Annex A

Aboriginal Consultation Log

Table A.1 Consultation Stage 1: Advisory Requests

Date	Organisation/group/individual	Contact Name	Details
28-Jun-07	Native Title Services	N/A	Search of NNTT website of Lake Macquarie LGA shows 7 claimant applications, none of which are active. Three of these were for Wonnarua Tribal Council and were discontinued, one was for the Boongary Clan of the Taurai People which was discontinued, one was for Jamie Roy Denniss which was discontinued, one was for Mimaga Wajaar Traditional Custodians Wanuruah Claim and was dismissed, and one was for the Wonnarua People and was discontinued.
28-Jun-07	DECC	Brendan Diacono	Email requesting groups to consult. Letter received 4/07/07 identifying three Aboriginal parties who may be interested in being consulted: Guringai Tribal Link Aboriginal Corporation (who we're already consulting), Mur-Roo-Ma Inc. and Arthur C. Fletcher.
28-Jun-07	Registrar of Aboriginal Owners	Megan Mebberson	Email requesting groups to consult. Email received 29/06/07 specifying that no Aboriginal owners are known for the area.
28-Jun-07	Wyong Shire Council	Chris Ferry	Email requesting groups to consult. Email received 4/07/07 directing us to contact DECC, which we have already done.
28-Jun-07	Lake Macquarie City Council	Mary Loder	Email requesting groups to consult. Resent on 25/07/07 as no response had been received. Email received 8/8/07 saying to contact LALC.
1-Oct-07	Wallsend Leader newspaper	N/A	Ad to appear on 1 October 2007, given response date of 15 October 2007 –no responses received
19-Oct-07	Awabakal Local Aboriginal Land Council	Ron Gordon	Phone call discussing project and checking whether a representative would be available for survey. Email to this effect giving details, map and requesting groups to consult.
19-Oct-07	Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer	Phone call discussing project and checking whether a representative would be available for survey. Email to this effect giving details, map and requesting groups to consult.
19-Oct-07	Awabakal Descendents Traditional Owners Aboriginal Corporation	Shane Frost	Phone call discussing project and checking whether a representative would be available for survey. Email to this effect giving details, map and requesting groups to consult.
19-Oct-07	Kukuyngal Barritjapa	John Thorpe	Phone call discussing project and checking whether he would be available for survey. Email to this effect giving details, map and requesting groups to consult. Following consultation with Local Aboriginal Land Council, decision made that John Thorpe would represent the ALALC on survey.

Table A.2 Consultation Stage 1: Aboriginal Group Registrations Received

Date	Organisation/group/individual	Contact Name	Details
19-Oct-07	Awabakal LALC	Ron Gordon	Phone call registering interest.
19-Oct-07	Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer	Phone call registering interest.
19-Oct-07	Awabakal Descendents Traditional Owners Aboriginal Corporation	Shane Frost	Phone call registering interest.
19-Oct-07	Kukuyngal Barritjapa	John Thorpe	Phone call registering interest.

Table A.3 Consultation Stage 2: Briefing and Methodology Advice Sent

Date	Organisation/group/individual	Contact Name	Details
22-Oct-07	Awabakal LALC	Ron Gordon	Email of methodology and invitation to participate in fieldwork; survey date of 29 Oct to 2 Nov 2007.
22-Oct-07	Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer	Email of methodology and invitation to participate in fieldwork; survey date of 29 Oct to 2 Nov 2007.
22-Oct-07	Awabakal Descendents Traditional Owners Aboriginal Corporation	Shane Frost	Email of methodology and invitation to participate in fieldwork; survey date of 29 Oct to 2 Nov 2007.
22-Oct-07	Kukuyngal Barritjapa	John Thorpe	Email of methodology and invitation to participate in fieldwork; survey date of 29 Oct to 2 Nov 2007.

Table A.4 Consultation Stage 2: Aboriginal Comments Received

Date	Organisation/group/individual	Contact Name	Details
22-Oct-07	Awabakal LALC	Ron Gordon	Phone conversation to confirm scope of the survey, route, intended participants and any further comments. Agreed with ERM's approach.
22-Oct-07	Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer	Phone conversation to confirm scope of the survey, route, intended participants and any further comments. Agreed with ERM's approach.
22-Oct-07	Awabakal Descendents Traditional Owners Aboriginal Corporation	Shane Frost	Phone conversation to confirm scope of the survey, route, intended participants and any further comments. Agreed with ERM's approach.
22-Oct-07	Kukuyngal Barritjapa	John Thorpe	Phone conversation to confirm scope of the survey, route, intended participants and any further comments. Agreed with ERM's approach.

Table A.5 Consultation Stage 3: Draft Report Sent

Date	Organisation/group/individual	Contact Name	Details
After initial client review	Awabakal LALC	Ron Gordon	
After initial client review	Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer	
After initial client review	Awabakal Descendents Traditional Owners Aboriginal Corporation	Shane Frost	
After initial client review	Kukuyngal Barritjapa	John Thorpe	

Table A.6 Consultation Stage 3: Aboriginal Comments Received – During Charette

Date	Organisation/group/individual	Contact Name	Details
Nov 07	Awabakal LALC	Ron Gordon	Discussion of report, findings and recommendations during charette 19-22 Nov. Agreed with the results and fed further comments directly into the charette process. Results of this process have been used to modify concept plans for MLR.
Nov 07	Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer	Discussion of report, findings and recommendations during charette 19-22 Nov. Agreed with the results and fed further comments directly into the charette process. Results of this process have been used to modify concept plans for MLR.
Nov 07	Awabakal Descendents Traditional Owners Aboriginal Corporation	Shane Frost	Discussion of report, findings and recommendations during charette 19-22 Nov. Agreed with the results and fed further comments directly into the charette process. Results of this process have been used to modify concept plans for MLR.
Nov 07	Kukuyngal Barritjapa	John Thorpe	Discussion of report, findings and recommendations during charette 19-22 Nov. Agreed with the results and fed further comments directly into the charette process. Results of this process have been used to modify concept plans for MLR.

Annex B

Effective Coverage Table

Table B.1 Effective Coverage

Transect	Landform	Length (m)	Width (m)	Area (m²)	Visibility	Exposure	Visible area (m²)	Area available for detection (m²)	% Effective coverage
1	Slope	542	3	1626	100%	100%	1626	1626.0	100%
2	Steep Slope	308	10	3080	100%	100%	3080	3080.0	100%
3	Flat	207	10	2070	100%	100%	2070	2070.0	100%
4	slope	536	3	1608	100%	100%	1608	1608.0	100%
5	downhill slope	279	2.5	698	90%	100%	627.75	627.8	90%
6	steeper slope	371	2.5	928	90%	100%	834.75	834.8	90%
7	Ridgeline	1010	2.5	2525	90%	100%	2272.5	2272.5	90%
8	Slope off ridge	382	2.5	955	100%	100%	955	955.0	100%
9	slope	924	0.5	462	100%	100%	462	462.0	100%
10	steep slope down ridge	731	1	731	100%	100%	731	731.0	100%
11	slope	324	0.5	162	100%	100%	162	162.0	100%
12	slope	462	1	462	100%	100%	462	462.0	100%
13	road	418	3	1254	0%	100%	0	0.0	0%
14	slope	876	1.5	1314	100%	100%	1314	1314.0	100%
15	steep bank	133	1	133	0%	100%	0	0.0	0%
16	slope	650	3	1950	100%	100%	1950	1950.0	100%
17	slope	701	8	5608	100%	100%	5608	5608.0	100%
18	ridge	436	3	1308	100%	100%	1308	1308.0	100%
19	upper flat	403	5	2015	100%	100%	2015	2015.0	100%
20	Slope off ridge	507	5	2535	100%	100%	2535	2535.0	100%
21	Ridgeline	561	3	1683	100%	100%	1683	1683.0	100%
22	Slope off ridge	1021	3	3063	100%	100%	3063	3063.0	100%
23	Ridgeline	288	3	864	100%	100%	864	864.0	100%
24	slope	681	4	2724	100%	100%	2724	2724.0	100%
25	Ridgeline	377	3	1131	100%	100%	1131	1131.0	100%
26	upper flat	473	3	1419	100%	100%	1419	1419.0	100%
27	steep slope down ridge	472	2	944	100%	100%	944	944.0	100%
28	ridge top	200	1	200	100%	100%	200	200.0	100%
29	slope down ridge	801	1	801	100%	100%	801	801.0	100%
30	slope	647	2	1294	100%	100%	1294	1294.0	100%
31	slope	100	1	100	0%	100%	0	0.0	0%
32	ridge top	492	1	492	100%	100%	492	492.0	100%

Annex C

Review of Historical Aerial Photographs

C.1 HISTORICAL AERIAL PHOTOGRAPHY

Historical aerial photographs were obtained of the Minmi area for the years 1954, 1966, 1975, 1984 and 1996 (*Figures C.1 – C.5* respectively). The extent of each of these photographs varies slightly but is still able to provide valuable information regarding the development of Minmi presenting an overall view of the progression of open cut mining in the area over a 40 year period. The 1984 aerial is shown below (*Figure C.4*) with annotations which are made reference to in the text. Each area of open cut mining is labelled A through F to allow for easy identification of the points made reference to in the following text.

C.1.1 1954

The 1954 aerial (*Figure C.1*) photograph shows the southern end of Minmi and the forested land to the south and west of the town. This image demonstrates a buffer of around 100 metres of relatively un-forested grassland and open cut mining (Point A on aerial) extending around 300 metres into a ravine to the south-eastern edge of this grassland.

C.1.2 1966

The 1966 aerial photograph (*Figure C.2*) shows a greater extent of the area around Minmi particularly to the south. It is apparent that the south west mine has been extended and open cut mining has occurred to the north of A (Point B on aerial). This image also demonstrates further mining to the western edge of Minmi (Point C on aerial).

C.1.3 1975

This aerial (*Figure C.3*) shows greater detail of the northern part of Minmi, revealing a small area of what is thought to be open cut mining to the north end of the study area (Point C on aerial). At this time the mining operations in the south-eastern edge of Minmi have become more clearly visible and two distinct, areas of mining can be seen (Points E & F), the beginnings of which were first seen in 1966.

C.1.4 1984

In the 10 years following 1975 the mining operation to the south-east of Minmi appears to have increased significantly, as shown by the 1984 aerial photograph (*Figure C.4*). The two areas of mining mentioned earlier (Points E & F) remain distinct from one another and have expanded in a North-South direction. At this time the more western of the two mines extents approximately 1 kilometre north to south whilst the eastern mine is around 1.5 kilometres north to south, tapering at the northern end. The 1984 aerial shows that there is minimal expansion of the other open cut mines.

C.1.5 1996

By 1996 it appears that the mines are no longer in use as the aerial photograph (*Figure C.5*) of the area shows the surrounding bushland beginning to reclaim the area. The two aforementioned sites of open cut mining in the south-east of Minmi are still clearly distinguishable at this time.

C.2 SUMMARY

Over the 42 years between 1954 and 1996, the extent of the area of un-forested grassland surrounding the town of Minmi appears to have changed very little, and evidence of an expanding mining operation is clearly visible. The main concentration of this mining was to the south-east (Points E and F), outside the study area. There are a few, smaller open cut mines visible: to the north (Point B) of the point where the main operation began (point a); the northern extent of Minmi (Point D) and; on the eastern edge of the town itself (point C). All of these other, smaller areas (Points B, C and D) fall within the study area. Mines B, C and D appear to have not been in operation after 1975.

G:\GIS\Jobs\2007\0073083\0073083_GIS07_R0.wor 23/11/2007 Environmental Resources Management Australia Pty Ltd

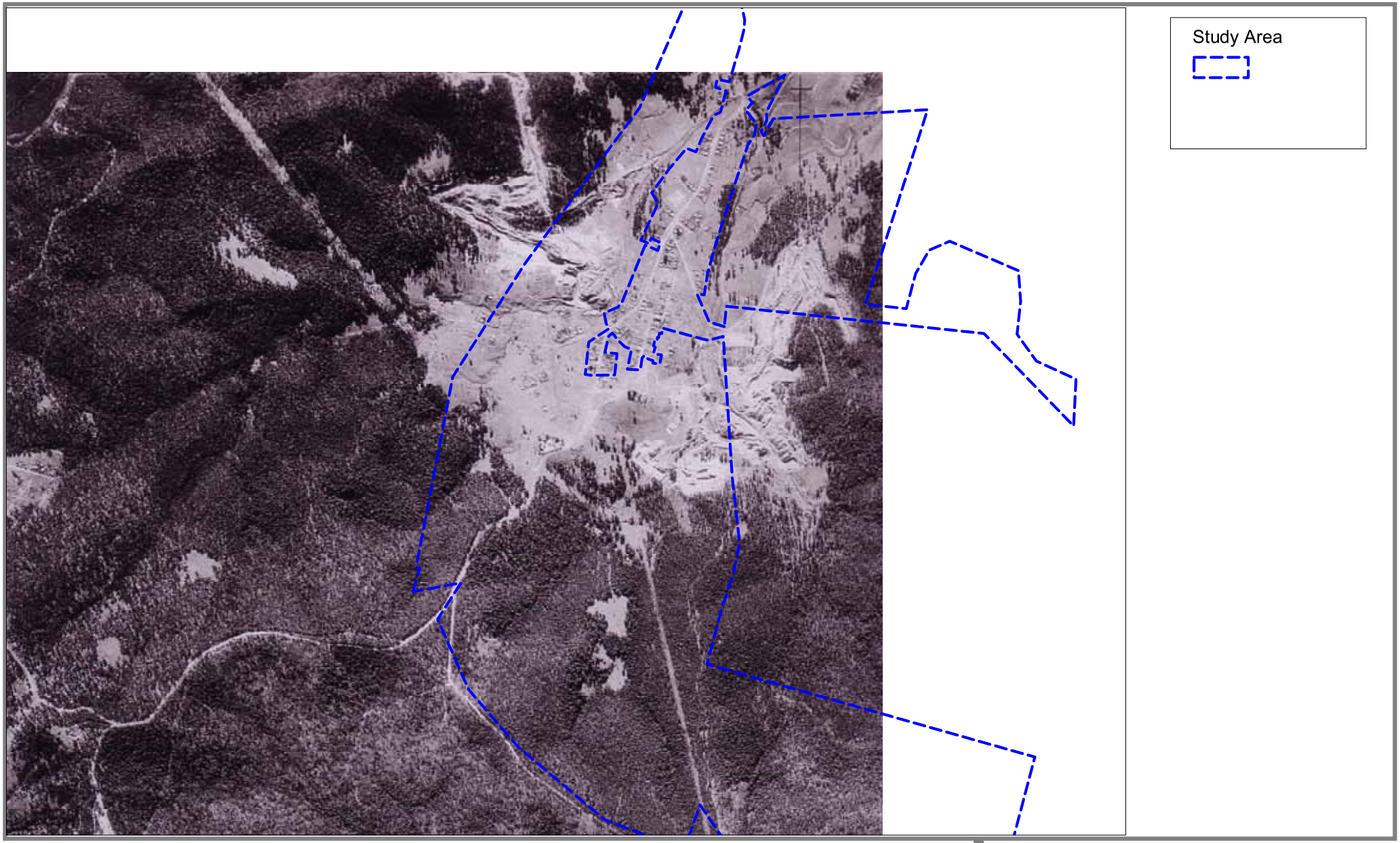
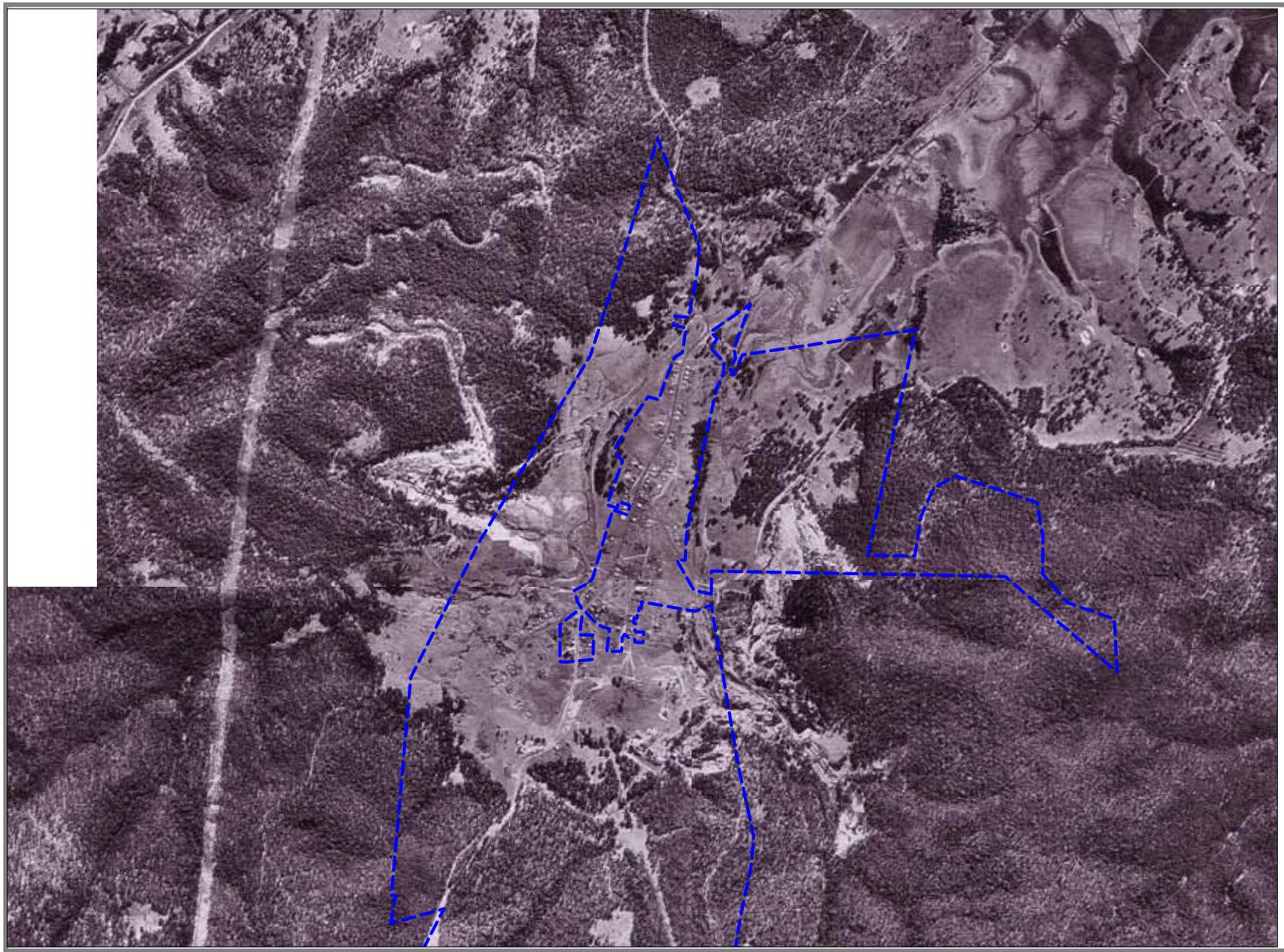


Figure C.1 1954 Aerial Showing Mine Sites

Client: Catylis
Project: Minmi/Link Road

G:\GIS\Jobs\2007\0073083\0073083_GIS07_R0.wor 23/11/2007 Environmental Resources Management Australia Pty Ltd



Study Area

0 450 900

metres

Figure C.2 1966 Aerial Showing Mine Sites

Client: Catylis
Project: Minmi/Link Road

G:\GIS\Jobs\2007\0073083\0073083_GIS07_R0.wor 23/11/2007 Environmental Resources Management Australia Pty Ltd

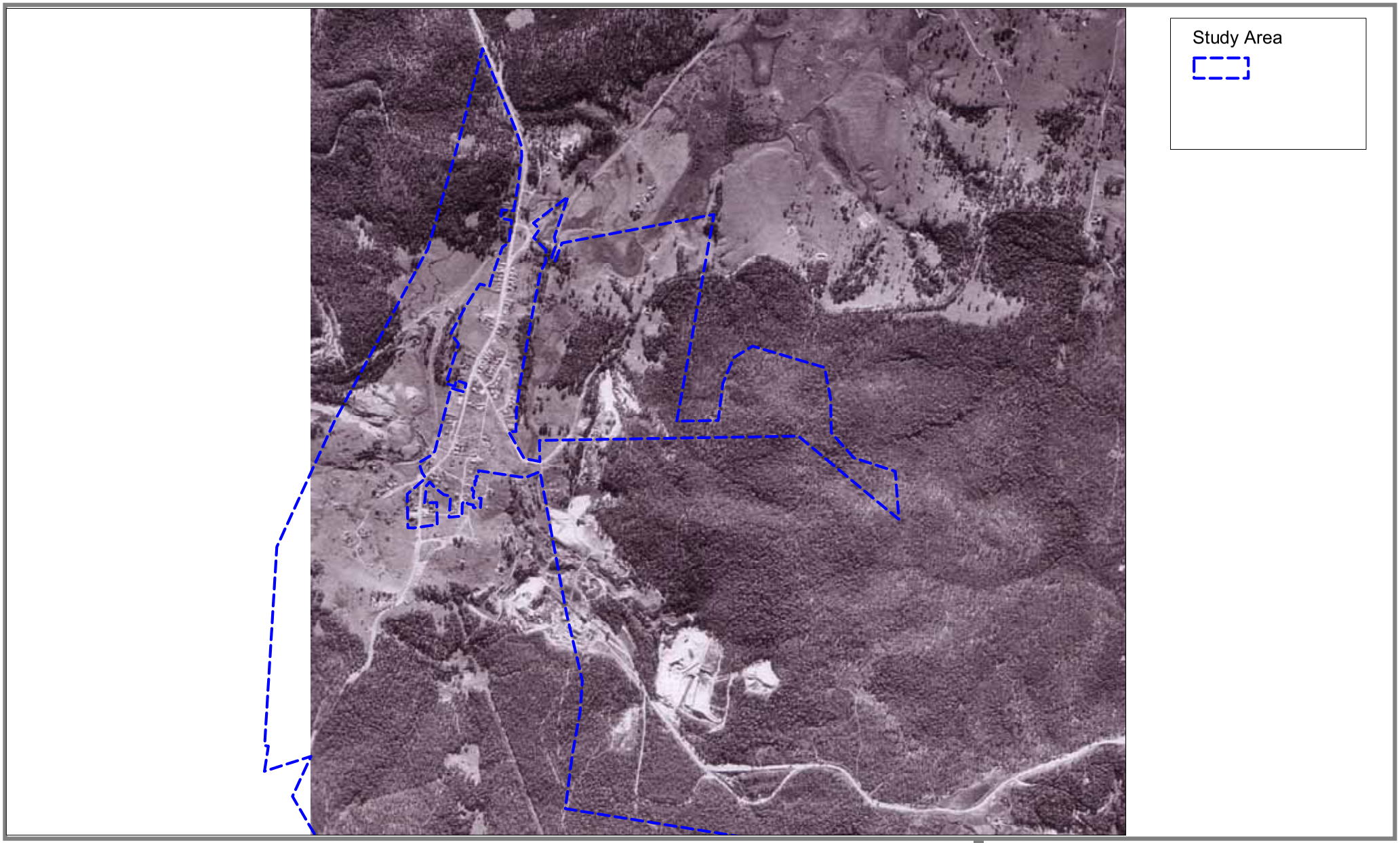


Figure C.3 1954 Aerial Showing Mine Sites

Client: Catylis
Project: Minmi/Link Road

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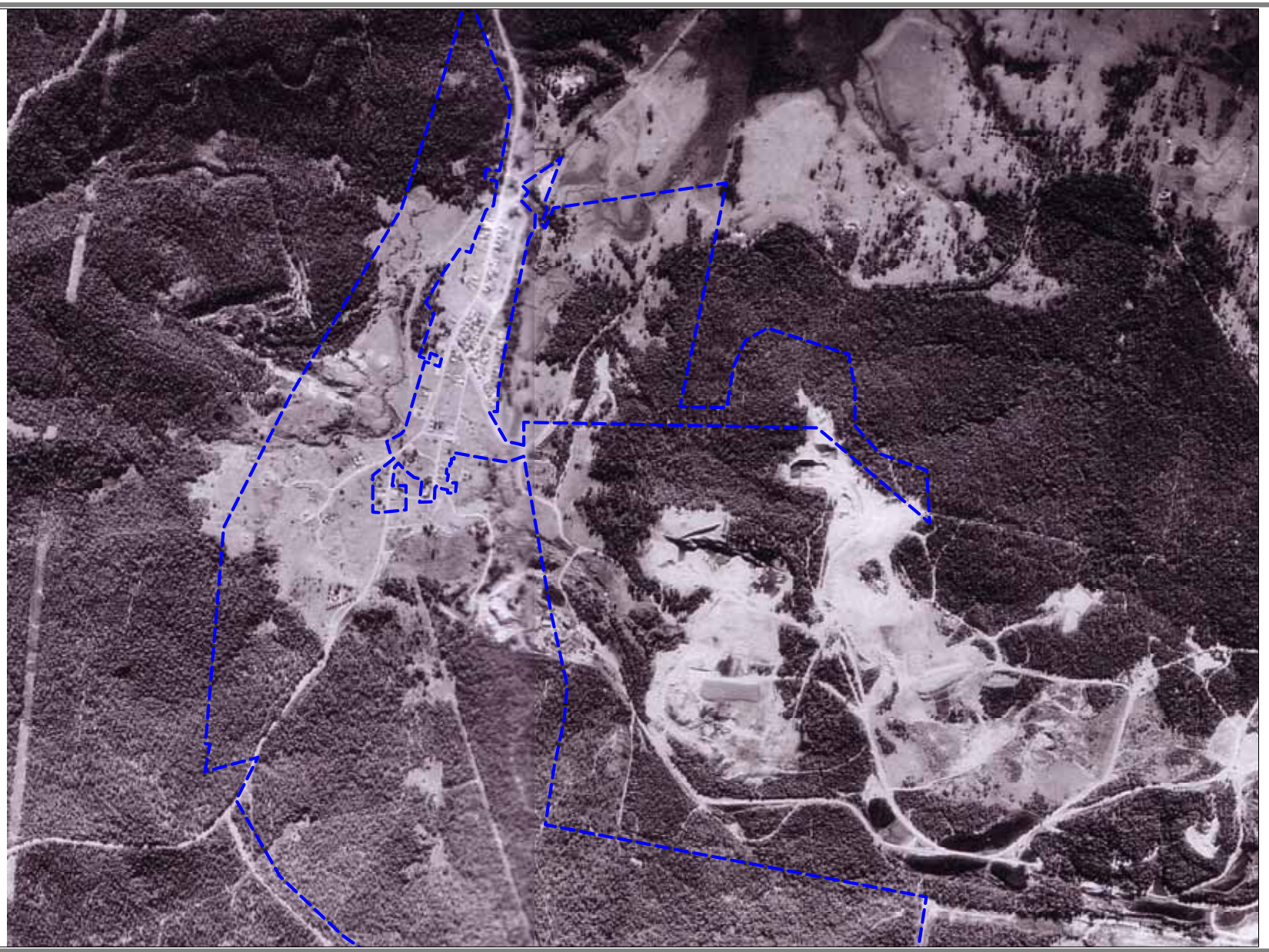

Study Area

0 450 900

metres

Figure C.4 1984 Aerial Showing Mine Sites

Client: Catylis
Project: Minmi/Link Road

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Study Area

0 450 900

metres

Figure C.5 1996 Aerial Showing Mine Sites

Client: Catylis
Project: Minmi/Link Road

Annex D

Minmi Significant Historical Characters

D.1 MINMI SIGNIFICANT HISTORICAL CHARACTERS

The following information on John Eales and members of the Brown family is extracted from the Australian Dictionary of Biography available online.

D.1.1 John Eales

EALES, JOHN (1799-1871), grazier and pioneer pastoralist, was born on 28 March 1799, at Ashburton, Devonshire, England, the son of John Eales, farmer, and his wife Elizabeth, née Leaman. The name Eales dated back to Norman times, the family seat being Berry Pomeroy Castle at Totnes, Devonshire.

Deciding to emigrate to New South Wales, Eales applied to Earl Bathurst, a family friend, for rights to select land in the colony, which he received on 24 October 1822. He arrived at Hobart Town on 19 August 1823 in the *Francis*, with letters of introduction to Governor Sir Thomas Brisbane. After a brief stay he went to Sydney and thence to the Hunter River district, where he selected his grant of 2100 acres (850 ha) about four miles (6.4 km) from Morpeth. With the aid of one servant, 'Jim-the-Londoner', he cleared some 200 acres (81 ha) and planted it with wheat. The estate, which he named Berry Park, soon became one of the finest in the district and by 1831 was yielding an annual return of 10,000 bushels. Trouble with rats forced him to build giant iron tanks to hold grain, possibly the first silos used in the colony.

Soon afterwards his interest turned to grazing, and in the 1830s he acquired by purchase and squattage a number of runs on the Liverpool Plains, the largest being Walholla and Queepolli. In the early 1840s he became the pioneer pastoralist of the Maryborough district, although it is doubtful that he himself ever visited the area. About 1842 he sent his superintendent, Joliffe, on an expedition to the area north of Moreton Bay to report on the suitability of land for sheep and cattle grazing. Joliffe explored the country around Wide Bay and sent glowing reports. Impressed with his findings, Eales bought some 20,000 sheep and authorized his superintendent to take up a large amount of land on his behalf. Joliffe established a head station at Tiaro, some twenty miles (32 km) south of the present Maryborough, and out-stations at Gigoomgan and Owanyilla. In March 1843 Dr S. Simpson, commissioner of crown lands, visited these stations and in his journal spoke favourably of them. Soon afterwards Joliffe began to have trouble with attacks by Aboriginals on sheep and shepherds. In June 1844 the *Sydney Morning Herald* noted that Eales had been forced to send most of his sheep to Moreton Bay because, although the land to the north was excellent for grazing, difficulties with Aboriginals and supplies prevented its profitable occupation. A month later many of his sheep were seized by the commissioner for crown lands at Moreton Bay to enforce payment of a large sum due for assessment, but later the claim was withdrawn. After some years Eales had to abandon the northern stations altogether.

At the end of the 1830s Eales turned his attention to the development of shipping services in the north. Alarmed at the uncertain and irregular shipping between Morpeth and Sydney, and its effect on exports from the Maitland district, he convened a meeting of interested parties in Sydney in July 1839 to discuss the formation of a new shipping line. As a result the Hunter River Steam Navigation Co. was established with a capital of £40,000 in two thousand shares of £20, Eales being a principal shareholder and a director. Almost immediately an order was placed with Fairbairn & Co., shipbuilders of England, for three steamers. These ships, the *Rose*, the *Shamrock* and the *Thistle*, began services between Morpeth and Sydney in the 1840s. In 1841 Eales built a dry dock for the use of the company's vessels, on the river at the base of his property. Ten years later the company was incorporated as the Australian Steam Navigation Co., with Eales still on the board of directors.

At the beginning of the 1840s, he established a boiling down works at Berry Park. In August 1844 the *Sydney Morning Herald* claimed that he was a pioneer in boiling down on his own property instead of sending sheep and cattle to public establishments for treatment. Although the prevailing feeling in the colony was against the importation of coloured labour, Eales brought out a number of Chinese to work on his estate, and in 1842 his name appeared as a member of an association formed to promote the immigration of Indian labourers to the colony. In 1844 he was one of a number of graziers who protested vigorously against the new squatting regulations of Governor Sir George Gipps. As a result of a public meeting held in Maitland in April 1844 he was appointed to a district committee who drew up a petition for an inquiry into the system of letting lands beyond the boundaries, and the means of imposing and collecting tax on cattle and sheep in these districts.

About this time coal was discovered on his estate. Recognizing the possibilities of the youthful coal-mining industry, he began mining near Minmi in defiance of the Australian Agricultural Co.'s monopoly. Within several years he was exporting large quantities of coal from the Duckenfield collieries, and in 1848 the Sydney Gas Co. chartered the *Currency Lass* to carry his coal to Sydney. By an Act of parliament Eales and his partner Christie gained official sanction to build a railway line connecting the mines with the Hunter River at Hexham. About 1859 Eales sold the mine and railway to the brothers, James and Alexander Brown.

In company with many other large landed proprietors, Eales suffered from the effects of the depression in the early 1840s but soon made good his losses. He had more than 16,000 acres (6475 ha) of freehold in the Maitland district and some twenty stations in New South Wales. In 1853-54 he sold many of these stations and a number of his suburban allotments. About this time he began building a mansion on the Duckenfield estate. The mansion, Duckenfield Park House, was completed and enlarged by his son John.

Throughout his life, Eales was actively interested in horse-racing, and as early as 1833 had organized the first race meeting held in the Hunter River district. At Duckenfield he made a private race-course and bred blood stock. He died at Duckenfield on 1 April 1871. Known to many as the 'One-Man-Settler', Eales was reputedly one of the wealthiest men in New South Wales. A man of great versatility and independence, everything he touched seemed to prosper.

He had married Jane Eleanor Grisley, née Lavers, at Upper Paterson in February 1828 and had five children. One son, John Eales junior (1831-1894), became a noted breeder of blood stock, and in 1880-94 was a member of the Legislative Council.

(http://www.adb.online.anu.edu.au/biogs/A010328b.htm)

D.1.2 Alexander Brown

BROWN, JAMES (1816-1894) and ALEXANDER (1827-1877), colliery proprietors and merchants, were born in Lanarkshire, Scotland, sons of Alexander Brown and his wife Mary, née Hart. Like his father, James (b.3 August 1816) was a hand-loom weaver and agricultural labourer before the family migrated to Sydney in 1842. As a bounty immigrant he had engaged to work on a farm but the family settled at Newcastle and James worked in James Mitchell's tweed factory at Stockton. In 1843 he leased eighty acres (32 ha) of land at Four Mile Creek, near East Maitland, and assisted by his brothers John (1823-1846) and Alexander (b.26 June 1827) began to mine outcropping coal for sale in Maitland and Morpeth.

Since the coal in this land had been reserved by the Crown in an agreement with the Australian Agricultural Co. designed to protect its investment in mines at Newcastle, the Browns were warned to stop mining or face prosecution for intrusion. The company had been tolerating small-scale mining for local use but took action when the Hunter River Steam Navigation Co. accepted Brown's tender to supply about 4000 tons of coal a year at 5s. 11d. a ton: it had been paying 13s. a ton for Australian Agricultural Co. coal. Other producers were entering the Sydney market and competition had reduced the price of coal to 7s. by 1847. These price reductions and the threat of legal action drove almost all the newcomers from the industry but James Brown persisted.

In the Supreme Court in August 1845 Brown's counsel argued that the agreement between the company and the British government was illegal as it tended to promote a monopoly, and also disputed the Crown's right to reserve coal on land which it sold. James Brown was found guilty of intrusion, fined 1s. and ordered to pay the costs of the action. To recover costs the bailiff forced the family from the lease at such short notice that the twelve dwellings built there had to be left and a further £147 was lost in the move. The barristers, Richard Windeyer and Robert Lowe, who had represented Brown in the first trial, sought a retrial. Similar legal arguments were used and again rejected by the Full Court: 'a variety of topics … with which we have, as Judges, nothing to do and which were of too popular a character, merely, to justify further notice by us'. The Australian Agricultural Co., anticipating further difficulty in maintaining its position, hastened to negotiate the end of the agreement on advantageous terms and its termination was announced in Sydney on 17 August 1847. The advent of open competition and the lower price of coal in 1845-52 were largely due to the challenge of James Brown.

Meanwhile James had formed a partnership with John Eales, whose land grant predated the company's agreement, and continued to supply the steamships which linked Sydney and Maitland. After several more years of small-scale mining in the East Maitland area James and Alexander Brown, now partners, moved to the Burwood estate south of Newcastle in 1852 to develop a new mine which yielded large quantities of coal at a time when it was selling for as much as £1 10s. a ton in Newcastle. By 1857 the brothers owned valuable property in Newcastle, a ship-chandlery and import-export business, and at least one ocean-going ship. Alexander emerged as the more enterprising of the partners and after the amalgamation of the Burwood estate mines in 1856 he became the manager before taking one of their own ships to Java in 1857. His outward cargo was coal and on the homeward run the ship carried rum, sugar and coffee, the first direct import of such goods to Newcastle.

The brothers returned to mining in 1859 by acquiring the Minmi colliery and its railway to Hexham. They increased its output from 44,000 tons in 1860 to 111,000 tons in 1862. This increase in sales was achieved by reducing prices and by shipping coal on their own account to New Zealand, China and North America as well as to colonial ports. Simultaneously the Minmi private township was developed and one of the most elaborately equipped engineering workshops in the colonies was set up there to service their locomotives and steamships. The firm was already employing the first screw collier used in Australian waters and had bought a tug, the second in Newcastle and first of a long line operated by the Browns. These achievements enabled the brothers to sell a half interest in their Minmi property for £75,000 in 1863 to a company formed for the purpose. Some of this money was then invested in pastoral properties in Queensland and elsewhere; managed by James Brown they did not prosper, but involved losses estimated at £25,000 over the next two decades.

The failure of the Minmi Co. and their financial problems forced them back to mining in 1865 and preoccupied them thereafter. Two new mines were developed and, though one failed, J. & A. Brown was once more the largest producer in the colony in 1868. These were difficult years for the Browns as coal was selling for about 7s. a ton and the low price hampered their complete recovery until the first coal vend was formed in 1872. This organization shared trade between the proprietors and enabled them to raise the price of coal to 14s. a ton and to maintain it near this level until 1880, thus making a golden period of mining in the Newcastle district. In these years James devoted himself to colliery management while Alexander continued his efforts in the foreign trade, visiting England in 1874 and being acclaimed by his peers the businessman of Newcastle on his return, for meeting 'the merchant princes of England' and impressing them with their claims for 'reciprocity of trade' and for his advocacy of the port. Among his many other ventures Alexander had bid for a franchise of coal mining in Tasmania in 1861, visited the United States on a business tour in 1863 and acquired valuable gold leases on the Gulgong field in 1872. He also gave evidence to a large number of select committees on railways and mining. He dominated the firm until his death at Newcastle on 31 May 1877. He was buried in the Presbyterian cemetery at East Maitland. He was unmarried and his property, popularly estimated at £250,000 but sworn for probate at £100,000, was left principally to his nephews.

At St Andrew's Presbyterian Church, Sydney, on 20 December 1847 James Brown had married Elizabeth Foyle. He died at Newcastle on 27 September 1894, survived by his wife, four sons and a daughter. In 1886 he had made over his interest in the firm to his sons. The most influential of them was John who managed J. & A. Brown until his death in 1930.

In 1843-86 James and Alexander Brown produced more than three million tons of coal and so well established their firm that by 1914 its total output exceeded sixteen million tons, about 8 per cent of the total production of New South Wales for the period. Their success can be attributed to their early start and to the complementary talents of the brothers, one an experienced, able and persistent mine manager and the other a shrewd, enterprising man of commerce. Alexander Brown in particular appears to have played a significant role in the development of the overseas trade which was to absorb about a third of all coal produced in New South Wales in 1860-1914.

(http://www.adb.online.anu.edu.au/biogs/A030503b.htm)

D.2 JAMES BROWN

BROWN, JAMES (1816-1894) and ALEXANDER (1827-1877), colliery proprietors and merchants, were born in Lanarkshire, Scotland, sons of Alexander Brown and his wife Mary, née Hart. Like his father, James (b.3 August 1816) was a hand-loom weaver and agricultural labourer before the family migrated to Sydney in 1842. As a bounty immigrant he had engaged to work on a farm but the family settled at Newcastle and James worked in James Mitchell's tweed factory at Stockton. In 1843 he leased eighty acres (32 ha) of land at Four Mile Creek, near East Maitland, and assisted by his brothers John (1823-1846) and Alexander (b.26 June 1827) began to mine outcropping coal for sale in Maitland and Morpeth.

Since the coal in this land had been reserved by the Crown in an agreement with the Australian Agricultural Co. designed to protect its investment in mines at Newcastle, the Browns were warned to stop mining or face prosecution for intrusion. The company had been tolerating small-scale mining for local use but took action when the Hunter River Steam Navigation Co. accepted Brown's tender to supply about 4000 tons of coal a year at 5s. 11d. a ton: it had been paying 13s. a ton for Australian Agricultural Co. coal. Other producers were entering the Sydney market and competition had reduced the price of coal to 7s. by 1847. These price reductions and the threat of legal action drove almost all the newcomers from the industry but James Brown persisted.

In the Supreme Court in August 1845 Brown's counsel argued that the agreement between the company and the British government was illegal as it tended to promote a monopoly, and also disputed the Crown's right to reserve coal on land which it sold. James Brown was found guilty of intrusion, fined 1s. and ordered to pay the costs of the action. To recover costs the bailiff forced the family from the lease at such short notice that the twelve dwellings built there had to be left and a further £147 was lost in the move. The barristers, Richard Windeyer and Robert Lowe, who had represented Brown in the first trial, sought a retrial. Similar legal arguments were used and again rejected by the Full Court: 'a variety of topics … with which we have, as Judges, nothing to do and which were of too popular a character, merely, to justify further notice by us'. The Australian Agricultural Co., anticipating further difficulty in maintaining its position, hastened to negotiate the end of the agreement on advantageous terms and its termination was announced in Sydney on 17 August 1847. The advent of open competition and the lower price of coal in 1845-52 were largely due to the challenge of James Brown.

Meanwhile James had formed a partnership with John Eales, whose land grant predated the company's agreement, and continued to supply the steamships which linked Sydney and Maitland. After several more years of small-scale mining in the East Maitland area James and Alexander Brown, now partners, moved to the Burwood estate south of Newcastle in 1852 to develop a new mine which yielded large quantities of coal at a time when it was selling for as much as £1 10s. a ton in Newcastle. By 1857 the brothers owned valuable property in Newcastle, a ship-chandlery and import-export business, and at least one ocean-going ship. Alexander emerged as the more enterprising of the partners and after the amalgamation of the Burwood estate mines in 1856 he became the manager before taking one of their own ships to Java in 1857. His outward cargo was coal and on the homeward run the ship carried rum, sugar and coffee, the first direct import of such goods to Newcastle.

The brothers returned to mining in 1859 by acquiring the Minmi colliery and its railway to Hexham. They increased its output from 44,000 tons in 1860 to 111,000 tons in 1862. This increase in sales was achieved by reducing prices and by shipping coal on their own account to New Zealand, China and North America as well as to colonial ports. Simultaneously the Minmi private township was developed and one of the most elaborately equipped engineering workshops in the colonies was set up there to service their locomotives and steamships. The firm was already employing the first screw collier used in Australian waters and had bought a tug, the second in Newcastle and first of a long line operated by the Browns. These achievements enabled the brothers to sell a half interest in their Minmi property for £75,000 in 1863 to a company formed for the purpose. Some of this money was then invested in pastoral properties in Queensland and elsewhere; managed by James Brown they did not prosper, but involved losses estimated at £25,000 over the next two decades.

The failure of the Minmi Co. and their financial problems forced them back to mining in 1865 and preoccupied them thereafter. Two new mines were developed and, though one failed, J. & A. Brown was once more the largest producer in the colony in 1868. These were difficult years for the Browns as coal was selling for about 7s. a ton and the low price hampered their complete recovery until the first coal vend was formed in 1872. This organization shared trade between the proprietors and enabled them to raise the price of coal to 14s. a ton and to maintain it near this level until 1880, thus making a golden period of mining in the Newcastle district. In these years James devoted himself to colliery management while Alexander continued his efforts in the foreign trade, visiting England in 1874 and being acclaimed by his peers the businessman of Newcastle on his return, for meeting 'the merchant princes of England' and impressing them with their claims for 'reciprocity of trade' and for his advocacy of the port.

Among his many other ventures Alexander had bid for a franchise of coal mining in Tasmania in 1861, visited the United States on a business tour in 1863 and acquired valuable gold leases on the Gulgong field in 1872. He also gave evidence to a large number of select committees on railways and mining. He dominated the firm until his death at Newcastle on 31 May 1877. He was buried in the Presbyterian cemetery at East Maitland. He was unmarried and his property, popularly estimated at £250,000 but sworn for probate at £100,000, was left principally to his nephews.

At St Andrew's Presbyterian Church, Sydney, on 20 December 1847 James Brown had married Elizabeth Foyle. He died at Newcastle on 27 September 1894, survived by his wife, four sons and a daughter. In 1886 he had made over his interest in the firm to his sons. The most influential of them was John who managed J. & A. Brown until his death in 1930.

In 1843-86 James and Alexander Brown produced more than three million tons of coal and so well established their firm that by 1914 its total output exceeded sixteen million tons, about 8 per cent of the total production of New South Wales for the period. Their success can be attributed to their early start and to the complementary talents of the brothers, one an experienced, able and persistent mine manager and the other a shrewd, enterprising man of commerce. Alexander Brown in particular appears to have played a significant role in the development of the overseas trade which was to absorb about a third of all coal produced in New South Wales in 1860-1914.

(http://www.adb.online.anu.edu.au/biogs/A030240b.htm)

D.2.1 John Brown

BROWN, JOHN (1850-1930), 'coal baron', shipowner and racehorse breeder, was born on 21 December 1850 at Four-Mile Creek near East Maitland, New South Wales, eldest son of James Brown and his wife Elizabeth, née Foyle. He was educated at Newcastle, and at 14 began work in the Newcastle office of his father's and uncle's firm, J. & A. Brown. After experience underground, then as a colliery clerk, surveyor and pit-manager at the Minmi mine, he was sent overseas—to China on the firm's business and to inspect its London agency. He also studied the latest technology and working methods in mines in Britain and the United States of America. In the 1870s he managed the Minmi mines. On 25 January 1881 at Govan, Lanarkshire, Scotland, he married Agnes Bickers Wylie with the forms of the United Presbyterian Church. However she died in Sydney on 17 August the same year.

In 1877 Brown's uncle Alexander had died leaving his £100,000 estate to his nephews; in 1882 James appointed John general manager and handed over his coal interests to his sons in 1886. John Brown remained in control of policy. He extended the Minmi mine and benefited from membership of the Vend, a cartel which regulated prices and shared the trade between Newcastle coal-proprietors, but be left it in 1890.

Free to reduce prices and with no shareholders to satisfy, he embarked on a period of trade expansion which contributed to the dissolution of the Vend and thereby helped to impoverish the district. In 1896, when many collieries were idle, his Minmi mines worked on 256 out of a possible 280 days and next year were active on 264: the firm's annual output exceeded 300,000 tons in 1897-1901. In the early 1900s Brown expanded his South Maitland interests, acquiring the high-producing Pelaw Main and Richmond Main collieries, and by 1904 had connected both to the firm's Minmi-Hexham railway. He also built up the fleet of tugboats which operated in both Sydney and Newcastle.

In order to develop the export trade Brown spent much time abroad and opened offices in San Francisco, Valparaiso and in London, where he mostly lived in 1888-93 and 1899-1904 while the business was managed by his brother William. William then claimed the right to participate in the firm's management and from 1905 pursued his claim in the Equity Court. In November 1909 the partnership was dissolved by order of the court and John was appointed receiver and manager; his appeal to the Privy Council against the dissolution was dismissed.

Early in the century, Brown became famous for his horse-breeding and racing exploits. In 1893 he had begun to race horses as 'J. Baron', and 1897 won the Australian Jockey Club Doncaster Handicap with Superb. In 1902 he imported the stallion, Sir Foote, for his stud, Wills Gully, near Singleton. Sir Foote's most famous son was Prince Foote: in 1909-10 he equalled Poseidon's record in winning the A.J.C. and Victoria Racing Club Derbys and St Legers and the Melbourne Cup in the same season — as well as the A.J.C. Sires' Produce Stakes and the three-mile Australasian Champion Stakes. That season Brown topped the winning-owners' list with £14,610 in stakes. Duke Foote carried his pale blue colours with yellow sleeves and black cap to victory in several important races, but was the unplaced favourite in the 1912 Melbourne Cup won by William Brown's Piastre. In 1919 John's Richmond Main dead-heated with Artilleryman in the A.J.C. Derby and won the Victoria Derby. He bred other notable horses including Prince Viridis, Prince Charles, winner of the 1922 Sydney Cup, Leslie Wallace and Balloon King. Between 1910 and 1924 he reputedly won £90,094 in stakes. Terse with trainers, he frequently changed them, but he pampered his horses. Although by 1930 he owned 240 brood mares and seven stallions he usually refused to sell any horses even if he did not want to race them. He exhibited and imported prize dogs, poultry and turkeys, and bred stud cattle. He bought Darbalara, near Gundagai, another stud near Scone, and in 1927 Dalkeith, near Gundagai, to grow maize and lucerne.

Confirmed in sole management, Brown expended much capital in his desire to be self-contained. Before World War I the firm had two-thirds of Sydney Harbour's towing and carried out much ocean salvage work, also controlling the Newcastle pivot system until it was taken over by the government.

He spent large sums on the latest mining plant, colliers, rolling stock and his Hexham shipping point and engineering works, which serviced steam and locomotive engines for other firms: on one excursion abroad he spent over £1 million on locomotives, mining equipment and a steamship to carry them home. In the 1920s he opened up the Stockrington mine and for many years he had a contract to supply the Australian Gaslight Co. In 1930 he had a large collier, 5 coastal colliers, a schooner and 10 tugs, including the *Rollicker*, one of the most powerful in the world — but there was little work for her. He abhorred the idea of turning his firm into a public company.

Brown's 'antagonism to unionism was bitterly unequivocal and even ruthless', and 'his passion for riding the whirlwind and defying the storm of popular disapproval' in his relations with his miners was well known; he was also extremely reluctant to accept the State and Commonwealth arbitration systems. At Pelaw Main, from 1903 he installed modern cutting machinery manned by American technicians and free labour. In defiance of the Colliery Employees' Federation, in 1913 he persuaded the Minmi miners' lodge to sign a local agreement for five years. He acquired a reputation for severity, denying his Minmi miners the opportunity to buy the land on which their homes were built, and refusing to renew long leases, so they could be threatened with eviction during strikes, but he believed it was his responsibility to provide employment so long as the miners accepted the exigencies of the industry. In late 1914 he issued a writ against the Colliery Employees' Federation for £100,000 damages for loss of trade and payment of demurrage. For much of World War I Brown was chairman of the Northern Colliery Proprietors' Association.

In the troubled 1920s when the price of coal was depressed and the export trade dwindling, Brown closed Minmi mines (in 1922) when the men refused to accept lower wages (although allegedly he secretly arranged to pay their bills at the local store). He repeatedly warned the government that the coal trade was in jeopardy and advocated a reduction in wages. On 4 March 1929 he began 'something in the nature of a lockout at the Richmond Main and Pelaw Main Collieries', because he could not sell coal interstate or overseas at its current price. It was announced in the House of Representatives that he would be prosecuted; but in April the charge was dropped, to the indignation of the Labor Party which revived the question in September.

Brown died childless at his unpretentious home in Wolfe Street, Newcastle, on 5 March 1930, and was buried in the family vault in the Presbyterian cemetery, East Maitland; huge crowds watched his funeral procession. He left the residue of his personal estate, valued for probate at £640,380, and shares in J. & A. Brown to his general-manager Thomas Armstrong and to Sir Adrian Knox, as tenants in common, to carry on the firm under the same name during the lifetime of his brother Stephen.

'Shrewd, analytical, and taciturn', Brown shunned publicity and was an enigmatic and legendary figure, who might have stepped out of the pages of a Galsworthy novel.

He was tall, spare and upright, and continued to dress in sober broadcloth, glossy black boots and ties' with a high square bowler hat. Although he was the focal point for much industrial ill-will and Labor oratory, the *Australian Worker* admitted that in 'his personal relations with his employees he was by no means wholly unkind; indeed, at infrequent times, he was comparatively generous'. He had a 'strong strain of theatricality' and liked playing the part of the relentless capitalist. Nevertheless he made a practice of getting out among the miners.

His brother William (1862-1927) shared his interest in racing: as well as Piastre, he had other winners in Haulette, Thana and Colbert. For a time he managed the Duckenfield colliery at Minmi and was consul-general for Chile. He died unmarried at his home 153 Macquarie Street, Sydney, on 2 February 1927, leaving his estate to his brother John and sister Mary Stephen Nairn. Their youngest brother Stephen (1869-1958) was educated at Newington College, Sydney. After John's death the firm's interest in tugboats was sold to the Waratah Tug & Salvage Co., and from 1931 Stephen was a partner in and a director of J. & A. Brown & Abermain Seaham Collieries Ltd after its amalgamation. He travelled widely, enjoyed fishing and at Segenhoe grew prize dahlias and chrysanthemums. He died unmarried on 19 November 1958 at 153 Macquarie Street, Sydney, and left his estate, valued for probate at £149,977 to (Sir) Edward Warren.

Brown's first cousin Alexander (1851-1926), merchant and politician, was born on 9 February 1851 at Maitland, New South Wales, son of William Brown, medical practitioner, and his wife Mary, née O'Keefe. He was educated at West Maitland, then articled to his stepfather Joseph Chambers, and admitted as a solicitor in 1873. On 8 August 1872 at West Maitland he married Mary Ellen Ribbands. He entered J. & A. Brown and, after his uncle Alexander's death in 1877, took over the Newcastle office. In 1883, following an overseas trip, he was dismissed by his uncle James after selling the Ferndale colliery without approval. Next year he unsuccessfully claimed in two Supreme Court cases that he was a partner in the firm.

Alexander relinquished his interest in J. & A. Brown in return for his cousins' share in the New Lambton mines, which he thereafter managed and turned into the New Lambton Land & Coal Co. Ltd in 1891. During industrial disputes he pursued an independent line from other proprietors and occasionally supported the miners. In 1885 he became manager of the Newcastle branch of Dalgety & Co. Ltd and in 1905 managing director. He also built up extensive pastoral interests.

In 1889-91 Alexander represented Newcastle in the Legislative Assembly as a Protectionist and supporter of (Sir) George Dibbs, who was a director of the New Lambton Land & Coal Co. Defeated in 1891 Alexander was nominated to the Legislative Council on 30 April 1892.

In 1892-96 he was first president at a difficult period of the Hunter District Water Supply and Sewerage Board at £300 a year; repeated questions were asked in the assembly about his anomalous position of holding an office under the Crown while a member of parliament. In 1895 a select committee investigated the cost of construction works and in 1897 there was a royal commission into the board's management, but Brown emerged well from these inquiries. Although strongly conservative, he was regarded as 'a fair fighter'.

Alexander was president of the Newcastle Chamber of Commerce in 1888 and 1892. He was Belgian consul in Newcastle in 1882-1926 and was appointed chevalier of the Order of Leopold in 1902; he was also consul for Italy. He died on 28 March 1926 at his home, Cumberland Hall, East Maitland, and was buried in the Presbyterian cemetery. He was survived by five sons and three daughters of his first marriage, and by his second wife Edith Mary, née Adams, a nurse whom he had married on 27 March 1920. His estate was valued for probate at £60,871.

(http://www.adb.online.anu.edu.au/biogs/A070448b.htm)

Annex E

Coke Oven Research

E.1 INTRODUCTION

The industrial heritage and history of Minmi and its surrounds has been documented through past publications, such as the Newcastle and Hunter District Historical Society's *Minmi: The Place of the Giant Lily*. These documents have been used to provide a context for the historical background and consequential assessment that appears in this report. This research has been supplemented through the oral history and historical documents and photographs kindly provided by many of the Minmi residents.

However, during the course of this research it became apparent that Minmi contained a potentially significant archaeological site, which warranted further and more detailed investigation – the Minmi Coke Ovens.

This site was potentially significant because of its antiquity and as such deserved to be investigated further. This annex has been written to underpin the assessment of the Minmi Coke Ovens archaeological site. It provides a background context against which the consequential assessment has been made. It can also be used to as the basis for future historical research into this archaeological site.

E.2 COKE PRODUCTION – A BACKGROUND

The following details regarding coke production have been taken directly from CSIRO (2007) and Harper (1916:11-26).

Coke is required for use in the blast furnace process (and other metallurgic workings), which produces molten iron. An ideal coke is dense, quick to heat, maintains a high uniform temperature during burning and burns without impurities being imparted (i.e. ash, sulphur and phosphorus) into the metal being heated.

Coke is produced from crushed coal by heating it in a coke oven. In the 21st century a coke oven is a refractory lined box that is heated by flues on the vertical walls. Historically the process of coke production began in the early 17th century, but it was not until the 19th century that the industry was developed to any great extent – this development being associated with improvements in the manufacture of iron and steel.

Coal was originally cooked in mounds or heaps in the open air, similar to charcoal, until bee-hive ovens were introduced. Bee-hive ovens (see *Figure E.1*) are so called because of their shape; this shape advanced towards the end of the 19th century to become rectangular, but these ovens still operated on the bee-hive principal i.e. top heat only or constructed with flues which cause the heat to be applied all round the charge. The advantage of the rectangular shape was that it enabled the use of a surface ram for discharging the coke, instead of the universal manual discharge from the true bee-hive pattern.

At the end of the 19th century bee-hive patterns were predominantly found across NSW, although other technologies had been invented (such as the 'retort oven' [in 1861 – involving the complete exclusion of air from the cooking chamber] and the 'by-product' saving oven [1869] where by-products were recycled).

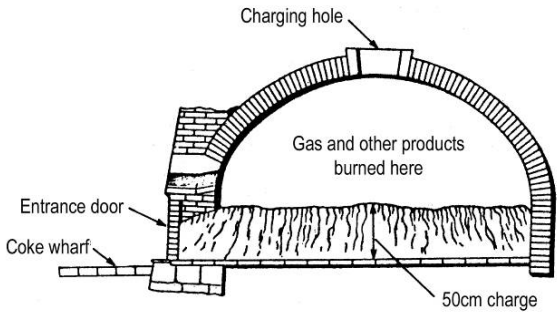

Figure E.1 Structure of a Bee-hive Coke Oven (Source: Rogers 1988:13)

The process of coke production is quite simple. Basically during the heating process, the crushed coal first gives off moisture, then softens and releases volatile gases. At higher temperatures, it resolidifies to form coke.

Coal can be divided into two broad categories – coking and non-coking, obviously non-coking coal cannot be used to manufacture coke. A coking coal is one which when subjected to heat, is generally fusible, with the result that individual fragments become caked together. By 1916 there were three principal seams of good coking coal in NSW – the borehole seam in the Northern Coalfields (including the current study area), the Bulli seam in the Southern fields and restricted area of the Lithgow seam in the Western field.

The coke production process in 1916 is described by Harper (1916: 17-27) and summarised here from his publication. Reference is made only to methods employed during the use of bee-hive ovens, as this is of relevance to the current study.

> "By far the largest proportion of coal used for coke making in NSW is in the form of screening of slack and ranges in size from coal dust up to fragments the size of walnuts…. Crushing a coal before it is charged into ovens improves the quality of coke produced. Fine crushing makes the distribution of impurities more uniform, and subsequent breakage of the coke is reduced… [The] coal is charged to the oven from canisters running along the top and discharged into one or more ports, after which it is levelled off by hand… local conditions and requirements must entirely govern the question of charging coal to the ovens in either a moist or dry environment [it is possible that some moisture is added prior to firing]… coking [in a bee-hive oven] was dependant upon top heat only, the oven in NSW being generally built on the double-row principle, that is, back to back…
>
> The essential features of the beehive oven are a circular vaulted brick chamber with a port-hole in the top, through which the coal may be charged, and the products of combustion escape. An arched opening is left at the bottom to admit the air necessary for combustion and for the quenching and withdrawal of the coke, such being temporarily bricked up during the coking process, with the necessary air-vents so manipulated that the supply is more or less under control all the time… Some are built with side flues in which the evolved gasses are burnt whilst passing between the oven walls; other have bottom flues only, with a similar object; whilst a third type are fitted with both side flues and bottom flues, thus assuring a more general distribution of the heat…
>
> The period occupied in burning a charge of coke varies not only with the size of the charge, and the nature of the coal, but also with the amount of air admitted into the oven… In NSW, with the ordinary type of rectangular oven, it is, found most advantageous to arrange the burning period on a 72 hour 96 hour basis…
>
> In coke-making it is desirable, as soon as ever the charge is 'ripe' i.e. thoroughly coked, to terminate combustion as rapidly as possible, for if this is not done, the coke commences to burn itself away, with resultant loss in the form of ash. In the old type of true beehive oven, internal quenching was of necessity adopted, that is the oven door having been removed, a jet of water was played upon the incandescent mass within the oven."

E.2.1 The Minmi Coke Ovens

The coke ovens at Minmi have been mentioned in a number of secondary historical sources. These sources have been reviewed to present the available evidence on their history. This has been supplemented by field assessment to determine the extent of possible archaeological remains. Finally a brief review of historically comparable coke ovens in NSW has been undertaken. This assessment has allowed for the historical archaeological assessment of the Minmi coke ovens.

An excellent description of the Minmi coke ovens and their mode of operation have been provided by Harper (1916:11-12). Harper was charged by the NSW Minerals Council to undertake a review of the coke industry in Australia. His review included a historical appraisal, which is provided here:

> "Apparently no official record of the first manufacture of coke in New South Wales was kept, but from the following information collected by Mr. J.G.Hutton, Inspector of Collieries, it would appear that the first ovens were erected at Minmi about the year 1861, the coal used being won from the Borehole Seam [this is potentially disputed by other historical records – see discussion below].
>
> Mr. Chas. Brown, a surface overseer at Duckenfield Colliery, Minmi, supplied the following statement:-
>
> > "The coke ovens were going at Minmi when I first came to the district 40 years ago (1876). My wife is 58 years of age and came to Minmi 54 years ago, and the ovens were there then. She remembers quite distinctly playing near them when she was going to school at 8 years of age. They were put up by Mr. Eales, who was the owner before Mr. Brown"…
>
> Mr. Wm Woods, a man 54 years of age, and at present working on the surface at Brown's Minmi Colliery, made the following statement to Mr. Hutton in April, 1916:-

"I have been at Minmi for fifty years. The coke ovens were at Minmi from my earliest recollection. For a number of years I was a coke burner, in the early 'eighties'. There were 32 ovens, two rows of 16 each, built back to back. They were circular inside [the bee-hive design], and flat bottomed, the side walls being straight up for about 3 feet or 3 feet 6 inches, and they domed over. There was a round chimney, 18 inches in diameter at the top, and the diameter of each oven was 9 feet. The height of the oven inside was 6 feet, and the outside walls were built straight up, and the top was flat, to enable workmen to walk about on them when necessary. In front of each oven there was a doorway or opening 3 feet 6 inches high, and 2 feet 3 inches wide. The charge was a wagon lode (seven tons) of small coal direct from the screens. The bottom of the wagon was let down, and the small coal allowed to run on to the ground in front of the oven door or opening. It was then shovelled into the oven, and the openings were closed, and a damper put over the chimney. The oven was left in this sealed state for three more days, when the bricks in the doorway or opening were taken out (the damper being left on the chimney) and the coke withdrawn by means of a long iron rod with two prongs turned down at one end. The damper was left on top of the chimney while the drawing was being done to prevent the coke burning up again. The coke was red-hot when taken out of the oven, and no water was used to cool it, but it was spread on the platform to cool, and then stacked."

According to the records at the Duckenfield Colliery, operations ceased at these coke ovens in June, 1898, and they were pulled down two or three years ago [i.e. c.1911]."

E.2.2 Primary Sources

This section includes information gathered from primary sources.

Historical Photographs

Two historical photographs, shown below, provide evidence for the Minmi Coke Ovens. *Photograph E1* shows a small low structural item located to the west of Woodford Street, west of the Railway Street junction. The item appears to comprise of a series of sixteen 'entrances'. Analysis of this photograph and comparison against other historical photographs (post 1906 following the removal of the Coke Ovens) suggests that these ovens measure approximately 1.5 - 2 m in height. The number of openings (16) corresponds to the known historical documents, as noted above, suggesting sixteen back-to-back ovens. *Photograph E1* provides little evidence for the configuration of the railway at this point, although, given the mode of loading (described from historical sources) the railway must have been located either side of the ovens.

Photograph E.1 Source: Minmi Historical Society. Crop of 1906 Minmi photograph, facing east. Shows the remains of the Minmi Coke Ovens, post operation, prior to demolition.

Photograph E.2 Source: Minmi Historical Society. Crop of a Minmi Ambulance Station photograph, facing southwest (date unknown). Coincidentally it shows a faction of the Minmi Coke Ovens.

The only close up view of the Minmi Coke Ovens appears in the background of a photograph of the ambulance station – *Photograph E2*. This photograph shows the entrance to a single oven (the opposite side to that in *Photograph E1*) with the workshop complex in the background. The oven has an arched entrance with a 'decorative' line above the entrance. The front face is flat and appears to have a flat area in front of the oven – possibly showing a railway line. The flat top of the oven has been built up and is now devoid of its chimney and covered with soil and grass. The oven's entrance appears to have been blocked by wood or bricks – possibly being used as a wood store.

This photograph compares favourably with the historical description of the oven, as provided by Mr. Woods.

2007 Field Survey

The quarantine zone for the equine influenza epidemic prevented a walk over of the possible coke oven site; although it could be observed from the road, see *Photographs E3* and *E4*.

Photograph E.3 Photograph montage to coke oven site, facing N. Railway Street is the road on the right. Post Office can be seen on right centre. Ambulance Station stood where red brick house now is.

Photograph E.4 Photograph montage across coke oven site, facing NE. Post Office can be seen on mid-centre. Ambulance Station stood where red brick house now is.

Photographs E3 provides an unobstructed view north across the landscape to the western side of Minmi.

Land to far right of this photograph was impacted by 1950s open cut mining, but it is possible to see the path of the historical railway line meandering from the central distance to the right foreground. The route of the railway provides an approximate delineation between the open cut and residual soils at Minmi.

This photograph provides a context, with the Post Office building being situated on the right centre. The location of Ambulance Station (as seen in *Photograph E2*) has been replaced by a modern red brick dwelling. It can be assumed that the fence of this Lot cuts across the coke oven site and the route of the railway.

Photographs E4 provides a view of the flat zone which would have contained the coke ovens and railway. There are no immediate obvious landscape elements or residual fabric defining the former location of the oven. However, the flattened area extends from the rear gardens of the houses to Railway Street. It is possible that the railway divided and run either side of the coke oven, rejoining to form a single track that led into the workshops.

E.2.3 Minmi – The First NSW Coke Ovens?

As discussed above, it is reputed that the first coke oven constructed in NSW were at Minmi in 1861 (Harper 1916:11). The origin of Harper's claim is a reputed source – the 'Inspector of Collieries'.

This claim is backed by the secondary historical sources of the Newcastle & Hunter District Historical Society (1991:8):

> "At an early date, possibly 1861, J. and A. Brown established a coke works which was reputed to be the first to operate in NSW… Before they ceased operation in 1898, thirty-two ovens had been erected. They remained derelict until they were dismantled in 1912."

and the Australian Heritage Commission's 'Mining Heritage Places Assessment Manual' (AHC 2000: Model Type Profile 1 Cole):

> "The first coke ovens in NSW were built at Minmi near Newcastle in 1861, and coke manufacture started in the Illawarra coalfields in 1875. In Queensland the first coke ovens were built in 1869 to supply coke to the railways for fuel, and a series of coke ovens were in operation on the Ipswich coal fields up until 1958."

Further Rogers [a professional historian] cites Harper's claim in his history on the Wollongong coke works (Rogers 1988:12).

These secondary sources (two academically and professionally reputed) would suggest that the Minmi Coke works are the earliest in Australia.

However, an online search of the NSW Heritage Office State Heritage Inventory (SHI) has revealed a listing for the 'Newcastle Coke Ovens' (NSW Heritage Office 2007). This listing states that the Newcastle Coke Ovens were constructed prior to those at Minmi:

> "The site marks the place of the first Coke Ovens in Australia and has been assessed by industrial archaeologists as being of state significance.
>
> The coke ovens were started in 1853. By March, 1854, the first was in production and four more were being built. In 1855 three more were at work. The company had hoped to sell coke to South Australia to use to smelt South Australian copper, but the copper companies found it cheaper to import Welsh coke in otherwise empty ore ships. The coke ovens ceased production in 1861. Council workmen uncovered the remains of the ovens during work on Frederick Street in the 1930s."

No information is provided with regards to the condition, integrity or presence of archaeological remains at the Newcastle site. The on-line listing states that the site is significant at the State level under NSW heritage assessment criteria A, E and F. The information was compiled by Suters Architects Snell in 1996 for their Newcastle City Wide Heritage Study.

Therefore, at the current time, it would appear that the Minmi Coke Ovens are the second set built in Australia and NSW (see *Table E.1*). However, it should be considered an imperative for future research to confirm the validity of primary historical sources for either claim.

Table E.1 Summary of early Coke Ovens in NSW (and others known in Australia)

Location/Name	Dates	Years of Operation	Number of Ovens	Source
Newcastle Coke Ovens (NSW)	1853-1861	8	Unknown	NSW Heritage Office 2007
Minmi Coke Ovens (NSW, by Eales)	1861-1898	37	32	Harper 1916; NDHS 1992; Rogers 1998; AHC 2000
Queensland – misc	1869-on			AHC 2000
Flagstaff Point (Wollongong, NSW, by Ahern and Osborne)	1875-1879	4	12(?)	Harper 1916; Rogers 1998
Plattsburg (Wallsend, NSW, by Co-operative Colliery), see *Figure E2*.	1875-1916+	40+	?	Harper 1916
Wallsend (NSW, by Purified Coal and	1877-1916+	38+	?	Harper 1916
Tasmania – Tamar	1876-on		Min 40	Rogers 1998
Flagstaff Point (Wollongong, NSW, by Ashley)	1885-1890	5	Min 2	Harper 1916; Rogers 1998

1. This list is not exclusive and is based upon the historical documents assessed. It is likely that outside NSW further coke ovens were constructed during this period.

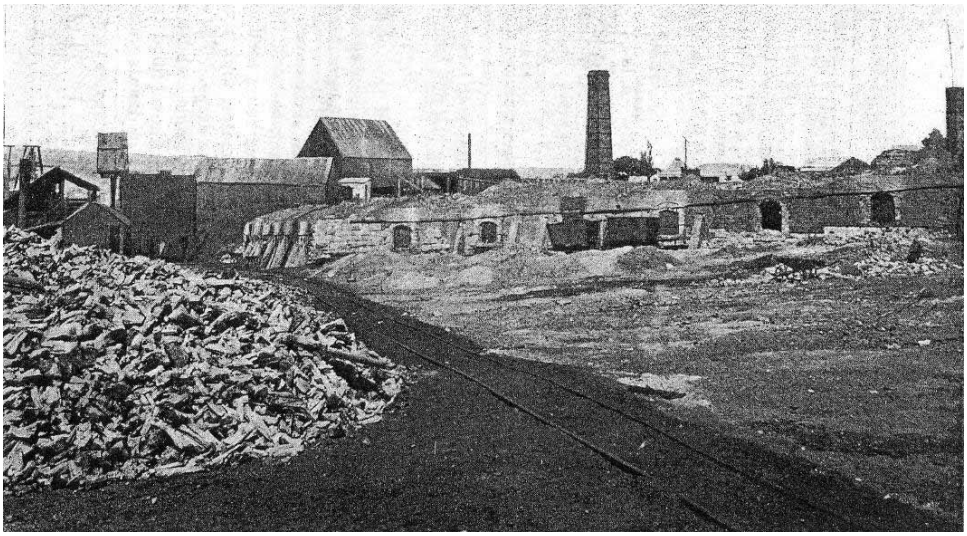

Figure E.2 Co-operative Coal and Coke Co.'s Plant, Wallsend (Source: Harper 1916-60)

E.2.4 Commercial Operation of the Minmi Coke Ovens

"Before they ceased operation in 1898, thirty-two ovens had been erected [at Minmi]. They remained derelict until they were dismantled in 1912" (NDHS 1991:8).

This statement is all that has been found with regard to the commercial operation of the Minmi coke ovens (although additional archival research could possibly provide company records). Further to this statement the commercial success of the Minmi ovens can be gauged through comparison with the fortunes of other Australian (especially NSW) coke producing facilities.

Table E.1 provides an overview of historical coke ovens in NSW, which can be supplemented by Roger's commentary on the fortunes of the 1875 coke ovens at Wollongong (c.f. Rogers 1988).

Rogers' historical research focused upon the two companies operating at Wollongong from 1875. His research has proven that the first Wollongong coke company (Ahern and Osborne) failed financially because of their 'over-optimistic assessment of the potential market' (1988:15).

> "The partners seem to have held the naïve belief that once they had a product of good quality, sales would automatically follow. However, they quickly found that glowing endorsements from Sydney foundries were not orders in their books; foundry proprietors apparently were unwilling to sever ties with established suppliers in favour of an untried manufacturer." (1988:15)

This suggested that it was difficult for a new company mass producing coke to enter the Australian market because of existing competition and their business ties. Given that only three NSW companies were operating in 1875 (numbers outside NSW unknown for this research) it is proposed that the local market was dominated by the Hunter Valley producers (and an unknown quantity of coke imported from the UK). This is evinced by the Wollongong company initially supplying a manufacturer in Tasmania, who immediately established their own coke ovens – see *Table E.1*.

Therefore, Minmi's position in the 19th century Australian coke market can be described as significant. They had a relatively large number of coke ovens (32) and operated for a long period of time (37 years). The cessation of their operations, in 1898, appears to have coincided with the advent and uptake of new technology in the coke manufacture industry (as described by Harper 1916), which by 1916 included 'over 530 ovens in the district…' (1916:13).

E.3 OTHER LISTED NSW COKE OVENS

A search of the NSW SHI reveals that five other coke oven sites are listed at the local level (i.e. on respective LEPs). These sites are:

- Blast Furnace Site (Lithgow);
- Coke Ovens, Coalcliff Colliery (Wollongong);
- Coke Ovens, Endeavour Drive (Wollongong);
- Newcastle Coke Ovens, Merewether (Newcastle); and
- Rids Creek Coke Ovens & Associated Works, New England Highway (Singleton).

A search of the RNE reveals a further two listed coke oven sites (both on NSW):

- Asgard Mine and Coke Oven, Victoria Falls Road (Mount Victoria); and
- Coke Ovens at Newnes Shale Oil Plant, Wolgan Road (Newnes).

Photographs of these seven sites (as available online) show that all are ruins, except the Coalcliff site, which is still operational. All are listed for the historical, research, rarity and representative values. Some assessments state that this significance is at the State level, although none have been listed on the SHR.

E.4 HERITAGE SIGNIFICANCE OF THE MINMI COKE OVENS

An assessment of the Minmi Coke Ovens against the NSW Heritage Office Assessment Criteria (from the publication '*Assessing Heritage Significance'*) results in the following significances (criteria deleted if not applicable – this assessment has also been presented in the main report):

Criterion (a) – an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);

The Minmi Coke Ovens are historically important because they represent the introduction of larger scale coal processing and coke production in NSW, utilising the bee-hive oven design. The Minmi Ovens are probably the second coke ovens in Australia. The production of coke from the Brown's mines represents domination of local industry and markets (as evinced by the inability of other producers to enter the market).

This criterion is met at the local level.

Criterion (e) – an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);

The Minmi Coke Ovens has the potential to yield archaeological evidence for the introduction of coke production to Australia and the NSW coal fields. The site could provide evidence for the type of coking technology employed in the mid to late 19th century, with possible evolution over their operational life time.

This criterion is met at the local level.

Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);

The presence of 19th century coke ovens does not appear to be rare; however, it is likely that Minmi's ovens are the second coke oven constructed in NSW and the first commercially successful coke oven. The mode of coke production is now defunct and archaeological remains of the Minmi coke ovens could demonstrate a process which is historically defunct.

This criterion is met at the local level.

Criterion (g) – an item is important in demonstrating the principal characteristics of a class of NSW's:
cultural or natural places; and/or
cultural or natural environments.

The Minmi Coke ovens demonstrate the principal characteristics of 19th century coke production.

The ovens could provide evidence for the coke manufacturing and may be some of the last historical relics at Minmi that demonstrate the former mining history of the town.

This criterion is met at the local level.

E.4.1 Statement of Significance

Minmi's Coke Ovens are significant at the local level because of their history and association with the mining heritage of the town. They represent an integral component of Minmi's 19th century commercial success and the town's growth within the NSW coal fields. The ovens are testament to the expansive business acumen of the Brown brothers, who aimed to dominate and control local and overseas coal markets. The Mimi Coke Ovens appear to be the second set of ovens constructed in NSW and probably the first to be commercially successful. Their long history of use only appears to have ceased when the technology employed ceased to be profitable, which can also be associated with the initial downturn in the Brown family's fortunes.

The extent of remains for the coke ovens remains unproven, however, if archaeological relics were to be found at Minmi they would be significant at the town as a central component of the mining history of the place. They have the potential to further industrial archaeological knowledge through investigation of the technology introduced to NSW in the 1860s.

Condition & Integrity

The condition and integrity of the Minmi coke ovens is difficult to assess, because no obvious or proven relics are present above ground at the site. However, following demolition of the coke ovens (c1912) the site has not been developed or otherwise impacted (although it is difficult to gauge any impacts from the adjacent open cut mining). Removal of the coke oven, presumably for building materials, may have removed all residual fabric from the site, although it is likely that the lower courses of bricks would remain.

Given an absence of obvious 20th century impacts to the site, it is possible that any coke ovens remains are retained in a moderate condition, however, because of many unknown factors, it is possible that the integrity of the site is moderate to low.

Research Potential

The archaeological research potential of the Minmi Coke Ovens can be described as high. If archaeological remains for the ovens were to be proven, and the site was in good condition and had a high level of integrity, then the site could contain the remains of the second oldest coke ovens in Australia.

As the Newcastle coke ovens site remains archaeologically untested, then it is difficult to gauge the comparative rarity of early coke oven remains in NSW prior to those from Wollongong. Certainly the Minmi site would be comparably significant to that at Wollongong.

Any residual fabric would be significant to the town of Minmi, because of its direct link to the local mining industry and employment.

E.4.2 Recommendations for the Coke Ovens

Until the exact location of the Coke Ovens can be proven it is recommended that a 'buffer zone' surrounding the site be created. This zone should either be avoided by development or archaeological 'tested' to determine the extent of the coke ovens site.

It is recommended that:

- a geophysical survey of the site be undertaken to determine the possible extent of the coke oven relics (GPR or conductivity should yield suitable results);
- archaeological test excavation could be undertaken to determine the condition and integrity of any remains;
- the site deserves to interpreted for public appreciation; and
- if development is to impact the coke oven's archaeological zone, then a program of geo-physics and test excavation could be used to investigate the extent of the site, the coking technologies employed and the site's relationship to the railway. If substantial remains were uncovered, these could be considered of sufficient local significance to warrant partial in-situ conservation, along with public interpretation.

E.4.3 References

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Environmental Resources Management

Building C, 33 Saunders Street
Pyrmont NSW 2009
Locked Bag 24,
Broadway NSW 2007

T: 61 2 8584 8888
F: 61 2 8584 8800
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