

Coal Mining Heritage Study in Victoria



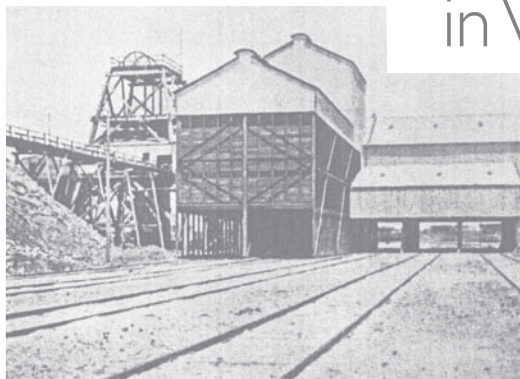
Prepared by Jack Vines

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Published by the Heritage Council of Victoria, Melbourne,
March 2008

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Authorised by the Victorian Government, 8 Nicholson Street,
East Melbourne.

ISBN 978-1-74208-036-9 (print)

ISBN 978-1-74208-037-6 (online)

ISBN 978-1-74208-136-6 (CD-ROM)

For more information contact the Heritage Council
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About the Author

This study has been prepared by eminent engineer and consultant Jack Vines.

After serving for four years in the AIF in World War Two, Jack completed a Bachelor of Civil Engineering Degree in 1948 and a Graduate Diploma of Town and Regional Planning in 1952, both at the University of Melbourne. In 1958 he completed a Bachelor of Economics Degree at the University of Tasmania. Jack currently retains membership as a Fellow of the Institution of Engineers Australia and as a Fellow of the Australasian Institute of Mining & Metallurgy.

Jack has had a lifelong passion for engineering heritage and in particular the development of the coal industry and has written extensively on the subject including detailed technical histories for the State Electricity Commission of Victoria.

Jack Vines has utilised his many years experience as a senior manager at the State Electricity Commission of Victoria and subsequent work as a consultant as the basis for this comprehensive account of the establishment of the coal industry from early colonial days to the present.

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Introduction

In the 1990s a group called the Historic Mining Sites Assessment Committee was pursuing the conservation of mining heritage in Victoria, beginning with a heritage study of gold mining in Victoria.

In 1995 the new *Heritage Act* replaced the *Historic Buildings Act* and created the Heritage Council of Victoria, an independent statutory authority which was the state's main decision-making body on heritage matters. Heritage Victoria was created as the government agency responsible for administering the Act. The Historic Mine Sites Advisory Committee (HMSAC) was also established, superseding the earlier committee, to advise the Heritage Council on mining heritage. The HMSAC is now known as the Industrial Engineering Heritage Committee reflecting the broader understanding of the role and significance of industrial heritage.

In July 2001 the Heritage Council approved the HMSAC's proposal to undertake a study of the history and heritage of the coal industry in Victoria.

Stage 1 of the study was to collate:

- A history of the critical developments in the coal mining industry in Victoria, identifying its essential characteristics, techniques and physical distribution.
- An inventory of places relating to the coal mining industry, with a description of the mine development and operations for each site, including drawings, tables, photos and references.
- An initial assessment of the historic, scientific, economic and social heritage significance of each coal mine site. Further assessment for possible inclusion on the Victorian Heritage Register or local planning schemes will follow in Stage 2.

The *Coal Mining Heritage Study* was undertaken by Jack Vines from November 2003 – May 2007, under Heritage Victoria's management. Many people have contributed to this study which, it is hoped, will be indispensable to all future study of the state's coal mining industry.

Chronology

Coal Discovery, Mining and Utilisation in Victoria

- 1791** Convicts escaping from Sydney discovered coal seam(s) in a creek near Newcastle.
- 1797** Black coal seams were discovered to the south (Coal Cliff) and to the north (Newcastle) of Sydney. Mining commenced on Coal River (Newcastle) in 1797 or 1798.¹
- 1798** The first overseas export of coal from the Colony occurred. Four thousand tons were 'shipped in 1799'.²
- 1800** Hunter River coal mines were being worked near Newcastle on a continuing basis under the control of the Governor of New South Wales using convict labour.³
- 1826** 18 December: The first recorded discovery of coal south of the Murray River was by William Hovell. He was accompanied by two soldiers and two convicts on an official exploration from the small military and convict settlement at Corinella on Western Port Bay. This coal was observed in the shore cliffs in the area now known as Cape Paterson. A sample of the coal was taken by William Hovell and dispatched with a report to the Governor of the Colony of New South Wales located in Sydney.⁴ No mining activity eventuated in this coal seam(s) for more than 20 years. Two coal seams were later identified and called the Rock and Queen veins.
- 1828** A private company, the Australian Agricultural Company (AACO) operating from Newcastle, NSW (at some stage this may have been called the Newcastle Coal Company), received a virtual monopoly from the Governor for a 30 year period over the mining of coal in the Colony. The monopoly was bypassed by several challengers but these had only minor success intruding the monopoly until the late 1840s. Political debate emanating from these challengers resulted in cancellation of the monopoly in 1850.
- Nevertheless a strong commercial cartel in the NSW coal supply remained for many years.
- 1831** Arrival in Sydney of the first steamship to visit the Colony of New South Wales occurred. As steam powered vessels progressively took over from the sailing ships, coal mining in the colony became a more vital and strategic industry.
- Coal was found and extracted in small samples by settlers at Bass on Western Port Bay. The coal samples had been brought to the notice of Captain Lonsdale, Police Magistrate in charge of the Port Phillip District.
- 1837** Coal was found and extracted in small samples at Kilcunda on Bass Strait.⁵
- 1839** CJ La Trobe was appointed as the first Superintendent of the Port Phillip District of the Colony of New South Wales.
- 1840** Supply of convict labour to the NSW coal mines ceased.
- Production of coal (all black coal) in NSW had reached nearly 35,000 tons per year.⁶
- Veins of brown coal were reported in locations on the shore line in locations from Anglesea to Cape Otway.
- 1841** The first public company to mine coal in the Port Phillip District was formed. William Watson was appointed Mine Manager. A shaft was sunk at Cape Paterson to mine coal. Due to disturbances between Aborigines and whalers in the area, the operation was abandoned without producing coal.
- 1847** The Cape Paterson Coal Proprietary Company was formed but did not reach a mining stage.⁷
- 1847** Iron smelting was commenced at Berrima NSW, opening greater demand for coal fuel and strengthening the move towards secondary industry in the colony.

1840s	Anecdotal collations assert that coal was discovered in a creek bed by settlers at Loy Yang. This coal was not specifically identified as brown coal at the time.	1856	Alfred Selwyn appointed to initiate a Geological Survey of Victoria.
1850	The City of Melbourne Gas and Coke Company was formed. The Melbourne Gas Company came into service about six years later.	1857	Carboniferous Deposit found at Lal Lal, south of Ballarat, described as lignite by the Geological Survey Department.
1850	Gold was discovered at Clunes. Further gold finds followed in the adjacent areas. Many finds were not initially disclosed.	1857/58	Some coal mining occurred at Wormbete in the Otways. This was evidently not a successful venture and did not continue.
1851	Disclosure of gold finds at Bathurst in February lead to the 'Gold Rush' in NSW, followed shortly after in August 1851 by a larger 'rush' to Victoria.	1858	A.R.C. Selwyn found coal in a hand bore about one mile north of the present town of Wonthaggi. ¹⁰ This was in the coal deposit later to be worked by the State Coal Mine. A shaft was sunk into the known coal veins at Cape Paterson. The Victorian Coal Company commenced drilling in the Cape Paterson area to trace these coal veins. Subsequently, on Mining Lease 229, this company mined about 2,000 tons of coal from 1859 to 1864, transporting this coal by bullock wagons to whaleboats and thence to off-shore vessels at Cape Paterson. ¹¹ Iron rail tracks were laid to improve the transport arrangements in 1863.
1851	Port Phillip District of the Colony of New South Wales was constituted as the Colony of Victoria taking effect on 1 July 1851 upon the issuing of writs for the first election of elective members of the Legislative Council. Charles La Trobe was appointed the first (and only) Lieutenant Governor.	1859	The Electric Telegraph came into service on the eastern seaboard of Australia, vastly improving commercial communication.
1851	Production of coal (all black coal) in NSW had reached 67,000 tons per year.	1862	Mining at the Lal Lal lignite deposit commenced.
1852	The Government of the new Colony offered a reward of £1000 in September 1852 for discovery of an economically workable coal seam(s). The reward was later claimed by Richard Davis for coal from Cape Paterson. 'The government subsidised sinking of a shaft 53 feet deep which intersected a seam three feet nine inches thick'. ⁸ Another version is that Davis opened a 2.7 metre seam at low tide level near Coal Creek at Cape Paterson. ⁹ The reward was only partly paid some years later. The shaft became known as Davis' shaft and was in the same coal seam area as originally discovered by William Hovell.	1862	Coal was discovered in the Narracan Creek valley south of Moe. A mining lease was taken out in 1864.
1854	Opening of the first steam railway, Flinders Street to Port Melbourne.	c1864	Mineral Statistics, a quarterly publication, was initiated by the Mines Department to provide a brief summary of mineral and coal discoveries and workings.
1854	Miners' Rebellion at Eureka, Ballarat, in December 1854.	1860s	Miscellaneous coal discoveries, not usually reported upon, were made by miners searching for gold throughout the colony.
1856	A Select Government Committee established to report on Coal Resources of Victoria reported unfavorably on the commercial prospects of coal as discovered to that time.	1864	Several tons of coal were dug from a shallow pit a few kilometres east of Griffiths Point on shore off Bass Strait. Further extraction was abandoned due to thin and irregular seam(s).

- 1865** Coal was found at Kilcunda. This coal was subsequently to be mined by the Western Port Coal Mining Company.¹²
- 1867** The first recorded discovery of brown coal in central Gippsland occurred at Yarragon. Later, some mining of this deposit occurred. Further west, brown coal was found at Mc Kirley's Creek, north of Warragul, in 1869.
- 1867** A Select Government Committee was formed to investigate Coal Supply in Victoria. A major outcome in 1870 was an offer by the Government of £5,000 for the first delivery of 5,000 tons of coal to Melbourne from a Victorian mine.
- 1869** R. Brough-Smith, Secretary of the Mines Department, issued a report on the Carboniferous Areas of the Colony.
- 1870** The Western Port Coal Company commenced mining at Kilcunda with coal being hauled overland by bullock wagon to Griffiths Point, San Remo, from where coal was shipped to Melbourne. Installation of a three foot six inch gauge tramline from Kilcunda to San Remo was in service in 1874. This mine closed in 1883. (Quantities shown in the Mines Department annual *Mineral Statistics* indicate about 5,400 tons were mined to December 1874 and about 9,000 tons to December 1877. JC Knight, 1951, says 15,000 tons were delivered until the company ceased operations in 1883.) In spite of repeated requests and litigation, the mine operators apparently did not receive the £5,000 government bonus that had been offered in 1870.
- 1872** Cable communication with London came into service, greatly improving commercial and government communication to and from England.
- 1873** First recorded discovery of brown coal in the Latrobe Valley on the bank of the Latrobe River at the north east of Moe. Other finds followed at Moe in 1874 and at Toongabbie in 1875. Brown coal was also found in south east Gippsland at Yarram in 1875.
- 1873** RAF Murray confirmed black coal seams at Korumburra. Some small scale mining had occurred to discover the seam but did not continue at that time. Coal finds were also reported at Foster and Fish Creek.
- 1873** John Mackenzie, as a consultant to the Victorian Government, reported that 'no workable seam of coal had been opened in any part of Victoria'.
- 1874** The Kilcunda Coal Association sank a shaft to a thin coal seam at Kilcunda. Mining operations did not proceed until the mid 1920s.
- 1874** The Excelsior Coal Mining Company mined thin black coal seams at Billy's Creek in the Morwell River Valley. The coal proved to be of poor quality. This was the first coal mining in the Morwell, Narracan, or Latrobe Valleys.
- 1874** A black coal seam was found about seven kilometres west of Thorpdale. This seam was known as Ryan's Seam and was the first black coal found to the west of the brown coal fields around Thorpdale.
- 1875** *Geological Reports* Numbers One to Three by the Mines Department reported on extensive brown coal deposits in central Gippsland and the likelihood of black coal seams in south west Gippsland.
- 1876** Several strikings of brown coal occurred in the Latrobe Valley during excavation of cuttings on the rail track to Sale, indicating a widespread brown coal resource.
- 1876** Brown coal seams were discovered at Won Wron in south east Gippsland. Mining of these seams occurred around 1957.
- 1879-92** Government rail lines opened to Gippsland from Melbourne and were connected to Sale by 1879, Mirboo North by 1886, Thorpdale by 1888 and Leongatha by 1892. The rail lines presented a new opportunity for coal haulage to Melbourne, to major provincial towns and industries, and to coal storages for locomotives and shipping.

- 1880** Mining at Mosquito Creek at the south east of Moe was undertaken by the Gippsland Coal Mining Company. This was the first commercial scale black coal mining venture in the Narracan Valley but closed after about two years. The Moe Mining Company commenced mining in the same area in 1882. However the VR rail line into the Narracan Valley was not in service until 1887, after which several mining operations followed.
- 1880** The first Victorian International Exhibition opened in Melbourne. This demonstrated to the world that Victoria was an international trade competitor, and that Victorian commercial enterprises could arrange coal supplies (albeit from NSW) to foster industrial growth in the Colony and to provide coal requirements for shipping at its ports.
- 1881–82** Brown coal was found from boring at Newport/Altona East.
- 1880–90** Leases were taken out by many individuals and companies for mining or exploration over most of the land in the Morwell River Valley for up to 10 kilometres south of the Latrobe River.
- 1882** A tunnel was driven at Silkstone (near Korumburra), from which the first block of Korumburra area black coal was displayed in Melbourne.
- 1882** The Mines Department commenced a drilling program in the Latrobe Valley coal deposits.
- 1883** Completion of the railway between New South Wales and Victoria opened up the opportunity for a lower cost of supply of NSW coal to Victoria.
- 1883–84** The Narracan Valley Company commenced mining at what was later known as Coalville and demonstrated the mine and coal quality to the VR Commissioners at the mine site.
- 1884** Mining of black coal at Narracan, (Coalville), south east of Moe, was undertaken by the Moe Coal Mining Company. This was to be the largest of the Narracan Valley mines.
- 1884** Brown coal was found in the Bacchus Marsh area. This area was subsequently mined until the present time.
- 1887** In August 1887, a syndicate took out a mining lease on a brown coal deposit on the north bank of the Latrobe River north west of Morwell. Development commenced via a shaft, but shortly afterwards operations were transferred to a second site some several hundred feet downstream on the same mining lease area. This mine was developed by the Great Morwell Brown Coal Mining Company and later by the Mines Department and finally by the SECV as Yallourn North Open Cut.
- 1887** Opening in Melbourne of the Second Victorian International Exhibition took place. This exhibition displayed innovation in secondary industry, much of which required power sourced from coal.
- 1887–88** The Maryvale Proprietary Mining Company drilled a bore at the Morwell township intersecting 760 feet of brown coal in seven seams. About 200 tons of coal was mined from a shaft but no contracts eventuated and the venture closed.
- 1888–90** Drilling by the Mines Department intersected black coal seams of commercial thickness at Korumburra. The Coal Creek Mining Company was formed and opened the mine via a shaft into black coal seam(s). By May 1890, tunneling had begun but the mine was waiting for the arrival of the South Gippsland Rail Line. Commercial scale mining did not occur until a VR branch line was connected to the mine in 1892.
- 1888** Black coal seams were found at Berry's Creek, south of Mirboo North. This seam was opened as Scarlett's Mine circa 1930 and again from 1957 to 1959 when it was known as Berry's Creek Coal Mine. At its closure in 1959 it was the only operating black coal mine in central Gippsland.
- 1888–89** The Haswell and Company Mine in 1889, and the Horrocks Co-operative Colliery possibly as early as 1885, opened small brown coal mining operations about four miles north east of Thorpdale. Both had a short life and had ceased

- operation by 1894. Reactivation of mining of the Horrock's seam occurred in the late 1940s at low output and had ceased by 1950.
- 1888–94** Brown coal seams were found by John Rollo at Yarragon. The 'Rollo' Mine was opened by the Yarragon Brown Coal Mining Company in 1890 through a shaft adjacent to the Yarragon township area. Mining continued intermittently to 1894. The coal deposit was representative of extensive brown coal deposits west from Moe to Darnum.
- 1888** Several small brown coal mines opened in the Thorpdale area, but all had closed by 1894. These mines included Dickenson's, Henderson's, Willis's, Crisp's/Ferngrove and Rollo's Mines on the Yarragon Escarpment.
- 1889** In February 1889, the Great Morwell Brown Coal Mining Company NL took over the mining lease (originally taken out in 1887) located about seven kilometres north west of Morwell on the northern bank of the Latrobe River. By this time, tunnels had been driven into the exposed coal seam. A bridge across the river was built in 1889 and a rail connection to the main Gippsland rail line was in service in September 1890. This operation subsequently changed to an open cut operation and later existed as the Yallourn North Open Cut, a vital source of coal for the SECV from 1921 until closure of the mining in this open cut in 1963.
- 1889** On 15 July 1899, the Government established a Royal Commission on Coal which presented a final report in 1891. The submissions and discussions during this Commission highlighted lack of government initiative and support for the coal industry in Victoria, particularly reaching conclusions that the brown coal resource was of tremendous significance to the Colony.
- 1889** As part of a broader investigation of the drilling that had commenced in the Latrobe Valley in 1882, a drilling program was commenced in 1889 by the Mines Department to investigate the brown coal deposits at Loy Yang.
- 1889** The Mirboo Collieries Mine at Boolarra installed a shaft into a thick brown coal deposit. In 1890, coal deliveries of 5,412 tons of coal were made to the Mirboo North VR line.
- Black coal seams were discovered at Jumbunna south of Korumburra.
- 1890–94** Extensive industrial strikes in NSW mines and ports severely decreased reliability and volume of coal supply from NSW to Victoria.
- 1890–94** Brown coal seams found in the Bacchus Marsh area were identified as part of extensive brown coal deposits eastwards to Altona and Port Phillip Bay, but largely overlain by basalt. Considerable mining occurred particularly from the 1940s in basalt-free areas at Bacchus Marsh.
- 1891–92** Coal was delivered from the Coal Creek Mine by road to the VR rail line at Korumburra in June 1891. By October 1892, a branch line had been extended to the mine site. Several other mining ventures followed in the Korumburra area from 1891. The Silkstone mine was reactivated in 1882. The Strzelecki Mine opened in 1893 and continued under several changes in ownership beyond 1922. The Korumburra Coal Company, the Korumburra and Jeetho Coal Mining Company, the Black Diamond Coal Mine NL, the Austral Coal Company, the Silkstone Coal Mine Company, and the Dudley Coal Syndicate were among the other active but intermittent black coal mines in the Korumburra area from the 1890s to the 1920s.
- 1892–30** At least nine black coal mining operations opened and closed in the Narracan Creek Valley between Moe and Coalville between 1892 and 1930.
- 1894** Mining of black coal seams commenced at Jumbunna, at Outtrim and at Howitt all with access to the South Gippsland rail line via branch lines to Korumburra from near the mine sites.
- 1894** At Altona Bay, mining of brown coal occurred from a shaft which was abandoned in 1896 due to flooding from aquifer water. A new shaft was installed in 1899. Mining was intermittent in small quantities to 1920 and was resumed from 1927 to 1931.

- 1895** At Benwerrin in the Otways, good quality brown coal was mined from 1895 to 1903. Subsequent attempts at reactivation occurred through to 1950.
- 1896** A briquette factory came into service at the Great Morwell Brown Coal Mine after an earlier factory had been burnt down before successful operation. This second briquette venture did not succeed technically or commercially.
- 1898** The Great Morwell Brown Coal Mining Company ceased operation. However, mining by subsequent lessees continued intermittently at low output until 1914. Mining was reactivated under Mines Department management in 1917, was transferred to State Electricity Management in 1924 and continued through to 1963, latterly being called Yallourn North Open Cut.
- 1899** Black coal output in Victoria, mainly from South Gippsland, peaked at about 260,000 tons per annum, representing about 50 per cent of demand. By about 1904, Victorian black coal output fell to about 60,000 tons per annum due to strikes and industrial disturbances and the closure of small uneconomic mining operations.
- 1900** Only three small black coal mining operations continued to be in operation in the Narracan Creek Valley.
- 1909** Following strikes severely restricting coal supplies from NSW, the State Coal Mine at Wonthaggi came into operation to mine the black coal seams in the Powlett River Valley, centered about five miles north of Cape Paterson. A VR rail connection to the State Mine was in service in 1910. By 1911, mining was progressing via three productive mines – Shafts Three, Five, and Ten. Eventually there were to be 12 separate mines in the State mine project which remained in production until 1968, being by far the major black coal mining project in Victoria.
- 1908, 1912** C Merz, consultant to the Government, recommended base load electric generation in the Latrobe Valley sourced on brown coal as well as peak load generation located in Melbourne sourced on black coal.
- 1910** Daly's Mine was opened into black coal seams on the Powlett River in South Gippsland. It continued in operation to 1926. It was the only new private mine brought into operation in this area of South Gippsland from the late 1890s.
- 1917** A State Government-appointed Brown Coal Advisory Committee recommended construction of a power station and a briquette factory to utilise brown coal from a defined area south of the Latrobe River in the Morwell River valley.
- 1914–19** Seven new mines were opened at the State Coal Mine at Wonthaggi, namely: Number Nine shaft, the McBride tunnel with three operating benches, the Station area tunnel and the Eastern Area with two operating benches. At the end of 1919, there were eight producing mining operations.
- c1918** Mining of brown coal commenced at Wensleydale in the Otways shortly prior to 1918. Initially, underground mining was used probably to 1932. In 1943 mining of this deposit recommenced as a larger scale open cut operation by the Wensley Bray Coal Company, followed by operation by Roche Brothers until closure of operations in 1959/60 after the Anglesea deposit was opened.
- 1919** The State Government approved construction of a power station (50 megawatts) and a briquette factory at what was later called Yallourn, immediately on the south side of the Latrobe River and opposite the 'Old Brown Coal Mine' site. This approval also authorised a mining plan and proposals for mine plant as recommended by Lindsay Clark, mining consultant commissioned by the Minister of Public Works. This authorisation was prior to the appointment of the 'Electricity Commissioners'.
- 1919** Practically all the area in the Morwell River Valley for up to ten kilometres south of the Latrobe River was subject to exploration or mining leases between 1891 and 1919 as entrepreneurs sought opportunity for utilisation of the brown coal resource. This enthusiasm emanated from the 1889–1891 Royal Commission on Coal. However, the Government authorization in 1920 of a Public

- Authority to operate an open cut mine, power station and briquette works at Yallourn lessened private enterprise ambitions for brown coal supply. None of the prospective private brown coal mining ventures in the Latrobe Valley reached a commercial ongoing production stage.
- 1919** At Lal Lal, mining of brown coal resumed after previous cessation in 1898.
- 1921** The State Electricity Commission of Victoria (SECV) was established on 1 January 1921. Among its immediate tasks associated with the management of electricity generation and supply throughout Victoria was the establishment a power station, briquette works and open cut at Yallourn. Site works had commenced in October 1920 by the 'Electricity Commissioners' to plans previously approved by Parliament. Included in the defined role of the SECV was 'the development of the brown coal resources of the State.' From 1921 to 1924 as overburden was removed to expose coal surface, a few hundred tons of coal in total was intermittently extracted for testing. Coal deliveries on an operational basis commenced on 21 August 1924.
- 1922** A brown coal seam 30 feet thick was found from drilling at Dean's Marsh in the Otways. This seam was mined from 1947 to 1950, latterly as the Globrite Colliery.
- 1924** The State Electricity Commission of Victoria took over operations of the Old Brown Coal Mine from the Mines Department with coal supply mainly to the new Yallourn Power Station. The old mine was subsequently named the Yallourn North Open Cut and also supplied coal to Newport Power Station and to industry in Melbourne and Gippsland. The mine operated from 1924 to 1930, again in 1934 and then continuously from 1941 to 1963. Lifetime total coal output was 17,039 million tons.
- 1927** At Yallourn Open Cut, major modifications were implemented to the Lindsay Clark mining concept with provision of higher capacity plant following German practice to meet substantially higher coal demand.
- 1929** Underground mining commenced at the Parwan Brown Coal Mine eight kilometres south of Bacchus Marsh. This was the first mining of the deposits at Bacchus Marsh and continued intermittently as a small operation until 1945 when spontaneous combustion led to sealing of the workings.
- 1936** Proposals were advanced for a new open cut in the vicinity of Yallourn with coal transport interconnection with Yallourn Open Cut to provide extra coal winning capacity and reliability for additional power and briquetting units.
- 1941** Yallourn North Open Cut was reactivated by SECV to substitute for black coal war-time shortages.
- 1942-45** Investigations and reports within the SECV continued into the provision of a new open cut in the Latrobe Valley to meet increasing demand for power generation and briquetting.
- 1944** Maddingley Brown Coal Mine Number One at Bacchus Marsh was opened in 1944 as an underground operation. In 1946 operations were changed to an open cut. This mine closed circa 1950.
- 1946** The Star Collieries Numbers One and Two each located a few kilometres south of Bacchus Marsh were open cut operations. Number One colliery commenced in 1946 and Number Two in 1950.
- 1946** The Lucifer Colliery, located a few kilometres south of Bacchus Marsh, opened in 1946 to mine brown coal as an open cut operation.
- 1947** The Moonmook, Corovuna and the Moolamoona Mines, located about five kilometres southwest of Thorpdale, were opened as adits into brown coal in 1947 and operated until 1965.
- 1947** The Globrite Colliery at Dean's Marsh commenced operations in the brown coal deposit found in 1922.
- 1948** Government approved the Maryvale Project as a briquetting complex integrated with a power station and supplied with coal from the new Morwell Open Cut adjacent thereto. Rail haulage

was to be used for transport of overburden and coal. Excavation was intended to be by bucket chain dredgers.

1948 Maddingley Brown Coal Mine Number Two commenced an open cut operation about two kilometres south of Bacchus Marsh. This mine has had continuous operation until the present time mainly delivering by VR rail to paper works at Fairfield.

1940s The 'Rollo' Brown Coal Mine at Yarragon was reactivated after its initial cessation in the early 1890s. 'At December 1950, the mine had produced 23,810 tons of coal and was still in operation'. (This statement from anecdotal sources requires verification.)

1949 The Boxlea Colliery located a few kilometres southeast of Bacchus Marsh commenced an open cut operation in 1949/50 after initially installing an adit in 1948.

1950 At Gelliondale in South Gippsland, an open cut commenced in 1923 and was shut down some time later after a small output. This mine was reactivated some time prior to 1950 and was worked until 1955. A small briquetting plant at the mine site had proved commercially unsuccessful. The coal resource at Gelliondale was of keen interest to entrepreneurs during the world oil crisis of the 1970s.

1951 Yallourn Open Cut introduced the first bucket wheel dredger in Australia, named Number Three dredger. Three ladder dredgers and several shovels and draglines were already in service at Yallourn.

1955 Yallourn North Extension Open Cut (YNX) was opened up by the SECV due to dwindling coal reserves at Yallourn North Open Cut (originally the Great Morwell Brown Coal Mine). The YNX mine utilised equipment from Yallourn and Yallourn North open cuts and effectively took over coal supplies previously derived from Yallourn North. The mine closed in 1969 with a lifetime total output of 9.3 million tons of brown coal, leaving

an immediately accessible coal reserve of about seven million tons and a coal resource of about 40 million tons.

1955 The first coal deliveries commenced from Morwell Open Cut initially with transport by SECV rail trucks to Yallourn Power Station. About three million yards of overburden were excavated by mobile plant by October 1955. Bucketwheel dredger Number 21 was the first dredger in operation at Morwell, initially digging overburden from October 1955 with first coal supply in November 1955. This dredger, now out of service, has been preserved as a public exhibit at the entrance to Morwell Open Cut.

1956 A Lurgi Process Gasification Plant converting brown coal to gas came into operation at Morwell, initially using briquettes from the Yallourn Briquette Works and later from the Morwell Briquette Works. This gasification plant closed in 1969 on the advent of Natural Gas supply from Bass Strait.

1958 The first unit of Morwell Power Station came into service supplied with Morwell Open Cut coal.

1958 Mining of the small brown coal open cut at Won Wron commenced.

1959 The first half factory of the Morwell Briquette Works came into service supplied with Yallourn Open Cut coal.

1959 Coal supply to industry and institutions in the Geelong area from a Brown Coal Mine at Anglesea commenced, substituting for previous supply from the Wensleydale Open Cut. The new mine was initially operated by Roche Brothers.

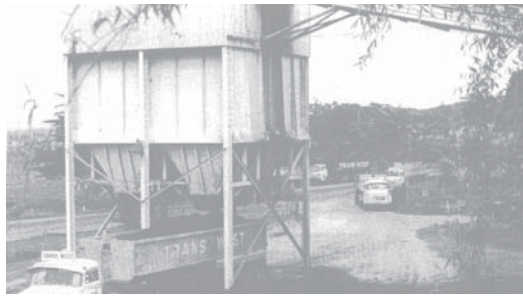
1961 The Anglesea Mine was taken over by Alcoa of Australia for supply to the 150 megawatt Anglesea Power Station owned and operated by Alcoa. Western Mining Company carried out the initial mine planning and mine management. The Anglesea Mine continues in operation at 2007.

1963 Yallourn North Open Cut ceased coal mining. However its outloading plant continued outloading coal from YNX Open Cut to VR rail trucks.

- 1964** Operations at Yallourn North Open Cut ceased. As a component of a long term rehabilitation plan, portions of the open cut mined out area continue to be used at 2007 as a below natural ground level storage for ash hydraulically pumped from the nearby Yallourn W Power Station.
- 1964** The first unit of Hazelwood Power Station came into service supplied with Morwell Open Cut coal.
- 1968** The State Coal Mine at Wonthaggi closed down in December 1968 after mining 16.7 million tons of coal in its 58 year lifetime.
- 1970** Australian Char Pty Ltd established a coal to char conversion plant at Morwell using briquettes from the Morwell Briquetting works. High quality parameters were sought by Australian Char in coal selection at Yallourn Open Cut, the source of briquetting coal until 2002. This char plant was still in operation at 2007 but continuation of briquette supply seemed uncertain.
- 1970** The eighth 200 megawatt unit of Hazelwood Power Station came on line completing the generation plans based on Morwell Open Cut.
- 1976–77** Annual coal output of Morwell Open Cut reached a peak of 16,024 million tonnes.
- 1976–77** The Loy Yang Project to be located several kilometres south of Traralgon was authorised by Parliament as a 4000 megawatt power station to be fuelled from an adjacent open cut. Site works commenced in February 1977.
- 1981–82** Coal output from Yallourn Open Cut reached a peak of 22,275 million tonnes in the 1981/82 year.
- 1982** At the Loy Yang Open Cut, the first dredger (D14) commenced commissioning in July 1982 and went into commercial operation excavating overburden on 1 October 1982. The first coal deliveries occurred in July 1983, with commercial operation of the first 500 megawatt power unit officially on 30 June 1984.
- 1985–89** Morwell Coal was used in a solar dried coal slurry plant installed at a trial scale at the south of Morwell Open Cut. Economic viability for this process proved highly doubtful.
- 1985–90** Yallourn Coal was supplied to an outloading station at Morwell for use in the Brown Coal Liquefaction Victoria (BCLV) plant for conversion to oil. The conversion process proved technically feasible. The plant was taken out of service c1990 and largely dismantled.
- 1989** Yallourn North Extension Open Cut ceased coal mining operations due to APM Maryvale (the last remaining customer) converting fully to power generation from natural gas. Rehabilitation of the open cut has occurred such that mining of an approximate 40 million tonnes of coal could be viable in the future.
- 1992** At Loy Yang Open Cut, the fourth dredger (D27) went into normal operation on 1 June 1992. Provision has been made for a fifth dredger but no commitment has been made.
- 1992** At Loy Yang, a pulverized dried brown coal plant went into service with coal supply from Loy Yang open cut. This plant had a contract to supply dried coal as a start up fuel for Loy Yang B Power Station.
- 1996** At Loy Yang, the sixth 500 megawatt power unit (the last unit committed at 2004) was handed over for full time operation on 30 September 1996. Coal output averaged 30.7 million tonnes over the calendar years 1998 and 1999. An average annual output of 32 million tonnes is expected in current and future years.
- 2003** At Loy Yang, the Hyland Highway was diverted over a length of about five kilometres to allow for expansion of the open cut to the east and south.
- 2004** At Morwell, in January 2004, a fire in the briquette factory caused extensive damage. Some funding for restoration of damaged plant and buildings occurred providing for continuing operation at a lower output of briquettes. The integrated Morwell Power Station continues in operation at 2007.

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- 2004** At Yallourn Open Cut, all excavation was in the East Field and earthworks were in progress for a re-deviation of the Morwell River to provide for expansion of the open cut to the east and south. Coal excavation was in the process of change to dozer/mobile crusher/feeder plant on two or three levels loading to the existing conveyor systems.
- 2004** First deliveries of coal from the west field of Morwell Open Cut occurred.
- 2004** Government interest in brown coal utilisation, particularly of the Latrobe Valley resource, was evident in sponsoring specific research activities with opportunity for increased combustion efficiency and reduced greenhouse effects. Three consortia had been selected by government after tender, with development rights in specified areas from Driffield to Rosedale. The other potential development sites suitable for large scale brown coal mining in Southern Gippsland such as Gelliondale, Stradbroke and Alberton were not included in this government-sponsored initiative.
- 2005** Yallourn, Morwell and Loy Yang Open Cuts remain in service in the Latrobe Valley and the Anglesea Open Cut at Anglesea. The Maddingley Open Cut Number Two and the Yallourn North Open Cut are each being used as planned refuse disposal areas. Some minor excavation of brown coal at Maddingley Open Cut is being used in soil conditioning packages for distribution for horticultural use. All other coal mining activities in Victoria have been terminated.

A Contextual History of Coal Mining in Victoria



Dedication to Coal Miners

The centuries will burn rich loads

With which we groaned.

Whose warmth shall lull their dreamy lids,

While songs are crooned.

But they will not dream of us poor lads,

Lost in the ground.

Wilfred Owen, *Collected Poems*, 1946¹³

1 Coal Discoveries in Australia prior to the inauguration of the Colony of Victoria in 1851

The first recorded discovery of coal in the area of the Colony of New South Wales was by convicts escaping northwards from Sydney in March 1791. They had found coal in a creek near what is now Newcastle. This find was recorded in a manuscript lodged at Koepang by escapee Bryant circa 1792 and later re-recorded in notes by Captain William Bligh. In August 1797, coal seams of more economic significance were found at what is now known as Coal Cliff to the south of Sydney. About one month later in 1797, a substantial coal seam was found to the north of Sydney in coastal cliffs near Newcastle.¹⁴

Mining of coal in the Colony of NSW commenced almost immediately after the 1798 coal discovery in the Newcastle area. The first location to be mined was 'near the Nobbies on the Coal River at Newcastle.' By the end of 1800, approximately 4,000 tons of coal was being shipped out of the Newcastle area annually. In 1801, the Lieutenant Governor of NSW arranged to have drawn up 'a stratigraphic section identifying a number of (coal) seams' in the Newcastle area.¹⁵

The early coal mining in NSW was undertaken by the Crown using convict labour. Ownership of all coal seams and deposits was vested in the Crown. Initially mining operations were inefficient. But by about 1800 'the adits of the earlier years were being supplemented by shafts'. In 1828, a private company, The Australian Agricultural Company (at some stage this may have been called or was known colloquially as the Newcastle Coal Company), chartered in 1824, had received from the Crown a virtual monopoly on coal mining in the whole of the NSW colony for a thirty year period. The AA Company, initially operating from Newcastle, maintained this privileged position (although 'challenged from time to time') until it voluntarily relinquished its monopolistic rights in 1850.¹⁶ Another more probable version is that political debate led to cancellation of the AA Company virtual monopoly in 1850.¹⁷

The first overseas export of coal from NSW had occurred in November 1801.¹⁸ It was reported in the House of Commons Papers for 1812 that of the export trade from the Colony of NSW 'the trade in skins and coals were the most thriving.'¹⁹

A substantial increase in export quantities of coal occurred from about 1850 when supplies to South America were initiated.

The recorded history of coal discoveries in the Port Phillip District of the Colony of NSW later to be named Victoria date back to 18 December 1826, when William Hovell accompanied by two soldiers and two convicts²⁰ in an official exploration from the small military and convict settlement under the command of Captain Samuel Wright at Corinella on Western Port Bay found coal on the Bass Strait shoreline in the area now known as Cape Paterson. (The spelling Cape Paterson as listed in Australian Post Codes will be used throughout this history, although the spelling 'Cape Patterson' was also often used in early official documents.) The initial coal finds were not precisely at the point known now as Cape Paterson but at a location about 3.5 kilometres to the West. (These seams found by Hovell were subsequently accessed in the DAVIS SHAFT, the first formally acknowledged site of coal mining in the Port Phillip District of NSW. These seams were also the source of the coal mining in 1910 by the State Coal Mine based at Wonthaggi.) A report on this discovery and a sample of the coal was taken to Sydney by Captain Wetherall, commander of the vessel, the Dragon, to Governor Darling of the Colony of New South Wales under whose authority the settlement at Corinella had been established. Darling forwarded Hovell's report to London but a decision had already been made in London to close down the Western Port military base. No action followed from Hovell's report²¹ at that time. The settlement at Corinella was abandoned in 1828.

In 1836, coal was subsequently found and extracted in small quantities (reputedly the first coal mining operation in Australia by non-convict labour) for domestic use by Samuel Anderson who had settled on Western Port Bay at Bass in 1835.²² (The location of this operation has not been definitively established as yet by me, some references stating this to be at Cape Paterson, others state the location as at Bass. These locations are about 20 kilometres apart. It is important to resolve this location for heritage recognition. The location of Anderson's first house is shown in Horton & Morris p.107).

In 1838, settlers Anderson and Massie told Captain Lonsdale, Police Magistrate of the Port Phillip District, who had taken up duty on 1 October 1836, that there was abundant coal in the Cape Paterson area and had asked permission to extract it, but no official reply was received.²³

CJ La Trobe, appointed in 1839 as the first Superintendent of the Port Phillip District of the Colony of New South Wales, visited the Western Port area in July 1840. Stimulated by the high social and economic value of a potential coal supply indigenous to the Port Phillip District, he showed considerable interest in encouraging private coal mining ventures in the Western Port area as the only known potential coal supply source in the Port Phillip District. In 1839, Captain WA Moore, of the cutter Prince George, and Robert Hoddle, a surveyor, were instructed by Superintendent La Trobe to undertake an expedition in search of coal along the southern coastline of the Port Phillip District of NSW. Their only coal discovery was 'a strata of coal about six inches thick below high-water mark level in Western Port near Griffiths Point.' 'It was not a successful expedition -they found no coal of any consequence in the areas searched.' They did not investigate the coastline to the east of Griffiths Point. Prior to 1840, Samuel Anderson had also found this coal strata at Griffiths Point identified by Moore and Hoddle but had not reported his find.²⁴

In 1840, Captain Cole, subsequently a board member of two companies with interests in the coal trade, initiated coal mining 'from the cliffs between Kilcunda and San Remo' outloading 'a few tons of coal' into ship via lighters and transporting this coal to Melbourne.²⁵

In October 1840, La Trobe instructed H Cameron to explore the Cape Paterson area for coal deposits. Cameron returned to Melbourne with coal samples and much enthusiasm reporting on 'the exhaustless black diamond treasures awaiting only the co-operative power of men and money.'²⁶ Resulting from this report, a company was formed in March 1841 and William Watson 'an experienced miner', was provided with men and equipment to commence a coal mining operation at Cape Paterson. Shortly after mining was initiated, this operation was closed down due to local attacks by and on aboriginal groups, Watson left the site and the project was abandoned without productive mining of coal having been achieved.²⁷ However, it had been found from this initial activity that the coal seams discovered were thinner than predicted. Nevertheless in 1847, a commercial enterprise named 'The

Cape Paterson Coal Proprietary Association was formed to bore and work the coal, but very little work was done'.²⁸ (Captain Cole was a board member of this company).

In the 1840s, veins of brown coal in several locations along the coast between what is now Anglesea and Cape Otway were reported by the surveyor Smith.²⁹

By the mid 1830s, private coal mining operations on the coast in central New South Wales were well established serving Sydney as well as exporting coal. At 1835, private coal exporters in NSW were well poised to provide coal by sea transport to serve the new settlement in Port Phillip Bay established in 1835.

In New South Wales, the right of the Crown to coal on privately owned land was terminated in 1850. Private coal mining and exporting entrepreneurs had gained considerable political support at the time of the separation of the Colony of Victoria from that of NSW.

In the other colonies in Australia, coal discoveries and coal mining increasingly became of high significance to economic self-sufficiency and the potential to supply steaming fuel, for secondary industry, locomotives and shipping. Coal had been discovered near Hobart in 1803 and utilised there from 1805. Other discoveries followed in Tasmania through to the 1830s. A significant mining operation at Saltwater River to the South East of Hobart commenced in 1834. However the coal resource was not large and no export occurred prior to 1850. In Queensland the first recorded discovery of coal was in the vicinity of Ipswich in 1825. The first mining of coal in Queensland took place in about 1845. However the competitive advantages for export of coal from the Newcastle and Coal Cliff mines at-seaboard virtually eliminated any potential for export of coal from the inland Queensland site. In 1839 in Western Australia, the Governor had offered a reward in the form of a land grant for the discovery 'of any considerable bed of coal south of Shark's Bay' in the WA colony. Seven years later the reward was granted for a discovery about 250 kilometres north of Perth which subsequently led to a small mining operation but without realistic potential for commercially viable export. In the Colony of South Australia, coal was first discovered in 1836 to the north of Adelaide but mining did not occur until decades later.³⁰

On 31 July 1847 the decision of the British Government was announced to separate Port Phillip from New South Wales and to call the new colony Victoria. The relevant British legislation came into effect on 5 August 1850. The actual independence of Victoria was dated from 1 July 1851 when the writs were issued for the elections of the first Victorian Council. CJ La Trobe was sworn in as Lieutenant Governor on 15 July 1851.

At 1851, the politically supported and financially successful well established coal mining and delivery operations on the NSW central coast were now privately owned and operated. These operators and entrepreneurs were in effect the exclusive suppliers of coal to the embryo colony of Victoria.

There had been no significant coal discoveries and no commercially successful coal mining in the Port Phillip District of NSW. For the newly established colony of Victoria, exploration and development of Victorian coal mines close to the metropolitan and regional centres or on the coast were of high priority.

By 1851, the time of the first gold rush and the separation of the Colony of Victoria, production of coal (all black coal) in the colony of NSW had reached over 67,000 tons.³¹

2 Coal exploration and mining in the newly established Colony of Victoria 1851–1870

2.1 Increase in Government influence on coal exploration and mining in the 1850s

In 1851, CJ La Trobe, the Lieutenant Governor influenced the government to offer a reward of £1000 for the establishment of a commercially successful coal mining venture in Victoria. La Trobe strove diligently to encourage commercial independence with the political separation from NSW but not without strong opposition from entrenched business interests tied to NSW. However, although the Victorian Government paid some minor rewards for coal discoveries in the 1850s, no coal mining operation of significant commercial prospects eventuated in the 1850s.

Gold had been discovered near Bathurst as early as 1823. However, it was the discovery of gold by EH Hargreaves in the Bathurst district in February 1851 (announced in the Sydney Morning Herald, 15 May 1851) which began the gold rushes in NSW. Minor gold discoveries in Victoria had occurred from the early 1840s and in large quantities at Ballarat in August 1851. This started the great rush to Victoria.³² The widespread exploration for gold (with associated discovery of coal seams and lignite deposits) and the influx to Victoria of skilled miners, many of whom were formerly coal miners in Britain, seemingly provided a potential for development of coal mining in Victoria from the mid 1850s.

In 1852, Alfred Selwyn of the Geological Survey of Great Britain was appointed to the newly declared colony as a geological surveyor to be attached to the Surveyor General's Department. Over the next four years he travelled extensively with one assistant on geological surveys throughout the colony. In 1856, a Select Government Committee established to report on the coal resources in Victoria, reported unfavourably on the commercial prospects of coal discoveries found to that time. In 1856, Selwyn was appointed 'to commence a Geological Survey of Victoria'. R Brough Smyth was appointed as Secretary of Mines in 1861 with responsibilities including Mining and Geological Surveys.³³ In 1863, the first Geological Map of Victoria was produced. Selwyn was responsible for

Geological Surveys through the period of extensive gold discoveries and exploration until his resignation in 1869. His resignation arose through conflict on the interface between the geological surveyors and mine surveyors, which had arisen between Selwyn and R Brough Smyth.

In 1870, Brough Smyth submitted a report 'On the Present Condition of the Geological Survey of Victoria'. Appointment of three geological surveyors followed – namely RAF Murray, EJ Dunn, and FM Krause each of whom subsequently had a long and strong influence on the accumulation and interpretation of geological information throughout the colony. A new geological map of Victoria was issued in 1872. From 1873 onward the first of eleven progress reports of the Geological Survey was issued.³⁴

A Geological Survey of New South Wales was not commenced until the New South Wales Department of Mines was established in 1875.

In 1857, a carboniferous deposit found at Lal Lal near Ballarat was described as lignite by the Geological Survey Department. This was the first identification made in the Colony of Victoria of this lower grade fuel. (This lignite deposit at Lal Lal was subsequently the first lignite/brown coal to be mined in Victoria albeit with mixed commercial success through several different mining companies intermittently over the next 90 years.)

In 1858, after initially providing a 25 pound sample of coal from the coal seam outcrops originally found by Hovell in 1826, a shaft was sunk by Richard Davis at Cape Paterson intersecting the two veins of coal. After much negotiation with the Government a reward of £110 was paid to Davis. (Some references including Knight [1940] state that the full payment to Davis was eventually £400). In 1863, Thomas Bury was paid £100 by the government to carry out some further examination and tests from this shaft.³⁵

In 1858 the Victorian Coal Company was formed and commenced boring at Cape Paterson with the intent to prove and mine suitable coal seams.

In 1859 thin seams of good quality black coal were recorded at Bass.³⁶ It is probable that coal from these seams was that used domestically by the Andersons in the 1830s.

2.2 Widespread coal exploration and discovery in the 1860s

By the 1860s, discoveries of coal were being reported throughout the colony, particularly south of the Great Dividing Range, in South West and Central Gippsland and to the west of Melbourne. By this time, geologists and analysts from the Mines Department were separately classifying the various discoveries as either black coal, or as brown coal or lignite (eventually from about 1900, the broader nomenclature 'brown coal' was adopted, instead of lignite, for all the geologically younger coals). *Mineral Statistics*, issued annually by the Mines Department from about 1864, which included a brief summary of the coal and lignite discoveries and workings in the colony, traces the history of these early prospects. By 1864, it was noted that, in the area from Cape Paterson to Griffiths Point, 33 searching licences for coal or lignite had been issued and four mining leases were in operation.

The Victorian Coal Company between 1858 and June 1863 mined 1,933 tons of black coal from shafts into the coal near the original find of Hovell west of Cape Paterson. Two seams named the Queen and the Rock seams, each about 40 to 50 inches thick at the shore outcrop, were intersected.³⁷ The coal as mined was shovelled by hand into bags, then hauled in bullock wagons and outloaded into whale boats delivering to ships anchored off Cape Paterson. This company ceased operation in 1863 after considerable infrastructure costs had been expended to establish effective haulage over an iron rail tramway to the outloading point. At 1865 this company still retained its lease but stated its lack of activity was due to problems with shipping out the coal.^{38, 39}

In 1865 the Western Port Coal Company was formed to work a black coal seam exposed at Kilcunda. It was intended to haul the coal about 11 kilometres to San Remo for delivery by ship to Melbourne. By 1870 a shaft 0.4 kilometres inland from the shore at Coal Creek near Cape Paterson was sunk striking good black coal at 100 feet in a seam 1.7 to 2.0 feet thick.⁴⁰ An undisclosed quantity of coal was hauled by bullock wagon to Griffiths Point but the haulage route quickly cut up and mining operations were suspended waiting for decisions and action on a better haulage provision. This company eventually continued through to 1883.⁴¹ It mined about 15,000 tons having built a three foot six inches wooden rail tram track by

1906 later replaced with iron rails to a wharf constructed for outloading coal at San Remo/ Griffiths Point.

In 1868, another Select Government Committee on coal resources was established. The major outcome appeared to be the offer of £5,000 reward by the government in 1870 for delivery of 5,000 tons of black coal to Melbourne from a Victorian mine.

In 1869, R Brough Smyth, Secretary, Mines Department, issued a further report on the Carboniferous Areas of the Colony. He warned that successful competition by Victorian mines against coal deliveries from NSW black coal mining operations 'would require thick seams from locations which would permit the coal being brought to market in good condition and at no great cost'.⁴² Nevertheless his report was timely and of high significance advocating increased exploration in areas depicted by him as being potential coal bearing areas. Many local discoveries of black and brown coal subsequently took place as prospectors explored in new areas and as land settlement in South and Central Gippsland occurred through the 1870s.

Coal proving activity in the Kilcunda to Griffiths Point area had been high due to the proximity of safe ship shelter. The New Griffiths Point Coal Company drove a deep bore towards 1000 feet but did not disclose their results in detail. In the late 1860s, coal extraction from shallow pits near Griffiths Point did not prove technically successful due to thin seams. In these and other embryo black coal mining ventures in the colony, high transport costs and thin seams were combined disadvantages.

By 1870, only 2,033 tons of black coal (all from South West Gippsland) and 997 tons of lignite (all from near Ballarat at Lal Lal and Sebastopol) are recorded as having been mined in the colony of Victoria to that time. It is highly probable that outputs from small coal mining ventures were not fully reported at this time. No black coal production had been recorded in the period 1865 to 1869.

With respect to lignite or brown coal mining, the Lal Lal mines are the pioneer brown coal mines of Victoria. The Lal Lal deposit (adjacent to the current Geelong-Ballarat railway line) about 15 kilometres south of Ballarat had been assessed as 'being a bed of lignite more than 100 feet in thickness'.⁴³ In 1864, the first lignite mining took place via a shaft sunk by the Victorian Lignite Company with 200 tons raised and sold.

At June 1865, there were several shafts with four mining leases in force over 667 acres with four separate companies involved at Lal Lal.⁴⁴ However there was no market identified at the time for economic application of this high moisture coal either locally or at Ballarat, Geelong or Melbourne and further production did not occur until 1869.⁴⁵ Concepts of the mining lessees turned to coal drying and briquetting as well as use as a soil conditioner or fertiliser or for conversion to liquid fuels, lubricants, or other chemical by-products. These potential uses have remained to the present day as concepts, with some implementation, for effective utilisation of the vast brown coal deposits of Victoria.

At Lal Lal, a number of mergers and withdrawals of the mining lessees occurred resulting in the Victorian Brown Coal Company Ltd. being the sole operator by 1874 with a mining lease of 475 acres. By this time only about 3,000 tons had been raised. Mining had been very intermittent. Maximum storage capacity under cover of the mined lignite was about 200 tons. Generally, this storage was full, waiting for sale of the stored lignite.

Another lignite mining operation occurred at Sebastopol near Ballarat by the Victorian Patent Manure and Chemical Company in late 1865 raising 35 tons only. Nothing further was recorded for this venture. There were other lignite finds recorded in the 1860s in central Victoria but apparently none of these reached a commercial mining stage.

By 1878, the progressive quantities mined as shown in *Mineral Statistics* of the Mines Department had risen to 8,971 tons of black coal and 4,589 tons of lignite. (Note that the quantities attributed to individual mines exceeded the total shown for all mines.)

In 1873, the first coal find in the Otways was recorded for lignite deposits 'of considerable thicknesses at Point Castries south west of Aireys Inlet'. These deposits were assessed 'to be widely spread but they do not in any one place cover a very large area'.⁴⁶

2.3 Effect of infrastructure on coal supplies

2.3.1 Influence of the railways network on coal supplies

On 12 September 1854, the first locomotive in the Colony of Victoria travelled from Melbourne to Hobson's Bay on a rail line built by a private company.⁴⁷

From the late 1850s, the advent of rail lines from Melbourne and Geelong to Ballarat, Bendigo, and beyond increased the market opportunities for coal delivered by sea from NSW. The Sydney-Melbourne rail link came into service in 1883. However, the difference in rail gauge at the junction of the Melbourne to Sydney rail line at Albury obviated the economic opportunities of coal deliveries from NSW by rail. It was not until the 1880s and later that the Victorian rail network into the coal bearing areas of Victoria presented opportunities for coal mined in Victoria to compete with NSW coal delivered by sea to Melbourne, Geelong or Portland.

With respect to Central Gippsland, the rail line between Melbourne and Sale was completed in 1879, a branch line from Melbourne to Mirboo North was progressively built from 1883 to 1886, and by 1888 a branch line from Moe to Thorpdale had been established.

In South Gippsland, the rail line between Melbourne and Leongatha was opened in 1892. Rail lines into South West Gippsland servicing Cape Paterson and into the Otway Basin serving Winchelsea followed as the network of rail lines 'spider webbed' the colony providing opportunities for scattered black coal mines to establish branch lines and sidings on the main lines.

Not only did the government rail network provide key transport routes to Melbourne, and thence to coal consumers at other centres on the rail network, but it also offered opportunities for coal supply to the locomotives and to the port-side coal storages for the extensive steam-ship traffic now using the Victorian ports.

2.3.2 Influence of increasing and scattered gas manufacture on coal supply

In 1849, the first gas light in Melbourne was in use at a confectioner's shop. In 1850 the City of Melbourne Gas and Coke Company was formed.⁴⁸ In late 1855 (1857?), another manufacturer/distributor, the Melbourne Gas Company, came into service.⁴⁹ Throughout the colony, gas produced from coal rapidly replaced oil for lighting in streets, and in homes and business premises. As well as at metropolitan and regional centres, many of the small townships had their own gas works requiring firm contracts for reliability of coal supply. (The structure of the gas supply industry progressively changed from multiple privately owned utilities to unification under the Gas & Fuel Corporation which became the sole distributor of gas in Victoria by 1974.⁵⁰ In the 1990s the gas industry was again privatised involving several companies.)

Gas supply in Victoria was based on black coal from 1849 to 1956 with increasing competition from oil refinery by products by the mid 1950s, from brown coal in 1956 and from brown coal briquettes from 1956. The advent of natural gas supplies from Bass Strait in 1969 led to immediate closure of the Morwell Gasification Plant and cessation also of brown coal and briquette deliveries thereto.⁵¹ Black coal usage for gas production throughout the state progressively fell away as substitution by natural gas occurred.

2.3.3 Influence of growth of shipping trade on extent and reliability of coal supply to portside storages

The first steam ship to arrive in Sydney came in 1831, before the settlement of Melbourne commenced. By 1841, steam vessels had commenced regular goods and passenger transfers between Melbourne, Williamstown, Geelong and Sydney.⁵² The first steamer to voyage direct from the Cape of Good Hope to Melbourne arrived in 1853⁵³ at the peak of the sailing trader traffic and a year or so after initial steam voyages from India.

By the 1860s, black coal storages were in service at all commercial ports in Victoria.

3 Coal exploration and mining in the Colony of Victoria 1871–1890

3.1 Influences on the Potential Development of Coal Mining 1871 to 1890

In 1873, Reginald Murray, Geological Surveyor with the Mines Department, undertook a geological investigation of the carbonaceous region in South and Central Gippsland. A Geological Sketch Map of South Gippsland and a report (*Geological Report No. 3*) were published in 1875 summarising his investigations. His report confirmed indications arising from *Geological Reports No. 1* and *No. 2* of 1873 and 1874 respectively that a very extensive deposit of brown coal (lignite) existed in Central Gippsland between Warragul and Rosedale, particularly to the East of the Haunted Hill(s). His report also indicated the likelihood of further discoveries of black coal seams in South West Gippsland. In his investigations he inspected a black coal seam found the previous year at a location now called Coal Creek at Korumburra. This was the first coal find (named by Murray as the Strzelecki seams) reported in South Gippsland.⁵⁴

In 1873, John Mackenzie, NSW Examiner of Coal Fields, was invited to report on the potential for coal mining in Victoria. He reported that 'no workable seam had been opened in any part of Victoria'. Inter alia his examination of the two seams at Cape Paterson revealed that on the average of three different locations the seams were about 27 inches thick rather than over 40 inches thick as had been believed for the previous 20 years.

In the 1880s, there were little or no centralised marketing arrangements for the coal mining ventures in Victoria. Coal from scattered prospective suppliers was also of highly varying quality ranging from high moisture brown coal to high quality black coal compared with a reasonably standard quality from the well developed NSW mines. Large scale potential customers such as the government railways, the gas companies, and the coal vendors to the shipping trade were disillusioned with the varying quality and the intermittent supplies from the numerous small coal mining operations in Gippsland. They either refused to enter long term contracts, or alternatively set low rates of payment to individual suppliers both because of their low bargaining power as well as the unreliability of supplies.

3.2 Royal Commission into Coal in Victoria 1889 to 1891

There had been some shortages of coal from NSW through the 1880s due to industrial disputation on the NSW coal fields. Additionally, the NSW coal supplies were controlled by commercial cartels with very little price competition. These cartels also had invested in many of the prospective coal mines in the Gippsland area.

The *Gippslander and Mirboo Times* (10 June 1892), referring to a commercial take-over of the Mirboo Coal Company Ltd. in 1887 stated 'Although shares were taken up and large capital amassed, the company has not spent a single shilling in developing the mine. The preponderance of power for the management of the syndicate fell into the hands of a favoured few, who evidently intended to keep the mine locked up for purposes of their own, no doubt having a paramount interest in other large coal measures in a sister colony'.

In 1889, the Government of Victoria established a Royal Commission into Coal in Victoria.

Intermittently, during the tenure of the Royal Commission from 1889 through to its final report in 1891, a series of strikes in the NSW mines caused serious coal shortages in Victoria further emphasising to the Royal Commission the desirability of a reliable indigenous Victorian Coal Industry. The Royal Commission's inquiries were broad. It assessed that the black coal resources of the colony were mainly confined to South and South West Gippsland and were unlikely to be a major source of long term challenge to the NSW coal cartels even after the completion of the South Gippsland railway would provide reduced transport costs to the Melbourne area. More significantly, the Commission's final report acknowledged the existence of large resources of brown coal. Its investigations noted the proven expertise already existing (in Germany) for conversion to gas, to hard fuel (briquettes) for domestic and industrial heating, and as a raw or crushed dried fuel for steam raising in electricity generation and in industry. The conversion of the raw coal to a pulverised fuel for locomotives was envisaged as a strong possibility, and conversion to liquid

fuel had been demonstrated to the Commission. The technical feasibility and economic potential of long distance transmission of electricity at high voltage from a power station at the mine site with transformation and distribution at low voltage to industrial and domestic consumers were also acknowledged by the Commission as being of likely feasibility.

The Commission's final report strongly recommended that Victoria must promote the utilisation of brown coal as a key economic and strategic objective as well as to provide a competitive alternative to all uses of NSW black coal.

3.3 Black Coal Mining Activities in South West Gippsland 1871 to 1890

At 1870, the Western Port Coal Company (WPCC) mine at Kilcunda was the only active coal mine in Victoria but mining had been suspended while the company regrouped and built a wooden rail tramway from the mine to a wharf built by them at San Remo. Subsequently the wooden rails were replaced by iron rails with horse drawn trucks. Provision of a locomotive was intended but did not eventuate. In 1872 the WPCC sank two new shafts and sent a 10 ton sample of coal to Melbourne for exhibition and as a call for political support.⁵⁵ At 1874, this company mined 2,879 tons of coal from a seam 20 to 32 inches thick with a third shaft in operation.⁵⁶ The Western Port Coal Company had anticipated being eligible for the government reward of £5,000 by 1875 by which time they had mined about 8,000 tons. However in spite of many requests and litigation in ensuing years they did not receive any reward. Evidently this was partly due to the long period since the reward was 'on the table' and partly due to other support the company had received from government in establishing its haulage and outloading infrastructure. This operation at Kilcunda closed in 1883 having mined about 15,000 tons of black coal.⁵⁷

In South West Gippsland, there were various black coal seam finds in the 1870s and 1880s but little significant black coal mining other than by the WPCC occurred to 1889 in this region.

3.4. Black Coal Mining Activities in South Gippsland 1871 to 1890

Following the confirmation in 1873 by Reginald Murray of black coal seams near the present location of Korumburra (Coal Creek) other finds occurred at Foster and Fish Creek. In 1873, mining was reported near Korumburra (at Silkstone) but did not continue due to the remoteness and high transport costs to markets. In 1882 a tunnel was driven at Silkstone (a few kilometres south east of Korumburra) from which the first block of Korumburra coal was exhibited in Melbourne.⁵⁸

In 1889, the Mines Department commenced drilling in the Korumburra area and two deep bores had been sunk at the town site and nearer to Coal Creek by the end of 1890. The second bore intersected more than eight seams about four of which appeared to be of good black coal thick enough for commercial mining.⁵⁹

In 1889, the Coal Creek Mining Company sank a shaft and commenced a small operation (after seeking finance for six years). At May 1890, 'a tunnel 50 feet long had been driven intersecting three good seams of coal' – this was inspected during a visit to Korumburra by the Royal Commission into Coal in May 1890.

However production from this or other prospective mines in South Gippsland was waiting on the railway line to Melbourne.

3.5 Black Coal Mining Activities in Western and Central Gippsland 1871 to 1890

3.5.1 Coal Deposits assessed as Black Coal

At 1873, coal finds were being reported widely outside the original coal discovery area of black coal in South West Gippsland. In Central Gippsland, black coal seams were found in the valleys of the Morwell, Narracan, and Tyers rivers and their tributaries,⁶⁰ generally at the extremities of the younger brown coal fields.

3.5.2 Morwell River Valley

In the Morwell River Valley, a small coal mining operation by the Excelsior Coal Mining Company commenced in 1874 in outcrops of thin coal seams (15 inches to 28 inches thick) on the banks of Billy's Creek near the present area of Jeeralang Junction. A shaft with a drive following the dip of the main seam was used to extract coal of rather poor quality 'scarcely marketable as a fuel'.⁶¹

In December 1874, the Hazelwood Coal Mining Company took out a coal mining lease on land about seven miles south of the present town site of Morwell⁶² and in the vicinity of the Excelsior operation. The Hazelwood mine worked for a few years but was found to be uneconomical and phased out by 1879.

In June 1879, the Prince of Wales Coal Mine commenced operations at the former Hazelwood Mine site. The completion of the Melbourne-Sale rail line in 1879, had led to the declaration of coal discoveries perhaps previously known but not reported. Proliferation of search and mining leases for coal occurred widely.

In addition to the mines mentioned above, the following mining endeavours were of some significance:

- The Royal Standard Mine initiated about 1886 at the Southwest of the Hazelwood mine.
- Burke's Black Coal mine initiated in 1886 about one mile from Boolarra.
- Mirboo Collieries initiated in 1886 was still operating at 1889.
- Mirboo Proprietary Coal Mine Company was in production with deliveries by rail in 1889.
- In 1889 Pratt's Boolarra Mine was working at three shifts per day.
- In 1889, Batt's coal seam at Boolarra was reported at 'three feet five inches of dense black coal.'⁶³ Some mining of this seam occurred.

There were some other mines closer to Morwell and Yinnar which found the close to surface coal was brown coal and lacking an economic market. Stephen Legg⁶⁴ summarised as follows: 'There were 15 workable seams found between 1873 and 1890, 10 syndicates were formed to mine in these seams, all but one were failures.'

3.5.3 Narracan Creek Valley downstream of Narracan

At the Narracan Creek Valley, coal had been found in 1862 and the first coal mining lease had been taken out in 1864. At Narracan, a store/hotel had been established by 1874 and a school and a Mechanics Hall by 1878. The first mining operations were by the Fear Not Coal Mine in 1879, the Gippsland Coal Mining Company at Mosquito Creek in 1880, and by the Moe Coal Mining Company about six miles South East of Moe in 1882/84.⁶⁵ By 1891, the mining township of Coalville was the largest town in the shire of Narracan.⁶⁶

Progressively from 1882, the Government funded a coal drilling program which in addition to confirming the vast extent of the brown coal deposits of Central Gippsland also revealed the existence of some thin coal seams in the older geological structures on the fringes of the Latrobe Valley Depression. Most of these finds were initially considered to be black coal largely because of their colour and relative hardness compared with the thick brown coal seams found in the Morwell River flatlands.

The Morwell River Valley and Narracan Creek Valley branch rail lines from the Central Gippsland rail line, completed in 1886 and 1888 respectively, offered access to existing metropolitan and regional markets for black coal. However coal seams were thin and rail transport costs were high. In several ventures the coal quality as a fuel was below expectations. Many small mining ventures in these valleys failed to gain adequate capital or failed to achieve economic production, and either were liquidated or taken over by more successful operations.

Among the many coal finds in the Narracan Valley from the 1870s to 1890, some details of ventures some of which reached the mining stage are as follows:

In 1877/8 black coal was found as a seam 60 cm thick at the head of Mosquito Creek in the Narracan Valley. Shafts were sunk and the Fear Not Coal Mining Company was formed in 1879. No evidence has been found that this venture reached a commercial mining stage.⁶⁷

In 1880, the Gippsland Coal Mining Company mined from a 25 feet deep shaft into a seam two feet wide further down Mosquito Creek about five miles south of Moe.⁶⁸ The venture closed about two years later with no ready market. However it stimulated interest by others and fuelled demand for a railway into the Narracan Creek Valley.

From 1884 the Moe Coal Mining Company worked a lease on Deep Creek mining from a seam 70 cm thick close to the surface about five miles south of Moe and to the east of the other mines. This mine outloaded the first trainload of coal to be carried on the Moe to Thorpdale branch rail line on 28 June 1887.⁶⁹ At mid 1890, one hundred men and three ponies were working at this mine.⁷⁰ The company survived until July 1897.

The Narracan Valley Company took out a lease in the same area about 1.5 kilometres south of Coalville Station in about 1883. The Narracan Valley Company in late 1883 demonstrated at the mine site to the Railways Commissioners 'several hundred tons of some of the finest coal ever raised in Australia.'⁷¹ It sold its lease to the Narracan Company in 1887 which sold out to the Coalville Central Company in 1888. This latter company continued a financially successful operation until the mid 1890s.⁷²

From 1887, the Grange Colliery was also in the same area but west of the Narracan Creek opposite the Moe Coal Mining Company workings. It closed by 1890. It despatched a small quantity of coal to Melbourne.⁷³

The Emersley Park Company erected a poppet head and machinery near Coalville in 1890 but could not raise further finance. The potential operation closed prior to 1891.⁷⁴

The Coalville Central Company opened operations at Coalville in 1888 but was not economically successful and had ceased operations by 1894.

Other black coal mines which commenced operation in the Narracan valley downstream of Narracan are referred to in Section 4.2.

3.5.4 Westwards beyond Thorpdale

Discoveries of black coal seams west of Thorpdale occurred from 1875, the first find officially recorded as Ryan's Seam. Subsequent discoveries also tended to be known by the name of the land occupier or discoverer and included Whelan's, Unger's, Rollo's 'Carpe Diem' mine and Scarlett's (Berry's Creek) mine. These seams all discovered before 1890 were generally thin seams discovered as outcrops and all off the west and southern perimeter of the Latrobe Valley Brown coal field. All these mining ventures were small scale operations, some except for the Berry's Creek mine having a

short life or becoming local domestic suppliers disadvantaged in the area where wood fuel was readily available.

The advent of the VR rail terminus at Thorpdale in 1888 and at Mirboo North in 1886 proved insufficient opportunity to render mining of the thin seams as profitable ventures. The Berry's Creek seam, a few miles south west of Mirboo North, although found in 1889 was mined commercially in the 1930 year and again in 1957–1959.

3.6 Black Coal Supply Constraints

By the late 1880s, in the commercially unorganised coal mining industry in Victoria many mining ventures were in potential financial collapse with operations having been suspended or not having reached production due to lack of assured contracts. Unlike the NSW coal supplies to Victoria, there was considerable variation in the quality of coal mined in the Morwell River and Narracan Creek Mines as it was progressively found that some of these seams were of older age brown coals and not of black coal heating value.

Shortages of coal supplies from NSW in the 1880s had reactivated some Victorian Government support for an indigenous coal mining industry. In 1888, the Minister of Mines had announced that rail lines would be constructed to any payable coal seam. He also announced that the Government would buy at a predetermined price (25 shillings per ton in 1888), at the customers storage, all production from Victorian coal mines – this price was nominally the same as that for NSW coal.⁷⁵ However, no rail freight concessions or Government subsidies were granted to Victorian coal producers.

Up until 1890, only about 55,000 tons of black coal had been mined in Victoria. In the 1890/91 year, annual output had increased to about 20,000 tons, but this was still only about 3 per cent of Victoria's black coal demand.

3.7 Brown Coal Mining Activities to 1890

3.7.1 Gippsland Brown Coal Discoveries – 1871 to 1890

By 1876, 32 locations in Victoria were listed by the Mines Department as identified brown coal (or lignite) deposits. The first recorded discoveries in Central Gippsland were at Yarragon in 1867 and north of Warragul at McKirley's Creek in 1869 – small scale mining for local users in both these areas subsequently occurred but without achieving commercial success. The first discovery in the Latrobe Valley area was in 1873 at the north of the Haunted Hill(s) on the bank of the Latrobe River.⁷⁶ This location was later marked on Mines Department plans as Davis's Cut.

Further discoveries were recorded at Moe (1874), Sale (1878), Toongabbie (1875) and Yarram (1875) in the Gippsland region.

3.7.2. The Great Morwell Brown Coal Mine to 1890

A mineral lease No. 773 had been taken out in August 1887 over an area of 217 hectares which extended northwards from a brown coal deposit outcropping on the elevated north bank of the Latrobe River about seven kilometres north west of Morwell and about two and a half miles downstream from the original brown coal discovery in the Latrobe Valley in 1873. By October 1888, under the same lease, tunnelling into the river bank had been undertaken accessing a single thick brown coal deposit. With a substantial coal resource envisaged, the Great Morwell Coal Mining Company was formed in October 1888 and acquired the initial lease. The mining concept was initially envisaged in 1888 as a shaft operation. However the mining site was relocated in 1889 about 600 feet further eastwards as a tunnelling operation.⁷⁷

A bridge across the Latrobe River was built by 1889 and a branch rail line from the main Gippsland line to the mine site was built in 1890. Output in 1890, the first year of operation was recorded as 1000 tons.⁷⁸

The Great Morwell Mine aimed at obtaining a Government bonus, recommended by the 1889 Royal Commission, for successful manufacture of briquettes at a rate of not less than 1,000 tons per month. It also envisaged extensive use of the coal in Government railway locomotives. This pioneer

mine was of significant importance to Victoria at various times through to closure of mining in 1963.

3.7.3 Mirboo Collieries Mine at Boolarra to 1890

In 1889, Mirboo Collieries Company, also known as the Mirboo Collieries Proprietary No. 1, had installed the Boolarra Shaft which penetrated into a brown coal deposit 162 feet thick beginning at 134 feet below surface.⁷⁹ This shaft was located about three miles North East of Boolarra and about one mile east of the Morwell River. In 1890, during a maritime workers' strike affecting supplies from NSW, this mine extracted 5,412 tons of brown coal delivering over a rail line from the mine to the VR line Morwell to Mirboo North.⁸⁰ (Some writers have indicated this mine as excavating black coal at this location but the seam thickness and geological assessment indicate the mine product as brown coal and continuous with thick brown coal deposits between Boolarra and Morwell. It appears more likely that this uncertainty has arisen because the same company, the Mirboo Collieries Proprietary No.1, operated a black coal mining venture near the Darlimurla Railway Station.)⁸¹

3.7.4 The Haswell Mine

The Haswell and Company Mine, located about 4.2 miles north east of Thorpdale, commenced a tunnelling operation in 1888/89.⁸² This operation was into a brown coal seam 13 feet thick below basalt. This mine remained open with some intermittent mining in low quantities until about 1950. See Section 7.5.2.

3.7.5 The Horrocks Colliery

Horrocks Co-operative Colliery, located about half a mile upstream from the Haswell operation, commenced in 1888. This was also a tunnelling operation into a brown coal seam about 20 feet thick. This Horrocks operation ceased commercial operation in the early 1890s. Colloquial information indicates that some manual small scale extraction of coal may have continued in subsequent years. Re-activation of mining in this locality in the late 1940s is referred to in Section 7.5.3.

A cross section of the Horrocks seam shown as Plate No. 5 in J Stirling (1899) depicts the brown coal seam under basalt with a thin black coal seam several strata lower below Mesozoic sandstone. Stirling considered this general structure applied through to the west of Thorpdale including the Haswell

operation. Also see Plate No. 6 by Stirling (1899) and his comments that it is probable that these seams 'form part of a connected deposit extending down the western watershed of the Narracan Valley and easterly under basalt towards Boolarra'.⁸³

3.7.6 Crisp's Mine

Outcrops of black and brown coal at Childers were typical of many coal finds in the hills south of Yarragon towards Thorpdale and Leongatha. At Crisp's, a 12–15 metre deep deposit of a dark brown coal, identified by the Mines Department as the Ferngrove Seam,⁸⁴ was being 'worked with a few men' in 1888.⁸⁵

3.8 Maryvale Proprietary Coal Mining Company and other Brown Coal Mining Ventures in the Morwell River Valley to 1890

In 1888 on the Maryvale Proprietary Mining Company lease about one kilometre north east of Morwell Railway Station, a bore hole to a depth of approximately 1,000 feet proving a brown coal thickness of 760 feet in seven seams was recorded by the Mines Department.⁸⁶

(This location is still identifiable on a housing lot in Morwell). Although sinking of a shaft about 100 metres deep and erection of a poppet head were achieved, and excavation of 200 tons of coal occurred,⁸⁷ commercial contracts for the high moisture coal were not forthcoming and this mining venture faltered. Subsequently the lease changed hands three times but mining did not progress further. Nevertheless, by 1890 further drilling in this locality proved to the satisfaction of the Royal Commission and to private entrepreneurs the existence of extensive thick brown coal near surface deposits in the Latrobe and Morwell River valleys. This Maryvale operation is of heritage significance with respect to activities which followed there from.

In 1889, the Gippsland Railway Coal Company commenced boring and sank shafts close to the railway and near the siding known as Hernes Oak. Although these shafts did not reach the production stage, they reinforced knowledge of the quality and thickness of the brown coal deposits.

The Gippsland Gold Fields Syndicate took out a lease over 613 hectares of freehold land west of the Morwell River and south of the Latrobe River.⁸⁸

In the Morwell River Valley by 1890, mining/exploration leases existed on nearly all the land for about five kilometres south of the Latrobe River. However, although some of these raised small quantities of coal for testing and appraisal, most of these prospective ventures did not reach the production stage. Some of these other ventures still existing after 1890 are referred to in Section 5.2.

3.9 'Rollo' Mines (including the Yarragon Brown Coal Mining Company) to 1890

In 1884, the Narracan Coal Prospecting Company was the first of several coal prospecting groups searching for coal on the flat lands west of Moe.⁸⁹

In 1888 boreholes intersecting three brown coal seams from 17 feet to 67 feet thick above basalt were drilled by John Rollo on the escarpment south of Yarragon. A mine, known colloquially as Rollo's Mine, was opened on the west of the escarpment by 1890. Opportunities for this mine were presented to the Royal Commission in 1890. Coal samples were taken to Germany for testing for briquetting suitability. The tests reputedly proved satisfactory.⁹⁰ However this mine did not prosper and had ceased operation before the mid 1890s.

In 1890, the Yarragon Brown Coal Mining Company initiated a mining activity in the township allotment area of Yarragon where John Rollo had found brown coal which was confirmed by diamond drilling by the Mines Department. This company sank a shaft, erected a poppet head and commenced mining in 1890. The mine was connected by tramway to the Yarragon Railway Station on the main Gippsland line. In 1895 the company surrendered its lease.

From 1887 coal seams had been found in the hillsides further south of Yarragon at various locations but none reached commercial mining viability after initial enthusiasm.⁹¹

3.10 Coal Mining Activities West from Melbourne 1871–1890

3.10.1 Lal Lal

As stated in Section 2.2 above, brown coal (or lignite) in Victoria was first mined at Lal Lal, south of Ballarat, intermittently from 1863 to 1878 via a shaft intersecting the top seam of lignite about 40 feet thick with top surface about 70 feet from ground level.⁹² A total of about 4,500 tons was mined until the mine was shut down in 1878.⁹³ However mining did resume in 1894 in a long but intermittent life for this mine. The continued operation at Lal Lal is outlined in Sections 5.3.1 and 7.1.

3.10.2 Altona to Bacchus Marsh

Brown coal had been found near Bacchus Marsh during the Melbourne to Adelaide rail line construction in 1884.

In 1881/82 two bores were sunk (Melway 55F4 to F6 in the Newport/ East Altona area) by the Williamstown (Taegtow) Coal Prospecting Company seeking black coal. Only brown coal and water were found.⁹⁴ Nevertheless the existence of brown coal deposits was confirmed.

A shaft was sunk by J Hosie at Altona in 1890. A small quantity of brown coal had been mined before the shaft was deepened and intersected strata bearing sub-artesian water which flooded the workings.⁹⁵ Activity did not resume until 1894.⁹⁶ Subsequent mining at Altona is outlined in Sections 5.3.2 and 7.2.

3.10.3 The Otways

- In the 1840s, veins of coal were reported in various outcrops along the coast from the Port Phillip entrance to Cape Otway. In 1857/8, some coal mining occurred at Wormbete but this was apparently not a commercial endeavour and was not further reported.⁹⁷ In 1873, a bed of lignite was found and examined near Stony Creek at the Southwest of Airey's Inlet.⁹⁸ In 1884, the Geelong and Western District Coal and Mineral Processing Company drilled a bore about nine miles south of Winchelsea.⁹⁹
- Subsequent mining of brown coal in the Otways is outlined in Sections 5.3.3 and 7.3.

4 Black Coal Mining Activities in Victoria 1891–1920

4.1 Black Coal supply situation to 1910

From 1891, the return of reliable supplies of NSW coal, priced with the objective to reduce competition from Victoria, was to have an adverse effect on Victorian black coal mines. However, Victorian black coal production rose from about 9,000 tons per year in 1888 to about 237,000 tons per year in 1896 – nearly all of this from South Gippsland, with small quantities of varied quality coal from the Morwell and Narracan River Valleys. By 1899, with annual black coal output at 260,000 tons, Victorian supply was meeting 50 per cent of Victoria's demand. Severe strikes in the South Gippsland mines in the early 1900s led to cancellation of commercial contracts and to the closure of several mines. Victorian black coal output fell to about 160,000 tons per year at 1906.

4.2 Mining of Thin Coal Seams in West and Central Gippsland in the 1890s

Many of the thin coal seams found as outcrops in the gullies and hillsides of Gippsland were initially assumed to be black coal. However many of these on later examination were assessed as brown coal. 'Tabular Statements' differentiating coal discoveries were presented in RAF Murray's 1889 report on the 'Development of the Coal and Lignite Resources of Victoria'.

Geological evidence submitted to the 1889 Royal Commission had indicated that the coal seams existing at Korumburra, and at the Powlett River were larger and of better quality than those in operation at Coalville and Moe in the Narracan Valley. Investor interest in black coal mining turned towards South Gippsland with the arrival of the South Gippsland rail line in 1892. Nevertheless there was much activity in black coal mining in Central and West Gippsland in the 1890s.

In the Morwell River Valley, several new mining companies had come into operation particularly in the Boolarra and Mirboo areas in the late 1880s. Coal discovery had evolved into coal mining reality with the advent of the railway network.

However, mining costs were too high in the thin seams, rail freight charges were too high and coal quality too variable for economic competition with the coal supply from NSW and from South Gippsland. A seam (known as Scarlets and found in 1888) was located on Berry's Creek, south of Mirboo North, but was not mined commercially until 1930 as black coal producing about 2,000 tons¹⁰⁰ for local consumption including milk factories. All coal mining in this valley except for the Great Morwell Brown Coal Company operations on the Latrobe River had closed by 1896.

In the Narracan Creek Valley to the north of Narracan, consolidation of mining companies occurred in endeavours to achieve economies of scale but by 1910 only three mines remained in operation, and had little commercial success thereafter. The mines included:

- The North Coalville Mining Company which commenced mining in May 1892 in several tunnels outloading to a rail siding north of Coalville and east of the Narracan Creek. By early 1893, output was 200–300 tons per week. However from January 1895 the Railways Commissioners restricted their deliveries from the Narracan Valley transferring to coal supplies from the Outtim mines. The North Coalville Mining Company ceased operation in early 1895.¹⁰¹
- The New North Coalville Company which was established in the mid 1890s but had Victorian Railways contracts withdrawn and did not survive.¹⁰²
- The Moe Coal Mining Company, referred to in Section 3.5.3, continued in operation until late 1892 when legal disputation with respect to their lease caused cessation of mining. Mining resumed by 1895 but by this time competition from the South Gippsland mines led to both reduction of demand and lower prices for Narracan Valley coal. On 17 July 1897 the Moe Coal Mining Company went into liquidation after 15 years of pioneering work for little profit to its promoters.¹⁰³
- The Tipton Vale Co-operative Company which took over the Moe Coal Mining Company area but had Victorian Railways contracts withdrawn and closed by about 1899.¹⁰⁴

- The Coalville Central Company, referred to in Section 3.5.2, which closed in the mid 1890s.
- The Coalville Co-operative Black Coal Company, which opened in 1904 but failed shortly after.¹⁰⁵
- The New Moe Company was formed in August 1908 and mined a seam one metre thick from shafts on the west side of Narracan Creek near the Coalville Station to which it was connected by a tramline. In early 1909 it was taken over by the Dudley Colliery Company. This company had disputes about pay rates and closed its operations in May 1911 not being willing to operate in a higher cost scene. From 1908 to 1911 this mine had been the most successful mine in the Narracan Valley area, selling coal as far away as Geelong.¹⁰⁶
- The Gladiolus Company which operated from 1929 to 1930.¹⁰⁷

4.3 Initiation and growth of Black Coal Mining in South Gippsland

4.3.1 The Korumburra Area Coal Mines to circa 1920

As noted in Section 3.4 above, the Coal Creek Mining Company was ready for significant coal deliveries as soon as the rail connection from Korumburra to Melbourne was in service in June 1891.¹⁰⁸ Some coal was delivered by road from the mine at Coal Creek to the Korumburra Rail Yards until a branch line three quarters of a mile long had been connected from the main line to a siding at the mine. The first train to leave from the mine site was on 25 October 1892. Several seams of good black coal (main seam four feet six inches thick) were worked.

In January 1891, 3 mining companies were actively prospecting for other potential mine sites, each sinking a shaft to inspect and sample discovered seams. By May 1891, the 'giant drill' of the Mines Department had completed its third bore in the local area again proving several seams. At 1891, seven seams of thickness two feet six inches to five feet had been proven. By 1908, 40 bores were drilled in the area to trace seams in a wider area.¹⁰⁹

In the first quarter of 1894 the Coal Creek Mining Company delivered 24,649 tons of coal. However the company needed funds for development of the mine and went into voluntary

liquidation. In May 1895, the Coal Creek Proprietary Company Ltd. was formed and took over the original mine. In October 1895, the company lost VR contracts for supply of coal and were forced to take lower prices to survive. In 1905, the company took over part of the Black Diamond Mine assets, but in 1907 was split into two new companies, Kay & Company, and J Cook & Company Both of these companies closed in 1920, the former then continuing as Sunbeam Collieries Pty Ltd from 1922 to 1959.

In March 1890, the Strzelecki Coal Mining Company NL was registered. Its mining lease was located a few miles south east of Korumburra at a site where coal had been discovered in 1873. However this first Strzelecki Mine operation closed down in 1893 having sunk a shaft which intersected good coal seams but not the main seam. In November 1893, the Strzelecki Consolidated Colliery Company recommenced activity with increased capital, a new manager and a new shaft from which mining of the main seam commenced. In 1894/5 a VR branch line about two and a quarter miles long had been installed between the VR branch line from Korumburra to Coal Creek and a railhead about half a mile from the mine mouth. (Dr LL Smith, the local State Parliamentary Representative was a board member of this company). Wire rope haulage from the mine mouth to the rail head was installed by September 1895. However the mine did not prosper and closed in March 1897. The mine was reopened in 1905 by a new company the Strzelecki Coal Mining Company Ltd. which mined 947 tons before closing in 1906. Between 1907 and 1910, three different companies in succession failed to make this mine profitable, mining a total of 9788 tons of coal. In 1911 the Austral Coal Company acquired part of the Strzelecki Mine leases but the mine was not reactivated until 1922 as the Strzelecki Co-operative Syndicate.¹¹⁰

In April 1892, the Korumburra and Jeetho Coal Mining Company was formed. It operated the Jeetho Mine at a location some 250 feet west of the Coal Creek mine. It constructed a shaft and tunnel, but soon found that water pumping was needed continuously. It merged with the Coal Creek Extended Coal Mining Company to form the Korumburra Coal Company in July 1894. (The Coal Creek Extended Coal Mining Company, registered in August 1892, commenced mining coal in January 1894 with prospects of output of 150 tons per day¹¹¹). The Korumburra Coal Company mined about 5,000 tons in the first part year of operation in 1894 and then at an annual output of about 15,000 tons,¹¹² (There is some disagreement with output

figures from different sources). The company was not satisfied with the price offered by the VR for deliveries in the 1897 year and closed in financial difficulties in mid 1897.¹¹³

The Black Diamond Coal Mine NL, registered in April 1894, located south-east of Korumburra, commenced coal deliveries in late 1898 after installation of machinery from the nearby Silkstone mine and with chute access to the Silkstone-Strzelecki branch rail line. To December 1899 this mine delivered 3,940 tons of coal. In 1900 the Black Diamond Mine was taken over for operation by the Coal Creek Proprietary Company which continued operation until 1905 when the lease was abandoned. The mine machinery was transferred to the Coal Creek Proprietary Company and to the Korumbunna and Jeethro mines. In 1907, the previous Black Diamond Mine lease was taken up by the Austral Coal Company.¹¹⁴ Shortly after it found a seam four feet six inches thick which was worked until the mine closed in 1943.¹¹⁵

In November 1891, the Silkstone Coal Mine Company Pty Ltd was registered. By July 1892 it had installed a shaft and a 130 feet tunnel at a location southeast of Korumburra close to the Coal Creek Extended mine (at the embryo Newcastle township land subdivision).¹¹⁶ The company was reformed as the Silkstone Colliery Company NL in November 1893. A light railway 390 feet long connected the mine to the Silkstone-Strzelecki VR branch line which had reached the Silkstone siding by January 1894.¹¹⁷ (The Silkstone-Strzelecki branch line served 9 separate mines over its lifetime.) Mining commenced in April 1895, but much pumping was found necessary and the mine was closed down as uneconomic late in 1895.¹¹⁸ Two shafts had been sunk, the output from the principal shaft down to a depth of 77 feet, was 45 tons per day.¹¹⁹ The mine was reactivated by the Dudley Coal Syndicate in 1923.

4.3.2 The Jumbunna Area Coal Mines to circa 1920

Coal discovered at Jumbunna East in 1889/90 had been reported on favourably by RAF Murray as a four feet six inch seam. Initially the Jumbunna True Coal Mining Company was formed but was transformed into the Jumbunna Coal Company before the mine commenced in 1894. A VR branch line three and three quarter miles long from Korumburra to a railhead about one mile from the Jumbunna Mine was in service in May 1894.¹²⁰ An aerial ropeway (steel cable about two miles in length) was installed for haulage and automatic unloading of a quarter of a tonne skips at the rail siding. By

February 1896, the VR branch rail line had been extended two and a quarter miles to Outtrim to service coal mining in that area. The branch line extension ran closer to the Jumbunna Mine and a new outloading facility was installed. From 1894 to 1903 average annual output was about 54,000 tons, maximum 73,652 tons.¹²¹ In 1903/4 there was a major strike for about 15 months, predominantly caused by attempts by mine owners to apply lower wages following lower prices being offered by the VR for Victorian black coal following price cuts applying in NSW. Coal seam faces below the main seam flooded during 1903 resulting in the termination of mining of these lower seams. From 1906 to 1912 annual production improved averaging greater than 60,000 tons. However, output then fell away due to continuation of industrial stoppages and counter threats of mine closure. The lack of skilled manpower was also of significance as miners transferred to the regime of higher wages and better working conditions at the new State Coal Mine at Wonthaggi.¹²² In 1916 there was a major fire which resulted in closing of part of the mine. The mine continued to operate until 1939.

The West Jumbunna Coal Company was registered in June 1893 but sold out to the Jumbunna Coal Mining Company in 1896 without working its mining lease.

4.3.3 The Outtrim Area Coal Mines to circa 1920

A coal seam outcrop was found in a creek bed at a location later called Outtrim in October 1892. A shaft was sunk by the property lessee. This shaft disclosed a black coal seam four feet thick.¹²³ The Outtrim Coal Company and the Howitt Coal Mining Company were each registered in November 1892.¹²⁴ In July 1894 these two companies, before they had commenced mining, amalgamated with the British Consolidated Coal Company to form the Outtrim, Howitt and British Consolidated Mining Company (OH&BCMC). The mine location was about eight miles south of Korumburra. Initial mining was carried out through a tunnel close to the initial exploratory shaft. A VR rail link two and a quarter miles long from Jumbunna to Outtrim was opened on 27 January 1896. Mining with delivery by bullock wagon to the railhead at Jumbunna and a stockpile of over 8,000 tons of coal at the mine mouth had preceded the arrival of the rail connection to Outtrim.¹²⁵ 'The company had anticipated a yearly production of 66,000 tons of coal. But in the first year of operation 126,000 tons were produced.'¹²⁶ The mine continued to produce over 100,000 tons per year with three tunnels in operation and delivery to the railhead by an endless rope haulage.

By 1908, the OH&BCMC was aware of depleting coal reserves with closure imminent a few years ahead. Fires at the mine in 1911 and 1912 accelerated cessation of mining. In 1913 the company had purchased coal leases of the Kilcunda Coal Mining Company and transferred some mine machinery thereto¹²⁷ but found the seams too thin for commercial success. In 1914, the company closed their Outtrim mine. In 1915 the company ceased all operations. During the company's operations one and a half million tons of coal had been produced from the Outtrim area of which 1.375 million tons were produced by this company. The township of Outtrim with its population of 4,000 people was due to and reliant on the mine operation. Many of the Outtrim community and buildings were transferred to the burgeoning township of Wonthaggi.

There were some very small mining operations also outloading coals at the Outtrim rail head with output totalling about 122,000 tons over a 20 year period to 1915 when the VR rail service to Outtrim was terminated. 'When the mines (on branch lines to the main line at Korumburra) reached maximum production up to nine trains per day left Korumburra. Two trains a day ran regularly on the Outtrim-Jumbunna-Korumburra branch line and a special late train on a Saturday night.'¹²⁸

In 1892, an outcrop of black coal proving to consist of three seams each under three feet thick was found at Kongwak but mining of this coal did not occur before 1910. Anecdotally some coal mining did occur in the Kongwak area about half way between Jumbunna and Wonthaggi, but verification of this has not been sighted.

Mining ventures which came into operation in the Outtrim area between 1921 and 1957¹²⁹ will be referred to in Section 6.3.

4.4 Government Restriction on coal exploration and mining leases in South Gippsland 1910

In 1890 the Government had inserted in the *Coal Mining Act* the following:

'All minerals, ores and metals, other than gold and silver, in or below the surface of all lands in Victoria not alienated in fee simple from the Crown on or before the first day of March, 1892, shall be and remain the property of the Crown.'

From 1910, granting of new exploratory leases for coal in the South Gippsland area was greatly restricted by the Mines Department.¹³⁰ This action severely limited private mining companies in their search for new potentially commercial coal resources and for long term planning as existing operating mines ran out of economic coal reserves. This action inter alia lessened future competition against the State Coal Mine. This restriction of private exploration for coal was applied mainly in South and South West Gippsland and was lifted by 1920.¹³¹

4.5 Continuation of Black Coal Mining in South West Gippsland 1891 to 1920

4.5.1 *Daly's Mine at the Powlett River to circa 1920*

At 1891, there was no active black coal mining proceeding in South West Gippsland.

In 1910, the Powlett River Company commenced a mining operation on land owned by JP Daly about six miles inland adjacent to the Powlett River. The mine known colloquially as Daly's Mine was operated by two sets of tunnels each driven to a different seam with shallow ventilation shafts. A rail line one and a half miles in length north from the Melbourne to Wonthaggi VR line was installed about 1911/12. The mine closed in 1912 but was reopened in 1916 by the Powlett and North Woolamai Colliery NL. This company found that seams were getting thinner to about 15 inches rather than over four feet as predicted from a Mines Department bore.¹³² This company continued to persevere beyond 1920 as described in Section 6.5.

4.5.2 *The State Coal Mine at Wonthaggi to circa 1920*

In early 1908 drilling by the Mines Department on the Powlett River flats had passed through three distinct seams of black coal, the largest being three feet in thickness. Bores subsequently put down to prove the extent of these seams found that they merged into one seam nine feet thick. A thickness of eight feet of black coal close to surface was also found in drilling for water.¹³³

On 17 November 1909, following strikes on the NSW coal fields and in the shipping industry, the Victorian State

Government authorised the formation of a State Coal Mine based on the Powlett River black coal seams. This mine was initially (for six months) under the control of the Minister for Mines but was then transferred to the Railways Commissioners on 1 July 1910. The mine proved a vital source of supply to locomotives, and later to the Railways Power Station at Newport, during vagaries of supply of NSW coal. The mine opened up about five miles north of Cape Paterson.

Mining operations commenced promptly. By the end of November 1909, coal had been excavated; hauled 11 miles by bullock wagons to Inverloch Jetty and shipped to Melbourne. By mid December 1909, shafts one to four had been sunk. A Rail line at VR gauge was constructed between Nyora on the Main South Gippsland rail line and Wonthaggi. This came into service on 22 February 1910. Until this date 3,526 tons had been shipped to Melbourne via Inverloch. About 10,000 tons was also at surface waiting on completion of the rail line.¹³⁴ By April, mine output was 400 tons per day railed to Melbourne. By November 1910 the mine was producing 1,300 tons per day with 900 employees. Shaft three was the initial source of coal followed by shaft five sunk in 1910. Shafts nine and ten were sunk by 1911 at the west of the central area. Shafts one, two six, seven, eight and eleven were used for ventilation. All this initial activity was in the 'Central Area' of the State Coal Mine.

Basically there were to be 12 separate mines known collectively as the State Coal Mine. Seven of these mines each produced over one million tons of black coal. However, 'after 1913, very few of the coal seams were five or six feet high as was the case in the earlier mining of the seams'.¹³⁵ It had also been found that the coal was more friable and weathered more rapidly than had been expected. Slack coal averaged about 45 per cent.¹³⁶ This poor quality coal could be used in Victorian Railways Newport Power Station albeit with some technical and production penalties but the Railways Commissioners preferred not to accept these penalties and sold slack coal to private buyers at prices below that which the private mines could match. This action tended to capture the market for slack coal in Victoria thus freezing out opportunities for the private black coal mines to sell their slack coal profitably. During the lifetime of the State Coal Mine, the technical and economic feasibility of briquetting the slack coal from the State Mine came under consideration intermittently. However proposals evaluated in 1913, 1928, 1932 and 1933 did not receive approval.¹³⁷

Sale of screened coal other than to the Railways Commissioners did not occur until 1922 as Victoria contended with interruptions in supply of NSW coal caused by industrial action, by wartime shipping shortages, by post-war labour shortages and by deferred expansion of the NSW coal industry. By 1913, the State Coal Mine was supplying more than 50 per cent of the VR consumption of hard black coal at a rate of 925 tons daily.¹³⁸

In 1915, the McBride Tunnel (destined to be the largest producing mine in the Powlett River area) came into production in the 'Central Area' of the State Mine to substitute for Shaft three (worked out in 1914), Shaft five (worked out by 1917), Shaft nine (worked out by 1920) and Shaft ten (worked out in 1921). This tunnel was driven at a one in five grade to intersect the top seam at 518 metres from the tunnel portal. Eventually the tunnel was extended to 1,490 metres from the portal intersecting three lower seams. Each of the four seams was worked on benches established on either side of the tunnel.¹³⁹

In 1916, opening of the Eastern Area Mine occurred. This was about two and quarter miles easterly from the Wonthaggi town centre. Development of this mine was on three operating benches accessed from incline tunnels one for coal haulage and the other for ventilation.¹⁴⁰

In 1919, mining commenced in the 'Station Area', just to the north of the township. 'By 1919, a tunnel had been driven 259 metres to intersect a seam nine to 1.4 metres thick at 91 metres from the surface.'¹⁴¹

In 1912, production of the mines at Korumburra, Jumbunna and Outtrim was about 10,000 tons per month and at Wonthaggi about 30,000 tons per month. For the 1914/15 year, annual output for the Wonthaggi State Coal Mine was 550,000 tons and from other mines about 67,000 tonnes. There was a fall in production during the war years with output bottoming at about 370,000 tons in 1919 with subsequent increases to a peak of about 670,000 tons in 1930 (see Knight (1970), p.61).

By 1918, the State Coal Mine was virtually the only producer of black coal in Victoria but had limited coal reserves available for the future. By this time, it was clearly evident to the public, to Government and to private enterprise that the brown coal resource was the prime source of fuel available to the State.

Activities of the State Coal Mine beyond 1920 are outlined in Section 6.4.

5 Brown Coal Mining 1891–1920

5.1 Technical Investigations into Brown Coal Utilisation 1891–1920

The 1889 Royal Commission, as well as stimulating brown coal mining in the Latrobe Valley, and at Altona, Newport, in the Otways and at Lal Lal also firmly established Government interest in brown coal utilisation. This led progressively towards the concept of long term centralised Government control of electricity generation and distribution, and of coal supply for electricity generation, for briquetting, for gas, liquid fuels, locomotive fuel, and for conversion to chemical usage.

The influences of the 1889 Royal Commission continued over the next 30 years.

Scientific personnel from the Mines Department were sent overseas in 1891 (Newbery) and 1901 (Stirling) specifically to investigate brown coal utilisation in Germany.

Charles Merz, an English electrical engineer, was commissioned by the State Government to report on electricity generation in 1908 and again in 1912. In each report he recommended investigations into the establishment of a base load power generation plant at a suitable mine site 'at Morwell', with a peak load power generation plant burning black coal to be located at Melbourne.

In 1912, a German mining engineer, C Hoffmann, investigated on behalf of a group of large British and German private companies the commercial opportunities for private development of the state's brown coal resource to supply electricity to Melbourne, as well as to utilise the coal in chemical processes. His report strongly advocated the advantages of the 'Morwell' coal field compared with developing the brown coal deposits at Altona. He advocated the Morwell field as being suitable for the use of electric powered deep digging ladder dredgers and train haulage systems as used in the German Brown Coal open cuts. The business conglomerate he represented, the Victorian Mineral Development Company, proposed development of an open cut, power station and transmission lines to Melbourne as a private venture.

In 1912, the Government decided to proceed with a State owned power station to be built at Newport, operating on black coal, managed by the Railways Commissioners with the prime purpose of electrification of the metropolitan rail system. The government decision was based largely on proven practice with black coal furnaces, rather than the unproved (in Australia) techniques of combustion of brown coal. The shorter lead time for construction of a 'conventional' power station, and the expected assurance of firm contracts for coal supply from established black coal mining and transport organisations were also major factors in this decision not to use the indigenous source of brown coal. The State Coal Mine at Wonthaggi, operated by the Railways Commissioners, was also expected to be a strategic alternative or supplementary source of coal for the Newport Power Station.

The decision for this station to be Government owned and operated was a direct result of the recommendations of Charles Merz, in 1912. These recommendations incorporated the concept of the need for Government to take over control of the standardisation of electricity supply and its regulation and distribution throughout the State from the plethora of private and municipal electricity supply organisations then existing. Charles Merz's associated firm recommendation was that Newport Power Station would need to be supplemented within a few years by further generating capacity for general electricity supply other than railway electrification, and that planning for base load thermal power stations and for hydro-storage peak load power stations should be instituted forthwith. He also favoured the Latrobe Valley as the site for a base load power station supplied with brown coal.

5.2 Increased investigation of the Brown Coal Resource 1891– 1920

In 1913, the Government directed the Mines Department to undertake a comprehensive drilling survey of the brown coal resource to aid in the selection of a site for a power station. Hyman Herman, recently appointed Director of Geological

Survey, supervised this drilling task. By 1916, the drilling program was concentrated in the 'Morwell Coal Field' area.¹⁴²

In the Morwell River and Narracan Creek Valleys, there were at least 20 companies involved in brown coal mining/exploration leases. However, most of these did not reach the production stage.

Mining leases at the northern end of the known brown coal deposits in the Morwell River Valley, where subsequently the major mining developments were to occur, included:

- The Australian Commonwealth Mines Ltd., the Australian Commonwealth Fuels and Oils Ltd., and the L & N Brown Coal Ltd., each of which subsequently took over the Maryvale Proprietary Lease just north of the Morwell township. The latter company was liquidated in 1927, ending the commercial interest in this lease.
- A. Davey et al, on the south of the Latrobe River immediately opposite Davis's Cut, the first recorded location of brown coal in the Latrobe Valley. The lease was granted in March 1889. A Mines Department plan of this lease area shows RAF Murray as having an involvement in this land.
- The Albion Coal Mining Company just south of the Latrobe River near Davis's Cut, first leased in 1891.
- The Buln Buln Coal Mining Company Ltd. adjacent on the west of the Albion lease, first leased in 1891.
- The Victorian Brown Coal Development Company immediately to the north of 'Old Sale Road'.
- The Great Moe Company on the south of Old Sale Road.
- The King Edward V11 Coal & Briquette Company on the north and south of the Gippsland Railway.
- The Great Gippsland Railway Coal Company, the Great Gippsland Coal Syndicate, the Narracan Coal and Briquette Company, and the Victorian Briquette Company all on the south of the Gippsland railway.

5.3 Specific Brown Coal Mines 1891–1920

5.3.1 Lal Lal to circa 1920

The discovery and early mining efforts at the Lal Lal lignite deposit have been outlined in Sections 2.2 and 3.10.1.

The original mining efforts had terminated in 1871 after mining approximately 1,000 tons of lignite.¹⁴³ In 1873, the Victorian Brown Coal Company commenced mining from a new shaft and excavated about 4,000 tons of lignite to 1878 and continued to closure in 1892. Lifetime output from Lal Lal to 1892 is quoted by one writer (P Griffiths (1988)) as 44,000 tons but a much lower figure is recorded in Mines Department tables.

Emanating from the Royal Commission of 1891, the Mines Department drilled seven bores to identify the Lal Lal deposit more fully but although proving a larger deposit than previously recorded 'no definite structure of the basin was established'.¹⁴⁴

Armed with this recent information, the Lal Lal Lignite Company was formed in 1894 and worked a new shaft which 'was in coal from 70 feet to 220 feet'. However, attempts to make and market briquettes failed economically. Some pulverised coal for deodorising and fertilising was marketed but was not profitable. H Herman (1922) reports that 2,300 tons was mined by this company to 1898. Mining of the deposit was again shut down reopening briefly in 1914.¹⁴⁵

Analyses of drilling carried out in 1919 indicated a coal deposit of about 40 million tons covered with layers of sand and clay.¹⁴⁶ Subsequently, practical coal reserves from an area of 30 acres were assessed at 2.5 million tons.¹⁴⁷

In 1919, the Victorian Central Coal and Iron Mining Company sank a new shaft. Mined coal was dried in a rotary kiln and pulverised for sale. 4,000–5,000 tons of coal were sold in 1921. However problems with flooding from the adjacent old shaft and workings occurred, and the underground workings were again closed.¹⁴⁸

In 1921 an open cut operation was commenced but abandoned within one year without producing coal. In 1952, a new open cut venture commenced with larger excavating plant but this venture was also abandoned within a year without producing coal.

5.3.2 Altona at Altona Bay; Newport and Williamstown Coalfields to circa 1920

Section 3.10.2 refers to the initial investigations into the brown coal deposits in the Altona Bay area. In 1891, the Melbourne and Altona Colliery Company was formed. In 1894 this company sank a bore and a shaft at Altona at a location about three miles north west of Williamstown and about one mile west of Shaft No. One.¹⁴⁹ The Williamstown and Newport Coal Prospecting Company sank a shaft deepened by a bore to 311 feet intersecting five seams in 1894.¹⁵⁰ The Newport Coal Prospecting Company sank a shaft at Newport during the 1890s. These bores and shafts referred to in Thomas & Baragwaneth (1950) p.12 did not reach a commercial mining stage.

The profile of No. One bore at Altona Bay about four miles south west of Newport showed a brown coal seam 70 feet thick at 329 feet overlain by sands, clays, shale and basalt, the latter 23 feet thick.¹⁵¹ Other bores tended to show thinner and split seams, making geological interpretation of the deposit rather complex. At 1899, J Stirling considered that the brown coal beds 'in all probability extended towards the Werribee River and north westerly towards Bacchus Marsh'. These deposits were also considered to extend under Port Phillip Bay and be associated with brown coal beds on the eastern shores of this bay.

Some coal was raised to the surface from a shaft at Altona Bay in 1894/95 but the shaft was inundated with artesian water during deepening of the shaft which was then abandoned in 1896.

In 1899, a new shaft was installed a few hundred yards east of the flooded first shaft. The rail line was extended from Altona Station to the site. Several companies, including the Victorian Electric Light Heat and Power Distribution Company with RAF Murray as a director, took up and then withdrew from the challenge of a commercial operation while much negotiation took place with municipal councils to gain monopolies on supply of electric power from the Altona area coal deposits. Work at the site did not resume until January 1905. The wooden poppet head was renewed, and equipment upgraded, but negotiations with the Government and municipalities through to 1908 did not provide American (with Herbert Hoover as mining consultant) and British entrepreneurs with

assurance of long term coal supply. Mining did not resume at this stage.¹⁵²

S Priestley (1988 an) p.95 states that the location of the pioneer bores at Newport – Altona are shown on a 1902 plan of coal leases (not yet sighted by me). Borehole and shaft locations later than 1902 have also not been definitively identified by me. The location at Harrington Square of the shaft and poppet head of the Altona mine is shown in a photo in Priestley (1988) p.99.

The Melbourne and Altona Collieries NL was formed in 1908 and in late 1909 took over mining in the 1899 shaft. By November 1910 it had a production capacity of 50 tons per day from two shifts with excavation from drives into the top of the coal seam. From 1911 to 1919 this company extracted 26,332 tons of coal.¹⁵³

In 1911, a London Syndicate offered to develop the Altona deposits if the Government would grant it a monopoly over power supply in the Melbourne area. This offer was declined but significant political and business advocacy continued through to 1920 to have the Altona deposits worked by private enterprise rather than have a government owned integrated large scale mining, power and briquetting complex in the Latrobe Valley. At 1912, it was announced that 'the property containing the brown coal deposits at Altona Bay has been sold to an American and British Syndicate'.¹⁵⁴ However this announcement was premature and negotiations continued until the outbreak of war with Germany in August 1914. In 1913, the Government had called tenders from private companies for electric supply of five to 25 MW for railway electrification to supplement supply from Newport Power Station then under construction.¹⁵⁵ No action resulted due to the onset of war.

Mining from Altona continued with a skeleton workforce through the war years, some lower level drives were worked, and coal was sold at a profit in war time fuel shortages.

On 25 November 1915, Altona Beach Estates purchased a large portion of land previously intended for underground coal mining. Subsequently in April 1920 this land development company absorbed the remaining undeveloped land in this area of potential mining.¹⁵⁶

At 1918, local hopes in the Altona area were centred on post war prospects of briquette manufacture without necessarily abandoning grander thoughts of power generation. By

1919, political and technical preference had swung towards advocacy for large scale development of the Latrobe Valley brown coal deposits rather than the smaller scale potential of the Altona-Newport deposits in spite of their location advantages close to the consumption centre of Melbourne. It is interesting to note the comparative cost assessments for the Altona and Latrobe Valley coal supplies.¹⁵⁷

From output figures quoted by Herman (1922) p. 7, there was no significant output from the Altona shafts until 1911, with over 26,000 tons mined from 1911 to 1919. This output is probably that reported to the Mines Department. Output quantities and years of operation quoted by Drucker (1984) p. 48, are inconsistent with Herman and seem to be incorrect. S Priestley (1988) p.104, quotes an estimate of 75,000 tons being extracted between 1910 and 1919.

From 1911 to 1914 Altona had the highest annual output of brown coal in Victoria.

'Nearly all the (brown) coal obtained (in Victoria) during 1911 to 1916 (totalling 21,754 tons) came from the Altona mine, which produced also 3,643 tons in 1918 and 1,445 tons in 1919, since when it has been non productive.'¹⁵⁸

At 1920, mining of the Altona deposit had gone into recess but was subsequently reactivated as described in Section 7.2.

5.3.3 Benwerrin and other Coal Ventures in the Otway Basin to circa 1920

A deposit of high heating quality brown coal at Benwerrin about five and a half miles south east of Deans Marsh Railway Station was first worked in 1895. After a quantity reputedly of less than 2,000 tons had been excavated the Great Western Colliery took over the operation. In 1899, J Stirling of the Mines Department reported the seam being worked by the Great Western Colliery as being eight feet thick.

In the Mines Department Progress Report No. 12 of 1900, a map by OAL Whitelaw showed location of the mine and identified a seam averaging six feet thick of excellent quality brown coal with a resource of 200,000 tons.¹⁵⁹

Between 1899 and 1903, at Benwerrin, the Great Western Colliery Company mined 6,849 tons through two tunnels.¹⁶⁰
¹⁶¹ Initially coal was hauled to Deans Marsh rail station by horse and dray and thence by rail to Birregurra (South West of Winchelsea) on the Geelong to Colac main rail line.¹⁶²

In 1901, a VR gauge rail line was built by the company from the mine to Deans Marsh Station.¹⁶³ The mine delivered to the VR terminus at Deans Marsh over a tramway.

The coal was mined from a deposit of thickness six feet or more considered to exist over an area of about ten acres with estimated mining reserves of 75,000 tons.¹⁶⁴ The mine closed in 1903 due to high costs and lack of sales in Geelong and the local district. In Herman (1922) the terminology 'Deans Marsh tunnel' is used for this Benwerrin mine.

In 1912, S Hunter, Mines Department Engineer for Boring, reported that the old workings were waterlogged and that the seam was five to six feet thick over 15–20 acres. About 1918, the Western District Mining Company commenced working a mine at Wensleydale which was worked through to 1959. This mine and other mines which opened in the Otways area post 1920 are referred to in Section 7.3.

5.3.4 The Great Morwell Coal Mine to 1920

The opening of this mine has been outlined in Section 3.7.2.

In the 1890s, output was about 3,000 to 4,000 tons annually. Although a second briquetting plant was constructed after the first was destroyed in March 1895 when a bush fire entered the open cut, the expected coal demand for locomotive use, and successful briquette making from the German designed Australian manufactured plant, did not eventuate.

The operation was not financially successful and closed down in 1898. The mine had produced about 28,000 tons of coal and about 1,200 tons of briquettes.¹⁶⁵ The mining lease passed through several hands in ensuing years and from time to time some mining was recommenced to retain the lease. From 1905 to 1914, the Morwell Brown Coal Company operated the mine on a very intermittent low output basis mainly for tests of briquetability and processing, mining only about 1,500 tons in this ten year period.¹⁶⁶

This mine was re-opened by the Mines Department under government instruction in 1916 during war time fuel shortages caused by extensive strikes in the NSW coal fields and shortage of shipping and rail transport. However, the NSW strikes terminated shortly after, with only 130 tons of coal excavated from the former Great Morwell Coal Mine before cessation of activity at the mine.¹⁶⁷

In the winter of 1917, mining activity at the Great Morwell Coal Mine was renewed again by the Mines Department to offset shortages of coal in Victoria due to diversion of shipping to other war time priorities. Approximately 35,000 tons were excavated by the end of the year. Coal deliveries were by horse haulage to the Hernes Oak siding until the branch line to the mine could be restored for loco use. By the end of 1917, the mine had a capability of 1,000 tons per day.¹⁶⁸ From 1916 to 1920, recorded production from this mine was 370,981 tons.¹⁶⁹

From 1918, some deliveries were made to the Spencer Power Station operated by the Melbourne City Council where a boiler had been converted to carry out combustion testing on this brown coal. This testing was considered to be vital in technical considerations for a proposed power station on the Latrobe Valley Coal Field.

A brief description of the mining methods used at the Great Morwell mine to 1920 is provided in Herman (1952).¹⁷⁰ A more detailed description is collated in an article 'Power for Victorian Industries' (1921).¹⁷¹

The decision of the Government to take over operation and ownership of the mine followed a similar decision with respect to the State Coal Mine at Wonthaggi. Both decisions demonstrated that a public mining enterprise could swing into action at short notice and achieve continuity of outcome in adverse economic conditions not attractive to private investment. The decision was also a foretaste of the trend of political action in the 1910 to 1920 era to establish State enterprise management of production and infrastructure projects.

The story of the Great Morwell Mine in its private ownership years has been collated by Bill Morley. Its operation under Mines Department control from 1916 has been compiled by H Herman (1922). Its subsequent activities from 1924 under SECV control, eventually named Yallourn North Open Cut, have been recorded in histories by RJ McKay (to 1947), by GF Rusden (to 1965) and by JA Vines (to 1987).

Many highly significant aspects evolving from the operations at the Great Morwell Mine influenced the future direction of brown coal mining and utilisation from the 1920s. Firstly, the production 'deficiencies' of the two briquette plants at the mine highlighted the necessity for direct and close application of proven German practice and plant to the briquetting process. Secondly, the reasonably effective utilisation of this coal in

conventional type furnaces led to assumptions that all brown coal in the area would be similarly applicable. (It appears that the higher in-situ moisture content of the brown coal south of the Latrobe River was recognised by Mines Department technical personnel by 1915 or earlier. However it was evidently assumed that air drying during the mining and coal storage operations would allow the moister coal to revert to a drier coal similar to that of the coal in-situ in the Great Morwell Mine. This latter mine was located on the high river bank not subject to the flooding and swamp conditions of the brown coal area intended for the power generation. Hence, the wide variations in moisture content of the Latrobe Valley coals seem to have been attributed prior to about 1921 to the extent of drying in-situ, in sampling, in transit and in testing.)

5.3.5 West Gippsland Brown Coal Mines 1891–1920

The brown coal deposits referred to in this chapter were of the Narracan Group of Brown Coal Deposits, generally overlain with basalt and older geologically than the Brown Coal Deposits of the Latrobe Valley and northern Morwell River Valley. The locations of the mines are shown in Thomas & Baragwanath (1951) p.9.

Most of these Western Gippsland mines were found as exposed outcrops by land occupiers rather than by intentional drilling. It is probable that these outcrops were known locally without reporting to the Mines Department and were not worked as commercial ventures until the VR rail line at Thorpdale from Moe was in service in 1890.

Among the mine sites identified in Mines Department records were the following:

- The Rollo Mines in Yarragon and on the Yarragon Escarpment.

As outlined in Section 3.9, in 1890 the Yarragon Brown Coal Mining Company opened a mine in the township of Yarragon on a coal seam found by John Rollo. This mine ceased operation by 1895.

In 1890, John Rollo opened a mine in a brown coal outcrop on the Yarragon Escarpment. The mine had access to a tramline provided mainly for timber cartage to the VR rail line at Yarragon. The extent of coal output has not been ascertained but anecdotally is assessed at below 1,000 tons before the operation closed in the early 1890s as commercially

unsuccessful. A second outcrop further east on the escarpment was also identified by Rollo but was not worked commercially.

Hasswell's Mine

In 1889 a mine was opened about four miles North East of Thorpdale by the Haswell Coal Mining Company. The venture was unsuccessful commercially and closed down by 1894. It was to be reopened later.

Horrocks' Mine

The Horrocks' Mine about three and a half miles North East of Thorpdale was reputedly opened about 1885 as a tunnel operation into an exposed seam. It was not a commercial success and closed in the early 1890s. This mine was reactivated later and was worked between late 1940s to 1950.

Dickenson's Mine

This mine located about three miles West of Thorpdale was opened in 1889 but was not a commercial success and closed in the early 1890s.

Willis' Mine

This mine located about two and a quarter miles South of Thorpdale was opened in 1889 but was not a commercial success and closed by the early 1890s.

Crisp's/Ferngrove Mine

This mine located about three and a half miles South West of Thorpdale was opened in 1889 but was not a commercial success and closed by the early 1890s. The mine was reopened in 1947 as the Moononook Mine with sequent adjacent operations of the Corovuna and Moolamoona Mines through to 1965 (see Section 7.5.4).

6 Black Coal Mining in Victoria 1921 to 2003

6.1 The Korumburra Area Mines post-1920

As noted in Section 4.3.1, Sunbeam Collieries Pty Ltd was formed in 1922 and reactivated the mining operations at Coal Creek commenced by the Coal Creek Mining Company as the first mine in the Korumburra area in 1894. Mining was conducted from a series of tunnels and eventually tapped the same seam as worked by the Austral mine. From 1922, the State Coal Mine at Wonthaggi commenced sales of coal to private industry rather than to the Victorian Railways only. From the early 1960s, briquette supply from Yallourn brown coal was progressively available in greater quantities for private industry. Supply of brown coal from Yallourn North Open Cut to industry as well as to Newport Power Station also became available by the early 1950s. As a consequence of this competition, from the early 1950s output from the Korumburra, Outtrim and Jumbunna mines gradually decreased due to increased availability of alternative fuels as well as inability to compete on a price basis.

For the Sunbeam Collieries mine, the last remaining customer was the Korumburra Butter Factory which also changed to briquettes as their fuel in 1959. The last load of coal left the Sunbeam Colliery on 15 April 1959. The mine was the last to close in the Korumburra district¹⁷². Local organisations, mining companies, mine workers, and people complained bitterly that their private mines had been put out of business by State Government enterprises.

In 1922, a new company, the Strzelecki Co-Operative Syndicate was formed to reactivate the part of the original Strzelecki Coal Mine not sold to the Austral mine. However mining of 30 tons from the old workings was the only production before closure in 1922. The mine was reopened again in 1930 by Lucas & Greenwell and produced approximately 300 tons per fortnight until the coal appeared to be petering out. In the late 1930s, the lease was taken over by the Korumburra Coal Mine but production was not restored. This mine closed in April 1939.¹⁷³

The Austral Coal Company which took over the Black Diamond Mine in 1908 produced 433,745 tons of coal averaging over 12,000 tons annually over 35 years until its closure in 1943. There were still workable coal reserves but the company found difficulty in obtaining labour under wartime conditions. In 1948, the company offered the mine to the Government. This offer was accepted. However the mine has not been reopened.¹⁷⁴

In 1922, the Cardiff Colliery Company commenced mining at a location near the former Silkstone Colliery. A tramway was installed from the mine to the Silkstone-Strzelecki branch line. The mine produced 31,635 tons to 1925 when the company was liquidated. Operations were revived between 1937 and 1939 during which time 59,483 tons were produced.¹⁷⁵

In 1923, the Dudley Coal Syndicate took over operation of the former Silkstone Colliery and worked this mine to 1927 producing about 27,000 tons. The operations encountered faults in the coal seams and threat of water entry from old mine workings of the Korumburra and Jeetho mine. Another company with the same name operated the mine from 1932 to 1934 producing 4,447 tons until it shut down in 1934.¹⁷⁶

Preservation of the social heritage of features of coal mining in the Korumburra, Jumbunna, Outtrim and Howitt has been included in displays at the Coal Creek Heritage Park at Korumburra.

6.2 The Jumbunna Area Coal Mines post-1920

As noted in Section 4.3.2, by 1921 the fortunes of the Jumbunna Coal Company had been adversely affected by industrial disputes, by flood, by fire and by dwindling coal reserves. Although the calorific value and ash content had significant advantages of the order of 20–30 per cent compared with coal from the State Coal mine, commercial arrangements achievable from the Victorian Railways did not reflect these quality aspects. The company limped along until in 1928 the mine was offered to the Government for

£12,000 on a walk in–walk out basis. At that stage, the mine was delivering only about 50 tons per day from a seam two feet four inches thick. Eighty feet below this was the main seam three feet six inches thick. The offer was considered by management of the State Mine but was not favoured. Hence, the offer by the company was not accepted by the government.¹⁷⁷ The Jumbunna Mine closed in 1929. During its lifetime from 1894, coal deliveries of 1,304 million tons of coal were achieved from this mine.

6.3 The Outtrim Area Coal Mines post-1920

As noted in Section 4.3.3, operations of the major mine in the Outtrim area, the Outtrim, Howitt and British Consolidated Mining Company, ceased in 1915. From 1921 to 1957, small groups of investors and miners formed themselves into companies, obtained a mining lease and began mining coal mainly from the previous mines. Small companies which sent ‘mandatory’ reports to the Mines Department included:¹⁷⁸

Outtrim Coal Syndicate	1921–1928	17,790 tons
Outtrim Extended	1921–1925	7,326 tons
Mount Pleasant	1923–1928	2,436 tons
Roy’s Extended (North Outtrim)	1924–1928	9,068 tons
Howitt Colliery	1926–1936	56,990 tons
(Korumburra) Station Area	1932–1933	2,587 tons
Outtrim West (G.A. Foote)	1944–1951	13,357 tons
Blackmore, Leighton & Murray	1946	1,045 tons
Outtrim North (Willoughby)	1847–1948	1,847 tons
Howitt Colliery (McBride)	1947–1949	3,396 tons
Hillside Colliery	1953–1956	3,925 tons
Blackmore & Leighton	1956–1957	1,836 tons
Webster, Axford & Hodges	1950–1962	

At 1962 no further coal mining in the Outtrim area was reported. The State Coal Mine at Wonthaggi remained the only black coal mining operation in Victoria

6.4 The State Coal Mine at Wonthaggi post-1920

The initial years of the State Coal Mine project have been outlined in Section 4.5.2. At 1921, the four pioneer mines, shaft numbers three, five, nine and ten all in the central area, had been worked out. Number nine shaft had yielded 0.976 million tons from 1914 to 1920. Number ten shaft had yielded 1.395 million tons from 1911 to 1921.¹⁷⁹

In 1924/25, the Dudley Area at the north west of the known Powlett Coal Field was opened with number 16 and 17 shafts.¹⁸⁰

From 1926 to 1930, the number 18 shaft in the Eastern Area was opened up initially as a down cast shaft for ventilation to number four bench.¹⁸¹ This was an extended development from the three bench workings in the Eastern area which subsequently closed in 1931 after 12 to 15 years production totalling about 1.24 million tons. Number 18 shaft was the source of 1.94 million tons from 1930 through to 1946.¹⁸² From 1930 it was the main production source from the Eastern Area.¹⁸³

In 1928, the Station Area tunnel was closed down after nine years of production totalling 0.302 million tons.¹⁸⁴

In the 1929/30 financial year the State Mine Complex produced 0.662 million tons with personnel average for the year of 1776. This was the peak annual output and work force.¹⁸⁵

In 1931, numbers 19 and 20 shafts in the Northern Area were opened to help maintain total output from the State Mine at 0.5 million tons a year. These compensated for the closure of the three level Eastern Area bench operations. Production from the number 19 and number 20 totalled 1.718 million tons to their closure in 1962.¹⁸⁶

In 1934/35, the Western Area was opened from numbers 21 and 22 shafts. These operations took over from the McBride Tunnel in the central area which had produced 3.063 million tons from its commencement in 1915 to its closure in 1935. Total output from number 21 and number 22 shafts to their closure in 1968 was 1.869 million tons.¹⁸⁷

In 1938, the Kirrak area was opened with number 23 shaft at a location about two miles north east of Wonthaggi. This was the last mine opened in the State Mine complex. Operations from this shaft were suspended from 1945 to 1955 and thereafter

mining was somewhat intermittent due to higher costs and falling demand. Between 1939 and cessation of operations at the State Coal Mine complex in 1968, total output from the Kirrak area all through number 23 shaft was 0.464 million tons.¹⁸⁸

Mining operations at the State Coal Mine ceased in December 1968. Total output from the project was 16.695 million tons.¹⁸⁹ (JL Knight states 16.736 million tons.) The State Coal Mine had been commenced with enthusiasm, but without adequate drilling information on the quality, thickness and conformity of the coal seams. Each of these aspects proved to be more adverse than anticipated. Initial arduous working conditions prior to application of mechanised mining continued as coal seams became thinner and led to the return to manual mining. Establishment of the Wonthaggi township with strong social cohesion in its single industry base was a highly commendable feature of the State Coal Mine operation. Outputs from the complex of individual mines in the project were of vital importance to the economy of the State during shortages of coal supply from NSW, particularly in the first and second world wars. The State Coal Mine was the last significant producer of black coal in Victoria.

Wonthaggi remains a thriving rural township with some small manufacturing enterprise, some servicing of rural activities, and with a growing tourism function. A State Coal Mine Historic Reserve exists over part of the former mining areas and some preservation of the former mining activities is maintained.

6.5. Daly's Mine on the Powlett River Coal Field post-1920

The initiation in 1910 of Daly's mine is referred to in Section 4.5.1. In 1922, the Gippsland Coal Company took over the mine from the Powlett and North Woolamai Colliery NL until 1924, when it transferred operations to the Hicksborough Coal Company. All working closed in 1926 after a total production of 132,757 tons. By this time, the Dudley Mine of the State Coal Mine was in operation adjacent to the Hicksborough operation.¹⁹⁰

Daly's Mine was the only new private black coal mine brought into operation in South Gippsland from the late 1890s until the early 1920s due largely to government restrictions on exploration and mining leases in endeavours to preserve black coal resources for use by government utilities.¹⁹¹

7 Brown Coal Mining in Victoria 1921 to 2003

7.1 Lal Lal post-1920

Activities to 1921 at the brown coal deposit at Lal Lal have been outlined in Section 5.3.1. The Victorian Central Coal and Iron Mining Company which took over operations at site in 1919 did not prosper and closed down in 1922, although producing about 4,000 to 5,000 tons in 1921.¹⁹² The mine was flooded in 1921.

During 1940 a new shaft was sunk about 100 yards west of the old shaft but operations were suspended after a small quantity of coal of indifferent quality had been dug.¹⁹³

In 1949, fresh boring was commenced after a gap of 30 years.¹⁹⁴

An open cut operation commenced at the Lal Lal site in 1921 but was abandoned in 1922,¹⁹⁵ the location being depicted in Figure 40 in Thomas & Baragwanath (1950), p.15. A water-filled excavation perhaps 400 feet long by 100 feet wide on the east side of the railway and off Coal Mine Road about two to three kilometres south of Lal Lal township may be the site of this open cut. Herman (1952) does not mention this open cut operation.

In 1950, the Ballarat Courier announced the initiation of a new open cut at Lal Lal but the cost of overburden removal and dewatering proved the project uneconomic and the venture closed¹⁹⁶ without producing coal.

Output from the operations at Lal Lal has been stated as producing 25,376 tons to the end of 1950.¹⁹⁷ Anecdotally, there was no mining at Lal Lal after 1950. Mines Department statistics do not list any output from Lal Lal after 1950.

7.2 Altona post-1920

As outlined in Sections 3.10.2 and 5.3.2, underground mining of the brown coal deposits at the Altona area had occurred from the 1890s intermittently until 1919 when the mine at Harrington Square had gone into recess.

In 1927, the Altona Colliery Company revived. It attempted to persuade the State Electricity Commission to develop the Altona coal resource for electricity generation and briquette manufacture, the production of which had difficulty meeting demand, or alternatively to endorse the company to carry out these activities and sell in bulk to the SECV. The SECV rejected the proposal. The company then sought public support for extracting oil and gas from the Altona deposit and utilising processing residues for char, briquettes and fertiliser. Their proposals did not gain financial support.¹⁹⁸

In 1928, the Altona Colliery Company sank a new shaft about one mile west of Harrington Square, moved plant from the old mine site and began extracting coal by 1930. Three drives were worked but water ingress was a significant problem and marketing the coal against competition from briquettes and brown coal from the Latrobe Valley was difficult. The venture closed in 1931 after production of 600 tons only. The company offered their mining rights to the SECV in 1938 and in 1940, but these offers were rejected.¹⁹⁹ No further mining of the Altona deposits occurred thereafter to the present time 2005.

7.3 The Otway Basin post-1920

At 1921 there was no active coal mining operations in the Otway Basin or Ranges.

7.3.1 The Benwerrin Mine (see also Section 5.3.3) post-1920

In 1925, the mining lease at Benwerrin was taken up again and worked by various parties until 1930. Three seams were proven in this operation at 71 feet, 108 feet and 172 feet.²⁰⁰ The output for this period has not been identified.

In 1941, the lease was taken up by VT Ekberg, the three seams previously identified being exposed in a gully. Two tunnels were installed. A seam nine feet thick was worked at 112 feet deep from a shaft. Installation of pumping plant and haulage track was carried out.²⁰¹ In 1947, the Mines

Department installed 10 bores resulting in a revised estimate of 75,000 tons of winnable coal.²⁰²

At 1946, the mine was averaging about 30 tons per week output. By 1948, output was averaging about 20 tons per week²⁰³. It was noted in the 1948 *Annual Report* of the Mines Department that only 'a small tonnage' was being achieved from the tunnels at Benwerrin and that the mine was experiencing difficulties with water ingress and from labour shortages. No subsequent output has been identified in Mines Department records. Herman (1952), p. 49, states the mine was not in production in 1950.

A production of 11,393 tons is listed by Herman to 1950.²⁰⁴ It is likely that the lifetime output from Benwerrin was higher than officially recorded due to the low and intermittent output from this isolated site. Lifetime output probably did not exceed 30,000 tons. A winnable deposit of at least 70,000 tons remains.

7.3.2 The Globrite Colliery at Deans Marsh post-1920

In 1922, bores sunk by the Mines Department about two miles north of Deans Marsh in the Parish of Bambra disclosed a coal seam up to about 30 feet thick at 60 feet deep.²⁰⁵ In 1947, the Globrite Colliery sank a shaft 100 feet deep into this seam. Forty tons of coal was extracted for trials. Further boring northerly from this shaft showed variability in the thickness and continuity of the seam. In 1950, an adit was installed from which a weekly output of 50–60 tons was achievable. Also in 1950, the first year of operation, 756 tons was extracted.²⁰⁶ Anecdotally, remains of an old derrick of the mine are still evident on the south side of Parkers Road about three kilometres north from Dean's Marsh Village.²⁰⁷ No further information has been ascertained.

7.3.3 The Bambra Coal Mine post-1920

The Bambra Coal Mine is noted to have existed prior to or at 1922.²⁰⁸ No confirmation has been found. Perhaps this was the Globrite Colliery at Deans Marsh in the Parish of Bambra.

7.3.4 The Wensleydale Mines post-1920

Anecdotally, some mining of brown coal from the Wensleydale area south of Winchelsea had occurred before 1918 when the Western District Mining Company attempted commercial operations.²⁰⁹ (The location of the mine was about eight kilometres south from Winchelsea along the Winchelsea to

Deans Marsh Road and thence 1.5 kilometres east along a road now known as Coal Mine Road.) By 1922, mining was taken over by the Otway Coal Company outloading coal by an aerial ropeway three and a half miles to a siding at Wensleydale on the Mount Moriac to Wensleydale V rail line. At this time mining was via a series of tunnels²¹⁰ later converted to an open cut operation. A total production of 16,848 tons is recorded as the mine output from 1923 to 1932 when the operation ceased. The Otway Coal Company went into liquidation in 1936.²¹¹

In August 1943, the Wensley Bray Coal Company²¹² reopened the workings as an open cut operation hauling coal by road to Winchelsea railway station and to local and regional customers suffering fuel shortages due to war time restrictions. Mining was initially at the rate of a few hundred tons per week but by 1946 was averaging over 700 tons per week. From recommencement in 1943 to December 1947, total coal output was approximately 100,000 tons.²¹³

At 1948, J.L Knight of the Mines Department estimated coal reserves in an area of 38 acres at about 3.75 million tons with a maximum seam thickness of 152 feet.²¹⁴

On 1 July 1948, the Wensleybrae Coal Mine Pty Ltd reached agreement for Roche Brothers to operate the mine on a royalty basis.²¹⁵ In the early 1950s, in a period of acute fuel shortages in Victoria, the government purchased the mine and reached agreement with Roche Brothers to work the mine for five years and in that time to produce one million tons of coal for which Roche Brothers would pay a royalty to the Government.²¹⁶ Roche Brothers upgraded the mine plant and reached a peak production of 10,000 tons per week with up to 200 men employed in the mine. The coal was hauled by heavy trucks mainly to Winchelsea Railway Station but also to Geelong and other Western Victoria centres.

By 1955, Roche Brothers were concerned about dwindling coal reserves at the Wensleydale mine and commenced a drilling program in the Otways coal deposits under technical guidance of the Mines Department. This drilling proved an extensive coal deposit at Anglesea.

In 1959/60, the Wensleydale coal mine ceased to operate because of the discovery and progressive transfer of operations to the Anglesea Coal Field which could be more profitably worked. Total lifetime production of the Wensleydale mine was probably of the order of approximately two to two and a half million tons.

Anecdotally, a small mining venture had taken place on the northern side of Coal Mine Road prior to the mining operation later known as the Wensleybrae Mine. I have not found written verification of this. (Visibly, there is an excavation on the north side of Coal Mine Road about half a mile eastwards of the major mine but this appears to be a farm water storage rather than an old open cut. Further research may clarify this issue.) The overburden heaps and some disused plant of the mine on the south side of Coal Mine Road are clearly visible.

No other coal mining operations reaching a commercial stage have existed in the Winchelsea area.

7.3.5 Anglesea Brown Coal Mine

In 1959, Roche Brothers, a company which for many years had operated a brown coal open cut at Wensleydale, south of Winchelsea in the Otway Basin, commenced an open cut mine in a brown coal deposit in an area some two kilometres to the north of the coastal township of Anglesea.

The Wensleydale mine was closed down by 1960 after the Anglesea mine was opened sufficiently to continue the reliable supply of run-of-mine coal to industries and institutions in the Geelong region. However, demand for brown coal for steam raising in industry and institutions (particularly country hospitals) in Victoria was decreasing due to the increasing availability of other fuels and electricity. A successful economic future for the Anglesea mine was in doubt.

By 1961, Western Mining Company (WMC) acquired the mining right to the Anglesea Mine with the objective of supplying coal to a nearby 150 megawatt Power Station to be operated by Alcoa of Australia supplying electric power to an aluminum production plant to be established at the Port of Geelong, with reliability of electric supply being enhanced by connection to the State Electricity Transmission System. In the associated State Legislation, the *Mines (Aluminum Agreement) Act of 1961*, Alcoa was granted 'a 50 year exclusive right to explore and mine over some 7,350 hectares of leasehold land.'²¹⁷

The WMC undertook an extensive drilling investigation and relocated the mining operation to the east of the original Roche Brothers operation. The revised operation provided access to a larger coal reserve with a 50 million tons mine plan and was closer to the Power Station Site. Total thickness of the coal seams is about 140 metres. Total economic mineable reserves in the main upper seam have been

estimated at 70 million tons with a further 90 million tons in lower seams.²¹⁸ The mine continues to operate at 2005, with overburden being stripped and backfilled into the mined area by earth moving contractors and coal mining now by Alcoa using a conventional operation with shovels and trucks. At 1992, '[the] overburden to coal ratio averages around two and a half to one with an average coal thickness of 27 metres'. Annual coal production averages about 1.1 million tonnes with coal supply now exclusively to the 150 megawatt Power Station.²¹⁹

At 2005, output to date is of the order of approximately 35 million tonnes.

7.4 The Bacchus Marsh Coal Mines post-1920

7.4.1 Identification of Brown Coal Seams in the Bacchus Marsh Area

The first recorded find of thick brown coal seams in the Bacchus Marsh area was in 1894 at the Werribee River on the main railway line from Melbourne. A thin seam of brown coal had been found previously in 1890 in the bed of the Parwan River at Yaloak Vale.²²⁰

Subsequently, from the 1890s, partly as a secondary outcome of drilling for water, extensive brown coal deposits covered by thick flows of Newer Basalt were disclosed from Melbourne on each side of Port Phillip Bay westwards to Bacchus Marsh and southward to Geelong. A main seam near Bacchus Marsh known as the Mattingley Seam locally exceeds 40 metres in thickness and continues towards Altona.²²¹

7.4.2 The Parwan Brown Coal Mine

In 1929, an underground mining operation commenced at a location about eight kilometres south of the Rowsley railway station. This was known as the Parwan Brown Coal Mine or colloquially as the Parwan Shaft and was operated by the Bacchus Marsh Coal Mine Company Ltd.²²² A shaft 510 feet deep was sunk passing through basalts and thin fossiliferous clays to a 103 feet thick coal deposit which bottomed at 405 feet depth. The shaft and a 200 feet drive were completed in 1930/31.²²³ A small quantity, probably below 1000 tons, of good quality brown coal was extracted but the venture did not achieve commercial success and closed by 1931.

Two subsequent attempts to re-activate the mine did not succeed commercially until taken over by the Bacchus Marsh Coal Mine Company in 1941. Mining via the shaft of the Parwan Brown Coal Mine was carried out from two levels,²²⁴ the third level remaining flooded from previous operations. The mine operated intermittently to 1944/5 when spontaneous combustion of coal in the workings led to closure of mining operations and sealing of the shaft. Subsequent attempts to recommence mining led to renewed fire outbreaks and resealing of the shaft. This mine did not operate after 1945.²²⁵ Lifetime production from the Parwan Shaft was recorded by Herman (1952), p. 81 as about 13,000 tons, and on p. 49 as 10,119 tons for the period 1943 to 1950.

From the mid to late 1940s, in a time of fuel shortages in Victoria, several other companies commenced mining operations in the Bacchus Marsh area south of the Werribee River and south and east of the VR Railway where the overburden is free of basalt. All of these operations used open cut mining with an overburden to coal ratio better than one to one.

7.4.3 Maddingley Brown Coal Mine Number One

About half a kilometre south west of Bacchus Marsh Railway Station, mining commenced in 1944 via an inclined adit into a coal seam about 70–80 feet thick under about 80 feet of overburden. Colloquially this operation was initially known as the Maddingley Tunnel but subsequently was called the Maddingley Brown Coal Mine Number One and was operated by the Maddingley Brown Coal Company. At 1946 the underground mine was operating at about 250 tons per week.

In 1946, the Australian Paper Mills purchased an interest in the mine to ensure supply. The mine converted to an open cut operation quickly reaching an output of 1000 tons per week through a new outloading plant adjacent to the mine outlet. Output in the year 1947 was 67,641 tons.²²⁶ The mine phased out of coal winning operation from 1968 as Maddingley Number Two came into service. Total output from Maddingley Number One to June 1950 is recorded as approximately 100,000 tons.²²⁷ The mine continued to provide access for coal winning until about 1952 in case of problems restricting supply from Maddingley Number Two Open Cut. The largely worked out Number One Open Cut was progressively filled with overburden from Maddingley Number Two.

7.4.4 Maddingley Brown Coal Mine Number Two

In early 1948, the Maddingley Brown Coal Mine Number Two commenced an open cut operation at a location about Two kilometres south from Bacchus Marsh Railway Station. This mine was owned by Australian Paper Manufacturers and output was mainly dedicated to their Fairfield Mill, with direct rail transport from Bacchus Marsh by rail to a siding at the mill. (Yallourn North Open Cut coal was also delivered directly by VR rail trucks from the VNOC mine to the Fairfield rail siding.)

At the mine entry coal seam thickness was about 125 feet under about 30 feet of overburden. Output to June 1950 was recorded as 406,341 tons.²²⁸ At 1954, output was averaging 10,000 tons per week with output in the 1954 year recorded as 504,467 tons.²²⁹ This was the peak year of production. Output stayed above 400,000 tons annually through to 1967 after which natural gas began to supplant brown coal usage. By 1980, annual output had fallen to about 100,000 tonnes.

In 1972, the operations were transferred to APM Minerals Pty Ltd. In 1989, the operation was taken over by Melbourne Quarries and in 1992 by Calleja Nominees with all usage by the Fairfield Paper Mills having terminated. The open cut remains available for a small coal demand for fertiliser, soil conditioner, and combustion trials. The open cut is being used commercially for selected refuse disposal in conjunction with landscaping of the multilevel former coal benches.

The Maddingley Brown Coal Mine Number Two has reserves available for further usage.

7.4.5 The Star Collieries (The Star Open Cuts Number One and Number Two)

- In July 1946, an open cut operation, known initially as the Star Colliery but later called the Star Open Cut Number One, commenced at a location about 1.6 kilometres south east of the Bacchus Marsh Station adjacent to the Parwan Creek. The coal deposit mined was 100 feet thick under 35 feet of overburden.²³⁰ The mine operator was Star Collieries Pty Ltd
- In 1947 the Star Number One open cut excavated 48,995 tons of coal averaging about 1000 tons per week rising to 1450 tons weekly in 1948. However the leased mining area was too constricted and it was decided to open a new open cut about one mile to the south where coal winning commenced in May 1950.

- By 1950, the Star Open Cut Number Two had an average output of about 1,500 tons per week. By December 1950, total output to date of the two open cuts was reported as 209,243 tons²³¹ of which about 200,000 tons probably came from the Number One open cut which closed in 1951 and was subsequently used as an overburden dump.
- Star Number Two open cut continued at an annual output generally of over 50,000 tons to 1969 when it was taken over by the Bacchus Marsh Briquetting Company Ltd. which continued mining but did not venture into briquette manufacture. Annual output fell dramatically in 1970 to 18,480 tons. Further dramatic falls occurred to 1973 after which output was generally about 1000 tonnes annually until the closure of coal winning in 1978.

No further excavation occurred from 1869. The open cut remains visible as a water-filled lake south of Maddingly Number Two open cut.

7.4.6. The Lucifer Colliery

In October 1946, a company named Lignite NL commenced an open cut operation immediately to the south of and adjoining the Star Open Cut Number One. At the mine site the coal deposit was about 100 feet thick under 30 to 35 feet of overburden. By mid 1947, coal output was averaging 850 tons per week. At 1950, this mine had an average output of about 1000 tons per week with a total output to December 1950 reported as 161,808 tons.²³² However, coal reserves in the confined mine lease area were dwindling.

In March 1951, this operation was taken over by the Maddingley Brown Coal Pty. Ltd, operators of the larger Maddingley Number Two Open Cut immediately adjacent to the Lucifer Colliery. In the year 1951, 55,459 tons were mined but the mine ceased operation in June 1952 with a lifetime output of about 230,000 tons.

The largely worked out mine was then used as the main site for overburden disposal from the Maddingley Number Two Open Cut. At 2005, the former Lucifer Collieries site has been restored to natural landscape.

7.4.7 The Boxlea Colliery

Circa 1945, an adit was installed about half a kilometre north of the subsequent site of Star Open Cut Number One declining southwards to intersect the brown coal seam. This mining endeavour was known as the Boxlea Colliery. In 1947, before any commercial coal output via this adit, the Fuel & Chemicals Pty Ltd took over the operation, cancelled the underground venture and commenced an open cut operation immediately to the east (separated by a public road) of the Star Number One Open cut. By June 1950, an output of 463 tons of coal was reported as having been extracted.

In September 1950, the operation was taken over by the Sunshine Fuel and Brown Coal Company. The initial coal output from the Boxlea Open Cut was in 1950, production to December 1950 being recorded as 562 tons.²³³ However mining apparently ceased by March 1952.²³⁴ No mention is made of the Boxlea operation in the *Mining & Geological Journal* after this date. The mining lease area was small. From an inspection of the current site it appears that mining ceased before sufficient overburden was removed to develop multi-level coal faces. Colloquial information indicates that the open cut mine produced up to 30 tons per day. No definitive information on lifetime output from the open cut has been ascertained, but total output was likely not to have exceeded 10,000 tons.

The former open cut site remains as a water-filled hole on the east side of the public road. The external overburden dump at the east of the open cut has blended into the natural landscape.

7.5 West Gippsland Brown Coal Mines post-1920

The brown coal mines in West Gippsland have been referred to in Sections 3.7, 3.9 and 5.3.5. The locations of other brown coal mining endeavours in West Gippsland in the upland country around Thorpdale are shown in Fig 54 of Thomas & Baragwanath (1951), p. 9. Those which survived or had potential for reactivation from 1921 are referred to below.

7.5.1. The 'Rollo' Mines post-1920

- Yarragon Coal Mining Company on the flat lands
- On the Yarragon Escarpment

The Rollo mine at Yarragon is referred to previously in Sections 3.9 and 5.3.5. It surrendered its lease in 1895. It was not reactivated in subsequent years as suggested colloquially but not confirmed in publication or records sighted. Operation of the mine beyond the 1890s is also negated from specific discussions with the land occupier of the last 50 years. This was the only mine on the Moe to Warragul flat land area which survived beyond initial proving shafts and adits.

The Rollo Mines on the Yarragon Escarpment did not survive beyond the early 1890s and were not reactivated subsequently.

7.5.2 The Haswell Mine post-1920

As stated in Section 3.7.4, some intermittent mining in low quantities occurred but ceased before 1950 from the Haswell tunnel located about seven kilometres northeast of Thorpdale.²³⁵

7.5.3 Campbell's Mine (The Narracan Brown Coal Mine) post-1920

In 1941 a second adit was installed adjacent to the previous tunnel of the Horrocks mine on Campbell's property located about five kilometres northeast of Thorpdale. The brown coal seam was 10 feet thick. This was also known as the Narracan Brown Coal Mine. A small quantity of brown coal was extracted.

In 1948, the Mines Department prepared a mine plan and carried out a mine survey of Campbell's Brown Coal Mine. A plan and section of the mine is shown in Fig. 56 in Thomas & Baragwanath, (1951). This mine ceased operation by 1950 and has not re-opened.²³⁶

7.5.4 The Monoonook, Corovuna and Moolamoona Mines post-1920

In 1947, an underground mining operation known as the Monoonook Mine was initiated about five kilometres southwest of Thorpdale. This mine accessed the coal seam previously

developed as the Crisps Mine (see Section 3.7.6). In 1948 the mine was taken over and operated as the Corovuna Mine. In 1948, the Mines Department undertook a mine survey and prepared a mine development proposal.²³⁷ After 8,695 tons output was recorded, the mining operation was suspended in 1948.²³⁸

In 1950, a new mine known as the Moolamoona Mine was commenced adjacent to the former Corovuna mine. The layout and sections of these mines at 1951 are shown in Figure 55 in Thomas & Baragwanath, (1951). In 1951, the Moolamoona Mine intentionally broke through into the former Corovuna workings to improve ventilation and improve the development prospects for more extensive working of the seam. In 1954, new ownership took over the operation enthusiastically installing further tunnels into the outcrop. From this time through the 1950s the mine output averaged 4,000 to over 5,000 tons annually. However in the year 1961 a dramatic fall in output to less than 1000 tonnes occurred. Output then declined continuously until the last recorded output of 12 tons in 1965.

Combined total output from these mines to 1950 was recorded as over 23,816 tons.²³⁹ The lifetime output from the mines has not been ascertained in this study but would probably be of the order of 60,000 tons.²⁴⁰

7.6. The Great Morwell Mine 1921 to 1924

Sections 3.7.2 and 5.3.4 refer to the working of the Great Morwell Brown Coal Mine until 1920. At 1921, the Great Morwell Coal Mine continued in operation under Mines Department management with excavation by hand. Coal delivery from the mine was by VR trucks to outlets on the VR rail system.

From April 1921, this mine played a significant role in providing the initial coal supply requirements of the State Electricity Commission of Victoria at Yallourn, supplying coal to the Yallourn temporary Power Station which generated power for construction use and for the domestic use of on-site construction workers at Yallourn.²⁴¹

Operation of the mine was transferred to the State Electricity Commission on 1 April 1924. The first unit in Yallourn Power Station became operational on 15 June 1924 and the temporary power plant was shut down on 1 September 1924.

7.7 Yallourn North Open Cut (The ‘Old Brown Coal Mine’) from 1924–2005

The operation of the Old Brown Coal Mine was taken over by the SEC at the commencement of the Yallourn Power Station in 1924. It supplied coal to Yallourn Power Station on a continuous basis blended with coal from the new Yallourn Open Cut until 1927 and thence intermittently during coal supply shortages from Yallourn Open Cut. The open cut was closed down in September 1930 with the Yallourn Power Station then relying on Yallourn Open Cut for all coal deliveries. The old open cut was reactivated briefly when emergencies occurred in Yallourn Open Cut resulting from flood (1935) and fire (1944). In late 1940, the State Government requested that the mine be prepared for emergency supplies of fuel during the war time period. Deliveries of coal recommenced in May 1941.²⁴²

This mine subsequently played a vital role in the post war years 1945–1963 as a source of coal for Newport Power Station replacing black coal in short supply from NSW. Raw brown coal from this mine also substituted for shortfalls in briquette deliveries from Yallourn and Morwell briquette plants and was a vital fuel for many small manufacturing enterprises, hospitals, and Gippsland milk factories. Brown coal from Yallourn North (and later from YNX) was also used at the rate of about 70,000 tons per year with briquettes in the Gasification Plant at Morwell.²⁴³ The availability of this mine as an emergency and as a supplementary source of coal supply during coal supply difficulties from the Yallourn Open Cut emphasised the strategic security value of interconnection between open cuts and alternative sources of coal supply.

Until about 1921, the operation was largely by manual labour. It was then converted to rail haulage of overburden. Horse drawn coal dobbins were replaced by conveyor transport of coal within the mine from 1941. From the 1950s, excavation was by draglines, shovel excavators, a bucket wheel excavator, scrapers and other mobile plants. Coal removed from this mine totalled about 30,000 tons to 1915, approximately 650,000 tonnes from 1916 to 1924, and 16,358 million tons from 1924 to closure of excavation in 1963,²⁴⁴ ie. a lifetime total of 17.039 million tonnes. Further details of YNOC Coal Excavation Outputs Annually 1924–1963 are shown in Table 1.1/3 of Vines (1989).

Outloading facilities direct to the VR rail line continued in use until June 1964, receiving coal from Yallourn Extension Open

Cut to maintain traditional coal supplies from the old brown coal mine. Subsequently the open cut was used as a disposal area for demolition materials from the decommissioning of Yallourn Power Station and for disposal of hard clean waste from the construction of Yallourn W Power Station and from the Yallourn Works Area. From the late 1980s, the old open cut has remained in use for ash disposal from the Yallourn W Power Station. Rehabilitation and revegetation of overburden dumps has been carried out progressively from the 1950s.²⁴⁵

7.8 Yallourn North Extension Open Cut

In 1953, in view of depletion of coal reserves in the Yallourn North Open Cut mine plan area, the SECV initiated investigations to determine future options. In 1954, drilling proved a substantial near surface deposit later assessed to be of the order of 50 million tons of coal of similar quality to that of Yallourn North Open Cut at a location about three miles east of the Yallourn North Open Cut. On 5 July 1955, the commencement of the Yallourn North Extension Open Cut (YNX) at this site was authorised.²⁴⁶

Overburden was removed predominantly by contract and deposited in an external gully of coal to the north west of the planned open cut.

The coal excavation and conveying plant was progressively transferred from Yallourn North Open Cut. Coal haulage from the YNX outloading station was to road vehicles on contract to customers or to SECV trucks hauling to the Yallourn North VR loading station. Yallourn North Open Cut ceased mining in May 1963. Yallourn North Extension had commenced coal winning in July 1956.

The open cut was developed as a multi bench operation with face heights of about 27 feet high to suit the reach of the electric shovels employed. Each shovel loaded to a separate mobile primary crusher/loader which loaded to the in-pit conveyor system.

In the late 1950s, problems arose due to the tendency for exposed coal faces to smoulder with potential spontaneous combustion. This coal heating was attributed to high sulphur content in specific areas and at varying depths in the open cut. Subsequently, in 1966, the mine plan was amended to bypass the high sulphur areas.²⁴⁷

Annual output averaged over 300,000 tonnes from 1957 to 1989 with a total lifetime output of 9.3 million tonnes.²⁴⁸ At closure in 1989, the immediate planned mining area held about seven million tonnes of coal. After closure, a long term rehabilitation plan was implemented from 1991 to provide a stable, non-erosive condition to the mine and overburden dumps while ensuring visual harmony with the mine surroundings. Objectives were also to maximise opportunities for effective land use while preserving the option to reopen the mine in the future.²⁴⁹

7.9 Yallourn Open Cut

The occurrence of a large deposit of brown coal in the Morwell River Valley on flat land immediately south of the Latrobe River had been known to Mines Department geologists from the 1870s (see Section 3.1). The opening of the Great Morwell Brown Coal Mine in 1889 on the north bank of the Latrobe River in this area led to increased investigation and mining leases immediately south of this mine.

Interest from private companies and the Victorian Government in various forms of economic development of this coal deposit continued through to 1910, by which time the feasibility of long distance transmission of electricity demonstrated the potential for this coal to be a prime energy source for the State. From 1916 to 1918, various professional and government appointed committees recommended that the Morwell Coal Field be mined for fuel supply to a power station to be built adjacent to this new mine.

In June 1918, the Premier committed the Government to the inauguration of a State Enterprise to develop and utilise the brown coal resources of the State. In December 1918, an Australian Mining consultant, Lindsay Clark, commissioned by the Minister of Public Works, submitted a report on the procedure and cost of coal winning from a specified one square mile site south of the Latrobe River, a site chosen in 1917 by the State Brown Coal Advisory Committee evidently on the technical advice of its chairman Hyman Herman. Subsequently, the State Government appointed Electricity Commissioners in November 1919 who recommended inter alia the opening of the Morwell (later to be called Yallourn) Brown Coal Field.

Lindsay Clark was appointed by the Commissioners in October 1919 as Consulting Mining Engineer on a part time basis. It was to the mine plan and subsequent plant installation using available British and American open pit mining equipment as directed by Lindsay Clark that the SECV, established in January 1921, operated the mine as an open cut.²⁵⁰

The mine was named Yallourn Open Cut. Initially horse drawn scoops and skips were used, then steam shovels and locos until conveyors for overburden disposal and ropeways for coal haulage were introduced by June 1922. Lindsay Clark's engagement as Consulting Engineer was terminated on 30 June 1924, after which all mine planning and plant specification was carried out by SECV staff. Equipment as used in the German brown coal open cuts had become available and was progressively installed as coal demand expanded to supply additional power station and briquette manufacture installations. An electric rail system for both overburden and coal haulage was introduced by 1927 replacing conveyor and rope haulage systems. Three ladder dredgers of German design and manufacture were installed from 1928 to 1931.²⁵¹

In 1936, recommendations were made for the establishment of a new open cut to provide the extra coal winning capacity for a new power station and greater reliability against flood, fire and earth movements. However, action on these proposals was deferred by the higher priority for fund allocation to defence and the availability for some additional security of coal supply by reactivating Yallourn North Open Cut.

Some additional excavating capacity was provided from shovel and dragline plant in the 1930s to 1940s, until purchase of equipment from Germany was again available in the 1950s. The first Bucket Wheel dredger (SECV Number Three Dredger) came into service in November 1950. From 1955 to 1985, six other dredgers came into service in Yallourn Open Cut as older small capacity excavators were phased out.²⁵² The progressive commissioning of a four unit 1,450 megawatt power station, Yallourn W, from 1973 to 1981 necessitated significant upgrading of YOC overburden and coal excavation and delivery plant.

Conveyor systems replaced train haulage systems progressively from 1962, rail systems being fully phased out within the open cut by 1984. The interconnecting railway between Yallourn and Morwell Open Cuts reverted to a delivery system to Morwell only from 1985 and retained this one way delivery until 2003. Road transport of briquetting coal was then used with sourcing of briquetting coal also from Loy Yang Open Cut (or from Morwell Open Cut as a less acceptable option for briquetting quality).

Major relocations of plant systems had occurred over the years as operations swung southwards, then westwards and then northwards, eventually excavating the area previously occupied by the Yallourn Township which from the 1940s had over 5,000 inhabitants. At 2004, all excavation was in the East Field, an extension to the east of the initial open cut workings. Earthworks were under way for an extension of the East Field further east and to the south by a westward deviation of the Morwell River via an embankment to be built through the earlier open cut operational area. It was planned that four trunk conveyors from the mine extension would be placed in tunnels through this embankment and under the Morwell River deviation. This deviation opened up access to a further readily minable coal reserve. At 2004, only two dredgers (numbers 12 and 13) were retained in service, predominantly for overburden excavation, the coal excavation process being in course of change to downhill dozing to mobile crusher/loader (feeder/breaker) plant loading conveyors on two or more levels. Each feeder/breaker was envisaged to have a throughput capacity of up to 3,000 tons of coal per hour. This revised excavation mode phased out the coal selection procedures employed from the late 1920s to identify sand seams 'woody' coal, high moisture coal and dark lithotype coal and to selectively dig, store and blend such coal to avoid its delivery to the briquette factories.²⁵³

Output from the open cut increased progressively from 1924 reaching an annual output in 1981–82 of 22.275 million tonnes.²⁵⁴ Demand then decreased as units of the Yallourn Power Station were retired and as briquetting coal deliveries to Morwell decreased as demand for briquettes declined. Output in the year ending December 2002 was 17.276 million tonnes.²⁵⁵ Total output from commencement in 1924 to December 2003 was of the order of 840 million tonnes.

7.10 Morwell Open Cut

The concept of opening a new open cut, as recommended by German consultants in 1936, was advanced by investigations and reports from 1942 to 1945. These strongly recommended Maryvale South immediately to the south of the township of Morwell as the preferred site for a new open cut to supply coal to a briquette manufacturing works and integrated power station at Morwell. An interconnecting rail line between the Morwell and Yallourn Open Cuts was included in the project. Reservation of a large coal resource at Loy Yang for future power generation was also a key component of the recommendations.²⁵⁶

The Maryvale South (Morwell) Project was approved by the State Government on 13 July 1948. Site works in the Morwell Open Cut commenced on 11 April 1949. However an economic recession from 1951 to 1954 restricted funds and delayed plant procurement such that coal excavation did not commence until November 1955, initial coal supply being to the Yallourn Power Station.

Initially, the open cut was designed to use rail transport for overburden and coal removal. However decisions to supply coal from this open cut to a 1200 megawatt power station to be built at Hazelwood involving about four times the coal output capacity of the Morwell Open Cut at that time lead to a major review of the open cut plan and a conversion to conveyor haulage within the open cut. The Hazelwood Power station was subsequently extended to a 1600 megawatt installation, the extra coal demand on Morwell Open Cut being partly offset by decisions to continue supply to the Morwell Briquette Works with low ash coal from Yallourn Open Cut.²⁵⁷

Excavation was carried out by the following dredgers:

Number 21 Bucketwheel	1956 to 1992 now maintained as historical plant
Number 20 Bucketchain	1957 to 1970 now dismantled and sold
Number 3 Bucketwheel	1959 to 1982 now dismantled and sold
Number 19 Bucketchain	1961 to 1990 now dismantled and sold
Number 9 Bucketwheel	1964 and continuing

Number 10 Bucketwheel	1970 and continuing
Number 11 Bucketwheel	1971 and continuing
Number 24 Bucketwheel	1987 and continuing but available for sale
Number 25 Bucketwheel	1990 and continuing

Number 3 dredger had been built at Yallourn in 1951, transferred to Morwell in 1959 and returned to Yallourn in August 1982. The Number 24 Dredger had been built at Yallourn in 1984 and transferred to Morwell in June 1987.²⁵⁸

Morwell Open Cut was excavated to the base of the Morwell Number One seam, underlain by about 10–15 metres of soft clays and sands above the Number Two seam. The Number One seam was overlain by about 10–15 metres of soft clays with occasional silicified boulders of up to three cubic metres. At the northwest of the excavation, the edge of the Yallourn seam coal was mined as a separate small operation separated from the top of the Morwell seam by about five to ten metres of clays. The main excavation was carried out on up to 8 levels eventually with conveyor transport on four levels and each dredger planned to excavate on top and bottom sides of a face conveyor. Thickness of the coal seam was about 130 to 150 metres. The coal to overburden ratio as mined was about three and a half to one. Special attention was required to evaluate and minimise the effect of earth movement, to control aquifer pressures from aquifers under each coal seam by a managed pumping program, and to the selection and blending of coal to contend with areas of higher fouling coal.

Major changes in haulage systems were necessary to move excavation from the initial East Field into the Northwest Field, then into the Southeast Field and the present movement into the West Field. Major deviations of the Morwell River and relocation of highways to Thorpdale and to Yinnar had been necessary.

On 4 February 2004, the first deliveries of coal from the Morwell Open Cut West Field occurred. Installation and commissioning of a blend of new and reconditioned conveyor equipment had been achieved while meeting full demand from the Hazelwood and Morwell power Stations. Transfer of operations from lower operating levels in the South West Field was planned for oncoming years with coal supply to be from three conveyor systems in the West Field. Coal from the

West Field was expected to meet demand from Hazelwood Power Station for 25 years.²⁵⁹ The coal to overburden ratio in the West Field is assessed as 4.5 to one compared with 3.8 to one in the existing Southeast Field. The coal seam to be mined in the West Field is up to 130 metres thick compared with about 90 metres in the Southeast Field.²⁶⁰

Coal excavation reached one million tons in 1960, ten million tons in 1968, peaking at 16.024 million tonnes in the 1976/77 year. Annual output fell progressively to 14.120 million tonnes in the 1992/93 year followed by highly significant fall in coal demand from Hazelwood Power Station from 1994 as Loy Yang Power Units came on stream at a higher electricity system scheduling basis. At 30 June 1995, total coal output from the Morwell Open Cut from 1956 was 400 million tonnes.²⁶¹

In December 1994, the SECV was disaggregated, the public authority taking control of Morwell Open Cut and Hazelwood power Station becoming Generation Victoria and then Hazelwood Power Corporation. This latter entity was sold by the Government in August 1995 to a private consortium, then passed through changes in share ownership until at December 2005, International Power Hazelwood (IPRH) was the managing entity.

Over several years from 1996, as Hazelwood Power Station was restored to eight operating units, Morwell Open Cut commenced internal dumping of overburden. The long term plan of moving operations to a West Field was implemented as the existing operational multi level benches were worked out, with dredger operation in the West field commencing in February 2004. Government approval was granted in August 2005 for all matters associated with deviation of the Morwell River and two tributary creeks, for highway deviations, for environmental management and for mining of a coal reserve expected to suffice for 25 years. At December 2005, lifetime output from Morwell Open Cut totalled approximately 570 million tonnes. A record output of 19.77 million tonnes occurred in the year 2001.

7.11 Loy Yang Open Cut

In October 1945, the Premier, on advice of the SECV, stated that in addition to a new open cut and briquette factory at Morwell being under consideration, establishment of a power station and another open cut in the vicinity of Traralgon may be necessary. However as noted in Section 7.10 above, the utilisation of the coal from Morwell Open Cut was diverted to power generation as the Hazelwood Power Station was progressively brought into service through the 1960s.

From the early 1960s, detailed concepts for a new open cut located south of Traralgon at Loy Yang were developed by the SECV after extensive drilling and coal evaluation had occurred. However incremental increases in power generation capacity were obtained by natural gas fired plant at Newport and Jeeralang and by the Yallourn W brown coal fired plant at Yallourn. On 23 November 1976, legislation was passed for the Loy Yang Project as a 4000 megawatt plant fuelled from an adjacent open cut. Site works commenced on 15 February 1977.

Removal of top soil and preparatory earth moving for roads and drainage and removal of 2.570 million cubic metres of overburden took place by contract until the first dredger, number 14, commenced commissioning with overburden excavation on 29 July 1982. The official date for completion of number 14 Dredger commissioning and for commencement of open cut operations was 1 October 1982. The first coal deliveries took place on 6 July 1983 for test runs of the coal conveyor systems. Initial combustion tests in Loy Yang Power Station commenced in February 1984.²⁶² Commercial operation of the first 400 megawatt units officially commenced on 30 June 1984.

Number 15 dredger (D15) came into service in the open cut on 16 February 1984 in time for combustion testing in the Power Station. The D15 was then used predominantly for overburden excavation and D14 for coal winning.²⁶³ Coal quality was a problem initially as several million tonnes of weathered coal and high ash coal from burn holes in the cal surface were delivered to the power station rather than being disposed of as waste.²⁶⁴ All excavation was carried out by dredger, the configuration of three conveyors on each dredger including a telescopic intermediate conveyor and separately crawler mounted discharge boom having flexibility for three bench operation to a movable face conveyor.

For the 1986/87 year, coal output reached 10.782 million tonnes, with a record monthly output in March 1987 of 1.314 million tonnes and three units of the power station in service.²⁶⁵

Number 16 dredger (D16) commenced excavation testing in the open cut on 30 October 1987. After a protracted period of intermittent operation while the contractor rectified faults and attended to contract obligations, the D16 was taken over for commercial operation on 8 March 1988.²⁶⁶

A second overburden disposal system was commissioned on 25 January 1991. This plant consisted of a tripper/stacker straddling a new dump conveyor fed by a new overburden trunk conveyor. This plant duplicated the initial overburden system and provided for two dredgers simultaneously outloading overburden, interseam or inferior coal.

The number 27 dredger (D27) commenced excavation testing in the open cut on 19 May 1992. The D27 went into normal operation on 1 June 1992. The early planning for the Loy Yang mine had been based on a four dredger complex, all of the same configuration and capacity of about 3,750 tonnes of coal per hour and providing for ready interchange and flexibility. However, as early as 1982, electricity demand forecasts were lower than the forecasts of the mid-1970s, resulting in a delay program being developed for Loy Yang Power units after unit. Decisions were made to achieve economies by providing D27 as a 'compact' excavator at smaller capacity and size to the other three dredgers while leaving open the option of providing for another 'compact' machine and a fifth conveyor route if power station units 7 and 8 were approved. The D27 proved to be an effective addition to the dredger fleet at Loy Yang.

In December 1992, a pulverised dried brown coal plant came into service with a contract to supply pulverised dried coal to Loy Yang B power station for auxiliary firing (start up and flame stabilisation). The plant had a 150,000 tonnes per year output capacity of dried coal at about 15 per cent moisture content and provided a potential for further coal conversion processes.

Coal output increased progressively as the six 500 megawatt units of Loy Yang Power Station came on stream. The sixth unit at Loy Yang reached first steam to turbine on 4 December 1995 and was handed over for full time operation on 30 September 1996.²⁶⁷ Coal output in the year ending 30 June 1997 was 27.808 million tonnes.²⁶⁸

Subsequently, coal output rose progressively to 30.655 million tonnes in 1998 to the present yearly record of 30.747 million tonnes in the year 1999. Subsequently, as the six Loy Yang units competed to meet electricity demand in the more highly interconnected interstate transmission systems, generation from Loy Yang decreased partly due to plant overhauls and maintenance and coal output fell correspondingly to 28.750 million tonnes in the 2003 year.²⁶⁹

Quality control of coal deliveries to the power stations required assiduous attention contending with high sodium coal, overburden contamination, burnholes with high ash, interseam intrusions, and moisture content variations (partly from Yallourn Seam coal in the north of the mine).

Controlled depressurising of aquifer water was an essential feature of the mining operation to balance uplift forces on the coal seam. Dirty water control and treatment was assiduously applied to meet environmental obligations.

At 2000, '[the] mine is about half the length it is planned to be and is progressively extending to the north. We have about 250 metres to go north before the Dredger 16/conveyor L100 operation face reaches full length and about three to four kilometres (eastwards) to reach our eastern boundary. The mine will continue to develop the base to full depth, a further 30–35 metres (it is currently 150 metres deep).²⁷⁰ The mine will then be about 58 metres below sea level. At December 2002, the mine was 160 metres deep, (66 metres below sea level), and covered 245 hectares. Twenty two kilometres of conveyors were in service.²⁷¹

In November 2003, the Hyland Highway south of Traralgon was deviated along a four and a half kilometre length to provide for imminent extension eastwards of the mine. This deviation freed up mine expansion options to the east and south.

Total coal output from the Loy Yang mine to 31 December 2005 was about 470 million tonnes. Forward annual budgets showed an expected annual coal demand at about 32 million tonnes to be met on a continuing basis with existing excavation plant at a supply reliability of over 99.8 per cent.

7.12 Gelliondale Open Cut

The existence of close-to-the-surface brown coal deposits on the South Gippsland coastal flat lands from Toora to Yarram had been known since the late 1800s. (Some reports refer to this deposit or area as Hedley, which is the adjoining railway station to the west of the Gelliondale Station.) Drilling by the Mines Department, particularly in the period 1918 to 1921, had indicated the area from Gelliondale westwards to Hedley as potentially suitable for an open cut operation with soft overburden and an overburden to coal ratio of less than one. 'The Gelliondale Seam, typically 50 metres or more thick but split in places to form the Gelliondale A and B seams, has properties similar to those of the Yallourn Seam in the Yallourn area' although ash content is significantly higher at about six per cent compared with run of mine two per cent at Yallourn.²⁷²

In 1923, an open cut was commenced on the Gelliondale Brown Coal Deposits about three kilometres south west of the Gelliondale station on the South Gippsland Railway. Mining of the deposit was expected to have to contend with sub-artesian and interseam water.

A small briquetting plant was placed into service circa 1924 but was not successful technically or commercially. A photo of the mine is shown in Thomas & Baragwanath (1950), p.16. A total output of 13,940 tons of coal was recorded until December 1950.²⁷³ (It is probable that the output to 1950 was higher than in these Mines Department official records as quoted in Herman 1952.) Gloe (1948), p. 99, states that the Gelliondale Open Cut was operating intermittently sometime in the period 1941 to 1955. No further excavation occurred from this area from then onwards.

Nevertheless, the potential opportunity for development of the 'ready recoverable' economic reserves at the Gelliondale lease (estimated as 1,050 million tonnes economically recoverable coal in 1982),²⁷⁴ had come under consideration in government and private investigations. These investigations included the Brown Coal Advisory Committee of 1917 which recommended a Yallourn Development; the John Bridge (SECV) reports of the early 1940s which recommended a Morwell Development followed by a Loy Yang Development; and the SECV reports of the 1980s which recommended a Driffield Development. A

mining lease area of the Gelliondale deposits passed through several hands from the 1920s. At 1984, the leaseholders were ARCO Australia Ltd.²⁷⁵

Keen interest by groups contemplating coal to oil conversion processes was evident during the 1970s in particular. The Government had indicated the availability of the Gelliondale resource to private ventures rather than preserving for the State its potential for power generation by the SECV.

7.13 Won Wron Open Cut

A deposit of brown coal north of Yarram, at what is now Won Wron, was reported in 1876, being the most easterly brown coal deposit found in Victoria at that time. Mines Department reports in 1892, 1899 and 1902 refer to further discoveries in the Won Wron area, the most definitive being by Stirling J (1899).²⁷⁶ Shallow shafts were sunk into the Won Wron deposit in 1892.

Drilling to define the Won Wron deposit took place between 1922 and 1929. Brown Coal at one location was 140 feet thick under eight feet of overburden.²⁷⁷ However, the drilling showed the local deposit to be quite small with total reserves of about two million tons.²⁷⁸

In 1927, an open cut was commenced at Won Wron about 14 kilometres north of Yarram by the Won Wron Brown Coal Pty Ltd. This operation is depicted and described in Knight, J (1957).²⁷⁹ Total output and destination of the coal supplies have not been ascertained in this study. It is conjectured that the open cut operated for only a few years and its output was less than 50,000 tons.

8 Coal Mining in Victoria at 2005

At March 2005, there was no mining for black coal proceeding in Victoria. There were no highly significant black coal resources suitable for economic mining ventures, although there were localities in Gippsland where black coal in thin seams was known to exist or where mining had ceased leaving unmined reserves. It appeared that resurgence of black coal mining in Victoria was an unlikely investment area for private entrepreneurs or a likely area for priority of economic support from Government.

At 2005, private industry was operating brown coal open cuts at Anglesea, at Maddingley Number Two, at Yallourn, at Morwell and at Loy Yang. Substantial economically winnable reserves of brown coal have been identified in the Latrobe Valley and in eastern Gippsland although a significant portion of the most economic deposits have been deleted from potential mining development by planning for township and industrial site expansion, by environment preservation assessments and by associated buffer zones.

Additional knowledge of extensive brown coal deposits in north western Victoria generally at greater depth than in Latrobe Valley deposits has been acquired through a surge in drilling for minerals, gas and water from the 1970s. A greater understanding of the brown coal deposits and identification of specific 'mining fields' has also been achieved in the Gelliondale to Foster, Boodyarn, Alberton and Stradbroke areas of south west Gippsland.

Largescale new ventures in the utilisation of the brown coal deposits of Victoria have not developed beyond laboratory or pilot plant stage since the 1980s. From that time, significant research on modified techniques to reduce greenhouse gas emissions from combustion of brown coal has been proceeding. One group prominent in this research is the Co-operative Research Centre for Clean Power from Lignite, a joint venture between government and private industry. The outcome of such research is likely to be the main influence on the extent of brown coal mining in Victoria for several decades. The availability and economic competitiveness of natural gas may also continue to defer expansion of electricity generation

from brown coal as well as offering an alternative to its industrial use for steam raising.

In 2002, the State Government called tenders for exploration licences over brown coal deposits in four areas in the Latrobe Valley covering 764 square kilometres in the Driffield/Narracan and Flynn/Gormandale areas. Three companies, Loy Yang Power, HRL Ltd, and Australian Power and Energy Ltd. (APEL), were selected from 12 applicants with sole rights for exploration and mining licence application over specified areas. This concept was intended to provide greater certainty on the access to identified brown coal deposits to the selected companies in their investigation of the viability of proposed new coal combustion or processing technology.²⁸⁰

In January 2004, a fire in the Morwell Briquette Works destroyed some plant and reduced briquette manufacture by about 50 per cent. At December 2005 only partial restoration of the Briquetting Plant capacity had been adopted, mainly to continue briquette supply as a start up and flame stability fuel at Loy Yang A and Hazelwood Power Stations, and to the Morwell Char Plant. Final closure of the Morwell Briquette Works has been deferred by this partial restoration. Hazelwood, Morwell and Loy Yang A power stations, all of which used briquettes as a re-start fuel, tested options for alternative fuel blends including black coal, to achieve optimum re-start reliability and economy. Other industrial users of briquettes such as Australian Char at Morwell were also considering their options.²⁸¹

The Anglesea Open Cut was continuing to operate at about 1.1 million tonnes annual output with adequate reserves for at least 25 years for its dedicated supply to Alcoa.

The Maddingley Number Two Open Cut currently in intermittent use for low quantity supply for soil conditioning and process testing remains available for reactivation in the short term.