP 577478
Part Lot 22		DP 650039
Lot 9		DP 655050
Part Lots 158/159		DP 722293
Lot 11		DP 755757
Lots 33/34		DP 755757
Part Lots 42/43		DP 755757
Part Lot 59		DP 755757
Lot 60		DP 755757
Lot 70		DP 755757
Lot 78/83		DP 755757
Part Lot 86		DP 755757
Lot 87		DP 755757
Lot 89/91		DP 755757
Part Lot 93		DP 755757
Lots 94/110		DP 755757
Lot 112/121		DP 755757
Lot 123/126		DP 755757
Lot 139		DP 755757
Part Lot 8		DP 755758
Part Lots 45/47		DP 755758
Part Lot 55		DP 755758
Lots 1/10	Section 1	DP 758011
Lots 1/6	Section 2	DP 758011
Lots 15/17	Section 2	DP 758011
Lots 1/9	Section 3	DP 758011
Lot 5		DP 986083
Lot 7020		DP 1029319
Lot 7025/7026		DP 1050399
Lot 7022/7024		DP 1050402
Lot 7021		DP 1050431
Lot 7019		DP 1050747
Lot 7018		DP 1051447
Lot 7001		DP 1057060
Lot 7013		DP 1057515
Part Lot 7014		DP 1057712
Lot 7015		DP 1057714
Part Lot 7002		DP 1058210
Part Lot 7016		DP 1114802
Lots 7033/7034		DP 1116073
Part Lot 7031		DP 1116097
Lot 7032		DP 1116097
Part Lots 7035/7036		DP 1117631
Lot 7038		DP 1117632
Lot 7037		DP 1117633
Lot 10		DP 1118781
Lots 7/14		DP 1118784
Lot 18/24		DP 1118800
Lots 12/15		DP 1118801
Lot 7300		DP 1130282
Lot 7303/7304		DP 1130566
Part Lots 1/2		DP 1152312
Lot 1		DP 1190721
Lot 1688		DP 1191655

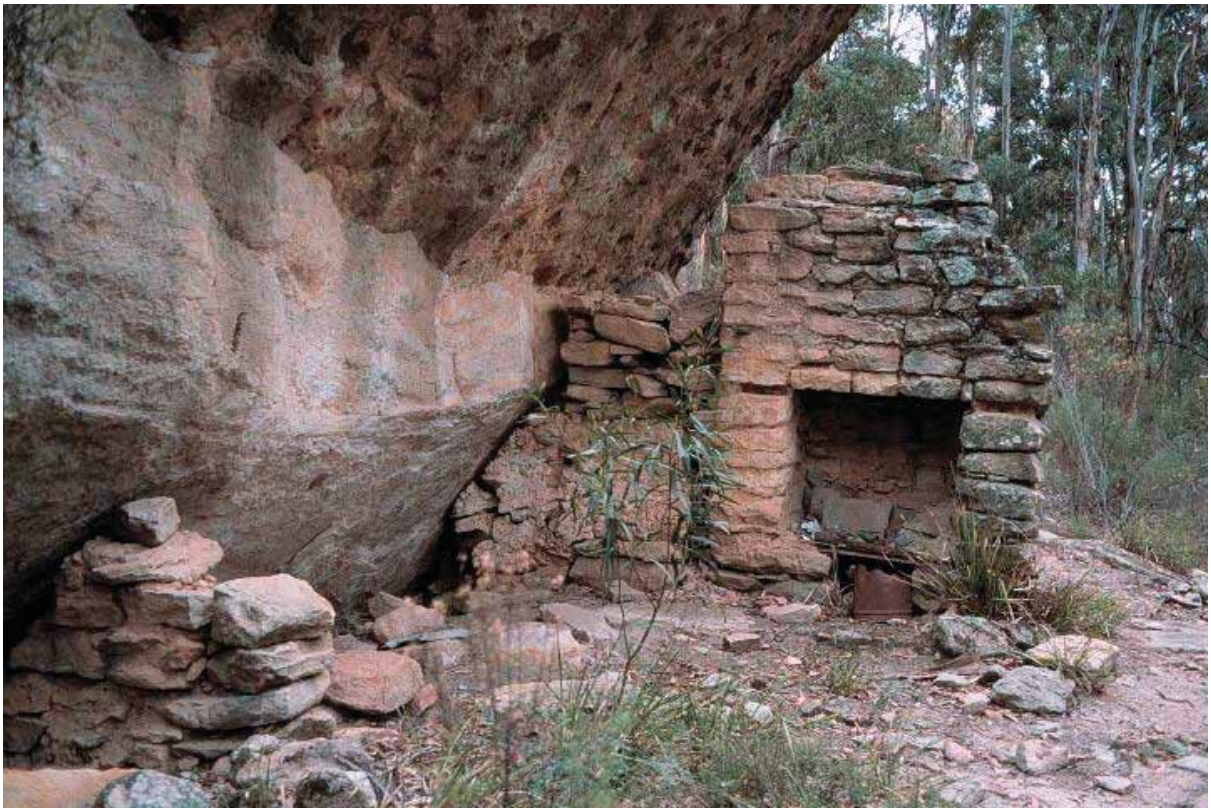


Figure 6: Remains of a Miners Hut under a cliff overhang at Airly Gap (Source: Ayling, B op cit)

Figure 7: Remains of the Mine Managers House at Airly Gap (Source: Ayling, B op cit)

Figure 8: Egg-end boiler associated with the Cable tramway haulage system (Source: Ayling, B op cit)

Figure 9: Remains of the Torbane Refinery and transport terminal. The Works Managers House at centre is now privately owned and occupied. (Source: Ayling, B op cit)

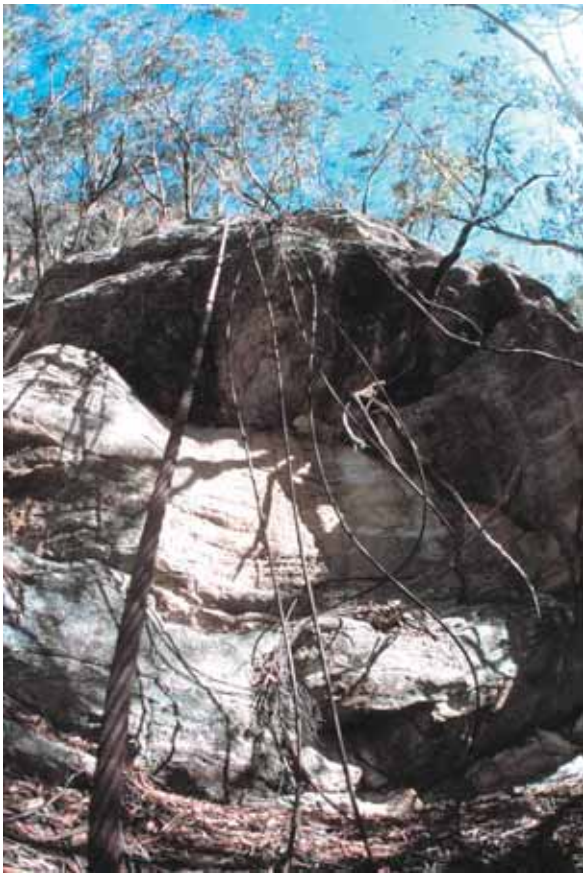


Figure 10: Remains of a Haulage Cables
(Source: Ayling, B op cit)

Figure 11: Mine Ventilation Chimney
(Source: Ayling, B op cit)

Figures 12 & 13: An abandoned skip (left) and overgrown winding drum (right) (Source: Ayling, B op cit)

Submission on the Airly Mine Extension Project EIS (State Significant Development 5581)

By Dr Haydn Washington, on behalf of the Colo Committee, October 2014
(Contact: Hon. Sec. Colo Committee, Dr Haydn Washington, haydnwashington@bigpond.com)

Introduction

The Colo Committee has been involved is assessing the biodiversity and geodiversity significance of the Airly and Genowlan mesas since 1980. We attended and made submissions to the original Mining Warden's Court and the 1993 Airly Coal Project Commission of Inquiry (Simpson, 1993) (the proponent was then Novacoal). We have since given extensive submissions on all development proposals in the area. We lobbied since the early 1980s for reservation of this area of great biodiversity and geodiversity significance, which has now been recognised through the creation of Mugii Murum-ban SCA. The author of this submission nominated both the 'Genowlan Point Heathland' Endangered Ecological Community under the TSC Act and was involved in the discovery and then nomination of the critically endangered *Pultenaea sp.* 'Genowlan Point'. The author is also the lead author of:

> Washington, H.G. and Wray, R.A.L. (2011). The geoheritage and geomorphology of the sandstone pagodas of the north-western Blue Mountains region (NSW). *Proceedings of the Linnean Society of New South Wales* **132**, 131-143.

This is the only peer-reviewed paper of the geodiversity significance of the 'pagoda' rock formations, and identifies the Airly and Genowlan mesas as the northern part of the pagoda heartland. This area thus has significant internationally geodiversity value. The Colo Committee (via the author) has been a member of the Subsidence Management Committee for Airly (now to be changed to a Consultative Committee). The Colo Committee has thus been involved intimately since 1980 with the research and discovery of the biodiversity and geodiversity significance of the proposal area. It can quite rightly be seen as a '***jewel in the crown***' of the whole area.

The lease proposal is immediately north of the World Heritage Area. The Greater Blue Mountains World Heritage Advisory Committee has also indicated that it would seek at a future time to *add* the Mugii Murum-ban SCA to the Greater Blue Mountains World Heritage Area once mining has completed – assuming its outstanding natural heritage values have not been damaged by mining. The author can confirm this as till recently he was a member of the Greater Blue Mountains World Heritage Advisory Committee. This area will most likely go on the National Heritage List when this is revised, certainly the World Heritage Advisory Committee recommends this. This SCA is not just of state significance but of *national significance*. Accordingly the **precautionary principle should be applied** to ensure the protection of the area and to minimise possible disturbance to the State Conservation Area.

Given the growing recognition of significance of the pagoda rock formation, and the other geodiversity and biodiversity of these mesas, the original Novacoal proposal for total extraction over most of the area (and 70% under cliffs) has been abandoned. The Colo Committee also acknowledges that Centennial Coal supported the creation of the SCA and has committed itself to a maximum of 125 mm subsidence rather than the 1.8 metre subsidence of past approvals. That is a major step forward to protect this area.

However, the Colo Committee's key concern remains the ***percentage of coal to be extracted*** under highly important pagoda and slot canyon areas and also under very high cliffs and associated very steep talus slopes that act as 'flying buttresses' to support these cliffs.

Pagodas, Genowlan Mountain

Concern regarding quality of information in the EIS

The author of this submission has been an environmental scientist for 40 years and has analysed many EIS's. This current EIS is light years ahead of the original appalling Novacoal EIS. We acknowledge the significant research undertaken to improve the knowledge of the area. However, given that Centennial in the past *verbally assured* the Colo Committee and the Colong Foundation for Wilderness that ***only 50% of coal would be mined*** under the mesas to ensure their protection, the EIS is woefully deficient in ***actually owning up to the percentage extraction*** under this area of great conservation significance. We have had to ourselves determine this percentage from comparing mine layouts for the various extraction zones. We are thus dismayed that extraction rates will be as much as **66%** under the majority of the mesas (panel and pillar zone). Such critical information should not have been *hidden* inside the EIS and breaches clarity and transparency requirements. The public has a right to know what is being proposed for this highly significant natural area. We had hoped that

Centennial would be forthcoming about percentage extraction given concerns we (and other groups) have expressed in the past on this matter, most recently in Airly Mod 3 only a few weeks ago.

A *sorry history* of impact on the Western coalfields

We also note the long and sorry history of lies about subsidence and collapse and other impacts (such as water pollution) on the Western Coalfields. Mining companies initially refused to acknowledge that longwall mining *caused* massive subsidence until it was proven to be the case by the Department of Mineral Resources. Mining companies (Centennial included) have sought to deny that full subsidence under upland swamps damages these areas (a recent report by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, IESC 2014, confirms such damage). Mining companies regularly downplay the impact of their activities on water quality and quantity (even though Centennial was fined over $1 million for this on Newnes Plateau). Mining companies regularly somehow 'fail to find' threatened species that amateur biologists trip over in quite obvious locations.

Regularly, environment groups are essentially called on to 'trust us' by mining companies. However, history has shown again and again that statements such as 'not predicted' or 'no impact' have ***proven to be false***. At that point the mining company essentially says 'oops - sorry' and seeks to blame it on natural erosion or unknown factors. In the interests of maximising their profits, mining companies *fail to employ the precautionary principle* at a level that properly protects high conservation areas such as this SCA. We believe the same process still continues in this EIS. It *looks* very comprehensive and professional (especially if one doesn't know the area and its history well). It seeks to use the strategy of most recent EISs, which is to drown the reader with masses of information in the hope that they give up and accept the proponent knows what they are talking about. However, the EIS seeks to ***hide the fact that too much coal is being extracted to ensure that significant damage does not occur to an area of national and international significance.***

Key points

1) **Subsidence**

The key failing of this proposal is its attempt to mislead the reader as to the percentage of coal to be extracted under this 'jewel in the crown' of the Capertee valley. The EIS deliberately avoids stating anywhere the percentage coal extraction under the various mining zones – **because it is too high for the safety of the SCA**. One can spend time and infer what percentage extraction will take place by consulting the mine plan layouts and looking at void and pillar widths (as we have done). This tells us:

- **Panel and pillar area** – most of mesas including pagodas, the Grotto and slot canyons such as Valley of the Kings and heathland Endangered Ecological Community – 61 metre void and 29.5 metre chain pillars so essentially ***66% of coal is being extracted***.

- **Cliff zone** – first workings only, so around **30% extraction,** but this is planned to happen even under the very high cliffs (over 100 metres) of Genowlan Pt and Pt Hatteras
- **Partial Pillar extraction zones** – depends on the depth as to how much they take off the pillar, but looks like it will range from **50-60% extraction.** From the diagrams in the EIS this is the hardest to estimate percentage extraction. This is set to happen under the steep talus slopes that act as flying buttresses to hold up the cliffs.
- **Shallow zone** – first workings so around **30% extraction.**
- **New Hartley mine zone -** panel and pillar mining so 66% coal extraction under an area that already has had subsidence.

There are **key issues** involved here, being:

1) The largest area of mining is **Panel and Pillar mining zone**, where two thirds of coal is proposed to be mined and voids are proposed to be 61 metres. This is ***wider than three cricket pitches end to end***. The commitment of only mining half the coal - given verbally by Centennial to the Colo Committee and the Colong Foundation for Wilderness when Mugii Murum-ban SCA was created has been ***abandoned***. The price of coal has dropped and Centennial is now seeking to *maximise coal extraction* under slot canyons and superb pagodas and many overhangs (e.g. Valley of the Kings on Genowlan Mountain). Centennial considered in the EIS reducing this to 50 metres wide – which had less subsidence, but settled on 61 metre wide voids *purely to maximise coal extraction*. It describes this as 'optimum' but in fact the table on p. 228 clearly shows that a 50 metre void is more optimum in having less subsidence and substantially less tilt. 66% extraction would not be considered acceptable under a water storage or under a cathedral. These mesas are 'natural cathedrals, so 66% extraction is not acceptable here either. The EIS goes to great effort to seek to downplay subsidence impacts from these 61 metre voids. However, the geodiversity of Mugii Murum-ban needs to be protected for *thousands of years*, not just the life of this mine. With two thirds extraction, a major earth tremor or mini-quake in the future could well cause major subsidence and cliff collapse. By seeking to maximise coal extraction, *Centennial has abandoned the precautionary principle* and is increasing the risk of damage to the SCA. Void widths **should be only 40 metres wide with 40 metre pillars**. P. 228 of the EIS does not consider the reduced subsidence for a 40 metre wide void but does show that a 50 metre void has less subsidence (and a lot less tilt) than the 61 metre void proposed.
2) **Cliff line zone** – where it seems 30% of coal will be extracted (p. 224) in first workings. However, the EIS notes that cliffs on the mesas can be up to **120-150 metres high**. Genowlan Point and Point Hatteras are key examples of such superb cliffs. The EIS notes (e.g. p. 245) that up to ***5% of cliff lines could be damaged*** by subsidence. It seeks to suggest that this would just be 'isolated rock falls', but this is just wishful thinking. 5% damage to these high superb cliffs is unacceptable in a SCA. It is simply ***not acceptable to mine any coal under cliffs over 50 metres in height***. If this occurs under the tip of Genowlan Point (where there is faulting and jointing) then there is a very good chance that the only known population of *Pultenaea sp. Genowlan Point*, a critically endangered species rarer than the Wollemi Pine will be destroyed as this area collapses.
3) **Partial pillar extraction zone** – which is under the very steep talus slopes that effectively act as flying buttresses to hold up the high cliffs. The EIS is even harder to comprehend in terms of percentage extraction (going on the mine layouts) and there

are two variants – ‘single sided lifts’ and ‘double sided lifts’. However it seems extraction here will be around 50% for the former and 60% for the latter. Under steep talus slopes supporting high cliffs, we feel **these areas should be first workings only** – with 30% extraction. The precautionary principle tells us that this is appropriate to ensure the long term integrity of talus slopes and the cliffs they support. The maps provided in the EIS are inaccurate but the key historic ruins seem to lie above this zone (possibly the shallow zone). These ruins are of such significance that there should only be first workings (30% extraction) under all the ruins in whatever zone they are located.

High cliffs, Genowlan Point

4) **New Hartley shale mine zone** – this proposes to extract two thirds of coal under an area that has already had subsidence due to past oil shale mining. As a result it predicts ***half a metre subsidence***. The EIS states there has been prior subsidence (estimated around 300 mm) and argues there will not be further damage (other than additional surface cracking, p. iii) caused by 500 mm subsidence. This is irrational and no proof is provided. The cliffs in this zone are *directly upslope* of the historic oil shale mining ruins. The EIS points out that there are cracks caused by the earlier subsidence and that a major rock fall occurred in 1911 (from that estimated 300 mm subsidence). With half a metre subsidence planned, this is likely to be more severe, with possible further cliff collapse that damages these nationally significant ruins. 66% extraction is clearly inappropriate under this area, which *should be limited to first workings* (30% coal extraction).

In considering the above, the statement on p. 250 that 'sensitive features' will not be impacted on cannot be seen as the truth. Significant risk remains of major damage to a superb natural area. Centennial staff drew the attention of a colleague of mine to pillars in the Clarence Colliery bord-and-pillar extraction area, where the fretting of pillars too place until a stable slope was reached, such that the top of the pillar (that supporting the roof) is narrower than the base. This process was happening during the life of the mine. This indicates the need for wider pillars (such as the 40 metres proposed here). This is reinforced by the report of Dr Pells (2014) on the Airly EIS that referred to the destabilising influence of flooded voids on pillar strength. He noted this was especially relevant to first workings under high cliff-lines. Dr Pells has also pointed out that Clarence mine was sited extensively as a model for what is proposed at Airly. He points (Pells, 2014) out that:

> *a paper published in 20147 on Clarence Colliery records that the predicted subsidence range is 20mm to 30mm prior to flooding, with the average maximum above 31 different panels since 2003 being 24mm. Given that the experience at Clarence Colliery is the basis for the Airly Extension mine design, it is my opinion that the panel and pillar design should target the same surface subsidence as at Clarence, namely 20mm to 30mm, and therefore warrants redesign.*

However, the EIS indicates that subsidence could be up to 65 mm, more than twice that at Clarence colliery. Hence why the void widths need to be decreased and the pillar widths widened (where only 50% of coal is mined) to reduce subsidence to a similar level as at Clarence. While Centennial regularly points to their record in minimal subsidence at Clarence, given its desire to maximise coal extraction it seems to be pushing coal extraction beyond the level at Clarence and hence creating greater subsidence and much greater risk. This is unacceptable under an area of such high conservation significance.

However, by reducing the amount of coal extracted by some 10-15% by the changes suggested above, the precautionary principle would be brought into play and the risk of major damage strongly reduced.

2) Historic ruins

The oil shale ruins on the side of Mt Airly are not just of state significance (on the State Heritage list) but actually of *national significance*, though the EIS attempts to downplay their

significance and to downplay any likely impact on them, despite the fact that pp. 366-373 show many good photos of this fascinating heritage. P. 374 shows that 9 sites have 'high contribution'. The conclusion of this section that the heritage of the oil shale ruins is only of local significance is a travesty. They are already on the state heritage list, so clearly the claim they are of only local significance is incorrect. The National Trust Register lists these ruins and notes:

> *The Airly township is a rare example of an abandoned mining town uncompromised by later development and the remains of the miners' houses are both technically interesting and evocative of the hardships endured by miners in these locations. The Torbane refinery was significant for its role in the development of retorting technologies in the early twentieth century and for its prototyping of retorts later used at Newnes.*

The EIS makes the claim that subsidence under historic sites will only be between 0 and 10 mm, however this does not conform with any of the subsidence figures for the mining zones and is clearly an error. It sounds good but is not supported elsewhere in the document. Extraction should be **limited to first workings** (30% extraction) only under this important heritage (though 50-60% extraction seems to be proposed on p. 375).

German bake-house, Mt Airly historic ruins

3) Flora

I am a plant ecologist by training and have done many flora surveys throughout the Greater Blue Mountains, and carried out the original flora survey for Gardens of Stone NP. Both myself and Jan Allen of Mt Tomah Botanic Gardens (an accomplished field botanist) have made many trips to Genowlan mountain. We co-discovered *Pultenaea sp.* 'Genowlan Point' and investigated the She-oak/ Grasstree heathland. I later nominated both the Pultenaea under both the TSC Act and EPBC Act and the heathland under the TSC Act as an EEC. I am thus

intimately familiar with the flora of the plateau-top. The EIS in regard to its flora and flora study is a major step up from EAs such as that for Coalpac (which missed 100 plants). However, the flora list in Appendix H misses 13 plants, being:

Astrotricha obovata (uncommon plant, found on tip of Gen Pt)
Billardieara procumbens (heathland)
Callitris rhomboidea (Gen Pt)
Cryptandra amara (heathland)
Dampiera purpurea
Gonocarpus longifolius (**ROTAP** 3RC)
Grevillea arenaria subsp arenaria (on basalt near Gen Pt)
Isopogon prostratus (uncommon plant but common in heathland)
Micromyrtus sessilis (limit of range, heathland)
Persoonia myrtilloides (heathland)
Pseudanthus divaricatissimus (**ROTAP** 3RC heathland and Gen Pt)
Pultenaea sp. 'Genowlan Point' (**critically endangered**!)
Xanthorrhoea johnsonii (limit of range, heathland)

It thus fails to record two ROTAP species found in the SCA – *Pseudanthus divaricatissimus* and *Gonocarpus longifolius*. It does record the presence of the Pagoda Daisy *Leucochrysum graminifolium* but fails to acknowledge that this is ROTAP listed 2R. There are thus **three other ROTAP listed rare plants in the SCA** that are not acknowledged. Indeed the species list actually fails to list the critically endangered *Pultenaea sp.* 'Genowlan Point' plus fails to list the presence of *Xanthorrhoea johnsonii* and *Micromyrtus sessilis* (heathland), both at the limit of their range. *Xanthorrhoea johnsonii* was identified for us by David Bedford of the Tasmanian Botanic Gardens (the expert on this genus). The EIS also failed to note the presence of the uncommon *Astrotricha obovata* (IDed by RBG) found on the tip of Genowlan Point. This uncommon plant should probably be listed as vulnerable, it is just that nobody has got around to nominating it. On the road to Genowlan Point on the small basalt section one walks through a grove of *Grevillea arenaria subsp. arenaria* (identified by Bob Makinson of the RBG for me) yet this obvious large patch of the 2-3 metre shrub is not listed. It is of interest that previously the mint bush found at Airly Turret and near Genowlan Point in some abundance was IDed by Barry Conn of the RBG as *Prostanthera howelliae*. It has been now been correctly identified in the EIS as *Prostanthera stricta* (***vulnerable***), though both the drawings in the Flora of NSW and the PlantNet website do not resemble the reality, which is why we originally sent a collection in to the RBG. This adds yet another unusual plant to the list found in this area that is a hotspot for both biodiversity and geodiversity.

Genowlan Point heathland EEC

Genowlan Mountain and Point are actually hot spots of botanic biodiversity (as well as geodiversity). The failure to find 13 plants, 3 of which are ROTAP listed and two of which are very uncommon **raises concern as to the *thoroughness* of the botanical survey**. The failure to find an obvious species – *Grevillea arenaria subsp. arenaria* adds to this concern.

4) Pagoda description inaccuracies

As the co-author of the only real paper on pagoda geomorphology (Washington and Wray, 2011), I would dispute what is stated on p. 37 of the EIS regarding pagodas in the SCA. There are ***both*** smooth and platy pagodas present, with good examples of both types. Mugii Murum-ban SCA is an excellent showcase of pagoda geodiversity. Pagodas are also regularly greater than 20 metres in height (the EIS states they only reach this height).

'City in the Sky' north of Genowlan Mountain trig shows both excellent smooth pagodas as well as platy pagodas.

The suggestion on p. 38 that pagodas will typically crack but that total collapse does not happen is ***not*** a rule. In fact pagodas undercut by caves or that are tilted have collapsed from subsidence in other parts of the Western coalfields. As p. 38 notes, pagodas are 'sensitive surface features', for this reason one does not remove two thirds of the coal in voids 61 metres wide underneath them. The plan to remove 50-60% of coal under talus slopes (depending on depth of cover in partial pillar extraction areas) is reprehensible. One can liken it to removing half the flying buttresses that hold up tall cathedral walls. The claim on p. 38 that 66% coal extraction will have no effect on talus slope vegetation is also questionable as major cliff collapse will have major effects on this community.

Well-developed ***platy pagodas*** (centre of picture) on Genowlan Mountain, looking towards start of Genowlan Point

5) Hydrology, water flow and water quality

The EIS is quite dismissive of the impact that mining will have on the permanent water supplies on the mesas. It suggests that all creeks are ephemeral. While this is mostly true, the Grotto *always* has water in our experience in the pool below the slot canyon. There are also seeps and springs on other parts of the mesas. P. iv states there will be no draw down on the Grotto or Genowlan creek (other than a 100 metre section). Again, while this sounds comforting, this is a hopeful prediction not an absolute fact. The absolute fact is that hydrology will not change if they do not mine. It may be true that if they extract only 50% of coal it may not affect hydrology, but if 66% of coal is mined under these areas as proposed, the likelihood of irreversible impact on permanent water sources in the SCA is much increased. The precautionary principle tells us to minimise risk, and this is highly appropriate in such a high conservation area. The EIS admits that the Airly village spring is likely to stop flowing (used by an adjacent owner via poly-pipe) but blithely asserts that there will otherwise be no impact. This claim has been made in the past however for many other mining

proposals **where major change occurred to aquifers and water flow**. It is quite likely that the water flow to the Grotto will be decreased and ceases to be permanent. Other permanent water seeps (e.g. in cave at start of Genowlan Point) and pools in Genowlan Creek may also dry up. This will make it even harder for walkers to source water in the SCA. It is also likely to affect springs used by adjacent landowners. P. 42 states that there is a 'lack of water' on Genowlan Point. Having camped there many times, there ***is*** in fact seeps and drips for bushwalkers to use, just as Aboriginal people would have used them in the past (indeed one is near the boomerang art site).

p. iv states that there will be no measurable change in water quantity or quality in streams flowing to the world heritage area. It also notes however that flow to Airly creek in the WHA will increase by 14.5%. We are concerned that water quality into Airly creek will also decline. However, we remain unconvinced as to assurances of zero impact, given they have been made for every other mining proposal in the Western Coalfields, yet major changes in water quality and water pollution have resulted. For example, Centennial was fined over a million dollars by the Commonwealth for pollution of streams on Newnes plateau flowing to the World Heritage Area.

The current water management system is unsatisfactory as it mixes clean surface water with site runoff water and also combines these with mine effluent from the underground workings. This is a most unsatisfactory arrangement and contrary to any standard practice for water management for the last thirty five years. The arrangements are clearly illustrated on pages 100 and 101 of the EIS. Even the production bore water goes into the large dirty water dam, along with the water from the CPP. Centennial Coal does not explain its water management in section 3. Why are clean and dirty waters mixed with mine effluent in the largest storage on the site? Surely it is better to minimise the dirty water and the mine effluent, so that these waste waters can be first used as operational process water, as is proposed for runoff from the reject emplacement area. The REA water is proposed to go to the 109ML large storage dam.

The water management plan needs to be rethought so that the dirty water is sorted SEPARATELY and used in preference for mine process water. Any overflows from these separate storages should then be diverted to the large storage dam. This would be a far better arrangement to minimise discharge of toxic water from the site, rather than risk maximising it, albeit in diluted form.

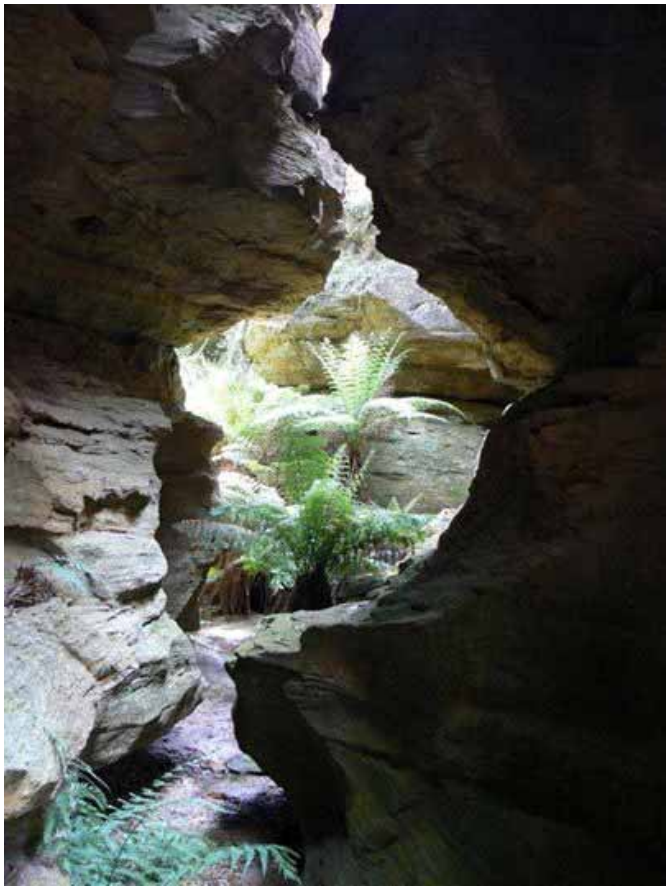
6) Failure to adequately discuss the risk of extinction to the critically endangered *Pultenaea sp.* 'Genowlan Point'

I was the co-discoverer of *Pultenaea* sp. 'Genowlan Point' (NSW 417813) and nominated it as endangered under the TSC Act and then as critically endangered under the EPBC Act. Only around 20 plants remain right on the very tip of Genowlan Point. Despite this (and the fact that the cliff below is over 120 m high), Centennial plans to extract 30% of coal under such cliffs, with some associated subsidence. Genowlan point has a fault and extensive jointing. The risk of the very end of the point collapsing is very real. Despite this, on p. 345 and 354 of the EIS it states that the proposal poses no long term risk of a decrease in the population of

this EPBC listed species. This is a ***direct and blatant untruth***, as the only known population runs serious risk of being sent extinct via cliff collapse. This deception is both unprofessional and unacceptable.

7) Slot canyon misrepresentation

P. 39 states that narrow deeply incised gorges are 'quite common' throughout the Blue Mountains. This is true of gorges but quite untrue of slot canyons such as the Grotto and Valley of the kings. Slot canyons are mainly limited to the north-west edge of Wollemi NP and Gardens of Stone. The extent of slot canyons in this area is arguably of international significance (Washington and Wray 2014). The Grotto is thus not just another boring old gorge, it is a *slot canyon*, a significant landform on the national and international stage.



The Grotto – a distinctive *slot canyon* (significant on international level), not a 'common' gorge

8) Misleading greenhouse gas information

This EIS shares (with other coal EISs) a generic blindness in regard to overall greenhouse gases produced by coal mining projects – it ignores the actual burning of the coal itself! This is because it is not burnt on site. However this in effect is 'smoke and mirrors', the atmosphere and global warming does not consider such paltry distinctions. This project will produce 1.8 million tonnes of coal a year. At a carbon content of 66%, this means one tonne of coal produces 2.2 tonnes of CO_2, hence the mine will produce 4 million tonnes of CO2 a year while in production. Australia's annual emissions of CO_2 (from the March Quarterly update for 2014) are 542 million tonnes of CO_2. The Airly mine CO_2 production is thus

0.73% of total Australian emissions – a considerable addition to global warming and climate change. This is the realistic comparison of the climate impact of the proposed mine, not the 0.002% stated on p. 432, produced by using the smoke and mirrors of the scope 1-3 methodology that ignores the burning of the coal if it is off site. The fact remains that this proposal is a significant greenhouse gas producer that will accelerate climate change, while Australia is a country that is very much at risk from climate change. To avoid runaway climate change, most of our remaining fossil fuels *need to be kept in the ground*, as noted by over 98% of climate scientists and most Academies of Sciences around the world.

Other points

Fauna

The Colo Committee has seen a breeding pair of the threatened **Peregrine Falcon** on Genowlan Point but these are not listed in the EIS.

World Heritage Area

p. 349 of the EIS downplays the impact of the proposal on the Greater Blue Mountains World Heritage Area. It fails to note however that the GBMWH Advisory Committee has identified Mugii Murum-ban SCA as an area that ***should be added*** to the WHA once mining ceases – provided that mining has not damaged the biodiversity and geodiversity of the SCA.

Missed Aboriginal art site

We question the thoroughness of the archaeological study, since if failed to identify an art site on the creek that runs up to Airly Turret from the stone cottage. This has charcoal animal drawings, which (while faint) are still visible. See below for charcoal outline of a tortoise there.

Inaccuracy re diamond mining

This was carried out on Airly Turret not Genowlan mountain. While Airly Turret is in fact on the Genowlan mesa and not the Airly mesa, nevertheless, the headwaters of Genowlan Ck separate it from the rest of Genowlan mountain, and it has a different name.

Conclusion and recommendations

This proposal is for mining under one of the most significant spots of natural heritage in NSW, an area of high biodiversity and geodiversity significance. That is why it is a State Conservation Area, that is why the Greater Blue Mountains World Heritage Area Advisory Committee would like to add the area the World Heritage Area in the future (if this mining proposal does not damage it). Let us be sure of what is at stake here – the 'jewel in the crown' of the Capertee Valley is at risk of significant degradation.

The key issue to be considered in this EIS should have been stated honestly up front – the percentage of coal to be extracted in the different mining zones. Instead, Centennial has sought to ***hide this percentage***. Why? Because if it was up front it would have to admit that it was breaking the commitment made to community groups such as the Colo Committee and the Colong Foundation for Wilderness in the past – that only 50% of coal would be mined. Instead, any reader of the EIS has to look at the mining layouts to discover that under most of this superb area 66% of coal is to be mined, leaving 61 metre voids (three times the length of a cricket pitch) below this superb area. We are expected to believe that this is *safe for all time*, not just for the 20 year life of the mine. We are asked to believe that with two thirds of the coal removed and huge voids under this special place, that a future earth tremor or small

earthquake will not then bring down cliffs and pagodas and slot canyons and significantly damage the surface of the SCA. Many of us in the Colo Committee are scientists, ***we do not accept such assurances***, given the failure of similar assurances over more than three decades on the Western coalfields. This EIS proposes too great an extraction of coal in the interests of Centennial making a greater profit. The price of coal has dropped since the original promise of taking only half the coal. Accordingly, the EIS now ignores the precautionary principle and puts at risk both a critically endangered species (*Pultenaea sp.* 'Genowlan Point'), and Endangered Ecological Community, areas of internationally significant pagodas and slot canyons and high cliffs that are a *major tourist attraction* for those that visit the area. It puts the SCA itself of risk of major degradation.

Yet it doesn't have to. Centennial could return to its earlier promise to only mine half the coal under the SCA. The precautionary principle could be applied and less coal would be extracted under the area. The Colo Committee does not oppose all coal mining under the SCA, just the current escalation of coal extraction that has substantially increased the risk of subsidence and cliff collapse. Hence **our recommendations** are:

- Cliffs over 50 metres in height should have **no coal extraction under them**, even 'first workings' that remove 30% of coal. This would protect the high cliffs of Genowlan Point and the critically endangered Pultenaea and the heathland EEC, plus protect the high cliffs of Point Hatteras and Mt Airly.
- Reduce coal extraction to **50% in the pillar and panel zone** so that voids are 40 metres wide with 40 metre pillars to ensure *long term protection* of the surface of Mugii Murum-ban SCA (and its high conservation biodiversity and geodiversity)
- Reduce coal extraction on the steep **talus slopes to first workings only** – 30% extraction, not the extraction of 50-60% proposed in the EIS for the partial pillar extraction zone.
- Reduce coal extraction to **first workings (30%) in the New Hartley mine zone** to minimise further subsidence that could cause cliff collapses to damage the significant historic oil shale ruins.

These recommendations may well reduce coal extraction by 10-15% overall. However they would allow a *much safer coal project* that would not run the risk of significantly damaging this superb State Conservation Area. The Colo Committee believes that if coal mining cannot be done in a 'safe way' that ensures the long term protection of the SCA, then it should not proceed. We urge the State government to ensure that if the mine is approved it is only approved with the above safeguards to protect this 'jewel in the crown' of NSW's natural heritage. Public opinion, local opinion, and the regard of future generations of Australians requires we get it right to protect Mugii Murum-ban SCA. The current proposal fails in this by *abandoning the precautionary principle* in the interests of maximising coal extraction. However it is the responsibility of the Department of Planning to ensure under the objects of the EP&A Act that ***the precautionary principle is upheld***. The recommendations above ensure that this is the case and we urge the Department to amend the proposal accordingly.

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