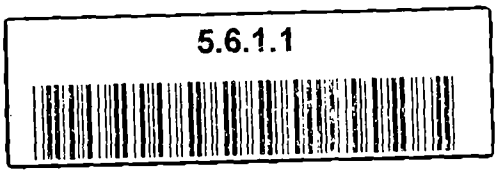
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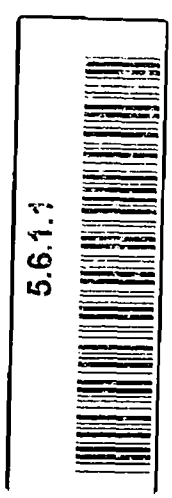
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YALWAL POST CONTACT HERITAGE INVESTIGATION

AND

CONSERVATION MANAGEMENT PLAN

FINAL REPORT

4 November 1998

Prepared by:

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EXECUTIVE SUMMARY

Shoalhaven City Council commissioned the post contact heritage investigation and conservation management plan for Yalwal to:

- provide an inventory of items of non-Aboriginal culture which remain at Yalwal and within its immediate environs, together with an account of how they fitted into the social, economic and industrial life of the area;

- recommend how these items may be presented to the public in an interesting yet safe manner and without causing further damage to the items themselves or their natural and cultural environments.

The post contact history deals in its first part with the European discovery and penetration of the Yalwal area, a period for which no physical remains are known to exist. The rest of the history centres on the discovery of gold in the area in the mid-nineteenth century and on the rise and decline of the goldmining industry. After a brief attempt at alluvial mining at the beginning of the 1870s, miners turned first to reef mining and then to open-cut or quarrying methods to obtain the ore. These methods were largely responsible for making the latter half of the 1880s and the first half of the 1890s the era of Yalwal's greatest productivity and prosperity. From the second half of the 1890s, however - and despite the considerable capitalisation and sophistication of some of the mining operations - the field began to decline as the better quality ore was worked out. Though punctuated by occasional good yields of gold, the field continued its decline for much of the twentieth century until active mining operations ceased in the early 1960s. It is the features and structures remaining from the century of goldmining activity at Yalwal that form the subject of this heritage investigation.

Each of the features and structures associated with Yalwal's post contact history is described in detail in a site inventory. Accompanying the inventory is a series of maps which have been based on extensive field work undertaken as part of this study and which show as accurately as possible all of the various mining sites. These sites are also illustrated by a comprehensive set of contemporary photographs. Taking advantage of the low water levels in Danjera Dam, the consultants have been able to record photographically several sites that are normally under water.

The features and structures remaining from Yalwal's post contact history have been assessed for their heritage significance using the criteria developed by the Australian Heritage Commission for assessing places nominated to the Register of the National Estate. Yalwal was found to meet six of the Heritage Commission's criteria and is thus assessed as having considerable heritage significance on the basis of its post contact history and physical remains.

In order to protect Yalwal's heritage values, a series of conservation management policies have been drawn up according to guidelines set out both by the Australian branch of the International Council on Monuments and Sites in its Charter for the Conservation of Places of Cultural Significance ('the Burra Charter') and by J.S. Kerr in his National Trust publication, *The Conservation Plan.* These conservation management policies comprise some general policy statements followed by a more specific set of policies, each accompanied by lengthy explanatory notes. Together, the policies and the notes provide guidelines for preserving

features and structures of post contact heritage significance at Yalwal. Particular attention is payed to the Chapman stamping battery, the tramways and the cemetery, as they require some special conservation strategies.

The study also makes recommendations for site visitation which, in essence, comprise suggested routes for two walking tracks in the area: a short walking track for elderly, physically handicapped and short-stay visitors, and a long walking track for the more able-bodied or those with more time at their disposal. Both tracks are designed to allow visitors to take self-guided tours to examine the main mining sites. The suggested routes for the tracks are depicted on a map accompanying thi section of the report. The short track takes in the Chapman stamping battery, part of a tramway and the Golden Crown processing site and quarry. The long track is far more comprehensive in its scope and includes, with some detours, the Pioneer tramway, tunnel, quarries and processing site; the Homeward Bound tramway, tunnel, quarry and processing site; the Star, Victory, Fountainhead, Caledonian, Golden Quarry and Black Lode workings; and the alluvial workings along Sawpit Creek. As an addition, the cemetery could be included in both the short and long tracks.

In developing the recommendations for both site visitation and conservation management, the consultants have had regard for safety issues and the question of incompatible uses. Safety considerations are particularly relevant to the long walking track as the proposed route passes through the Homeward Bound upper tunnel into the Homeward Bound Quarry, as well as approaching a number of other potential hazards, such as open shafts and adits, sheer drops and rocky overhangs. Some recommendations have been made where these matters impinge on site visitation and conservation, with the consultants recommending the construction of safety barriers and guardrails in materials and a manner sympathetic to the area and its heritage values. Strictly speaking, however, the safety issues are beyond the expertise of the consultants and therefore require examination and consideration by recognised experts, such as mining engineers, geologists and professional risk management assessors.

1. INTRODUCTION

1.1 Background

In March 1998, Shoalhaven City Council commissioned the preparation of a management plan for Yalwal and its environs. The plan was to be based upon an investigation into the post contact heritage of the area.

The primary objectives of the investigation and management plan were:

- To provide an inventory of items of non-Aboriginal culture which remain at Yalwal and within its immediate environs, together with an account of how they fitted into the social, economic and industrial life of the area.

- To recommend how these items may be presented to the public in an interesting yet safe manner and without causing further damage to the items themselves or their natural and cultural environments.

1.2 Study Area

The study area lies approximately 30 kilometres west of Nowra and comprises land within the Parish of Danjera. The land is bordered on the west by Danjera Dam and its waters, on the north by Danjera Creek below the dam and by Yarramunmun Creek, on the east by private properties in the hands of R. and L. Louth, F. and M. Regan and J. Fletcher, and on the south by boundaries of the land controlled by the Department of Land and Water Conservation [DLWC]. The total area amounts to about 400 hectares.

Within the study area, Shoalhaven City Council controls most of the northern part of the site, including land downstream of Danjera Dam and land east of the dam's catchment area. The catchment area along the eastern side of the dam's waters, as well as the land under the water, is controlled by the DLWC. The DLWC land includes the cemetery site and land along the eastern side of the dam's waters as far as the northern boundary of land controlled by the National Parks and Wildlife Service. It is noted that the DLWC-controlled land contains most of the old mine workings, including those now covered by the waters of Danjera Dam. It is further noted that the fence on the northern side of the whole area of the gazetted cemetery encroaches substantially on Shoalhaven City Council land.

1.3 Methodology

In broad terms, the methodology for the project involved the following components: research, write-up and analysis of research results, heritage assessment of Yalwal, drafting of conservation policy guidelines and making of recommendations for site interpretation and visitation, together with some additional considerations arising out of these recommendations. Each of these components of the task are dealt with in further detail below.

1.3.1 Research Methodology

The research methodology embraced a wide variety of tasks, including:

- examination of existing published material and reports on Yalwal;
- checking for existing heritage listings and planning controls at all levels of government;
- the finding, gathering and study of documentary evidence, including map and pictorial material. The documentary evidence consisted of a wide range of sources located in Sydney, Canberra and Nowra. These included:
    - extracts relating to Yalwal in every annual report of the Department of Mines from their commencement in 1875 through to 1967. These reports were examined and relevant parts copied at the Department of Mineral Resources, Sydney, and at the Australian Geological Survey Office, Canberra.
    - additional mining reports and maps at the Department of Mineral Resources, Sydney;
    - Yalwal Post Office records at the Sydney office of the National Archives of Australia (formerly Australian Archives);
    - Yalwal school records at the Archives Office of NSW, Sydney;
    - documents and photographs held by Shoalhaven Historical Society, Nowra;
    - census records 1891-1931 at the Australian National University, Canberra; and
    - contemporary newspaper reports, maps, photographs and other documentary material at the National Library of Australia, Canberra.
- interviews with people who were knowledgable about Yalwal and its history;
- a series of field surveys to examine the mine workings, remnant equipment and other items of possible heritage value. The extensiveness and complexity of the study area required eight separate field trips to reconcile the documentary evidence with the physical

remains at Yalwal. Barry McGowan carried out six field trips, while Brendan O'Keefe undertook two.

1.3.2 Write-up and Analysis

The results from the research were written up and analysed to provide a context for assessing Yalwal's heritage significance, drawing up conservation guidelines and setting out recommendations for site interpretation and visitation.

The evidence from all of the various sources - documents, maps, photographs, oral testimony and field trips - was used to carry out an historical analysis of Yalwal from the time that gold-bearing ore was first discovered in the area until the closure of the mining era at Yalwal well over a century later. This analysis, which takes the form of a detailed history that runs to approximately 18,700 words, comprises Section 3 of the report.

The documentary, map, photograph and oral evidence was also used in conjunction with the results of the field trips to accurately locate and identify all relevant sites at Yalwal and to understand their functions and relationships. This work led to the compilation of a site inventory which describes one-by-one and in detail each mining site still extant at Yalwal. The inventory appears as Section 4.1 of this report. To accompany the inventory, a series of maps have been drawn on which the physical remains of mining activity are accurately and comprehensively marked. These maps constitute Section 4.2 of the report.

1.3.3 Methodology for Heritage Assessment

The heritage assessment of Yalwal has been carried out in accordance with the criteria developed and used by the Australian Heritage Commission for assessing places for entry in the Register of the National Estate [RNE]. A full copy of these assessment criteria is attached as Appendix 1 of this report. Assessing Yalwal against these criteria, the consultants have elaborated a formal Statement of Significance for Yalwal which appears at Section 5.2.

If Shoalhaven City were interested, this Statement of Significance could be readily used as the basis for formally nominating Yalwal to the RNE. Should the nomination be successful, it would enable the Council to apply for funding under the National Estate Grants Program [NEGP] to carry out conservation and heritage interpretation works at Yalwal.

1.3.4 Methodology for Conservation Policy

The methodology used to develop conservation policies for protecting the heritage values of Yalwal is based both on the Guidelines set out by Australia ICOMOS in the Charter for the Conservation of Places of Cultural Significance ('the Burra Charter') and on James Semple Kerr's *The Conservation Plan* (J.S. Kerr/National Trust of Australia, 3rd edition, 1996). Australia ICOMOS is the Australian branch of the International Council on Monuments and Sites, an international organisation which is linked to UNESCO.

A copy of the 29 principles of the Burra Charter is attached as Appendix 2 to this report.

1.3.5 Methodology for Site Visitation Recommendations

In developing their recommendations for interpreting Yalwal and making it accessible for visitors, the consultants first had regard for the conservation policies they enunciate in this report. The conservation policies aim to preserve Yalwal's heritage values and thus take precedence over any activities, including public visitation, that might degrade those values.

With these policies in mind, the consultants examined the various heritage sites at Yalwal, the means of accessing them and the terrain in general. As a result of this examination, proposals have been formulated for the establishment of heritage walks that visitors may follow as self-guided tours in order to inspect the main sites. Examination and consideration of the sites have also led the consultants to make specific suggestions for site interpretation. The recommendations for heritage walks and site interpretation form Section 7 of the report.

In forming their recommendations on site interpretation and visitation, the consultants were mindful of the safety issues involved in allowing members of the public to view old mine workings. While these issues have been taken into account, the consultants well recognise that they do not have the necessary expertise to assess the risks properly. It is felt that these could only be assessed adequately by a geologist, a mining engineer and a fully qualified risk management assessor.

1.4 Study Team

The study team consisted of Barry McGowan and Brendan O'Keefe.

1.5 Acknowledgements

The consultants wish to thank the following people for their assistance during the study:

Al Bashford, Department of Mineral Resources, Sydney

John Berry, Shoalhaven Historical Society

Gareth Evans

Russ Evans

John Fletcher

Robyn Florance, President, Shoalhaven Historical Society

Professor Ian Jack, Department of Geography, University of Sydney

Bill Tomkinson, Planning/Development Manager, Shoalhaven City Council

Gary Usher

2. RELEVANT PLANNING CONTROLS

2.1 Local

The land at Yalwal is zoned under Shoalhaven City Council's Local Environment Plan [LEP] as Rural 1(a). This zoning permits a wide range of activities and makes no provision for the protection of places identified as having heritage significance.

Under a new draft Rural LEP, Shoalhaven Council is proposing to zone the land as Rural 7(c), making Yalwal a protected water catchment area. While this may incidentally provide some small measure of protection to features and structures of heritage value at Yalwal, it would prohibit camping, the establishment of a caravan park and the provision of other tourist facilities. As such, the zoning would limit visitation and interpretation of Yalwal's heritage items. It is believed, however, that Council is intending to amend the draft LEP to allow tourist development that does not conflict with requirements for water catchment protection.

Yalwal was identified as a place of cultural heritage significance in the 1995 'City of Shoalhaven Heritage Study'. This identification would point to the need for the protection of Yalwal's heritage significance by way of its inclusion as a specific item in the LEP. Although Council appears to be in favour of such a move, it has yet to take place.

2.2 Regional

The Illawarra Regional Plan No. 1 contains a provision under Section 124 (a) and (b) for protecting 'items of the environmental heritage' of the region. While Yalwal would clearly qualify as such a heritage item, to date it has not been included as a specific heritage place in the Regional Plan.

2.3 State

Section 130 of the NSW *Heritage Act* 1977 gives the Minister for Urban Affairs and Planning - or a local council under his delegated authority - the power to make an order preventing harm to buildings, works, relics and places which are not subject to any state or local government planning instruments. If there were any threat to Yalwal's heritage values, an order to provide protection could be made under this Section of the Act.

Similarly, Section 136 of the Act allows the Minister or the Chairman of the Heritage Council to make an order affecting any item of environmental heritage that 'is being or is about to be harmed.' Orders issued under this Section of the Act, however, only remain in force for 40 days.

The *Environmental Planning and Assessment Act* 1979 might also afford some protection to Yalwal if a proposed development threatened its heritage values. Section 90 of this Act would require Shoalhaven Council as the consent authority for development applications to consider the development's environmental impact on Yalwal and its effect on landscape and scenic quality in the area. The Act's relevance to the European built heritage of Yalwal, however, is much reduced by the fact that Section 90 is concerned with the natural environment, including native flora and fauna species, rather than with the built environment.

2.4 Commonwealth

Yalwal is not entered in the Register of the National Estate [RNE] and is not subject to any other Commonwealth planning controls on the basis of its heritage values. Listing of Yalwal on the RNE would only provide a measure of protection in the seemingly unlikely event that the Commonwealth gained control of the land and made plans to use it in such a way as to threaten its heritage values. In Yalwal's case, listing on the RNE may only help to protect Yalwal by dint of the prestige associated with its inclusion in the National Register.

3. HISTORICAL ANALYSIS

3.1 History of Yalwal

3.1.1 Exploration and Early Settlement, 1805-1865

Europeans took their first steps towards penetrating the country around Yalwal when Lieutenant Bartholomew Kent and surveyor James Meehan left Sydney on the cutter *Anne* in January 1805 to explore the Shoals Haven, as the Shoalhaven River was then known. After arriving at the mouth of the river, they set out on an overland survey on 11 February 1805, making their way upstream for a distance of about 26 miles. They reached a point about half a mile east of the later site of the village of Burrier before they headed back down the river. In spite of the explorers' exertions, there was no immediate practical sequel to this journey and it seems in fact to have been all but forgotten in the ensuing years. Almost another seven years were to pass before the crew of the vessel *Speedwell* became the next group of Europeans to visit the Shoalhaven, the crew sailing some 15-20 miles up the river in December 1811 in quest of cedar. So little was known about the river and of the earlier exploration by Kent and Meehan that the *Speedwell*'s crew returned from their enterprise mistakenly believing that they had discovered a new river. The Shoalhaven was the scene of at least three further cedar-getting expeditions in the years 1813-15, the last of these ending in the deaths of three cedar-getters at the hands of local Aborigines. In the wake of this incident, Governor Macquarie prohibited any more cedar-getters from visiting the area unless they obtained a special licence from the government.[1]

Another group of European explorers visited the Shoalhaven in the first half of 1818. In March of that year, a party including Meehan, Charles Throsby and Hamilton Hume set out from Sydney in an attempt to find an overland route to Jervis Bay. After encountering major obstacles in the shape of the rugged Shoalhaven gorges, the group split up, Throsby's party proceeding to Kangaroo Valley and then to the Shoalhaven, which they crossed at the beginning of April near the site of Burrier. Throsby's party recrossed the river, probably at the same place, on their return journey from Jervis Bay. In company with John Oxley, Meehan re-visited the area in 1819, while Throsby repeated his earlier journey to Jervis Bay in 1821. In January 1822, Alexander Berry, Hamilton Hume and Lieutenant Robert Johnston sailed up the river as far as the site of Burrier in the vessel *Snapper*, Berry using the trip to scout the area for a potential settlement. Later in the year, he and his partner, Edward Wollstonecraft, received a grant of land near the mouth of the Shoalhaven at which they set about establishing the famous Coolangatta property.[2]

Although other settlers soon followed Berry and Wollstonecraft to the Shoalhaven, the ruggedness and inaccessibility of the country further upstream discouraged European penetration and occupation for more than a decade. It was only in the early-to-mid 1830s that surveyors began to explore and map the narrow valleys of Yalwal Creek and its tributaries. In 1833, the surveyor Francis Rusden surveyed and charted the Ettrema region north of Pigeon House, and it is highly likely that Yalwal and Danjera Creeks were surveyed in this period, too. Certainly, an 1837 map of NSW by surveyor Robert Dixon depicts the two watercourses in some detail, indicating that they had been examined and surveyed by this time. A map of

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[1] A.K. Weatherburn, 'Exploration of Jervis Bay, Shoalhaven and Illawarra districts, 1797-1812', *Journal of the Royal Australian Historical Society* [hereafter *JRAHS*], vol. 46, pt. 2, June 1960, pp. 84-9; William A. Bayley, *Shoalhaven: History of the Shire of Shoalhaven New South Wales*, Nowra, Shoalhaven City Council, 1975, pp. 18, 19.

[2] Bayley, pp. 22-3; John Griffith, *A History of Kangaroo Valley Australia*, Kangaroo Valley, Kangaroo Valley Historical Society, 3rd edition, 1986, pp. 12-14.

the County of St Vincent dating from 1843-46 and published in William Baker's *Australian County Atlas* [see Historic Map No. 1] appears to be based on Dixon's 1837 map and, significantly, reveals that no grants or purchases of land had been made in the district up to that time (1837). From this point onward, however, grants of land began to be made along the Shoalhaven River north and northwest of the future mining settlement of Yalwal. Thus, in 1841, Dr Kenneth McKenzie acquired a property called Yalwal Station which seems to have been located on Yalwal Creek at or near its junction with the Shoalhaven.[3]

As will be seen below, the country bordering Danjera Creek became better known to Europeans as a direct result of the appointment in 1840 of A.K. Mackay as Commissioner for Crown Lands for the County of St Vincent. From this time forward, Mackay began to acquire, as he later put it, an 'intimate knowledge' of Danjera Creek and its environs. Up until at least the mid-1850s, however, there was still no settlement of the area. But around this time, William Elyard junior, who was then Chief Clerk in the Colonial Secretary's Office, acquired property totalling some 296 acres in the area and established a pastoral run on his land. Elyard, the eldest son of the late Royal Navy surgeon, Dr William Elyard, was already a large property-owner in the Shoalhaven area, having received a grant of 1,516 acres at Brundee east of Nowra in April 1841. The head station of his new run was named Toorooroo and consisted of a 40-acre block on the northern side of the junction of Yarramunmun and Yalwal Creeks; the remainder of his land stretched away southward, occupying the area between Danjera and Jinkbilly Creeks. To operate his run, Elyard employed a number of stockmen who thus became the first permanent residents of the area around Danjera Creek. Among these was David Fletcher who, with his brother Edward, later purchased land in the area himself; the Fletcher family remain landowners at Yalwal to this day. William Elyard junior died in March 1865 and, having no family, left his Yalwal properties to his surviving brothers, Alfred and Samuel, and his neice, Clara Jane. With the exception of Toorooroo, these remained in the Elyard family for many years. By April 1936, Toorooroo was owned by James Thompson.[4]

3.1.2 Early Prospecting and Mining, 1849-1878

The initial discovery that precious minerals existed in the country around Yalwal took place as early as 1849 when galena bearing quantities of silver was found in Talwal Creek, a tributary of the Yalwal. In June 1849, a sample of the galena was assayed in Sydney and, while it turned out to contain a high percentage of silver, the analyst thought it unlikely that the lode would prove payable. This negative assessment of Yalwal's mineral potential was sufficient to discourage any further prospecting of the area for some years, though as it was there was little government or private interest in searching out and exploiting deposits of precious metals in New South Wales in this period. The situation began to change with great rapidity following the discovery of gold in February 1851 by Edward Hargraves and John

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[3] Robert Snedden, Sassafras: Parish of Sixty Farms, Duffy (ACT), R.C. Snedden, 1995, p. 19; Robert Dixon, Map of NSW, July 1837, National Library of Australia [NLA] Map RM 831; Map of the County of St Vincent compiled for W. Baker, 1843-6, NLA Map G8971.S3 BAK; Bayley, p. 29.

[4] Bayley, pp. 30, 127, 140; letter, A.K. Mackay to J.R. Hardy, 6 March 1852, quoted in Rev W.B. Clarke, *Researches in the Southern Gold Fields of New South Wales*, Sydney, Reading and Wellbank, 1860, pp. 39-40; M. Saclier, article on William and Samuel Elyard, *Australian Dictionary of Biography* [hereafter *ADB*], vol. 4, pp. 139-40; Brian K. Burton, 'Exploration' in Hugh K. Gubb (ed.), *Living Echoes: A History of the Shoalhaven*, Nowra, Shoalhaven City Council, 1996, p. 31; David Glasson, *Yalwal Gold*, Ballina, 1987, p. 2; Map: Parish Buangla, Co. St Vincent, 7 Apr 1936, NLA.

Lister at what became the Ophir goldfield northwest of Bathurst. The discovery aroused intense interest in deposits of precious metals and led to the gold rushes in NSW and the recently-established colony of Victoria.[5]

In March 1852, just a year after the momentous discovery by Hargraves and Lister, Mackay, the Commissioner for Crown Lands for the County of St Vincent, reported to the Chief Gold Commissioner of NSW that gold and platinum had recently been discovered at several locations along Yalwal Creek and its tributaries. Through his twelve years' acquaintance with the area and his study of the geology of the Turon goldfields, Mackay had earlier come to the considered view that the propects for discovering gold at Yalwal were good. Thus, from about September 1851, he had started urging various settlers on the Shoalhaven to search for gold at Yalwal, even offering to show them where he thought the best prospects lay. Eventually, in February 1852, he succeeded in persuading a man with experience of the Turon to accompany him to Yalwal to check the area for himself. The man was profoundly impressed with the resemblance to the Turon ranges and his favourable opinion, coupled with Mackay's exhortations, provoked the immediate formation of two separate prospecting parties made up of Shoalhaven residents. The parties spent two days prospecting the area and, as Mackay had predicted, they discovered gold and also platinum.[6]

Mackay's views received some support from no less an authority than the leading geologist in NSW, the Reverend William B. Clarke. By 1852, Clarke had undertaken several geological excursions to the Shoalhaven, but had never gone to Yalwal because 'the auriferous indications were not of such striking characters as to induce me to change my route.' However, in 1856 he reported, probably on the basis of Mackay's work, that Yalwal was a gold-bearing area. Clarke's assessment immediately prompted John McLaren and several other Shoalhaven farmers to search Yalwal for gold, their efforts turning up alluvial gold in payable quantities. Clarke returned to the Shoalhaven in 1860, but again refrained from visiting Yalwal. Later in this year, he carried out an examination of extensive collections of rock samples from the Yalwal area which had been sent to him by a man named Henry Moss who, Clarke said, was conducting a survey of the district. From his study of these samples and his general knowledge of the Shoalhaven country, Clarke, with considerable perspicacity, concluded:

> I do not doubt, therefore, that there is some gold to be yet found in the ravines, and all along the broken country between the mouth of Yalwal Creek and the head of the Mongarlow River, and also along the Clyde; but it occurs in iron pyrites mechanically united, and in thin quartz veins, which will require the processes of science for the extraction of the metal.

Clarke predicted that 'the ferruginous *schists*, and quartzose rocks of ... Yalwal ... will not be found very rich in gold' and that 'alluvial gold can only be expected in small quantity.' These disparaging sentiments, when coupled with the rugged and inaccessible nature of the country, acted to deter further prospecting at Yalwal for some fourteen years after the brief foray made by McLaren and his colleagues in 1856.[7]

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[5] Clarke, *Researches in the Southern Gold Fields*, p. 45.
[6] Letter, Mackay to Hardy, 6 March 1852, in Clarke, *Researches in the Southern Gold Fields*, pp. 39-40.
[7] *Town and Country Journal* [hereafter *T&CJ*], 9 November 1889, p. 24; Clarke, *Researches in the Southern Gold Fields*, pp. 40-1, 43, 44.

The first attempt to develop whatever potential Yalwal may have had as a goldfield occurred in the early months of 1870 when a prospecting party comprising John Henry Sivewright, J. Brakewell and S. Donovan found alluvial gold in Danjera Creek. Erecting 350 feet of sluice boxes along the creek immediately above its confluence with the Yarramunmun, the men were able to obtain 1.5 to 2 ounces of gold per week. But the venture did not last long as flood waters washed away the sluice boxes the following year. Sivewright and a partner named Edward Curtis then worked their way up the creek, looking for the source of the alluvial gold they had found. In that same year, 1871, they discovered a gold-bearing outcrop on the summit of a bluff rising some 150 feet above the creek on its western side. The outcrop would soon become the site of the first formal claim on the field, the Pinnacle or No. 1 Claim. For the present, however, Sivewright and Curtis's hopes of a profitable discovery were dashed when an assay carried out on a sample of surface rock they sent to T.S. Mort's Company in Sydney yielded a disappointing result of only 7 pennyweights of gold (0.35 ounces) to the ton. Discouraged, Sivewright and his partner ceased work on the outcrop for several months. In similar fashion, a find of alluvial gold in Sawpit Gully in the same year was not pursued because the discoverers considered the metal did not exist there in payable quantities.[8]

By May 1872 at the latest, Sivewright had returned to the Pinnacle to try his luck again. He and his men carted stone from the summit of the bluff down to the creek where, with the aid of crowbars, they broke up the rock in nail cans they used as dollypots. By such crude and arduous methods, they were able to obtain 118 ounces of gold over the period May-September 1872. On the strength of these results, Sivewright purchased a Beer's one-stamper spring machine to help crush the stone. From November 1872 to March 1873, he and his men crushed 80 tons of ore, from which they secured 120 ounces of gold. Some of the surface stone that Sivewright's team crushed in this period produced yields as high as 23.5 ounces of gold to the ton, results no doubt that spurred the miners to persevere with their labours.[9]

Though hard-won, the success achieved by Sivewright and his men prompted others to search for reef gold in the Yalwal area. During 1872, two prospectors named E. Aldis and J. Caddle discovered gold in surface stone on what would become the Pioneer claim on the eastern side of Danjera Creek. Because the gold was too fine to be saved by the rudimentary techniques they employed, Aldis and Caddle soon abandoned their attempt to work the stone. By February 1873, however, various parties had taken out mining leases to a total of 69 acres in the Yalwal area. Among the lessees were a syndicate consisting of Robert Taylor Thorburn, his uncle, R. McGregor, and two colleagues, Kenneth McKenzie and John Faulks, who pegged out the Homeward Bound claim immediately west of the Pioneer site. As with the Pinnacle, the initial results here proved disappointing. Within a few months, in fact, Thorburn sold his share of the venture for the sum of only five pounds to two experienced Tasmanian miners, Michael Harvey and James West, and another, Joseph Colombo. The entry of the Tasmanians into the field was to have a significant impact on its development.[10]

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[8] E.C. Andrews, 'History of the development of mining at Yalwal', *Mineral Resources No. 9*, 1901, pp. 7-8.
[9] Andrews, pp. 7, 32; *Annual Report of the Department of Mines*, 1883, p. 159. These reports are hereafter cited as *Annual Report*, with date.
[10] *Shoalhaven News*, 15 February 1873, p. 2; *T&CJ*, 9 November 1889, p. 24; Andrews, p. 8.

From the outset, the productivity of the Yalwal field was hampered by a number of interrelated factors, including a slowness to understand the character of the local ore-bearing body, Yalwal's inaccessibility, insufficient development capital and a lack of mining expertise. It became clear at a very early stage that the quality of the Yalwal ore-bearing stone was quite variable, crushings giving widely differing yields of gold from the same lease. Thus, in contrast to the good results he obtained in 1872-3, Sivewright retrieved only 120 ounces of gold from 220 tons of stone he crushed during the year 1874. While this was still a payable yield, it was not the kind of result that he would have hoped for. Such variability derived from the way in which the gold was distributed in the local rock, but it was to be many years before the Yalwal miners fully understood this and appreciated its implications.[11]

Development of the field was also retarded by the difficulty of access to Yalwal, which depended on negotiation of the bush track from Burrier. Even for someone on horseback, this was an extremely rough track and, in the words of a newspaper correspondent in mid-1873:

> The ride to Yalwal is anything but a pleasant one, over sandstone ridges and along sidelings, over rotten patches of ground where a horse may at any time be bogged without a moment's notice to the rider. At last the Gap is reached, a cleft in the sandstone Mount, and to reach the valley a precipitous hill has to be descended ...[12]

The descent from the Gap into Yalwal was so steep that teamsters bringing bullock wagons into the valley were forced at one section to lower the wagons down on ropes. As this affected the diggings, it made it almost impossible to bring in proper machinery to crush the ore efficiently. Early on, Sivewright purchased a three-head stamper battery to supplement his single-stamper Beer spring machine, but the new stamper seems to have lasted little time, while the Beer stamper was soon reported to be 'constantly out of order.' In April 1874, one of the Yalwal mining parties was negotiating to buy the now-idle plant of the Fernbank Quartz Crushing Company and transport it to Yalwal. It was to be some time, however, before anything came of this proposal.[13]

While the track to Yalwal made it difficult to bring in suitable machinery, the mining parties operating in the area in the early days were so under-capitalised that they could not afford in any case to purchase proper equipment and transport it into the valley. This shortage of capital was a direct consequence of the character of the field in its early years. Typically, the leaseholders were local Shoalhaven residents, most of them farmers. For them, mining was a secondary activity to be undertaken as they wished or were able. Some of them, moreover, were probably indulging in the practice of 'shepherding', which involved taking out a mining lease on a piece of ground, but not working the lease until the quality of the field became clear from the efforts of other mining parties. By this method, the leaseholders did not have to commit capital or, indeed, even raise any until they were assured that their investment would produce a return. The development of Yalwal seems to have been particularly afflicted by this practice up until the late 1870s. The most notable instance of the failure to do anything but a token amount of work on a lease occurred with the Pioneer claim,

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[11] Andrews, p. 32;
[12] *Shoalhaven News*, 14 June 1873, p. 3.
[13] *T&CJ*, 3 May 1879, p. 856; Andrews, p. 8; *Annual Report*, 1875, p. 87; Barry McGowan, *Bungonia to Braidwood: An Historical and Archaeological Account of the Shoalhaven and Mongarlowe Goldfields*, Canberra, the author, 1996, p. 274.

knowledgeable observers repeatedly complaining during the 1870s that the farmers who held the lease would never develop it properly as a mine.[14]

The lack of capital on the field even extended to those leaseholders and other workers who did work the leases during this period. As one report noted, the workers at Yalwal had, from the beginning, 'tried to get along without forming companies.' Consequently, mining operations were small-scale, poorly financed and rather inefficient. One possible reason for the disinclination to form companies was that the men may have preferred the greater independence of working on their own account or in small local syndicates. In any case, despite of the lack of capital, substandard equipment and variable quality of the stone, the men were able to make good steady wages. This, as the *Annual Report of the Department of Mines* for 1875 pointed out, was why they had remained at Yalwal continuously for three years. The steadiness of the income, moreover, probably provided little incentive for the men to form companies, raise capital or procure better equipment, no matter how laborious and inefficient their work practices.[15]

The fact that miners had been able to make a living at Yalwal for three years was also, as the 1875 *Report* further observed, 'proof that the gold [was] there.' This was sufficient encouragement for others to enter the field at Yalwal. In 1876, despite the fact that eighteen leases were forfeited in that year, Harvey and West opened what appeared to be a promising new reef on the Homeward Bound. At the same time, work neared completion on a water-powered ten-stamp battery on Danjera Creek. The battery was connected to a waterwheel driven by water which was released from a dam along a race 350 feet long. It was built by Sivewright both for his own use and as a public crusher to be hired as needed by other mining parties in the area. Unfortunately, when it was completed, the battery proved to be inefficient because there was rarely enough water in Danjera Creek to power the waterwheel. Sivewright promptly bought a five-stamper battery. With this, he crushed 57 tons of stone during 1877 for a yield of 59.75 ounces of gold. For their part, Harvey and West crushed seventeen tons from their new workings during the year to secure a handsome return of 28 ounces.[16]

The year 1877 also saw the commencement of work on the lease adjoining the Pinnacle No. 1. Originally known as the Pinnacle No. 2, the lease was soon re-titled the Eclipse and was worked for its first year under a tribute arrangement. During 1877, Reuben Mison erected a five-head stamper on the site and undertook the first crushing from the Eclipse, comprising twenty tons of stone, for the satisfactory result of eighteen ounces of gold. Thereupon, Sivewright, who was dissatisfied with his own battery, hired Mison's plant to crush a further 60 tons from the Pinnacle, the crushing yielding 62 ounces. In the first half of 1878, Mison put an additional parcel of ten tons from the Eclipse through his crusher for a yield of 7.5 ounces. The productivity from the Eclipse (and other leases) then faltered for a time because Mison's battery, which was an old piece of machinery, repeatedly broke down. However, a solution to the continual problems the field had suffered with machinery seemed to be in the offing when James MacArthur formed the Danjera Crushing Company and commenced

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[14] *Annual Report*, 1875, p. 87; *Annual Report*, 1876, p. 99; Barry McGowan, *Lost Mines: Historic Mining Sites in the Monaro-Southern Tablelands Districts of New South Wales*, Canberra, the author, 1994, p. 7; *T&CJ*, 19 April 1879, p. 759; *T&CJ*, 3 May 1879, p. 856; *T&CJ*, 10 May 1879, p. 903.

[15] *Annual Report*, 1879, p. 122; *Annual Report*, 1875, p. 87.

[16] *Annual Report*, 1876, p. 99; *Annual Report*, 1877, p. 130; *T&CJ*, 5 July 1878, p. 13.

erection on the creek of a steam-powered battery of ten 500-pound stamps, part of the former Fernbank battery, which he intended to hire out for public crushing purposes. An abundance of timber in the Yalwal area ensured that MacArthur's battery would have ample supplies of fuel to power it.[17]

Notwithstanding the difficulties with machinery, the main Yalwal leases had by early 1878 given consistent returns for almost six years. The valley's future as a gold-mining centre seemed assured and, on 12 March 1878, Yalwal was officially proclaimed a Gold Field. In July, it was reported that a store, the first at Yalwal, was being built and that a gold escort would soon be introduced to protect gold shipped from the field from the attentions of bushrangers and other malefactors. At that time, some 45 to 50 men were working on the field. Lacking proper habitations, the men were living in slab huts with bark roofs; few of them had their families with them. In an attempt to improve communications and help break down the place's isolation, 73 people signed a petition to the Postmaster-General in October 1878 requesting the establishment of a post office. The request, however, was refused because many of the petitioners were actually residents of Burrier or even Nowra and would therefore not benefit from the asked-for service; in fact, the Postal Inspector for the area estimated that it would only serve 25 people. Despite this setback and the hardships in general, the infant settlement was said in mid-1878 to be 'very orderly and well conducted', a state of affairs that one correspondent seemed to think was attributable in part to the lack of any pubs at Yalwal.[18]

3.1.3 From Reefing to Quarrying, 1878-1881

The bright prospects that appeared in store for Yalwal in mid-1878 were borne out by events in the months and years immediately succeeding. More leases were worked, more and better equipment was brought to the valley and, most importantly, the productivity of the goldfield increased. MacArthur's battery was up and running by the end of the year, though some of the leaseholders, notably the Homeward Bound, baulked at paying his high charge of fifteen shillings per ton to crush ore. Some resorted to the older waterwheel battery, now in the hands of Francon Noble, whose charges were much lower. At the same time, various mining parties were at work on six main leases at Yalwal. Sivewright's former partner, Curtis, and Edward Fletcher had discovered gold north of the Eclipse and had commenced mining operations on what they called the Poor Man's claim. Their first crushing of 40 tons from the claim produced nearly an ounce of gold to the ton and, by April 1879, they believed they were onto even better stone. On the other side of the creek, a party made up of local farmers headed by William Kennedy started working the Pioneer claim, their first crushing of 107 tons yielding just over one ounce to the ton. While a second crushing of 100 tons before the end of 1878 produced just under half an ounce to the ton, the partners overall achieved a result of 0.75 ounces of gold per ton for their troubles. Not quite so fortunate was a party that

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[17] *Annual Report*, 1877, p. 130; *T&CJ*, 5 July 1878, p. 13.

[18] Map of Yalwal, 9 February 1893, in Yalwal School file, Archives Office of NSW [hereafter AONSW] item 5/18232.1; *T&CJ*, 5 July 1878, p. 13; *T&CJ*, 16 December 1882, p. 1179 (refers to the men still living in slab huts at this time); petition to the Postmaster-General, 31 October 1878, and report by Postal Inspector T. Moyse, 7 January 1879, in Commonwealth Record Series [hereafter CRS] C3629/2, item Yalwal Post Office [history file], Australian Archives, NSW office [hereafter AA NSW].

mined lease No. 13, which was later known as the Fountain Head. They put some 70 tons through MacArthur's battery for an almost worthless result.[19]

The most important developments on the field occurred with the Eclipse, Pinnacle and Homeward Bound claims. At the Eclipse, the miners began driving a tunnel in search of the vein of gold, but the productivity of the mine was still hampered by the inefficiency of Mison's old five-head stamper. In the first half of 1879, the mine operators replaced Mison's stamper with a more powerful battery consisting of ten 400-lb heads. Later in the year, the tribute system under which the mine had operated came to an end and the Eclipse Mining Company, a Nowra syndicate headed by John Maclean, took over the running of the mine. Next door, at the Pinnacle, Sivewright crushed 646 tons during 1878 for a return of 674 ounces but, like his neighbours, was handicapped by the lack of power in the five-head stamper he had bought the year before. He consequently purchased a heavy fifteen-stamp battery which, when it was eventually put into service in 1880, was powered by the 20-horsepower engine that had been used to drive the machinery at the recent International Exhibition in Sydney. Pending the arrival of his new battery, Sivewright struggled on with his old five-stamper, but also used his time well to construct a 280-foot long tramway that curved around the face of the bluff from his workings to the battery site. The funds to purchase the new equipment and carry out the other development works were probably provided by a board of shareholding directors in Sydney who now managed the mine under the title of the Yalwal Quartz Mining Company, though Sivewright remained as the on-site manager at Yalwal. Of greater significance to the Pinnacle and to all other mining ventures in the area, however, was the fact that Sivewright and his colleagues decided around this time to discontinue working from shafts and tunnels and 'to make a face of the whole mine.'[20]

When miners first turned from alluvial to reef mining enterprises at Yalwal, they were of course intent on driving shafts and tunnels to find gold-bearing reefs. But after some years, they came to appreciate that there was something odd about the gold-bearing deposits in the area. As one newspaper correspondent put it: 'What puzzles old and experienced miners is that the stone shows so little on examination and yet yields such good results, thereby clearly proving that the gold is very generally distributed.' This was close to the truth. There were, in fact, no clearly defined reefs at Yalwal; the gold existed in a finely distributed form of varying concentrations throughout the local rocks. In the event, the Yalwal miners were relatively slow to comprehend - and exploit - this peculiarity of the local ore body. This was probably due in part to the fact that, with many of the mining leases in the hands of local farmers, the field suffered from a dearth of mining skill and experience. It was not surprising therefore that the parties who hit upon the best way of conducting mining operations in the area were the most experienced operators on the field, Sivewright and especially Harvey and West of the Homeward Bound, though even they do not seem to have understood fully the nature of the deposits they were dealing with. Nevertheless, once hit upon, the new method of mining marked the way ahead for Yalwal.[21]

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[19] *T&CJ*, 28 June 1879, p. 1239; Andrews, p. 8; *T&CJ*, 19 April 1879, p. 759; *T&CJ*, 3 May 1879, p. 856; *T&CJ*, 10 May 1879, p. 903;

[20] *Annual Report*, 1878, pp. 114-5; *T&CJ*, 16 December 1882, p. 1179; *T&CJ*, 19 April 1879, p. 759; *Annual Report*, 1879, p. 122; Andrews, pp. 8, 34; *Annual Report*, 1880, pp. 124-5.

[21] *T&CJ*, 5 July 1878, p. 13; *Annual Report*, 1880, p. 125; *Annual Report*, 1883, p. 159.

Like other mining parties at Yalwal, Harvey and West had originally driven tunnels in an effort to locate the veins of gold. But by 1878, they had turned to working their claim as a quarry, opened to the top of the hill, because of what they imagined was the large size of the reef they had found. Using this straightforward technique, they crushed a substantial amount of stone for an average of about half to three-quarters of gold to the ton. They then sank a shaft nearby and extracted 107 tons of stone which, when put through the crusher in April-May 1879, yielded 347 ounces of gold. In the words of a contemporary report: 'This was the largest cake of gold that ever left this field', and it made the Homeward Bound for a time the premier claim on the field. Such a marvelous return provoked a number of changes. Thorburn, who had earlier sold his share of the mine for five pounds, now regretted his decision and, with John Faulks junior, bought back half the mine for one hundred pounds. With handsome profits continuing to flow from the mine, James West decided in 1880 to return to Tasmania, evidently well pleased with the rewards of his labours. At the same time, Thorburn and Faulks were compelled by other business or family matters to leave the mine for a while, and Michael Harvey, West's partner, was keen to try other parts of the Yalwal field. Harvey thus leased his and West's half of the Homeward Bound to a Sydney syndicate in return for their financing and carrying out development works. After spending 800 to 1,000 pounds on developing the mine, the Sydney syndicate abandoned it within a year. Harvey, Thorburn and Faulks resumed operation of the mine in 1881, but Harvey soon left for the newly-opened Temora goldfield, selling his and West's share of the Homeward Bound to Reuben and Ephraim Mison for fifty pounds.[22]

The good returns from the field prompted the opening of other mines at Yalwal. During 1879, the two Keiller brothers started work on a claim somewhere east of the Homeward Bound (possibly on the claim known later as the Robert Bruce) and achieved results of 0.75 ounces per ton from their first crushing of stone. According to the 1879 *Annual Report of the Department of Mines*, work also proceeded on another lease west of the Pinnacle, a 60 foot tunnel being driven into the rock. This may have been the mine later known as the Victory which was southwest of the Pinnacle on the other side of the creek; it was possibly run by Joseph Colombo, a former partner in the Homeward Bound. In 1880, work commenced on the Star lease directly south of the Homeward Bound and, by year's end, a tunnel only 35 feet above water level had been driven about 160 feet into the hill. Not surprisingly, the tunnel was wet and most unpleasant for the miners to work in. Another small lease called the Last Chance was worked in a minor way near the Homeward Bound, while the Golden Crown was also in operation, with average yields of 0.55 ounces of gold per ton from small crushings of stone taken from a shaft and drive.[23]

The continuing success of the field also contributed to the introduction of some services and facilities for the mining settlement. Some improvements were made to the road and, after the initial petition for a post office at Yalwal was rejected by the Postmaster-General, further agitation by the residents led to the institution of a postal service and postal receiving office on 1 September 1880. Edward Fletcher won the contract to convey the mails between Burrier and Yalwal, while Sivewright's wife, Caroline, was appointed the Postal Receiving Officer. Meanwhile, as early as May the previous year, the residents of Yalwal had begun to consider applying for the establishment of school. Although few children were actually residing at

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[22] *Annual Report*, 1878, pp. 114-5; *T&CJ*, 10 May 1879, p. 903; *T&CJ*, 24 May 1879, p. 999; *T&CJ*, 9 November 1889, p. 24; *Annual Report*, 1880, pp. 124-5.
[23] *Annual Report*, 1879, p. 122; *Annual Report*, 1880, pp. 124-5.

Yalwal at that time, a number of the men working there had large families and were willing to bring them to Yalwal if a school were set up. At length, on 6 July 1880, a group of 29 residents petitioned the Minister for Public Instruction (*i.e.*, Education) for the establishment of a school. Another petition signed by 34 residents, almost all of them the same people as before, was sent to the Minister on 17 September and yet a third petition was forwarded on 10 December. For use as a schoolhouse, a local miner, Thomas Galbraith, offered the Department of Public Instruction his own dwelling, a structure measuring thirty by twelve feet and comprising 'a new bark house lined with canvass, floor boarded, [with] a good fire place, and two glass windows'; the building included a small bedroom partitioned off for the teacher. In the new year, the Department approved the establishment of a Provisional School in the building after the local residents had banded together to purchase it from Galbraith. It was estimated that the school would have an enrolment of 26 pupils, made up of fifteen boys and eleven girls. The school duly opened on 11 July 1881, with 19-year-old Joseph Watts from Mittagong as teacher; it was his first appointment. Described by a Departmental inspector as 'of sound but rather weak constitution', Watts did not appear an especially suitable choice to withstand the rigours of life at Yalwal.[24]

During 1880-1, the main Yalwal leases continued to generate good returns. At the Pinnacle, Sivewright and his Yalwal Quartz Mining Company crushed 280 tons of stone for a yield of 670 ounces of gold in 1880. In the same year, Maclean's Eclipse produced 574 ounces from 376 tons crushed, while the Pioneer crushed 563 tons for a return of nearly an ounce per ton. Returns for the Pioneer and Pinnacle declined in the following year. The Pioneer retrieved only 0.5 ounces per ton from 315 tons of stone, and the Pinnacle got a mere 280 ounces from a massive 1,406 tons crushed, a yield of only 0.2 ounces per ton. Many of the other leases did dead work during this year, notably the Star Company which, by year's end, had driven its tunnel 460 feet into the hill. It was by far the longest tunnel on the field. Despite the low average yields from the Pioneer and Pinnacle, the Yalwal mines collectively turned out 1,375 ounces of gold from total crushings of 2,915 tons during 1881. Nearly sixty percent of this result came from the Eclipse which, after only starting crushing in July, put 1,000 tons of stone through its robust ten-stamper to achieve an 809-ounce yield. The Eclipse earned L.2,795 for its gold, by far the largest amount it had realised for any year to that point (and would realise for many years afterward). Significantly, the result had been attained, like the Pinnacle and to a lesser extent the Pioneer, by crushing a vast tonnage of stone. This was a clear indication that the Yalwal miners were slowly coming to see that there were no rich veins of gold to be discovered in the area. Rather, they were resorting to making their profits from low average yields of gold from massive quantities of stone they in effect quarried and crushed in their new, more powerful batteries.[25]

3.1.4 Decline and Revival, 1882-1888

During 1882, the Yalwal mines collectively turned out 828 ounces of gold from a total of 2,029 tons of stone crushed, an output of approximately 0.4 ounces per ton. The Eclipse crushed 805 tons for a return of 308 ounces, the Pinnacle 341 tons for only 69 ounces and the Golden Crown, which was worked during the year by a new partnership, 47 tons for twelve

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[24] Minute from Secretary, PMG's Department, re establishment of Receiving Office at Yalwal, 6 August 1880, CRS C3629/2, item Yalwal PO, AA NSW; *T&CJ*, 24 May 1879, p. 999; Yalwal School file, AONSW item 5/18232.1.

[25] Andrews, pp. 32, 34; *Annual Report*, 1880, pp. 124-5; *Annual Report*, 1881, p. 59.

ounces. For its part, the Homeward Bound obtained a modest financial return of L.575/18/11 from around 170 ounces of gold it extracted from an unknown quantity of stone crushed. With such meagre results, all but one of the working mines barely reaped sufficient return to cover their costs during the year. The exception was Kennedy's Pioneer claim which secured a result of the order of L.2,000 from about 560 ounces won from the rock.[26]

No mines could long sustain returns such as most of those at Yalwal had obtained for 1882 without operations on the whole field collapsing. Already, there were signs of strain. The two new partners in the Golden Crown lease had a falling out during the year over the direction their work should take, with the result that both abandoned the mine. More significantly, the Pinnacle and its plant were put up for sale and, early in 1883, were bought by Messrs Denny and Palmer. They promptly started cutting a tramway on a steep part of the cliff in order to transport some 200 tons of stone stacked in a paddock to the crusher. Within a few months, the Pinnacle was reported to be in the hands of a Mr Kelly, who had also got possession of the Golden Crown across the creek; Kelly may, in fact, have been in partnership with Denny and Palmer, but this is uncertain. Whatever the case, Kelly was the manager for a syndicate of Sydney investors and, with their solid financial backing, he began to overhaul the existing battery and add to it percussion tables, vertical and horizontal amalgamation pans and a furnace for smelting the pyrites. In addition, he set about 'taking down the hill on a face' - in other words, resorting to open-cut mining. Operations were clearly going to be conducted on a larger scale, on at least two mining leases, with better finances and improved equipment and technology. It was a sign of things to come on the Yalwal field.[27]

The advent of Kelly and his backers at Yalwal derived directly from the difficulties that arose from the new open-cut method of working the leases. As the existing leaseholders crushed ever larger quantities of quarried stone, costs escalated while the average amount of gold recovered from the crushings diminished. In truth, for the open-cut methods they now increasingly used - and which the peculiar nature of the Yalwal ore demanded - the leaseholders did not have the capital, the equipment or the know-how to make their operations really profitable. To make them pay, they needed bigger and more efficient operations so that they could achieve economies of scale. Thus, Kelly effectively amalgamated leases and introduced measures for recovering the gold locked in pyrites, all leaseholders to that time having taken no steps to extract this gold and having simply discarded it in the tailings. But further improvements were possible and indeed necessary. Much bigger and more powerful crushing plants, which could just as easily be run by the same number of men as operated smaller batteries, were an obvious requirement to crush the vast amounts of rock that were now needed to extract payable gold.

In the short to medium term, however, most of the mines struggled on in their accustomed inefficient manner. Returns from the Eclipse, for example, plummeted from a peak of L.2,795/3/0 for 1881 to a mere L.120/19/0 for 1885. It appeared that the local leaseholding syndicate was only working the mine intermittently. As the Department of Mines *Report* for 1883 pointed out, the claims were, with the exception of the Pinnacle and Golden Crown, 'still in the hands of men who do not wish to develop them beyond their own working capabilities.' The observation revealed an interesting truth about the miners' attitudes.

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[26] *Annual Report*, 1882, pp. 62-3; Andrews, pp. 32, 34, 40.
[27] *Annual Report*, 1882, pp. 62-3; *Annual Report*, 1883, pp. 75, 159.

Despite their wasteful practices and mediocre returns, most of the leaseholders and miners were content with their lot and had no interest in expanding their enterprises into large money-making concerns. As expansion would have meant the passing of control to men of capital in the cities, this attitude was probably born of a desire to remain independent, to be in charge of their own destiny. Certainly, a report of a few years later refers to the local leaseholders and miners happily carrying on with their inefficient and barely profitable operations with 'no Sydney directors to trouble them or interfere.'[28]

The negative consequence of this failure to develop was that the field in general stagnated during the 1880s. As a visitor to Yalwal remarked in December 1882, 'at present things are in a very slack state', while the government Geological Surveyor, Edward Pittman, reported in March the following year that there were only sixteen miners on the field. Only the Pinnacle, Eclipse, Pioneer and Homeward Bound leases were being worked. With mining operations at a low ebb, the little community at Yalwal managed to do little more than hang on. In mid-1883, the settlement consisted of a scattering of mostly slab and bark dwellings, though a few of them had gardens. Watts, the first schoolteacher, departed and was replaced in January 1884 by Mary Spain who, in turn, lasted only six months. She was succeeded in July 1884 by James Booth. Living conditions in the township were not made any easier by the fact that both MacArthur's Danjera Crushing Company battery and the old waterwheel battery discharged filthy water, probably contaminated with mercury, straight into the creek. On the positive side, however, the postal receiving office was upgraded on 1 January 1883 into a proper post office from which Yalwal residents could post, rather than just receive, letters. By July of that year, too, the NSW government had converted about half the track to Yalwal into a road traversible by drays, though the rest of it remained a bush track terminating in the perilous descent from the Gap. The difficulty of road access meant that provisions cost roughly 25 percent more in Yalwal than they did in Nowra.[29]

In early 1885, continuing poor returns from the Homeward Bound and the putative high costs of making it profitable prompted its owners, Thorburn, Faulks and the Mison brothers, to offer the mine for sale in London. There were no takers. Thereupon, the partners resolved to make the mine pay themselves. They set about converting the workings into a quarry sixty feet wide and fifty feet deep, and purchased MacArthur's crushing plant so that they could more cheaply crush their stone. From then on, they put every piece of quarried stone through the battery, without any sorting or selecting of stone whatsoever. With this new regime, their earnings from gold jumped from L.2,555/17/9 and L.2,051/7/6 in 1883 and 1884 respectively to L.5,133/11/9 in 1885. It was a crude, but profitable method, and to some extent mirrored the *modus operandi* of the Sydney syndicate which owned the Pinnacle. Returns from the Pinnacle declined a little, however, as its stone proved to contain a low percentage of gold.[30]

Thanks mainly to the efforts of Thorburn and his colleagues, Yalwal's fortunes revived to a small degree in the latter half of the 1880s. The Homeward Bound continued to enjoy healthy profits from its open-cut operation, the returns from gold topping six thousand pounds in 1887. In that year, work proceeded on the Pinnacle, Eclipse and Pioneer claims, while it was reported that a new drive was being sunk on the Hit and Miss mine. The Eclipse, in fact,

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[28] Andrews, p. 34; *Annual Report*, 1883, p. 75; *T&CJ*, 28 February 1891, p. 24.
[29] *T&CJ*, 16 December 1882, p. 1179; *Annual* Report, 1883, p. 159; *T&CJ*, 23 June 1883, p. 1174; documents in Yalwal School file, AONSW item 5/18232.1; Bayley, p. 142.
[30] *T&CJ*, 9 November 1889, p. 24; *Annual Report*, 1885, p. 72; *Annual Report*, 1886, p. 71.

produced a return of just over L.1,750 for the year, its second highest result since it was opened. Signs of revival were evident in the community as well. A site for a public school had been dedicated on 11 July 1884 and, in May 1887, some 97 residents of Yalwal and district petitioned the Minister of Public Instruction for a new school building, the existing one being described as 'so much out of repair as to render it necessary at times to send the pupils home to protect them from the weather.' After approval was swiftly granted, William Braithwaite erected a new building at a cost of L.60/5/0. At the beginning of the year, meanwhile, Hugh J. Bates had replaced James Booth as schoolteacher; Bates was to remain at Yalwal for ten years. A sketch plan from 1887 shows the village as a scattering of huts standing on either side of Danjera Creek, with the school on the eastern side and Adam's store on the western [see Historic Map No. 2].[31]

In its *Report* for 1887, the Department of Mines made a number of perceptive comments about the Yalwal field in which it summed up its idiosyncrasies and difficulties. In so doing, it endorsed the trend towards open-cut mining, especially the method used by the Homeward Bound, and the need for a substantial injection of capital. According to the *Report*:

> The mining was very different to the general character of quartz reefing as the lode or veins were undefined and of a very patchy and intermittent nature. Open quarrying passing through the machinery (both good and bad stone) appeared to be the most payable and practicable manner of obtaining payable ore. The gold bearing stone was so scattered that tunnelling and drives had not proved satisfactory, as it was practically impossible to trace any defined veins. Open face working appeared to be the most profitable.
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> A considerable amount of capital had been spent in testing the field by means of shafts. The only way to obtain the gold resources of the field would be by erecting large and extensive machinery crushing from an open face quarry, though a large quantity of indifferent stone would thus pass through the machinery.

In regard to the government-prescribed conditions for working the leases, the *Report* noted:

> The labour conditions were too stringent. The entire area of claims consisted of quartzose rock, almost impregnable in many places, and only desolate patches payable. The requirement was for 4 to 5 men on a 5 acre lease, but until the reef was fairly opened one shift per day would satisfy the labour conditions until crushing of payable gold reported. At present the condition of some of the leases required from 6 to 8 men in constant work, the result being that much enterprise was checked and prospective operations so expensive and practically prohibitory to any other than large capitalists.
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> The Yalwal gold-field generally required large capital to develop and work the several mines. There were difficulties of ingress and egress which greatly retarded its

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[31] Andrews, pp. 34, 40; *Annual Report*, 1887, p. 72 and Appendix A (map); petition to Minister for Public Instruction from residents of Yalwal and district, 25 May 1887, and other documents on Yalwal School file, AONSW item 5/18232.1.

> progress. Water was plentiful, but carriage of machinery and general stores was very expensive, and prejudicial to the efforts of smaller miners and shareholders.[32]

In line with the general drift of the *Report*, there was an attempt during 1887 to form a large well-capitalised company to operate several of the mining leases as a single entity. Various leases were registered for suspension, but in the end nothing came of the plan. Workings in the following year were hindered by a shortage of water and, in the case of the Homeward Bound, by mechanical breakdowns. Nevertheless, the Homeward Bound managed to win gold worth L.5,478/2/11 from its stone during the year. At the Eclipse, the return tumbled from its high of the previous year to a little in excess of L.700.[33]

3.1.5 The Age of Capital, 1889-1904

In 1889-90, the large capital that the 1887 *Report* considered was necessary for the development of the field - and whose advent had been heralded by the takeover of the Pinnacle by a Sydney syndicate back in 1883 - finally materialised in a major way. In August-September 1889, Thorburn, Faulks and the Misons sold the Homeward Bound to a Victorian syndicate including Joseph Clarke, a member of the richest family in Victoria, and a Mr Gayer for the sum of L.19,000 cash. For the seven years preceding the sale, Thorburn and his partners had won L.27,650/18/1 in gold from the claim, as well as an additional L.216/18/8 in silver, making it an attractive proposition for a big company. Above all, Thorburn, Faulks and the Misons, together with their predecessors at the Homeward Bound, Harvey and West, had demonstrated how the Yalwal deposits should be worked to ensure high profitability.[34]

Upon taking over the Homeward Bound, the Victorian syndicate registered it in Melbourne as a public company offering 120,000 one-pound shares; within a couple of months, the shares were being quoted at a rate 50 percent above their issue value. The Victorian syndicate immediately employed more men and made preparations to equip the mine with an immense Californian battery of forty 900-lb heads powered by a 40-horsepower engine. When complete, the battery would be capable of crushing as much stone in a day as the old ten-stamper had crushed in a week. During 1890, the first twenty heads of the new battery were erected and enclosed in a sawn timber and iron-roofed shed; the foundations of this battery are still visible at Yalwal. At the same time, the old ten-stamper that Thorburn and his colleagues had bought from the Danjera Crushing Company, was reconditioned and fitted with new gold-saving plates. From the tunnel leading into the floor of the quarry, an inclined double tramline was constructed down to the machinery site. By means of this tramline, stone was conveyed in trucks under the force of gravity to a large new rock breaker below, the speed of the downward trucks being controlled by the trucks returning on the up-line and by a brake wheel. Thence, the broken-up ore was dropped to the batteries for crushing. All told, to the end of 1890, the Victorian company spent L.7,156 on improvements to the mine. The other twenty heads of the Californian battery were installed in the first half of 1891, their installation reducing the costs of crushing the stone to under ten shillings per ton. Strangely,

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[32] *Annual Report*, 1887, pp. 72-4.
[33] *Annual Report*, 1887, p. 72; Andrews, pp. 34, 40; *Annual Report*, 1888, pp. 83-4.
[34] *T&CJ*, 9 November 1889, p. 24; *T&CJ*, 23 November 1889, p. 24; 'Days Gone By: Yalwal', Yalwal file 5056, Shoalhaven Historical Society, Nowra; article on Joseph Clarke in *ADB*, vol. 3. p. 424; *Annual Report*, 1889, p. 80; *Annual Report*, 1890, p. 90.

the new owners made no effort to augment their yield of gold by making arrangements to treat the pyrites.[35]

Victorian capital found its way to another part of the field in 1890 when a Mr J. Hanson bought the Pioneer lease from the local syndicate of William Kennedy, James Monaghan and party that had worked it since 1878. Hanson paid L.15,000 in cash for the mine. Immediately, he embarked on a major development programme, driving a tunnel (No. 3) that eventually penetrated the hill to a depth of 1,000 feet and lay 130 feet below the base of the Pioneer quarry. The quarry communicated with the tunnel by a series of shafts (or passes, as they were called). Quarried stone was let down the passes and transported along a tramway laid along the length of the tunnel to a shute that dropped it into a huge rock breaker. From there, a feeder carried the stone a short distance downhill to a powerful 40-head stamping battery that Hanson erected in 1891-2 on a large site he had excavated on the bank of the creek. Like the owners of the Homeward Bound - and despite the expenditure of considerable development capital - Hanson took no early steps to save the pyrites for treatment. Indeed, he must have rapidly become disenchanted with the mine's prospects because he sold it in 1892 to a Nowra syndicate which largely comprised the former owners.[36]

The Golden Crown and Pinnacle also changed hands in 1890. Kelly and his partners sold the Golden Crown to a Sydney syndicate among whom Captain Reynolds, who had been associated in 1882 with prospecting some distance from Yalwal, was a leading figure. Early in 1890, Kelly also sold the Pinnacle to a Mr King, who effected some improvements to the mine's plant and made plans to extract gold from the pyrites by roasting them. This proposal, however, seems to have come to nothing; like the Homeward Bound, Pioneer and other Yalwal mines, the Pinnacle continued to lose its pyrites in the sludge that was discharged from its battery directly into Danjera Creek. Nonetheless, the takeovers of the principal leases and influx of capital in 1889-90 gave renewed impetus to the field, encouraging others to test its prospects. Work proceeded on the Caledonian, Victory, Robert Bruce, Star, Albion, Usher, Fountain Head and other leases, most if not all of which were in new hands. Conversely, ownership of the Eclipse remained with a local syndicate of 32 shares, including John Maclean. Its operating methods remained unchanged, too, the partners soldiering on with their inefficient practices and aging ten-stamp battery.[37]

The upsurge in activity on the field at the end of the 1880s promoted the further development of services and facilities for the Yalwal community. During 1889-91, the road from Nowra was improved, the most significant upgrading occurring on the precipitous section from the Gap to the floor of the valley. Remnants of the stone-packed embankments for the new road are still visible on the way into Yalwal. Robert Thorburn, who had entered the coaching business before he sold his interest in the Homeward Bound mine, took advantage of the enhanced economic conditions to introduce a passenger coach service that operated thrice weekly between Nowra and Yalwal. The new service also permitted an increase in mail

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[35] *Annual Report*, 1890, pp. 90-1; *T&CJ*, 9 November 1889, p. 24; *T&CJ*, 24 August 1895, p. 26; Andrews, p. 37; *T&CJ*, 28 February 1891, p.24.

[36] *Annual Report*, 1890, pp. 90-1; *Annual Report*, 1891, p. 95; Andrews, p. 35; *T&CJ*, 28 February 1891, p. 24; *T&CJ*, 24 August 1895, p. 26; Brian K. Burton, 'Mining', in Gubb (ed.), *Living Echoes: A History of the Shoalhaven*, p. 36; David Glasson, *Yalwal Gold*, p. 10.

[37] *Annual Report*, 1890, pp. 90-1; *T&CJ*, 16 December 1882, p. 1179; *T&CJ*, 28 February 1891, p. 24.

arrivals and departures from two to three times a week. Unfortunately, both traffic and mail services to and from Yalwal were still subject to complete disruption whenever Yarramunmun Creek flooded, a problem that was not rectified until a new bridge over the creek was constructed in 1894.

Meanwhile, a telegraph connection was established to Yalwal in 1889, while a telephone service was provided the following year. Over the same period, Thomas and Caroline Galbraith erected a twenty-room hotel which was licensed during 1890. In that year, too, some 200 people attended a sports carnival held on an open expanse of land called Thompson's Flat, an event that reflected the rising optimism among the locals about Yalwal's future. By 1891, the residents had erected a School of Arts for their entertainment and self-education, and the township was able to boast of three well-supplied stores. On their farming property, the Fletcher family had a butcher shop - still standing - which supplied meat from their farm for the townsfolk. Farms in the area also provided the town with such other staples as milk and corn. The school, with an enrolment of 57 pupils, was extended in March-April 1892, and, at the end of that year, Yalwal was officially proclaimed a village and its boundaries were notified. The village was laid out on both sides of Danjera Creek and was split into two parts, a northern section where all the settlement was concentrated and a smaller southern section southwest of the Star lease where there is no evidence that the town allotments, most of which are now usually covered by the waters of Danjera Dam, were ever built on [see Historic Map No. 3]. All together, the village had about 110 buildings at this time, though many of these would have been no more than simple slab structures; a brick kiln was located halfway between Yalwal and Dean's Flat, but the bricks from it were used mainly in the mines and machinery sites. That living conditions were yet fairly primitive is revealed by the population statistics for 1891, which record that males outnumbered females by more than two to one in the total figure of 315. Clearly, Yalwal was still considered a rugged place for women and girls to live.[38]

Unfortunately, a combination of circumstances conspired at first to dampen the promise of the early 1890s. Not the least of the factors that contributed to Yalwal's difficulties were alarming developments in the outside world. In April 1893, the collapse of several major colonial banks heralded the onset of what would turn out to be a severe and prolonged depression in the Australian colonies. The economic downturn did not augur well for Yalwal, especially as over-speculation in mining ventures had been one of the causes of the collapse. Of particular significance to Yalwal, however, was the fact that the bank failures wiped out the fortune of Joseph Clarke, one of the leading members of the Victorian company that owned the so-called 'boss mine' of the field, the Homeward Bound. It may not have been coincidental, then, that the Homeward Bound claim was jumped on 12 May 1893. The incident prompted the owners to institute legal proceedings, and these eventually dragged on in the courts for four years. At first, the mine continued to operate, albeit at a diminishing rate, with the proceeds being paid into a (still-viable) bank. But in August 1894, all work ceased and did not resume for nearly three years. According to one report, the slowing and then cessation of operations threw about half the miners of Yalwal out of work. At the end of 1893, many of them were unable to pay school fees for their children. In an effort to scratch a

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[38] *Annual Report*, 1889, p. 80; *Annual Report*, 1890, p. 91; Bayley, pp. 142-3; *T&CJ*, 9 November 1889, p. 25; information from John Fletcher and Gary Usher; Yalwal School file, AONSW item 5/18232.1; map of Yalwal, 9 February 1893, in Yalwal School file, AONSW item 5/18232.1; *Census of New South Wales*, 5 April 1891, pp. 539, 744.

living, they turned to alluvial mining in Sawpit Gully and, in mid-1895, some 30 to 40 men were still trying their luck there.[39]

From the end of 1894, however, things took a sharp turn for the better. Back in 1892, two miners named William Underwood and R. Johnson had taken the Caledonian lease on tribute and had found a small but exceptionally rich ore body that yielded between 23 and 30 ounces of gold to the ton. In three months, the partners won L.3,500 from their workings known as Underwood's Cut. They had then lost the rich ore, inducing them to lease the claim to the Fletcher brothers. The Fletchers were successful in re-locating the continuation of the ore body and, in October-November 1894, they obtained about 4,000 ounces of gold from a small quantity of stone they had crushed at the Pioneer battery, the gold giving them a return of L.6,500. In the words of the Department of Mines' *Annual Report* for 1894, this 'Splendid yield' gave 'a great impetus' to the Yalwal field. The *Report* recorded with approval that 'Forfeited and abandoned leases were being applied for and tribute parties were in the course of formation to work them.' Importantly, local supplies of timber needed to fuel the batteries and cope with the increased level of activity remained plentiful. Following their success, the Fletcher brothers allowed the original owners to buy into their operations at a cost of L.950 and together they went on to work other small ore bodies at cuts known as Ison's and Sandeman's which ran parallel to Underwood's. In a short time, the partnership extracted another L.6,900 worth of gold from these workings.[40]

By comparison with the years 1894-5, the returns for Yalwal for 1896 were unspectacular, the whole field producing only 1,495 ounces of gold valued at L.4,530. The Pioneer, which employed about 30 men, crushed 10,000 tons of stone during the year, but King's Pinnacle, Maclean's Eclipse and the Caledonian crushed less than 2,500 tons between them. The ensuing year, however, brought changes of the utmost importance to the field. The trend towards well-financed large-scale operations received a major boost when Alexander Hay of Coolangatta near Shoalhaven Heads brought a number of Yalwal leases under his control and then amalgamated with the Pioneer to form the Yalwal Gold Mining Company; Hay soon held fourteen leases and was employing 52 men. At the same time, the litigation which had caused the Homeward Bound to lay idle for the better part of four years finally came to an end, the original Melbourne syndicate winning a victory by exhaustion over their opponents. It was in this year, too, that the mine owners turned to the new cyanide process to extract gold from the tailings from their mines; hitherto, the tailings had generally been ignored. The Eclipse had in operation its own small cyanide works which treated 40 tons of tailings during 1897 for a return of 63.5 ounces of gold. Hay planned to build a much larger cyaniding plant capable of treating substantial quantities of tailings from his leases, while the Melbourne owners of the Homeward Bound Gold-mining Company, freshly liberated from their legal shackles, were also interested in building a cyanide works. The 1897 Department of Mines *Report* predicted that, when these latter two plants were in full operation, 'the long-felt depression, caused chiefly by litigation for so long a time, will disappear, and the field once more will become more active and prosperous than of late.'[41]

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[39] Article on Joseph Clarke in *ADB*, vol. 3, p. 424; Bayley, pp. 143-4; Andrews, pp. 10, 40; *Annual Report*, 1894, p. 28; *Annual Report*, 1896, p. 32; Bill Frost, 'Yalwal: gold mining and telephone saga', *Shoalhaven Chronograph*, vol. 10, no. 3, April 1981, p. 3; *T&CJ*, 24 August 1895, p. 26; *T&CJ*, 31 August 1895, pp. 26-7.
[40] Andrews, pp. 9-10, 40-1; *Annual Report*, 1894, p. 28; *T&CJ*, 24 August 1895, p. 26; *T&CJ*, 14 September 1895, p. 30.
[41] *Annual Report*, 1896, p. 32; *Annual Report*, 1897, p. 40; *Annual Report*, 1898, pp. 41-2; Bayley, pp. 143-4.

The buoyant mood and bustle of activity continued into the next year. By 30 June 1898, 27 goldmining leases were operant at Yalwal and about 100 men were employed on the field, 52 of them by Hay's Yalwal Gold Mining Company. Hay completed his cyaniding works early in the year and made other improvements to his leases at a cost of around L.3,000; the cyaniding works included three solution tanks and five leaching vats, all built on concrete foundations. Among Hay's other improvements was the construction of a tramway some 660 yards long which allowed the ore to be trucked from his leases in Sawpit Gully to the 40-head Pioneer battery that he now owned; traction for the tramway system was provided by a winding engine he positioned above his jaw crusher. At the Homeward Bound, the new mine manager appointed in February 1898, Mr V. Petherick, decided to erect an experimental plant to trial the cyanide process on the mine's tailings. The results proved so promising that he immediately set about the task of installing a much larger plant. Cyaniding was also tried by other mining parties at Yalwal, including the party working the old Poorman's lease and another that may have been operating at the Eclipse.[42]

The increased activity and employment at the mines were naturally reflected in the fortunes of the township. Further improvements were made to the school during 1897 and a new teacher, Lenod Johnson, had arrived to take the place of the long-serving Hugh Bates. On 5 April 1898, 22 local male residents petitioned the Minister of Public Instruction for the establishment of an evening school for themselves in the existing school building. The request was quickly granted and the two-night-a-week school commenced in late April or in May. By November of that year, the average attendance in the ordinary day school was 51 pupils. Around the same time, a Yalwal Progress Committee came into being and was instrumental in securing additional improvements to school facilities in 1899. On 29 July 1899, the Yalwal Progress Committee forwarded to the Postmaster-General a petition signed by 110 residents of Yalwal calling for the provision of a savings bank in the local post office (still run by Mrs Galbraith). The petitioners wanted the facility in order to be able to deposit small amounts of money for safekeeping. With the nearest savings bank located at Nowra, the petitioners pointed out that it was uneconomical for them to visit the bank to deposit small sums because the return coach fare to Nowra was seven shillings. A savings bank was eventually opened in the Yalwal Post Office on 22 January 1900.[43]

In these years of the late 1890s, the coach and postal service between Yalwal and Nowra was increased to a daily run operated by Jake Heilman, who was one of the leading shareholders in Hay's Yalwal Gold Mining Company as well as its business manager. Whatever Heilman's business acumen, his fondness for the bottle often led to the non-appearance of the mail at Yalwal. When this occurred, local townsmen had to go out and find Heilman and bring him, the coach and the mail into town. The recreational and social life of the town also flourished in these years. Football matches had commenced in the winter of 1896, while an asphalt tennis court was laid out on a piece of ground levelled on the slope behind the School of Arts. A concrete cricket pitch, which was laid down in a field known as the 'cricket paddock' outside the current study area, was the venue for matches against visiting teams from Burrier and places further afield. At Dean's Flat, again outside the study area, the

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42 *Annual Report*, 1898, pp. 41-2; Andrews, pp. 10, 35.

43 'Petition for the Establishment of an Evening Public School at Yalwal', 5 April 1898, and other documents in Yalwal School file, AONSW item 5/18232.1; petition to the Post Master General from Yalwal residents, 29 July 1899, CRS SP32/1, 'Yalwal Post Office', AA NSW; Bayley, p. 144.

residents even created their own racecourse. The School of Arts, meanwhile, became the centre of the town's social activities as the building housed the town's library and was used for a variety of other community functions, including dances, receptions and church services. A single policeman was stationed in the town to attend to any infringements of the law, but Yalwal was always a law-abiding and peaceful place. In another sense, the peace of the town was constantly broken by the hammering from the stamper batteries which were kept going 24 hours a day six days a week in these years of intense mining activity. The machines only ceased working at midnight on Saturday nights out of respect for the Sabbath, the sudden silence waking the whole town. The batteries and the din resumed again precisely at midnight on Sunday nights. Notwithstanding the noise nuisance, photographs from the time depict a comfortable settlement of freshly-painted weatherboard buildings, with well-kept yards and neat paling or split rail fences. The population reached 350 in early 1901 and, reflecting the improvement in living conditions, the former imbalance between the sexes had closed to such an extent that males now outnumbered females by a ratio of only 4:3.[44]

Sadly for Yalwal's residents, the confidence they felt in the town's future in these years was not underpinned by consistent, healthy returns from the mines. During 1898, Hay and his partners in the Yalwal Gold Mining Company crushed 4,800 tons of stone for a paltry return of 280 ounces of gold. Their new cyaniding plant did better, producing a yield of 450 ounces from 3,150 tons of tailings treated, but almost all of this gold came from a small stock of 250 tons of tailings saved a few years before from the rich ore of the Caledonian lease. At the Homeward Bound, 3,712 tons of stone were crushed to give 971 ounces of gold, while Petherick's incomplete cyanide works treated some 300 tons of tailings for a negligible yield of 23 ounces. The Poorman's mine and the Eclipse experienced low yields similar to those of Hay's company and the Homeward Bound. Production was then hindered even further by the intervention of mother nature in the form of recurrent drought. Lack of water forced the cessation of all mining operations in the early months of 1899 and led to the suspension of labour conditions on most of the leases. For the year as a whole, the Yalwal Gold Mining Company produced only 900 ounces of gold, most of it from cyaniding. The Homeward Bound had a somewhat more productive year, crushing a massive 15,249 tons of stone for a return of 1,542 ounces, with cyanide treatment generating another 574 ounces. For the amount of effort and the number of men employed, the results from the two main mining operations at Yalwal were not reassuring.[45]

To some extent, the meagre returns were offset by the economies of scale achieved through the larger size of the operations, the amalgamated leaseholdings and the introduction of the cyanide process. The Homeward Bound's cyanide plant, for example, which was finally completed in 1900, required only three men to operate it. In this year, the Homeward Bound secured good returns of L.4,953 and L.2,568 from its crushings of stone and from cyaniding tailings respectively. This was sufficient to keep its board of directors in Melbourne happy and to support its workforce of 44 men (which included ten men engaged in cutting and carting wood). Hay's leases, on the other, produced virtually nothing for the year. With seemingly inexhaustible resources of capital, Hay had spent approximately L.10,000 on his

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[44] Dave Dudgeon, 'Yalwal', *Shoalhaven Chronograph*, vol. 15, no. 10, November 1985, p. 2 [reprint from August 1972]; *Sydney Mail*, 17 November 1900, pp. 1173, 1176; *T&CJ*, 14 June 1902, p. 26; information from John Fletcher and Gary Usher; Bayley, p. 144; Glasson, *Yalwal Gold*, pp. 4,5; *Census of New South Wales*, 31 March 1901, p. 550.

[45] *Annual Report*, 1898, pp. 41-2; *Annual Report*, 1899, p. 35.

leases by year's end for little return and was continuing to expand and develop his holdings. Earlier in the year, a Mr H. Martin had taken up the old Star lease after it had lain dormant for a decade, but by November of that year it had passed into Hay's hands. The Eclipse, too, which for a few years had maintained an independent existence as a small operation, was acquired by Hay during 1900. At that time, he held, with the exception of the Homeward Bound, all of the principal leases on the Yalwal field, an area amounting to some 100 acres. He set his employees to turning the Star into a large open-cut, laid a new tramway from it to his Pioneer battery and began to re-condition this and the other two small batteries on the Pinnacle and Eclipse leases. Hay and his partners could not go on indefinitely making outlays of the magnitude they had without seeing some solid returns for their investment.[46]

Though dry conditions caused a suspension of operations for about six weeks in the middle of the year, the Homeward Bound did quite well in 1901. The company crushed an enormous 18,493 tons of stone for a yield of 1,911 ounces of gold and treated a further 8,149 tons of tailings for another 1,105 ounces. In monetary terms, the gold was worth L.7,701/18/3. In addition, the mine's management made a number of improvements, namely installing electric lighting and a new steam pump, stabilising the walls of the quarry by removing some 4,500 tons of overburden and driving a new tunnel 375 feet into the west side of the hill below the old tunnel and 110 feet below the quarry floor. Hay's Yalwal Gold Mining Company fared better than the previous year, but again did not produce substantial returns. Most of the work took place on the Pinnacle and Eclipse leases where 4,500 tons of stone were crushed to produce 500 ounces valued at L.1,533/17/9. The Department of Mines *Annual Report* ascribed the 'small return' to the large amount of development work that Hay's company had had to carry out in order to make the mines safe.[47]

After 1901, drought returned with a vengeance to severely curtail mining activity. The Homeward Bound, whose operations were at a standstill for 29 weeks during 1902, managed a return of L.4,322 for the year, while Hay's mines only produced 668 ounces of gold at a value of L.1,932. Another four months' work were lost through drought during 1903, but the Homeward Bound still made a return of L.4,195. On Hay's leases, the results were frankly 'unsatisfactory'. While stone was crushed from various of his leases, the returns were, as the annual Department of Mines *Report* put it, 'unremunerative.' A total of 6,850 tons was crushed for a yield of 650 ounces with a value of L.1,805. The crunch came the following year. The Homeward Bound ceased operations for nine months and, in October, both it and the Yalwal Gold Mining Company were wound up. Their combined leases were taken over by a new entity, Yalwal Consolidated Gold Mines, headed by none other than Alexander Hay who had seemingly risen phoenix-like from the ashes of his previous venture. Significantly, however, Hay was soon looking for fresh capital to carry his operations forward. Though no-one seems to have realised it at the time, the decline of the early 1900s marked the end of Yalwal's heyday as a goldfield.[48]

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[46] *Annual Report*, 1899, p. 35; *Annual Report*, 1900, p. 19; *T&CJ*, 14 June 1902, p. 26; *Sydney Mail*, 17 November 1900, pp. 1173-6; Andrews, pp. 33, 41.
[47] *Annual Report*, 1901, pp. 18-19.
[48] *Annual Report*, 1902, p. 25; *Annual Report*, 1903, p. 23; *Annual Report*, 1904, p. 23; *Annual Report*, 1905, p. 20.

3.1.6 Yalwal in Decay, 1904-1921

The oscillations between expansion and contraction that had characterised mining at Yalwal since its inception in the early 1870s continued for much of the twentieth century, though the overall trend was ever downward. While there were occasional upsurges in mining activity and even some good results, the town clung on in hope of the great revival that never materialised, while the mining that did occur always petered out after a few years. From late 1904 through to 1911, the leases held by Hay's Yalwal Consolidated Gold Mines were worked almost exclusively by tribute parties, as Hay searched year by year for the capital needed to develop the mines on the grand scale he envisaged. But the times were not kind to him. The economic depression that had set in in the 1890s continued right through the first decade of the twentieth century, making it virtually impossible for him to raise funds of any magnitude. His cause was not helped by the occurrence at Yalwal of a severe drought over the period 1907-9, the dry conditions hampering mining operations and depressing output from the field. As if this were not enough, work was further impeded at the end of the decade by the shortage of skilled labour, 'it being almost impossible to secure the services of competent miners.'[49]

Hay's vision for Yalwal began to go seriously awry in 1909. In that year, the Homeward Bound which, like his other leases, had been worked on tribute for several years was taken over by J.L. Valentine. As the mine's machinery had been out of operation 'for some considerable time', Valentine set about overhauling and upgrading it. This involved the erection of new cyanide works and the replacement of the old steam engines with a more efficient suction-gas plant to power the stamping battery. The whole refurbishment cost Valentine about twelve thousand pounds and took him over two years to complete, during which time no mining was undertaken and no returns were gained. While Valentine was thus engaged, a Sydney-based company known as the Yalwal Exploration Syndicate took over all of Hay's other leases under option late in 1911. The company immediately embarked on an extensive programme to try to prove the value of the leases, with a view to working the whole area on a large scale. In 1912, however, its first full year of operation, the syndicate recovered only 185 ounces of gold at a value of L.498. Valentine, conversely, achieved an outstanding result for the year, crushing 6,500 tons of stone for 1,388 ounces valued at L.4,214.[50]

Results for the following years were much less impressive, and this applied to all of the leases that were worked. During 1913, operations on the field in general were hampered by a number of deficiencies, in particular shortages of labour, water and fuel. Of these, the shortage of fuel was a new phenomenon and probably indicated that, by this time, all timber within easy reach of the mines had been cut out and used either for fuel or for building purposes. In an attempt to minimise the problem, a furnace for producing charcoal for fuel was constructed 'on top of the mountain near the main road.' Nonetheless, because of the difficulties experienced through the year, Valentine's Homeward Bound secured a return of only L.2,050, less than half of the previous year's result. The Yalwal Exploration Syndicate,

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[49] *Annual Report*, 1905, p. 20; *Annual Report*, 1906, p. 21; *Annual Report*, 1907, p. 24; *Annual report*, 1908, pp. 20-1; *Annual Report*, 1909, p. 21; *Annual Report*, 1910, p. 22.

[50] *Annual Report*, 1909, p. 21; *Annual Report*, 1910, pp. 22, 84; *Annual Report*, 1911, p. 24; letter, Manager, Yalwal Exploration Syndicate to Mr Keating, Postal Inspector, GPO Sydney, 23 July 1915, CRS SP32/1, 'Yalwal Post Office', AA NSW; *Annual Report*, 1912, p. 21; *Annual Report*, 1913, p. 24.

whose efforts were apparently concentrated on the old Star lease, made only L.445 from the 170 ounces of gold it retrieved during the year. Somewhat better yields per ton of stone crushed were achieved by two brothers from England named Spencer who worked the Pioneer lease probably under a tribute arrangement. The brothers, who were fondly remembered years later by Dave Dudgeon for their habit of dressing in their dinner suits each evening for dinner, obtained eminently satisfactory results from small crushings of stone. The Mison brothers, on the other hand, repeatedly failed to get any worthwhile returns for work they had been carrying on intermittently on their lease since 1911.[51]

The trials that the Yalwal Exploration Syndicate had undertaken on Hay's leases had proven so unpromising by 1914 that the syndicate members had had no success in attracting any significant capital to the venture. It was not surprising therefore that labour conditions were suspended in that year and all work on the leases ceased. At the same time, the returns from the Homeward Bound fell to L.1,466 in 1914 and to only L.771 in 1915. The main reason for the falling returns was simply that the gold content of the stone Valentine was obtaining from his quarry was steadily declining. Making a difficult situation worse for him, however, was the attitude of the local miners. Apart from crushing his own stone, Valentine had provided a service as a public crusher for local mining parties. While he had done his best to oblige these parties, they had subjected him to continual petty demands and complaints apparently in the hope that they would drive him out of Yalwal and then pick up his machinery at a bargain price. They eventually reported him for not fulfilling to the letter the labour conditions on his leases, and this led on 24 November 1915 to the cancellation of all his leases. Valentine retaliated to some extent by taking all of his machinery with him when he left, most of it in the form of scrap iron. There was to be a further sequel yet to this unedifying story of malice and deceit. But with Valentine's departure, all mining activity at Yalwal came to an end and, as the war raged in Europe, prospects for any early revival of operations were bleak.[52]

As always, the vicissitudes of the local mining industry in these early years of the twentieth century manifested themselves in the fortunes of the town. Mirroring the decline in mining activity and returns, the town's institutions and services began to decay from 1901 onward. The coach and mail service, which had operated on a daily basis in the heady days of the late 1890s, dropped back to a three-day-a-week service. In late 1903, James T. Burrell, who had succeeded Lenod Johnson as teacher in 1900, reported that the teacher's residence he occupied was 'distinctly undesirable' as parts of the floor and walls were rotten with white ant infestation. The Department of Education had earlier refused to erect a more suitable residence and now again, on Burrell's advice, the department did nothing because of the uncertain outlook for Yalwal. On the positive side, the department carried out some minor repairs and improvements to the school in 1905 and again in 1909.[53]

By 1911, Yalwal's population had fallen by more than two-thirds from its figure of 350 in 1901 to only 106, and the town now contained only 22 occupied dwellings. In a tragedy that

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[51] *Annual Report*, 1913, pp. 23-4, 85; Dudgeon, *Shoalhaven Chronograph*, November 1985, p. 2; *Annual Report*, 1912, p. 21.

[52] *Annual Report*, 1914, p. 25; *Annual Report*, 1915, p. 22; *Annual Report*, 1916, p. 21; *Annual report*, 1917, p. 76; *Annual Report*, 1918, p. 79; *Annual Report*, 1919, p. 169.

[53] Dudgeon, *Shoalhaven Chronograph*, November 1985, p. 2; letter, J.T. Burrell to G.H. Hunt, Inspector of Schools, Wollongong, 'Report on Teacher's Residence at Yalwal', 9 November 1903, and other documents in Yalwal School file, AONSW item 5/18232.1.

seemed to typify the gradual falling away of the town and community, the three Payne children, John Henry, Leslie Roy and Phyllis Amelia, all died from diphtheria in a period of 48 hours in May 1911. Following the deaths, the school was closed down for three months. In the same year, the Postmaster-General's Department advised the Postmistress, Mrs Galbraith, that it intended to reduce her salary because of the marked decrease in business at the Yalwal Post Office. For her part, Mrs Galbraith thought she deserved a salary increase after her 30 years' of continuous service at the Post Office, and she threatened to resign unless the increase were granted. She eventually agreed to continue at the old salary in the expectation, typical of Yalwal in this period, 'of mining matters being considerably improved here very shortly.' 'It is reported,' she said, 'the properties are almost floated in London into a company with large capital ...' But the float, probably arranged through the Yalwal Exploration Syndicate, never eventuated. As it was, even during their brief flourishings at Yalwal, neither Valentine's Homeward Bound mine nor the Yalwal Exploration Syndicate had any significant effect in rejuvenating the town. Valentine employed only about twenty men at his peak, while the Syndicate only ever had three or four employees at Yalwal.[54]

The community suffered a further blow when Mrs Galbraith died suddenly on 15 July 1914. Although her daughter, Bernice, immediately assumed the responsibilities of postmistress, Mrs Galbraith's death marked another milestone in the passing away of the old Yalwal community. She had not been gone long when the PMG's Department resumed its attempts to reduce the postmistress's allowance. To press her case, Bernice Galbraith enlisted the support of the local federal member, Austin Chapman, as well as the manager of the Yalwal Exploration Syndicate. The latter obliged by writing a glowing letter to the PMG's Department, fulsomely expanding on the availability of capital and claiming that: 'I have been assured that this capital will be forthcoming and having already been promised support in Sydney am now on my way to Melbourne to make our final arrangements for launching our company.' It was a familiar refrain, and nothing came of it.[55]

The school, too, was affected by the town's decline. An official inspection of the school building in August 1914 revealed that, while it was structurally sound, the pine lining of its walls and ceiling was 'so much damaged by white ant as not to be worth patching.' A small play shed at the rear of the building was described as 'dilapidated, dark and dismal' and the playground itself was so steep that, the report said, 'probably the public road would be the preferred playground.' All in all, major repairs were needed and were, in fact, carried out later that year. But this did little to improve conditions for the teacher. After the teacher, Dave Dudgeon, left to join the army in 1915, a female replacement, Mrs Mary Milson Buck was sent to Yalwal in his stead. She stuck it out for over two years, but at the end of 1917 pleaded with the Department of Education to be moved to a less arduous appointment. The Senior Inspector's report on Mrs Buck's case provides a revealing insight into life at Yalwal at this time, especially for a female teacher:

> Board and lodging for a teacher is not obtainable at Yalwal. Mrs. Buck has been compelled to rent a small, poorly furnished house, and to live there alone, doing all

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[54] *Census of the Commonwealth of Australia*, 2-3 April 1911, p. 2292; Bayley, p. 146; headstone for Payne children in Yalwal Cemetery; documents in CRS SP32/1, 'Yalwal Post Office', AA NSW; *Annual Report*, 1913, p. 24.

[55] Headstone for Caroline Galbraith in Yalwal Cemetery; documents in CRS SP32/1, 'Yalwal Post Office', AA NSW.

> her own work, including cooking, washing, *etc.* Food is almost unprocurable - even meat and bread have to be obtained from Nowra by coach, and in summer time they often arrive in a very unsatisfactory condition. In fact, I believe that Mrs. Buck has lived almost entirely on biscuits and eggs for a long time.
>
> Mrs. Buck has put up with these trying conditions for a considerable time without complaining, but she informed me that she did not think she could face up to them again in the new year, and I do not think she should be asked to do so. She is doing really good work under trying circumstances, and has earned consideration.

Mrs Buck's request was granted and she did not return in 1918. By that time, there were only twelve children of school age at Yalwal, all of them belonging to local farming families. As the Department did not believe it justified to keep the school open for such a small number of pupils, it was closed down in April 1918. Instead, the Department offered the residents a subsidy to pay for the private tuition of their children locally at Yalwal.[56]

During these war years, the town came to such a pass that the galvanised iron was stripped from unoccupied local buildings and sold to buyers from Nowra. Just the timber frames of the buildings were left standing, their stark appearance providing abundant evidence of the town's depressed condition. Around the same time, all of the batteries and associated mining equipment were removed, and the sheds that housed the batteries were burned down. Following the war, in 1919, a few locals tried to get mining going again and, to this end, they asked the state government to set up a small public battery complete with its own manager. Sent to report on the proposal, an officer from the Department of Mines found that it would not be economically viable and that, apart from a few enthusiasts, no-one in the Yalwal area had any confidence in the scheme anyway. The officer also noted in effect that the same miners had been responsible for driving Valentine out of Yalwal four years previously and that they therefore had 'themselves largely to blame for their present conditions.' The proposal did not proceed. By April 1921, Yalwal's population had tumbled to only 31 people and there were only seven occupied dwellings in what remained of the town. Having been discharged from the army, Dave Dudgeon visited Yalwal around this time as the returning officer for an election. Through a long day of manning the polling booth, he recorded only eleven votes.[57]

3.1.7 Brief Revivals, Steady Decline, 1921-Present

Several attempts were made during the rest of the 1920s to revive mining operations. In 1923, two companies, the Golden Crown Gold Mining Company and the Victorian (Yalwal) Gold Mining Company, entered the field and began to erect crushing batteries. Initially, the latter company, which appears to have developed out of the old Yalwal Exploration Syndicate and held the same leases, concentrated its efforts on the Pinnacle mine. With the employment provided by the two companies, there was a small influx of miners and their families into Yalwal, the new arrivals including a number of German Lutherans with surnames like Heinrich, Reichelt and Kuhne. To educate the miners' children, the school was re-opened on a provisional basis in about October 1923. As the old school building was literally falling

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[56] Yalwal School file, AONSW item 5/18232.1.

[57] Dudgeon, *Shoalhaven Chronograph*, November 1985, p. 3; *Annual Report*, 1919, p. 169; *Census of the Commonwealth of Australia: Census Bulletin No. 11*, 4 April 1921, p. 95.

down, school was conducted in the School of Arts which was itself in a rather rundown state, having several of its windows missing. In 1924, the miners petitioned the Department of Education for the establishment of a proper public school for their children. This was agreed to by the department and, in November, the school commenced in the repaired School of Arts building. Unfortunately, the returns from the mines in this period were nothing less than disastrous and, in 1925, they forced the Victorian Company to abandon all work while additional capital was sought. With the downturn in mining activity, the school closed down again in August 1925.[58]

During the following year, a new company called Wilkinson's Amalgamated Yalwal Gold Mines was floated in Sydney and took over the Golden Crown lease from the company of that name. The appearance of the company, which was headed by Walter Barwon Wilkinson, an assayer from Sussex Inlet, gave renewed hope to Yalwal. The school re-opened in March 1926, and both Wilkinson's and the Victorian Company began setting up expensive new machinery on their leases. Wilkinson spent most of 1927 installing a large dry crushing plant, while the Victorian concern erected a crushing plant of its own and laid a heavy tramline 1,000 feet long in the Pioneer lower tunnel, connecting it with both the Pioneer and Homeward Bound quarries. The rockwall that remained between the Pioneer and Homeward Bound quarries was also broken down at this time. Despite all the work and expense, however, the returns from the mines were, as before, dismal. In 1928, Wilkinson's company went into liquidation and the Victorian (Yalwal) Gold Mining Company also experienced serious financial trouble. These reverses naturally impacted on the town and, in December 1928, the school closed once more, this time for good. The Victorian company failed all together in the ensuing year, William Fletcher picking up all of its leases.[59]

The onset of the Great Depression following the Wall Street crash of October 1929 put the raising of substantial capital for the resumption of major mining operations at Yalwal out of the question. Consequently, mining reverted to its former character of small-scale ventures undertaken by parties of a few individuals, many of whom were locals. In fact, a long series of such ventures occurred right up until the demise of active mining on the field in the 1960s. Rather typical of these operations was the work carried out by Fletcher and his partner, Linke, who recovered 39 ounces of gold by dry crushing and cyaniding in 1929-30. In the latter year, an entity known as South Coast Gold Yalwal Reefs Ltd acquired a site halfway between the old Homeward Bound and Eclipse mines, and installed an air compressor, a pump and some jackhammers. At the same time, a Wollongong syndicate and later Gold Mines of Australia Ltd had options to purchase several leases held by George Heron, who was Postmaster at Yalwal for just over four years from 1930 and made a practice of picking up leases that other miners abandoned. In the end, however, neither party chose to exercise their options. Heron thereupon cleared away the scrub around the old Fountain Head and Hidden

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[58] *Annual Report*, 1922, p. 12; *Annual Report*, 1923, p. 11; E.C. Andrews, 'Application for Aid to erect Treatment Plant on Golden Crown Leases, Yalwal', 29 February 1924, Department of Mineral Resources [hereafter DMR] file GS1924/033; J.B. Jacquet and V. Farrier, 'Report upon the Golden Crown Mine, Yalwal', 13 August 1925, MR2219, DMR; letter, George A. Blumer to Chief Inspector, 26 June 1924, and 'Annex to Application for the Reopening of a Public School at Yalwal', 1924, in Yalwal School file, AONSW item 5/18232.1; Bayley, p. 146; *Annual Report*, 1925, p. 11.

[59] *Annual Report*, 1926, pp. 12, 48; newspaper cutting from *Sydney Morning Herald*, 27 August 1926, in MR2219, DMR; *Annual Report*, 1928, p. 11; Bayley, p. 146; *Annual Report*, 1929, p. 11; *Annual Report*, 1930, p. 39; *Annual Report*, 1931, p. 81.

Treasure mines and made some open cuts and drives in 1932-3. For the remainder of the 1930s, he obtained some small amounts of gold from these and other workings.[60]

In 1936, a company called Oriomo Explorations Limited briefly conducted some mining on the Caledonian lease held by F. Bainbrigge, but the two most important developments during the 1930s were the arrival on the field of E.W.T. (Ernest) Pincombe and a partnership comprising J. Mulhall and A.T. Lean. In a Lithgow pub shortly before he died, an old miner who had worked on the Homeward Bound mine told Pincombe of a rich vein of ore he had discovered, but kept quiet about, in one of the mine's tunnels. The old miner even sketched out a map for Pincombe, showing the whereabouts of the vein. Though Pincombe subsequently lost the map, he resolved to follow up the lead and duly arrived at Yalwal in 1931-2. Buying an old brick crusher and a secondhand cyanide plant, he set to work in partnership with the Fletcher family on part of the Homeward Bound and the adjacent Star lease. After recovering only 15.25 ounces of gold in 1932, his output rose to 238 ounces from 1,050 tons of stone in 1934, and to 280 ounces from 1,025 tons in 1935. Thereafter, his returns diminished and he faded away at the end of the 1930s.[61]

Mulhall and Lean came down to Yalwal from Queensland in 1933 and, on arrival, asked Heron to suggest a likely spot to try their luck. He directed them to Sivewright's original old Pinnacle lease which he currently held, but which he now obligingly passed over to them. The two Queenslanders knew what they were about and, after some canny prospecting, they started work on some ground that miraculously still remained untouched within the area of the lease. From this, they secured a wonderful return of 105 ounces of gold from a mere ten tons of stone processed at Pincombe's plant In 1934, another ten tons yielded them 46 ounces, while a much larger quantity of stone, 178 tons, gave them the very handsome return of 416 ounces in 1935. Returns for the following two years were much lower, but in 1938 they obtained 48 ounces from only 60 tons of stone. Like Pincombe, Mulhall and Lean departed the scene at the end of the decade.[62]

Two events brought mining to a halt at Yalwal in the late 1930s. The first was the occurrence of a devastating bushfire that ripped through the valley and what was left of the town on Black Saturday, 14 January 1939. One man, John Roach, lost his live in the blaze, while only three buildings managed to escape the flames. Henceforth, for all intents and purposes, Yalwal ceased to exist as a town. The second event that put paid to mining was the outbreak of World War II in September 1939. As great numbers of men left their civilian occupations to enlist in the services, there was little manpower available, and not much incentive either, to continue mining operations at Yalwal. For several years, no mining was undertaken in the area. The year after the war ended, however, two mining parties were reported to be in operation at Yalwal. Cumming and Jackson were working the Homeward Bound, Fountain Head, Golden Crown, Victory and Pioneer Nos. 1 and 2. They had erected a pilot plant

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[60] *Annual Report*, 1929, p. 11; *Annual Report*, 1930, p. 12; *Annual Report*, 1932, p. 14; Glasson, *Yalwal Gold*, p. 8; large index cards in CRS C3629/2, item Yalwal Post Office, AA NSW; *Annual Report*, 1933, p. 84; *Annual Report*, 1934, p. 13; *Annual Report*, 1935, p. 13; *Annual Report*, 1936, p. 12; *Annual Report*, 1937, p. 12.

[61] Glasson, *Yalwal Gold*, p. 5; *Annual Report*, 1932, p. 14; *Annual Report*, 1934, p. 13; *Annual Report*, 1934, p. 13; *Annual Report*, 1935, p. 13; *Annual Report*, 1936, p. 12; *Annual Report*, 1937, p. 12; *Annual Report*, 1938, p. 12.

[62] Glasson, *Yalwal Gold*, p. 8; *Annual Report*, 1933, pp. 13, 39; *Annual Report*, 1934, p. 13; *Annual Report*, 1935, p. 13; *Annual Report*, 1936, p. 12; *Annual Report*, 1937, p. 12; *Annual Report*, 1938, p. 12. The two Queenslanders that Glasson refers to (p. 8) as 'Mile and Lane' are undoubtedly Mulhall and Lean.

consisting of a jawcrusher, ball-mill, amalgamating plates and cyanide tanks, and they had carried out a good deal of road construction to enable lorries to transport stone direct from any of their leases to the storage bin at their pilot plant. Another partnership, Leslie and McDonald, were at work in a small way on the Pinnacle and Eclipse leases. They had plans to install a cyanide plant and to re-erect and put back into commission an old five-head battery which was lying on one of their leases.[63]

In the event, neither of these ventures lasted long. Leslie and McDonald were unable, because of a shortage of labour, to find workers to erect their cyanide plant and battery. Their operations were thus restricted to some prospecting work during 1947, and they obtained no gold in this or the following year. After that, no more is heard of them. Cumming and Jackson were more active, adding a five-head stamper to their plant in 1947 and constructing a trestle bridge across Sawpit Creek to facilitate the transportation of ore from the mines to their treatment plant. Though in the course of their prospecting they discovered ore containing a reasonable amount of gold, severe floods in 1948 greatly interfered with their work and they secured no returns. They too disappeared from the scene after this time.[64]

The last period of mining at Yalwal occurred in the late 1950s and early 1960s. In 1957, R.W. Eginton and W. Dawes began operations on a small scale at the Homeward Bound, extending an old adit which had not been worked for half a century. They eventually extended the adit a total distance of 475 feet into the hill and then started sinking a shaft to it from the floor of the old Homeward Bound quarry. Their equipment, however, proved inadequate for the hardness of the rock and they gave up after penetrating it to a depth of only five feet. Plans were made to obtain better machinery, but these never came to fruition and their mining operations on the lease petered out in 1960. Eginton, meanwhile, had teamed up with one of the Fletchers to prospect another area they called the Reward Claim. Initial indications in 1959 were promising, and in the following year yet another of the Fletchers erected a stamping battery at or near this site. But at that point development stopped as the partners suspended all work on the lease.[65]

The same year that Eginton made his appearance at Yalwal, 1957, marked the arrival of W.L. Chapman. Chapman first conducted some preliminary work on various leases, including the Pinnacle and the Caledonian. He then commenced building a road, with a bridge to span Sawpit Creek, to connect the Caledonian with his proposed battery site on the banks of Danjera Creek. The battery, which had been manufactured in 1896 by Hudson Brothers at Clyde, NSW, was erected during 1959. Chapman completed further road-making works and erected additional equipment in the ensuing years. Among the equipment was a jawcrusher which carried out the initial breaking up of the ore and from which a conveyor belt ferried the ore to the battery for further breaking and crushing. Yet, despite all his expenditure of money and effort, Chapman did not continue his operations at the Caledonian beyond 1961. During 1962, he directed his energies to opening up the old lower tunnel at the Pinnacle and connecting it with the upper tunnel, but this was to be the last work he undertook at Yalwal.[66]

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[63] Bayley, p. 146; *Annual Report*, 1946, p. 54; *Annual Report*, 1947, p. 29.
[64] *Annual Report*, 1947, p. 29; *Annual Report*, 1948, p. 30.
[65] *Annual Report*, 1957, p. 22; *Annual Report*, 1958, p. 21; *Annual Report*, 1959, p. 20; *Annual Report*, 1960, p. 20; *Annual Report*, 1961, p. 28.
[66] *Annual Report*, 1957, p. 22; G.S. Gibbons and P. Le Messurier, 'Report on the Yalwal Goldfield', The Geological Survey of New South Wales: *Geological Report No. 46*, 1967, p. 4; site inspection of Hudson

Two factors led to the final closure of mining operations at Yalwal in the early 1960s. During 1962, Clutha Development Ltd exercised the first part of an option it held over Eginton's and Chapman's leases, and began to test the quality of the ore by cutting a series of costeans. If Clutha decided to take up its full option on the leases, Eginton stood to gain L.30,000 and Chapman L.20,000. Unhappily for them, however, Clutha found the results of some 1,800 feet of costeaning unsatisfactory and the company declined to proceed with its option. Subsequent sampling at Yalwal was carried out by Kennecott Explorations (Australia) Pty Ltd in 1965 and by Newmont Pty Ltd in the early 1970s, but assays by both companies showed only very low concentrations of gold. Neither felt there was any future in the field.[67]

During this same period, Shoalhaven Council began to consider the construction of a dam across Danjera Creek at Yalwal. If it were to be built, the dam would create a considerable reservoir which would make it impossible for mining parties to use some of the lower level sites, mainly those sites along the creek which had been used to accommodate batteries and other plant since the beginnings of mining operations at Yalwal in the early 1870s. The reservoir, moreover, would cut off the workings on one side of the creek from those on the other. Most affected by the proposed dam would be Chapman and his operations. He would lose access entirely to his workings on the Pinnacle lease as the road connecting it to his battery site on the opposite bank of the creek would be flooded. In any case, he would not be able to use his battery and cyanide plant because they would be too close to the waters in the reservoir when they rose to their full height, and he could therefore not prevent contamination of the waters by tailings and sludge from his plant. In due course, the construction of the dam went ahead and it was officially opened in April 1972. With the building of the dam, the mining era at Yalwal came to an end, almost exactly a century after Sivewright and his party had first embarked on serious reef mining operations in the area.[68]

Following the passing of the mining period, three extensive areas around Yalwal were added to the Morton National Park under the control of the National Parks and Wildlife Service. The first of these areas was proclaimed on 21 June 1978 and consisted of a large expanse of land west of Yalwal Creek to its junction with Danjera Creek. Tracts of land to the east and west of Danjera Creek were proclaimed as additions to the park on 17 January 1990, the eastern addition extending southward from the southern boundary of the former village and gold mining leases of Yalwal. A final expanse of land to the northeast of Danjera Dam between Yalwal and Yarramunmun Creeks was added to Morton National Park on 28 April 1993.[69]

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battery, Yalwal; *Annual Report*, 1958, p. 21; *Annual Report*, 1959, p. 20; *Annual Report*, 1960, p. 20; *Annual Report*, 1961, p. 28; *Annual Report*, 1962, p. 29.

[67] *Annual Report*, 1962, p. 29; *Annual Report*, 1963, p. 27; J.B. McManus and G.S. Gibbons, 'Inspection of some of the Caledonian Workings - Yalwal', 1965, DMR file GS65/215; Newmont Pty Ltd, 'Final Report on the Yalwal and Grassy Gully Goldfields, NSW', April 1973, DMR file GS1973/161.

[68] *Annual Report*, 1962, p. 29; *Annual Report*, 1963, p. 27; Bayley, p. 234.

[69] *NSW Government Gazette*, 14 July 1978; 17 January 1990; 28 April 1993.

3.1.8 Conclusion

Like so many other goldfields that sprang into existence in the goldrush era of the nineteenth century, Yalwal seemed to hold out to mining entrepreneurs, investors and miners the hope that they would be able to secure good returns of gold from the field for a long and perhaps indefinite period. As testament to the continuing belief in Yalwal's capacity to produce sustained yields of payable gold, a 100-year succession of operators, large and small, invested their money and their faith in the valley's gold-bearing ore. These hopes were fuelled by the distinctive character of the ore body at Yalwal. When the miners realised that the gold was distributed in fine concentrations throughout the local rocks, they came to believe that almost any piece of Yalwal stone could be processed to yield payable gold. Indeed, by 1896, Yalwal was regarded confidently, but misleadingly, as 'a mountain of gold'. The gold was certainly there, as the Reverend Clarke had noted in the 1850s, and numerous operators were able from time to time to obtain handsome returns. But as the miners found and processed the stone with higher concentrations of gold, the gold content in the ore that remained steadily declined. A mountain of gold Yalwal was, but most of the gold was in such low concentrations as to make its extraction not a paying proposition.[70]

Most of the better ore had in fact been exhausted by the early to mid-1890s, even before the epithet 'mountain of gold' had been applied to Yalwal. By this time, Yalwal's days as a goldfield were numbered, though no-one could have foreseen it at the time. In the event, only the great Caledonian finds of 1894-95 had kept Yalwal going and given miners and investors high hopes, unrealistic as they turned out, of major new discoveries and spectacular returns. After the Caledonian's outstanding results, none of the mine operators achieved any sustained success even despite the capitalisation and sophistication of some of the operations in the 1890s. Mining ventures in the twentieth century formed very much a postscript to the endeavours of the 1800s, underlining Dave Dudgeon's observation that 'Yalwal ... does not really belong to the 20th century.' Various attempts up to the end of the 1920s to revive mining at Yalwal on a grand scale proved futile, and from then on small operators were able for various periods to obtain greater or less returns from a field that was on the wane. The poor results obtained by large mining companies prospecting at Yalwal in recent times confirmed that it was no longer viable as a goldfield.[71]

Despite Yalwal's ultimate fate as a goldfield, the physical remains of the mining period provide a wealth of evidence of great endeavour, considerable technical expertise and the high hopes that sustained many mining communities, especially in nineteenth century Australia. These remains afford an invaluable opportunity for modern-day visitors to gain an understanding of the technical competence of the miners, the sheer magnitude of their labours and the arduousness of life on a goldfield, even one that was only 30 kilometres from a major centre like Nowra. The remains also reveal the unique characteristics of mining operations at Yalwal, characteristics that evolved in response to the unusual way in which the gold was distributed through the local rock. Properly-managed conservation, interpretation and visitation of the site would ensure that the invaluable information that Yalwal has to offer on mining techniques and on the life and death of a mining community is preserved and made available to a much greater number of people.

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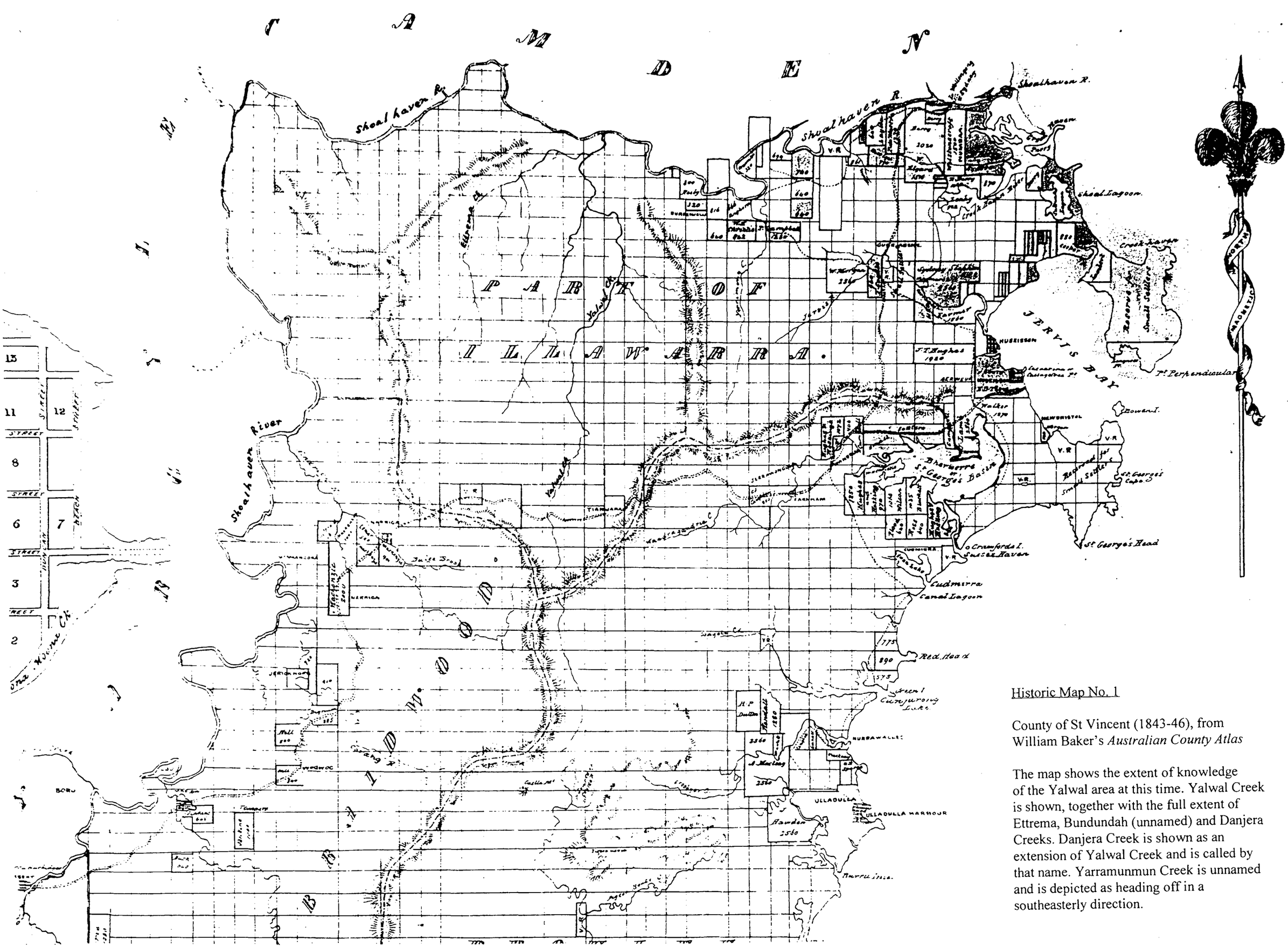
[70] Bayley, p. 144.
[71] Dudgeon, *Shoalhaven Chronograph*, November 1985, p. 1.

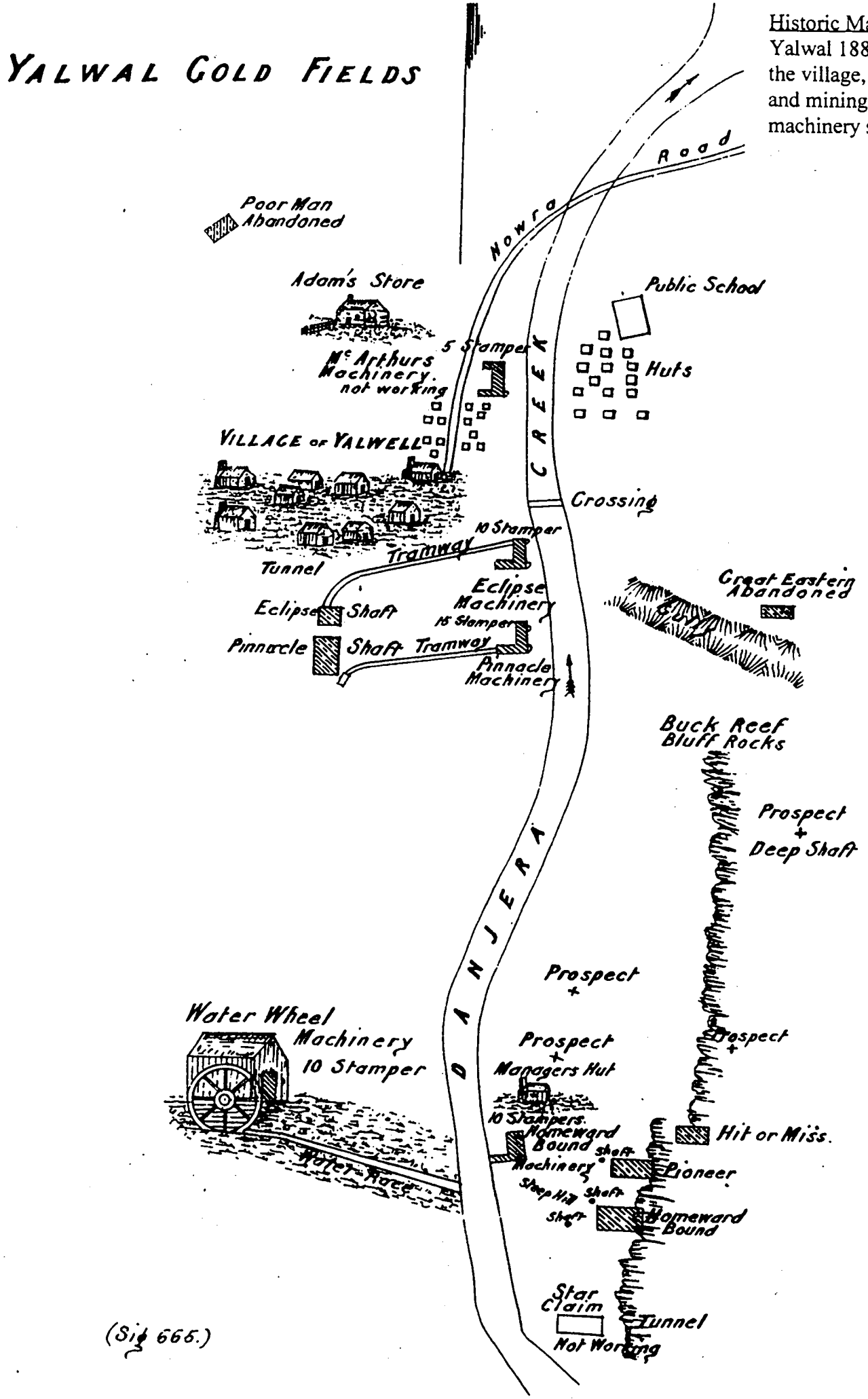
3.2 Historical Maps and Diagrams



Historic Map No. 1

County of St Vincent (1843-46), from William Baker's *Australian County Atlas*

The map shows the extent of knowledge of the Yalwal area at this time. Yalwal Creek is shown, together with the full extent of Ettrema, Bundundah (unnamed) and Danjera Creeks. Danjera Creek is shown as an extension of Yalwal Creek and is called by that name. Yarramunmun Creek is unnamed and is depicted as heading off in a southeasterly direction.



Historic Map No. 2
Yalwal 1887: showing the village, tramways, and mining and machinery sites

PLAN OF MANAGEMENT
YALWAL AND ENVIRONS
THE NATURAL ENVIRONMENT
FLORA AND FAUNA

June 1998

Prepared for:
SHOALHAVEN CITY COUNCIL
PO Box 42
Nowra NSW 2541

Prepared by:
KEVIN MILLS & ASSOCIATES PTY LIMITED
Ecological and Environmental Consultants ACN 003 441 610
222 North Curramore Road
Jamberoo NSW 2533

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1 INTRODUCTION

1.1 BACKGROUND

Shoalhaven City Council, in conjunction with the National Parks and Wildlife Service (NPWS) and the Department of Land and Water Conservation (DLWC), is undertaking a broad investigation into management issues affecting Yalwal and its environs. The investigation resulted from concern about the impact of current uses and activities on the natural and cultural attributes of the area.

Yalwal is the site of Danjera Dam, which is an integral part of the Shoalhaven water supply system. It is also the location of numerous disused gold mines and other works dating back to the nineteenth century. Yalwal is an important recreational area, a focal point for campers, fishermen and people exploring the surrounding bushland on foot or in off-road vehicles.

1.2 THE SCOPE OF THIS STUDY

This study of the natural environment was undertaken by Kevin Mills & Associates Pty Limited, ecological and environmental consultants of Jamberoo. The objectives of the study and the tasks to be undertaken were outlined in the Consultant's Brief issued by Shoalhaven City Council.

Objectives

i. to provide a description of the flora and fauna in the study area and their relationship with the environment;
ii. to identify any species that may be rare or endangered and make recommendations on how they may be safeguarded; and
iii. to provide recommendations for the management of the flora and fauna in the Yalwal area.

Tasks

i. Review the literature pertaining to the flora and fauna in the Yalwal area and in the region, where applicable.
ii. Carry out sufficient field work to allow an adequate inventory to be made of the whole spectrum of flora and fauna in the Yalwal area.
iii. Provide recommendations for the protection of any threatened species occurring in the area.
iv. Comment on the impact of human activity - past, present or future - on the ecology and how any adverse impacts may be minimised.
v. Provide a written report accompanied by maps, diagrams, photographs, etc.

1.3 THE STUDY AREA

The study area is the land at Yalwal owned by Shoalhaven City Council, as well as some surrounding land managed by the NPWS and DLWC, and some land in private ownership; see Figure 1.

The study area is in the valley at the junction of Danjera Creek and Yarramunmun Creek. The creeks converge just downstream from the study area to become Yalwal Creek, a tributary of

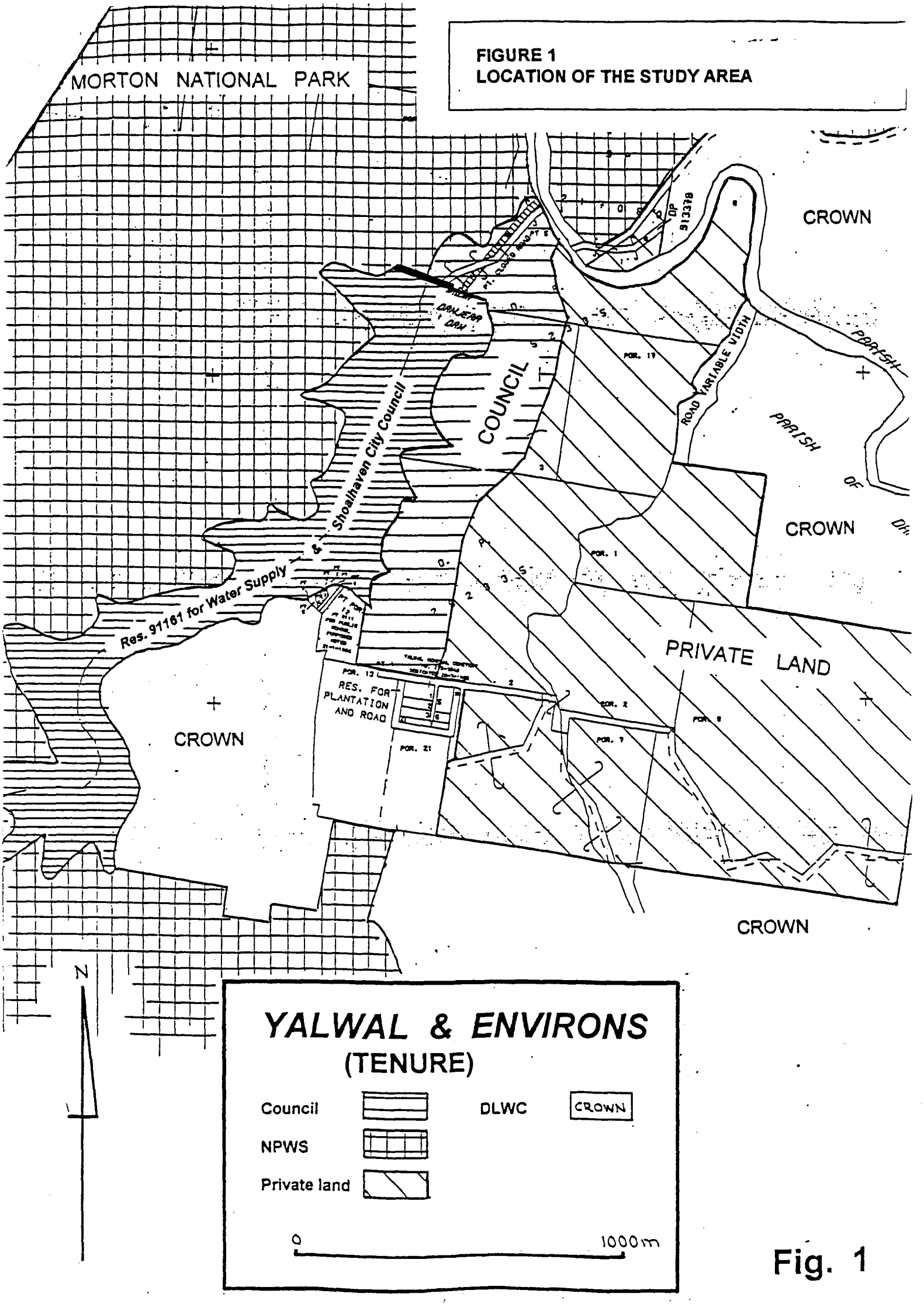


FIGURE 1
LOCATION OF THE STUDY AREA

Fig. 1

the Shoalhaven River, which is about ten kilometres to the north. These large valleys have cut through the Permian Sydney Basin sediments, the Nowra Sandstone, Wandrawandian Siltstone and Conjola Formation, to expose the underlying Devonian rocks. The rocks in the lower valleys are mainly old metamorphosed sedimentary rocks, with some basalt, dolerite and granitic rocks in and around Yalwal. The gold and other minerals mined in the area were associated with these rocks. Large holes, tunnels and other diggings are a feature of the hill in the southern part of the study area.

Most of the Yalwal area would have been cleared during the mining boom, but has since regrown as forest. Part of the area owned by Council is still cleared, as is much of the adjacent privately owned land to the east. There are patches of small trees in some areas, including wattles. Danjera Dam covers a considerable part of Danjera Creek valley at Yalwal, while the verges of Yarramunmun Creek are well forested.

Yalwal is a dry location; it receives only half the annual average rainfall of places along the Cambewarra Range, not far to the northeast. With 33 years of records, the average rainfall for Yalwal is 920mm and there is an average of 96 rain days per year. By comparison, the averages at the naval station at Nowra, about 14 kilometres to the east, are 1224mm of rainfall and 137 rain days; this data was calculated from records spanning 37 years.

1.4 INFORMATION ALREADY AVAILABLE

A report on Yalwal and its environs was prepared by Mr Russ Evans in 1997 for the Yalwal Consultative Committee (Evans 1997). The report describes past and present land uses, relevant planning controls, the ownership of the various parcels of land and the stakeholders in the area. Evans (1997) also provided an account of Yalwal's history and a detailed summary of the facilities and services, roads and tracks, geology and landforms, archaeological relics and items of historical and cultural interest. The report highlighted the need for a Plan of Management, and identified many of the opportunities for and constraints on the development of tourist facilities in the area. The report contained no information on the flora and fauna in the area.

No flora or fauna studies have previously been undertaken on the land at Yalwal owned by Shoalhaven City Council, but some information is available from several field studies carried out nearby. Furthermore, the consultant has been visiting the area for about 20 years and has collected some data on the biota of the area. The following reports and other sources of information were located during a review of the literature, and relevant data on flora and fauna was incorporated into this report:

i. Mills, Kevin (1988a). Rare Plants of the Ettrema - Shoalhaven Area of Morton National Park and Adjacent Areas, New South Wales. This chapter appeared in the book *Fitzroy Falls and Beyond* and is a useful reference to the ROTAP species in the district, including the Yalwal area.

ii. Mills, Kevin (1989). Fauna of Morton and Budawang National Parks, New South Wales: Inventory, Conservation and Management. This report, prepared for the Nowra District Advisory Committee of the NPWS, describes the fauna habitats and fauna associated with the two national parks to the north and south of the study area, as well as endangered fauna listed on Schedule 12 of the *National Parks and Wildlife Act 1974* (New South Wales 1974).

iii. Kevin Mills & Associates (1993). Rare Plants and Animals in the Shoalhaven. This study, commissioned by Shoalhaven City Council, collates all known records of rare flora and

fauna prior to July 1993. The report identifies the rare plants and animals known to occur in various parts of the city, including the Yarramunmun Plateau, just south of Yalwal.

iv. Kevin Mills & Associates (1996). Ecological Assessment. Two Rivers Walking Track, Sections 1 and 2, Shoalhaven River to Braidwood Road. This report describes the plant communities along the route and assesses which threatened species of flora and fauna are likely to be present.

v. Kevin Mills & Associates Pty Limited (1996). Flora and Fauna Assessment, Upgrading of the Braidwood Road, HMAS Albatross to Bulee Gap, City of Shoalhaven. This report discusses the threatened species of flora and fauna known to occur in the vicinity of the Nowra-Braidwood Road. The report provides a concise list of threatened species for this district, which is near the Yalwal study area.

vi. NPWS (1998). Review of Environmental Factors; Closure and Rehabilitation of Yalwal Creek Fire Trail. Unfortunately, this document is basically a desktop study; it provides no data based on field observation.

vii. Mills (1998). Birds Observed in the Ettrema-Shoalhaven Wilderness Area: 1980-1998. This unpublished report provides a comprehensive annotated list of the birds occurring in the area between Yalwal, the Braidwood Road and the Shoalhaven River.

2 FLORA

2.1 METHODOLOGY FOR THE FLORA STUDY

The vegetation survey was undertaken in March 1998. The survey methodology was designed to obtain a description of the plant communities in the study area and a comprehensive list of the native flora present, including threatened species.

Plant Communities
The distribution of the plant communities was investigated in the field, with the assistance of colour aerial photographs. Bearings were taken from the maps in the Evans (1997) report, from the Yalwal topographic map produced by the Central Mapping Authority of New South Wales at a scale of 1:25,000 and from the colour aerial photographs. Numerous traverses of the study area were made to determine the boundaries of the plant communities and to ensure that all plant communities were investigated. The area was traversed on foot and by motor vehicle, and a good coverage was achieved. The boundaries of the plant communities were marked directly onto the aerial photographs and a vegetation map was prepared later, showing the different plant communities, the location of the survey sites and other relevant features.

Vegetation survey sites were selected in locations considered to be typical of the local plant communities. Floristic data were recorded on a *pro forma* survey sheet at each survey site; these were about 30 metres by 30 metres in area. The vegetation was surveyed at four levels, if present: the canopy (trees), middle canopy (trees), understorey (shrubs) and ground cover (plants less than one metre in height). The plant species in each stratum were recorded and an estimate was made of the height and proportional coverage of each stratum. The aim of the surveys was to describe the general character of the plant communities, so not every species on every site was recorded on the survey sheet. Notes were also made on the condition of the vegetation, the amount of disturbance, and evidence of logging, bushfire and weeds. The survey sheets (see Appendix 1) form the basis of the plant community descriptions in Section 2.2, which summarise the floristic composition, structure, distribution and condition of the vegetation.

Australian vegetation classification systems are usually based on the name of the dominant species (the floristic association) and an expression of the growth form, height and cover of the vegetation (the structural formation). The classification system constructed by Walker and Hopkins (1984) is an example; see Appendix 2. In keeping with this practice, the names of the vegetation communities in this report are based on (i) the common name of the dominant species in the tallest stratum and (ii) the structure of the community, but there are occasional departures from this system.

Each plant community was given an identification code. The codes were developed by the consultant to standardise vegetation classification in the Shoalhaven local government area, and are specific to that area. More information on the vegetation survey methodology is available in "Vegetation Survey Methods and Natural Vegetation Types in the Coastal Parts of the City of Shoalhaven, New South Wales" (Mills 1996a).

Plant Species
A floristic audit was undertaken at the survey sites and during the entire study, for the purpose of identifying as many as possible of the plant species present. The resulting list of plant species (see Appendix 3) is reasonably comprehensive, but not definitive. This study is primarily concerned with the native vegetation.

Threatened Plants
The plant survey included a search for species listed on the *Threatened Species Conservation Act 1995.* Information on the distribution of threatened flora is obtainable from various botanical texts and from the Wildlife Atlas database of the National Parks and Wildlife Service. The consultant also maintains a regional database of records of threatened and uncommon plant species. Because of personal experience and the availability of these resources, the consultant is familiar with the threatened plant species in the Yalwal district and the habitats in which they usually occur. Habitats suitable for threatened plants were targeted during the plant survey and were searched thoroughly.

Limitations of the Flora Study
The plant species list in this report is fairly comprehensive but additional species would no doubt be detected during a longer survey that included the different seasons. Some plant species are difficult to find and to identify for part of the year. For example, the leaves and flowering parts of most terrestrial orchids appear for only a few months each year before dying back, leaving only their tubers and rhizomes beneath the ground. Similarly, many grasses produce sufficient plant material to enable accurate identification for only part of the year, and many herbs are difficult to find until they produce fresh growth and flowers. The long drought and the extremely dry survey conditions no doubt caused many plants, especially small herbaceous species, to die back.

It follows, then, that survey results can be improved by conducting lengthy surveys; generally, the longer the survey the more species will be recorded. Unfortunately, however, it is usually not feasible to delay or extend the duration of a survey to allow for seasonal variations. Most studies of this type are subjected to budgetary and time constraints that determine the duration and the timing of the surveys. This study was no exception. Many readers would be aware of these and similar methodological issues influencing the effectiveness of floristic surveys, and would consider the results in the light of these limitations.

Nomenclature
Most of the plant species names in this report are the current names published by the National Herbarium of New South Wales in the *Flora of New South Wales* (Harden 1990-1993). The taxonomic names are supplemented by common names obtained from various sources, such as the *Flora of New South Wales* (op. cit.) and *Australian Plant Genera* by Baines (1981).

2.2 PLANT COMMUNITIES

The vegetation in the study area is a combination of native forest, regrowth trees and cleared land. Five plant communities were identified in the study area; these are summarised in Table 1, and their structural and floristic characteristics are discussed below the table. The distribution of the communities in the study area is shown on the vegetation map; see Figure 2. Four vegetation survey sheets were completed during the survey; see Appendix 1.

Table 1
Plant Communities in the Yalwal Study Area

Name	Dominant Species	Occurrence
BAC-WRF Ironwood Warm Temperate Rainforest	*Backhousia myrtifolia* *Ficus coronata* *Pittosporum undulatum*	Narrow occurrences in deep gullies.
TER-ANG Red Gum - Angophora Forest	*Eucalyptus tereticornis* *Angophora floribunda*	Throughout the study area, on the floor of the valleys of Danjera and Yarramunmun Creeks, mainly on the "Yalwal Volcanics".
PUN-AGG Grey Gum - Stringybark Forest/Woodland	*Eucalyptus punctata* *Eucalyptus agglomerata*	On the dry ridges in the southern part of the study area; these are very rocky.
CAS-CUN River Oak Forest	*Casuarina cunninghamiana* *Eucalyptus saligna/E. botryoides*	On alluvial soil along Yalwal and Yarramunmun Creeks.
ACA-FOR Wattle Forest	*Acacia filicifolia* *Acacia mearnsii*	On previously cleared land, especially near the junction of Danjera and Yarramunmun Creeks..
Cleared Land	*Axonopus affinis*	On the ridge on the eastern side of the land owned by Council and in small clearings, elsewhere.

BAC-WRF Ironwood Warm Temperate Rainforest

Backhousia myrtifolia - Ficus coronata - Pittosporum undulatum

Occurrence: Ironwood Warm Temperate Rainforest occurs in the gully to the north of the main mining site, in the southern part of the study area. This community occurs in the deeper gullies throughout the district, including those on the western side of Danjera Dam.

Description: This is a closed forest ranging in height from about 8 to 10 metres, usually with emergent eucalypts more than 20 metres in height. The main trees in the community are Ironwood *Backhousia myrtifolia*, Sandpaper Fig *Ficus coronata*, Sweet Pittosporum *Pittosporum undulatum* and Rock Wax-flower *Eriostemon trachyphyllus*, which is a small tree. The shrubs in the rainforest include Blueberry Ash *Elaeocarpus reticulatus*, Native Olive *Notelaea longifolia*, Tree Violet *Hymenanthera dentata* and Yellow Pittosporum *Pittosporum revolutum*. Ferns are moderately common, but are restricted to hardy species such as Rasp Fern *Doodia aspera*, Common Maidenhair *Adiantum aethiopicum*, Necklace Fern *Asplenium flabellifolium* and Sickle Fern *Pellaea falcata*. Vines are prominent; the species include Wonga Vine *Pandorea pandorana*, Wombat Berry *Eustrephus latifolius* and Monkey-rope Vine *Parsonsia straminea*.

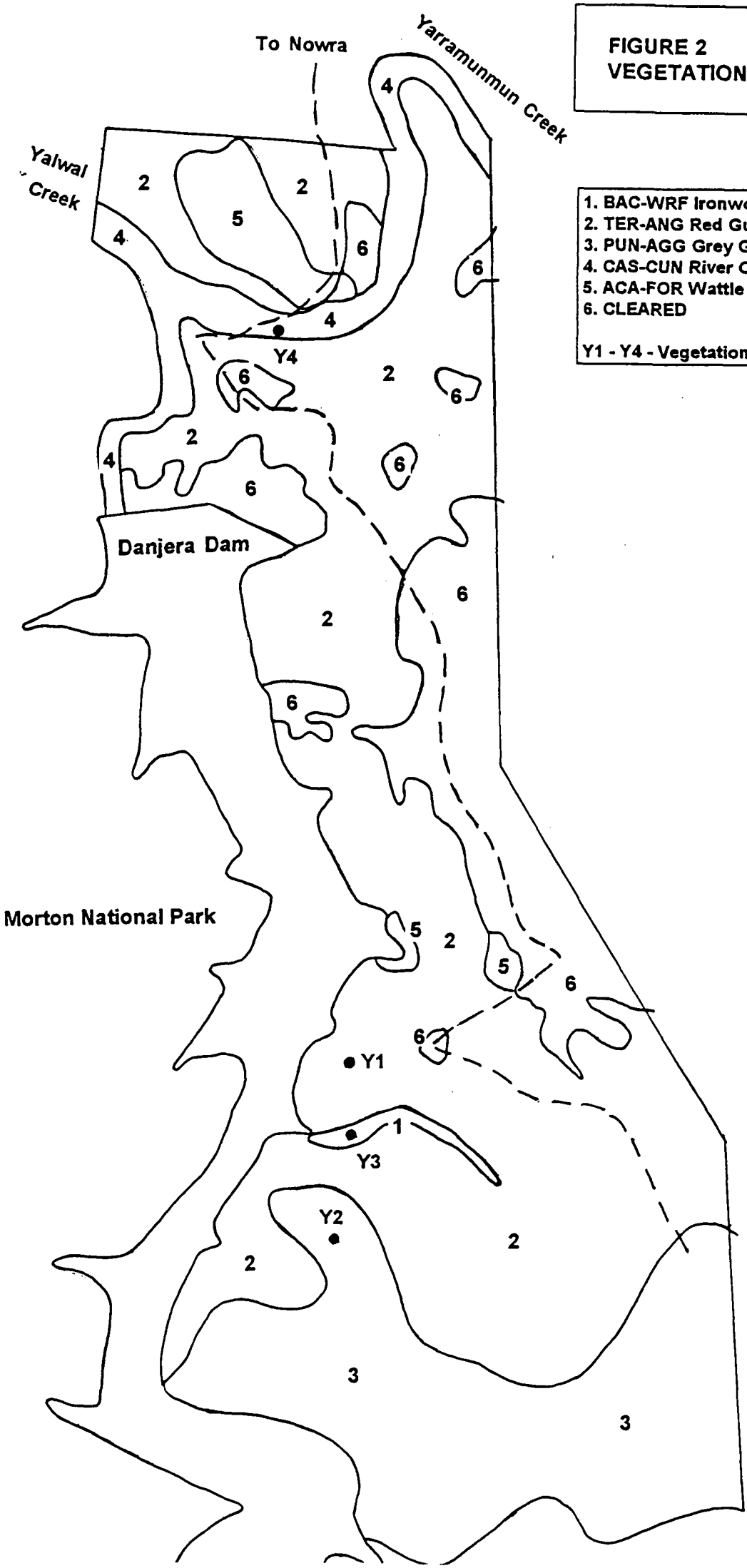


FIGURE 2
VEGETATION MAP OF THE STUDY AREA

1. BAC-WRF Ironwood Warm Temperate Rainforest
2. TER-ANG Red Gum - Angophora Forest
3. PUN-AGG Grey Gum - Stringybark Forest/Woodland
4. CAS-CUN River Oak Forest
5. ACA-FOR Wattle Forest
6. CLEARED

Y1 - Y4 - Vegetation Survey Sites

TER-ANG Red Gum - Angophora Forest
Eucalyptus tereticornis - Angophora floribunda

Occurrence: The Red Gum - Angophora forest occurs throughout the area and is the most common vegetation community on the land owned by Council. This forest type occurs throughout the Shoalhaven but grows only on high nutrient soils; at Yalwal, it is growing in volcanic soils.

Description: In good conditions, such as in moist gullies, this forest grows to more than 25 metres in height. However, it is usually about 20 metres in height. The dominant tree species are Forest Red Gum *Eucalyptus tereticornis*, Rough-barked Apple *Angophora floribunda* and Narrow-leaved Stringybark *Eucalyptus eugenioides*. Blue Gum *Eucalyptus saligna/E. botryoides*, River Peppermint *Eucalyptus elata* and the Ironbark *Eucalyptus beyeriana* occur here and there. This community occurs as regrowth in most places and contains the wattles O'Shanes Wattle *Acacia oshanesii*, Fern-leaf Wattle *Acacia filicifolia* and Black Wattle *Acacia mearnsii*. The understorey varies from sparse to rather dense and it contains shrubs that prefer fairly dry conditions such as Blackthorn *Bursaria spinosa*, Brush Daisy *Olearia viscidula*, Native Olive *Notelaea longifolia*, Tree Violet *Hymenanthera dentata*, Hopbush *Dodonaea viscosa*, Everlasting *Ozothamnus diosmifolius* and Juniper Beard-heath *Leucopogon juniperinus*. Smaller plants such as Stout Bamboo Grass *Stipa ramosissima*, Rough Saw-sedge *Gahnia aspera*, Spreading Flax-lily *Dianella revoluta*, Small-leaved Bramble *Rubus parvifolius* and Australian Clematis *Clematis aristata* are also characteristic of the community.

PUN-AGG Grey Gum - Stringybark Forest/Woodland
Eucalyptus punctata - Eucalyptus agglomerata

Occurrence: This community occurs on the rocky ridges in the southern part of the area. A similar community is quite widespread on sandstone soils throughout the district, but this community is unique because of the abundance of *Eucalyptus beyeriana*.

Description: This forest grows to about 20 metres in height. It has a rather open understorey because of the dry, rocky locations in which it occurs. The main trees in the community are Grey Gum *Eucalyptus punctata*, Blue-leaved Stringybark *Eucalyptus agglomerata* and Ironbark *Eucalyptus beyeriana*; occasional Red Bloodwoods *Eucalyptus gummifera* are also present. A sparse shrub understorey contains species such as Narrow-leaved Geebung *Persoonia linearis*, Native Holly *Oxylobium ilicifolium*, Prickly Parrot-pea *Dillwynia juniperina*, Sunshine Wattle *Acacia terminalis* and Hickory *Acacia implexa*. The ground cover includes species such as Variable Sword-sedge *Lepidosperma laterale*, Mat-rush *Lomandra confertifolia*, Austral Sarsaparilla *Hardenbergia violacea* and Spreading Flax-lily *Dianella revoluta*.

CAS-CUN River Oak Forest
Casuarina cunninghamiana - Tristaniopsis laurina

Occurrence: This forest occurs along Yarramunmun Creek, Yalwal Creek and Danjera Creek, both above and below the dam. The community is restricted to alluvial soils immediately adjacent to the stream channel.

Description: The community is a tall forest more than 30 metres in height. The main tree species is River Oak *Casuarina cunninghamiana*, which forms an almost continuous band of forest along the edges of the creek. Water Gum *Tristaniopsis laurina* is the other riparian tree in this community. Trees on the flats adjacent to the creek include Blue Gum *Eucalyptus saligna/E. botryoides* and River Peppermint *Eucalyptus elata*. Occasional rainforest trees occur in the community; the species include Coachwood *Ceratopetalum apetalum* and Scrub Beefwood *Stenocarpus salignus*. The shrubs in the forest, which are quite dense, include Tall

Baeckea *Baeckea virgata*, Yellow Teatree *Leptospermum polygalifolium* and White Sallow Wattle *Acacia floribunda*. Species such as Spiny-headed Mat-rush *Lomandra longifolia*, Fishbone Water Fern *Blechnum nudum*, Soft Water Fern *Blechnum minus* and Common Maidenhair *Adiantum aethiopicum* are typical of the ground cover.

ACA-FOR Wattle Forest
Acacia filicifolia - Acacia mearnsii - Acacia oshanesii

Occurrence: Regrowth wattles commonly occur on the edge of the cleared land. Only the large patches have been mapped on Figure 2.

Description: The regrowth forest of wattle trees is dominated by Fern-leaf Wattle *Acacia filicifolia*, Black Wattle *Acacia mearnsii* and/or O'Shane's *Wattle Acacia oshanesii*. The understorey is a mixture of introduced and native understorey species on previously cleared land. The common native species include the shrubs Brush Daisy *Olearia viscidula* and Tree Violet *Hymenanthera violacea*. The common introduced species include Paddy's Lucerne *Sida rhombifolia*, Tall Fleabane *Conyza albida* and Ribbed Plantain *Plantago lanceolata*.

TYP-RDL Cumbungi Reedland / ELE-SDG Tall Sedgeland
Typha orientalis - Eleocharis sphacelata

Small areas of these two wetland communities occur around the edge of Danjera Dam; they do not naturally occur on the streams in this area. The patches are very small and were not mapped on the vegetation map. The wetland plants found around the dam are Cumbungi *Typha orientalis*, Tall Spike-rush *Eleocharis sphacelata*, Common Rush *Juncus usitatus*, Slender Knotweed *Persicaria decipiens* and Water Primrose *Ludwigia peploides*.

Cleared Land
The cleared land in the area is covered in introduced pasture and weed species as well as regenerating native species. The introduced species include Carpet Grass *Axonopus affinis*, Spear Thistle *Cirsium vulgare*, Paddy's Lucerne *Sida rhombifolia*, Parramatta Grass *Sporobolus indicus* and Ribbed Plantain *Plantago fruticosus*. Various native species are regenerating, particularly wattles *Acacia* spp.

2.3 PLANT SPECIES

The native and introduced plant species recorded in the Yalwal study area are listed in Appendix 3; 184 native species and 26 introduced (weed) species were recorded. The threatened and rare plant species in the Yalwal-Yarramunmun district are discussed in Section 2.4.

There are patches of Blackberry *Rubus fruticosus* in many of the clearings, and just downstream from Danjera Dam. Most weeds in the area occur in clearings and on grazing land. The only other noxious weed found in the area was Green Cestrum *Cestrum parqui*. The tree Black Locust *Robinia pseudoacacia* may be a troublesome plant but is not noxious; this species occurs in the national park near the junction of Yarramunmun and Danjera Creeks.

2.4 THREATENED AND RARE FLORA

The *Threatened Species Conservation Act 1995* conserves threatened species, populations and ecological communities in New South Wales. Threatened plant species are listed on the schedules attached to the Act and are classified either as "endangered" (Schedule 1 species), "vulnerable" (Schedule 2 species) or "presumed extinct" (Schedule 1, Part 4).

The CSIRO has undertaken extensive research into the conservation status of Australian plant species and has prepared a list of rare or threatened Australian plants, commonly known as ROTAP species, for each state (Briggs & Leigh 1996). Each species has a risk code based on its distribution, conservation status and reservation status. All plant species listed under the *Threatened Species Conservation Act 1995* appear on the ROTAP list, so all plant species that are threatened in New South Wales are also considered to be rare on a national basis. However, the ROTAP list is much larger because it has an additional category, for "rare" plant species.

Plant species may also be uncommon, rare or important for conservation purposes in a regional context. For example, the species might be at or near the limit of its geographical range (latitude or altitude), it may be an outlying population or it may be rare in a specified region. Unfortunately, few regional assessments of plant species have been made. However, the conservation status of the rainforest flora in the Illawarra region (Mills 1988b), and the coastal flora in the Shoalhaven region (Mills 1996b) have been assessed.

Table 2
Rare Plant Species in the Yalwal - Yarramunmun District

Family Species	Conservation Code[1] (TSC Act[2])	Habit and Occurrence
Apiaceae		
Platysace sp. nov.	2RC[3]	Small shrub. Scattered occurrences, on rock surfaces.
Araceae		
Typhonium eliosurum	3RC-	A herb. Shoalhaven Gorge and Parma Creek.
Epacridaceae		
Budawangia gnidioides	2VC- *(V)	Tiny shrub. Moist rock overhangs in Budawang Ranges.
Euphorbiaceae		
Pseudanthus divaricatissimus	3RCa	Prostrate shrub. On sandstone outcrops.
Fabaceae		
Acacia bynoeana	3VC- (V)	Small shrub. One record east of Yalwal in heathland.
Acacia jonesii	3RCa	Shrub to 2m. Meryla to the Shoalhaven area.
Acacia subtilinervis	3RCa	Shrub to 4m. Throughout the area on rock surfaces.
Pultenaea villifera	3RC-	Shrub to Im. Shoalhaven River west of Nowra.
Goodeniaceae		
Goodenia glomerata	2RCa	Herb. Throughout the Budawang Ranges.
Haloragaceae		
Haloragis exalata	3VCa (V)	Herb. Shoalhaven gorge, dry woodland.
Myrtaceae		
Eucalyptus langleyi	2V (V)	Mallee. Endemic to the area west of Nowra.
Eucalyptus sturgissiana	2VCa- (V)	Mallee. Endemic to the Ettrema-Yarramunmun area.
Eucalyptus triflora	3RCa	Tree. Restricted to Budawang Ranges on cliffs.

Leptospermum epacridoideum	2RC-	Shrub to 2m. Sandstone soils throughout the area.
Leptospermum sejunctum	2K	Shrub to 3m. On rock surfaces west of Nowra; endemic to this area.
Melaleuca deanei	3RC-	Shrub to 2m. Heath on sandstone, Shoalhaven River.
Triplarina nowraensis	2K (E)	Shrub to 3m. Yarramunmun valley and west of Nowra; endemic to this area.
Proteaceae		
Grevillea barklyana	3RC-	Large shrub. Southwest of Nowra.
Rutaceae		
Boronia subulifolia	2Rca	Shrub to 1.5m. Budawang Ranges, rock outcrops.
Sapindaceae		
Dodonaea rhombifolia	3RCa	Shrub to 2m. Dry rocky areas (Shoalhaven Gorge).
Sterculiaceae		
Rulingia hermanniifolia	3RCa	Prostrate shrub. On sandstone outcrops.

1. Conservation codes used by Briggs & Leigh (1996); see Appendix 4.
2. Status in *Threatened Species Conservation Act 1995*: E - endangered; V - vulnerable.
3. Potential conservation codes for this new species.

None of the rare or threatened plants in Table 2 were found in the study area. Most of the species are associated with the Nowra Sandstone plateaux rather than with the deep valleys. For this reason, the species are not expected to occur at Yalwal. It is possible however, that some of the rare species occur at Yalwal but were not detected during the survey because of the extremely dry conditions; *Typhonium eliosurum* is an example.

The plant species recorded in the study area were assessed to determine whether any are regionally significant (Mills 1996b). Five species at Yalwal are considered to be of regional significance; they are regionally rare (see Table 3).

Table 3
Regionally Significant Plant Species at Yalwal

Acacia oshanesii Fabaceae	This tree wattle mainly occurs on the north coast of NSW. It occurs at a few locations on the south coast, mainly in the Yalwal area. It is a regionally rare species.
Cayratia clematidea Vitaceae	This species reaches its southern limit of distribution in the Yalwal to Ettrema area, where it occurs in patches of rainforest.
Eriostemon trachyphyllus Rutaceae	This large shrub or small tree is apparently rare in the region; this is the only known location in the Nowra district.
Eucalyptus beyeriana Myrtaceae	This tree reaches its southern limit of distribution at Yalwal; it is quite rare in the Shoalhaven region.
Maytenus silvestris Celastraceae	This shrub species is uncommon south of the Shoalhaven River; it is at its southern limit in the Nowra-Yalwal area.

3 FAUNA

3.1 METHODOLOGY FOR THE FAUNA STUDY

The fauna survey was undertaken in March and April 1998. The weather conditions were very dry and the region was experiencing a severe drought. Significant rain had not fallen for many months. The success of the survey for reptiles and amphibians was severely limited because of these conditions.

Species Detection
The survey concentrated on mammals, avifauna, reptiles and amphibians. The aim of the survey was to detect as many as possible of the fauna species present. Several techniques were used to detect and identify the fauna in the study area. These methods included opportunistic or chance sightings of mammals during daylight and searches for scats, tracks, runways, diggings and other signs of mammal presence. Triggs (1996) discussed how these methods are used to identify mammals. Birds were identified in the field by observation and/or call. Reptiles and amphibians were sought in suitable habitats. Habitat niches were targeted, and rocks and logs were removed and then carefully replaced in the search for fauna. Frogs were also recorded by interpretation of their call. Spotlights were used to detect fauna active at night, and ANABAT sonar detection devices were used to record bats.

Fauna Habitats
A description of the fauna habitats in the study area was prepared, because the types of habitats available in an area influence which fauna (including threatened species) occur there, as well as the diversity and abundance of fauna. The vegetation community descriptions provide a good source of information on the habitats present, but other data were also collected such as the presence/absence of rock outcrops, tree hollows, dams and streams, organic ground litter, habitat niches, prolific flowering and habitat features with the potential to attract threatened fauna. The fauna habitat study therefore has an important role in predicting threatened fauna likely to occur in the study area.

Threatened Species
Information on the distribution of threatened fauna is obtainable from various reports and publications, and from the Wildlife Atlas database of the National Parks and Wildlife Service. The consultant also maintains a regional database of records of threatened and uncommon fauna. Because of personal experience and the availability of such resources, the consultant is familiar with most threatened fauna occurring in the Shoalhaven district. Threatened fauna were searched for by the methods already described.

Limitations of the Fauna Study
The results of fauna studies can be optimised by conducting the surveys over a long period, to compensate for the effect of unfavourable weather on survey results and to account for seasonal change and climatic variation. In principle, the longer the survey the more species will be recorded, until the recording of additional species peters out. Results can also be improved by utilising a wide range of species detection techniques, because some fauna are detected by particular methods. These methods may include the direct observation of animals, spotlight surveys, call identification, habitat analysis to predict species' presence, scat identification, scat analysis, the laying of box traps, pitfall traps and hair tubes, the use of harp nets, sonar detection devices and pre-recorded playback tapes.

However, as already discussed, flora and fauna studies are subject to budgetary and time constraints that determine the amount of time allocated, the timing of the surveys and the species detection methods used. It is usually not feasible, for example, to delay fauna surveys until prime survey conditions prevail. Many readers would be aware of these and other issues influencing the effectiveness of fauna surveys. The results of the surveys should be viewed in

the light of these limitations. The fauna survey results are only a guide to the native fauna present and are by no means a definitive list of the species occurring in the study area. A complete inventory of species can only be obtained by an intensive fauna survey program spanning all seasons.

Nomenclature
The nomenclature in this report is based on the Australian Museum's *The Mammals of Australia* edited by Strahan (1995), the Royal Australasian Ornithologists Union's *The Taxonomy and Species of Birds of Australia and its Territories* by Christidis and Boles (1994) and *Reptiles and Amphibians of Australia* by Cogger (1992).

3.2 FAUNA HABITATS

There are three main habitat zones at Yalwal; these are the forests, the stream-side (and dam) environments, and the cleared hillsides.

1. Forests.
The area supports original forest and regrowth forest. The forests are generally dry with a rather open understorey. The trees are mostly medium sized, but smaller in areas of regrowth. The largest trees occur in the gullies. The hilly terrain also contains rock outcrops, particularly to the south around the old mine workings, where tunnels, pits and old shafts provide habitat for some species, particularly bats.

2. Stream-side environments.
The stream-side environments include tall casuarina forest, deep alluvial soils and, in the stream channel, rocky outcrops of creek and pools. Wetland habitat is provided along Yalwal Creek and Danjera Creek. In addition to the deep water of the dam, itself, the wetland habitat consists of small pools, large areas of deep open water, flowing water and shallow pools. Many of the bird species at Yalwal have a strong affinity for the riparian environment, which is also important to amphibians.

3. Cleared Land.
The cleared land provides grazing habitat or some species, such as the Eastern Grey Kangaroo and the introduced Rabbit. The open habitat also suits various native bird species such as Richard's Pipit, Willie Wagtail, Australian Magpie and Jacky Winter.

3.3 FAUNA SPECIES

3.3.1 Mammals

The mammals recorded at Yalwal during this study and on previous occasions are listed in Table 4. The table also provides notes on the records and the method of detection. Eleven mammal species were recorded during the study and a further four species had previously been recorded by the consultant. In total, 12 native species and three non-native species have been recorded there. Additional species are certainly expected to occur in the area; these can be ascertained from Appendix 5 which provides an annotated list of the mammal species recorded in and around the Yalwal area.

The results of the survey indicate that there is a high diversity of mammal species at Yalwal, a consequence of the diversity of habitats present and the large area of surrounding undisturbed forest habitat. The cleared land and the old mine workings supplement the natural habitats in the area.

Table 4
Mammal Species recorded in the Yalwal Study Area

Cattle* *Bos taurus*	Domestic cattle are present in the study area.
Chocolate Wattled Bat *Chalinolobus morio*	Recorded in the forest in the southern part of the area, on 22 March 1998.
Common Brushtail Possum *Trichosurus vulpecula*	Recorded in the forest in the southern part of the study area during this study; previously observed in the area.
Common Ringtail Possum *Pseudocheirus peregrinus*	Dung was found during this study and the species has previously been observed in the area.
Common Wombat *Vombatus ursinus*	Observed in the study area, where it is quite common.
Eastern Grey Kangaroo *Macropus giganteus*	Previously observed at Yalwal and in the surrounding areas.
Eastern Horseshoe-bat *Rhinolophus megaphyllus*	Recorded near the old mine workings in the southern part of the study area on 22 March 1998.
Fox* *Vulpes vulpes*	Observed in the general area on previous occasions.
Platypus *Orithorhynchus anatinus*	Previously observed on Yalwal Creek.
Rabbit* *Oryctolagus cuniculus*	Evidence of this species was found on cleared land during this study and on previous occasions.
Short-beaked Echidna *Tachyglossus aculeatus*	Recorded in the general district on previous occasions.
Sugar Glider *Petaurus breviceps*	Recorded in the study area during this study and on previous occasions.
Swamp Wallaby *Wallabia bicolor*	Observed in the study area during this study and on previous occasions.
Wallaroo *Macropus robustus*	Observed in the study area during this study and on previous occasions.
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	Recorded near the old mine workings in the southern part of the study area on 22 March 1998.

* Introduced species.

Wild pigs and goats have had an impact on the native vegetation in some places, and domestic cattle sometimes stray from nearby farms. The main impact of this is the spread of weeds (NPWS 1998).

3.3.2 Avifauna

Fifty-two (52) bird species were recorded during the study, all native species; see Table 5. Appendix 6 lists 145 birds previously recorded by the consultant in the Ettrema Wilderness, which includes the Yalwal area. Most are expected to occur in the study area or nearby.

Table 5
Bird Species recorded at Yalwal during this Study

Common Name	Taxonomic Name
Australasian Grebe	*Tachybaptus novaehollandiae*
Australian King-Parrot	*Alisterus scapularis*
Australian Magpie	*Gymnorhina tibicen*
Australian Owlet-Nightjar	*Aegotheles cristatus*
Australian Raven	*Corvus coronoides*
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
Brown Gerygone	*Gerygone mouki*
Brown Goshawk	*Accipiter fasciatus*
Brown Thornbill	*Acanthiza pusilla*
Brown-headed Honeyeater	*Melithreptus brevirostris*
Buff-rumped Thornbill	*Acanthiza reguloides*
Crested Shrike-tit	*Falcunculus frontatus*
Crimson Rosella	*Platycercus elegans*
Eastern Spinebill	*Acanthorhynchus tenuirostris*
Eastern Whipbird	*Psophodes olivaceus*
Eastern Yellow Robin	*Eopsaltria australis*
Fan-tailed Cuckoo	*Cacomantis flabelliformis*
Gang-gang Cockatoo	*Callocephalon fimbriatum*
Golden Whistler	*Pachycephala pectoralis*
Grey Butcherbird	*Cracticus torquatus*
Grey Fantail	*Rhipidura fuliginosa*
Grey Shrike-thrush	*Colluricincla harmonica*
Jacky Winter	*Microeca fascinans*
Laughing Kookaburra	*Dacelo novaeguineae*
Lewin's Honeyeater	*Meliphaga lewinii*
Little Pied Cormorant	*Phalacrocorax melanoleucos*
Magpie-lark	*Grallina cyanoleuca*
Mistletoebird	*Dicaeum hirundinaceum*
Noisy Friarbird	*Philemon corniculatus*
Pacific Black Duck	*Anas superciliosa*
Pied Currawong	*Strepera graculina*
Red-browed Finch	*Neochmia temporalis*
Rockwarbler	*Origma solitaria*
Rose Robin	*Petroica rosea*
Rufous Fantail	*Rhipidura rufifrons*
Rufous Whistler	*Pachycephala rufiventris*
Satin Bowerbird	*Ptilonorhynchus violaceus*
Silvereye	*Zosterops lateralis*
Spotted Pardalote	*Pardalotus punctatus*
Superb Fairy-wren	*Malurus cyaneus*
Superb Lyrebird	*Menura novaehollandiae*
Varied Sittella	*Daphoenositta chrysoptera*
White-bellied Sea-Eagle	*Haliaeetus leucogaster*
White-browed Scrubwren	*Sericornis frontalis*
White-faced Heron	*Egretta novaehollandiae*
White-throated Treecreeper	*Cormobates leucophaeus*
White-winged Chough	*Corcorax melanorhamphos*
Willie Wagtail	*Rhipidura leucophrys*
Wonga Pigeon	*Leucosarcia melanoleuca*
Yellow-faced Honeyeater	*Lichenostomus chrysops*
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*
Yellow-tufted Honeyeater	*Lichenostomus melanops*

3.3.3 Reptiles and Amphibians

As already discussed, the climatic conditions during the survey were not conducive to detecting reptiles and frogs. Only a few species were observed during this study; these are listed in Table 6. The species list has been expanded to include the species previously observed in the area by the consultant. Six reptiles and three amphibian species were recorded.

Table 6
Reptiles and Amphibians recorded in the Yalwal Area

Species	Taxonomic Name	Record
Frogs		
Common Eastern Froglet	*Crinia signifera*	Previously recorded in the area.
Leaf Green Tree Frog	*Litoria phyllochroa*	Previously recorded in the area.
Lesueur's Frog	*Litoria lesueuri*	Recorded during this study.
Reptiles		
Eastern Water Dragon	*Physignathus lesueurii*	Recorded during this study.
Eastern Water Skink	*Eulamprus quoyii*	Recorded during this study.
Grass Skink	*Lampropholis guichenoti*	Recorded during this study.
Lace Monitor	*Varanus varius*	Recorded during this study.
Red-bellied Black Snake	*Pseudechis porphyriacus*	Previously recorded in the area.
Weasel Skink	*Saproscincus mustelinus*	Recorded during this study.

3.3.4 Fish

Little research has been undertaken on the fish fauna of the Yalwal Creek system. Bishop and Bell (1978a) collected the Australian Grayling *Prototroctes maraena* in Yalwal Creek below Danjera Dam in 1975, and found 17 fish species in the Shoalhaven River below Tallowa Dam in 1976 (Bishop & Bell 1978b). More recently, The Ecology Lab (1998) found nine fish species below Danjera Dam during a study of water releases from the dam. All fish species recorded in the vicinity of the present study area are listed in Table 7.

Table 7
List of Fish Species for the Yalwal Creek System

Species		Ecology Lab (1998)	Bishop & Bell (1978b)	KMA[1]
Australian Bass	*Macquaria novemaculeata*	X		X
Australian Grayling	*Prototroctes maraena*		X	
Australian Smelt	*Retropinna semoni*	X		
Common Jollytail	*Galaxias olidus*	X		X
Cox's Gudgeon	*Gobiomorphus australis*	X		
Dwarf Flathead Gudgeon	*Philypnodon* sp. A	X		
Empire Gudgeon	*Hypseleotris compressa*	X		
Flathead Gudgeon	*Philypnodon grandiceps*	X		
Mosquitofish	*Gambusia holbrookii*	X		
Short-finned Eel	*Anguilla australis*			X
Striped Gudgeon	*Gobiomorphus coxii*	X		X

1. Recorded by Kevin Mills & Associates during this and/or previous studies.

3.4 THREATENED FAUNA

The *Threatened Species Conservation Act 1995* conserves threatened species, populations and ecological communities of animals and plants in New South Wales. Threatened fauna are listed on the schedules attached to the Act and are classified either as "endangered" (Schedule 1 species), "vulnerable" (Schedule 2 species) or "presumed extinct" (Schedule 1, Part 4).

The threatened fauna species recorded in the Yalwal District are listed in Table 8, together with a few other species that are quite likely to occur there. One threatened fauna species was recorded in the study area and several other threatened species are known to occur in the Yalwal district; the potential for these species to occur in the study area is noted in the table.

Table 8
List of Threatened Fauna Species for the Yalwal District

Mammals	
Southern Brown Bandicoot (V)[1] *Isoodon obesulus*	The nearest record of the Southern Brown Bandicoot is from Parma Creek. The species may occur in suitable areas of forest.
Spotted-tailed Quoll (V) *Dasyurus maculatus*	The Spotted-tailed Quoll has not been recorded at Yalwal, but may occur in the extensive forests in the valleys, although there are no known records
Koala (V) *Phascolarctos cinereus*	An old record from Colymea Creek. The Koala is probably now absent from the district.
White-footed Dunnart (V) *Sminthopsis leucopus*	The nearest record is from Parma Creek. The White-footed Dunnart may occur in woodlands on the plateaux around Yalwal.
Yellow-bellied Glider (V) *Petaurus australis*	The Yellow-bellied Glider has not been recorded in or near Yalwal but may occur in the forests, especially those containing *Eucalyptus punctata.*
Brush-tailed Rock-Wallaby (V) *Petrogale penicillata*	No recent records, although the species was once known to occur along clifflines in the Yalwal area.
Glossy Black-Cockatoo (V) *Calyptorhynchus lathami*	This species is relatively common around Nowra. It could occur wherever there are stands of mature Casuarinas.
Eastern Bristlebird (V) *Dasyornis brachypterus*	Recorded south of the Braidwood Road, but probably not as far north as Yalwal.
Striated Fieldwren (V) *Calamanthus fuliginosus*	Mainly recorded south of the Braidwood Road. This species occurs in the Tianjara Falls area.
Powerful Owl (V) *Ninox strenua*	Records come from Tianjara Falls and Sassafras. The Powerful Owl almost certainly inhabits the extensive forests in the valleys in the Yalwal area.
Broad-headed Snake (E)[1] *Hoplocephalus bungaroides*	Recorded in the Yalwal - Danjera - Yarramunmun area, where it inhabits rocky areas.
Heath Monitor (V) *Varanus rosenbergi*	This species has been recorded in the Yalwal area, where it inhabits woodlands on the plateau.
Yellow-bellied Sheathtail-bat (V) *Saccolaimus flaviventris*	Recorded around Yarramunmun Creek on 22 March 1998.

1.Endangered (E) or vulnerable (V) on the schedules of the *Threatened Species Conservation Act 1995.*

Two additional species of conservation importance occur in the area, the Australian Grayling *Prototroctes maraena* and the Platypus *Ornithorhynchus anatinus*.

The Australian Grayling was found below Danjera Dam in 1975 (Bishop & Bell 1976a) and it presumably still occurs in the Yalwal Creek system. This species is classed as vulnerable (Wager & Jackson 1993). The species is being impacted by dams, by the removal of riparian vegetation and by stream siltation, all of which have occurred in the Yalwal area.

The Platypus is not a threatened species (*Threatened Species Conservation Act 1995*), but there is concern for its survival in some parts of its range. Grant (1991) classified it as "common, but vulnerable". The Platypus occurs in the Yalwal Creek system and is likely to occur in any of the large pools along the local streams. It is less likely to occur in the deep water of Danjera Dam.

4 ASSESSMENT OF ECOLOGICAL CONSERVATION SIGNIFICANCE

4.1 PLANT COMMUNITIES

The vegetation in the Yalwal study area is not typical of the region, most of which is a sandstone environment. The volcanic soils in the Yalwal valley and in some of the other deep valleys in that district support a forest dominated by Forest Red Gum *Eucalyptus tereticornis* and associated species, as described above. This type of forest is characteristic of high nutrient soils, and wherever it occurred, it was usually cleared. The forest type is seldom included in protected areas. This forest has been extensively cleared at Yalwal, on the land owned by Council and on the adjacent freehold land. The remaining areas are of considerable botanical interest.

The Grey Gum - Stringybark forest in the southern part of the area is also of botanical interest because of the prevalence of *Eucalyptus beyeriana* which is at its southern limit. This ironbark is not known to occur in Grey Gum forest anywhere else in the region. The unique local geology probably accounts for its presence at Yalwal.

The River Oak forest along Yarramunmun Creek is restricted, because it only occurs along the main streams in the district; it is, however, widespread.

The Ironwood warm temperate rainforest is a widespread community, but is almost totally restricted to gullies and rocky areas providing protection from fire.

4.2 PLANT SPECIES

No threatened plant species were found in the study area, but several threatened and/or rare species are known to occur in the district; see Table 2. Five regionally significant plant species were recorded during the study; see Table 3. Other significant species may also occur there because of the unique geology. Furthermore, the extreme drought conditions at the time of the survey were not conducive to locating many species, especially small herbaceous plants.

4.3 FAUNA HABITATS

The fauna habitats in the study area are not significantly different from the forests and rocky areas in the surrounding district. However, the following habitat components are either not available or are not common in the surrounding district.

- Danjera Dam provides deep water habitat that is not present elsewhere in the district.
- Cleared land is an unnatural habitat, and is largely absent from most of the surrounding areas.
- The tree species *Eucalyptus tereticornis* and *Eucalyptus beyeriana* are absent from most of the surrounding district. *Eucalyptus tereticornis* is regarded as an important habitat tree for some fauna species, for example the Koala, and the ironbark *Eucalyptus beyeriana* is an important source of nectar.
- The mine tunnels provide habitat for some bat species. Eastern Horseshoe-bats were recorded near the tunnels. The threatened Common Bentwing-bat may also occur there.

4.4 FAUNA SPECIES

The Yalwal study area is part of a large area of natural country supporting a high diversity of animal species. The habitats in the study area are diverse. The presence of one threatened species, the Yellow-bellied Sheathtail-bat was confirmed during the study, and other threatened bat species are expected to occur in the area. The Yalwal area contributes significantly to the biodiversity of the district.

5 MANAGEMENT ISSUES

5.1 EXISTING IMPACTS

5.1.1 RECREATIONAL VEHICLE USE

The use of recreational vehicles, mainly 4WDs and trail bikes, is popular in the Yalwal area, leading to moderate and in some places severe impacts on the natural environment. Some of the mining relics have been adversely affected, and some of the roads and tracks have been badly eroded. There is no need to retain any tracks, other than the main loop track and one track to the southern end of Council's land. The access track into Morton National Park, north of Yarramunmun Creek, also needs to be rationalised.

5.1.2 WEED MANAGEMENT

The weed species recorded in the study area are listed in Appendix 3; most are associated with the cleared land east of Danjera Dam. Two noxious weeds, *sensu* the *Noxious Weeds Act 1993*, were recorded in the study area, Blackberry *Rubus fruticosus* and Green Cestrum *Cestrum parqui*. There were no large infestations, although action is required to control further proliferation.

5.1.3 STOCK GRAZING

Stock have been allowed to graze on Council's land for many years. Grazing is hindering the regeneration of the native vegetation, and stock are trampling and fouling the edges of the

dam and Yarramunmun Creek. The presence of stock is in conflict with the recreational use of the area.

5.1.4 POLLUTION

Sources of pollution in the area include the poor toilet facilities, the dumping of rubbish, cattle and sedimentation caused by eroding tracks. All of these issues need to be considered in any future management plan for the area.

5.2 MANAGEMENT AND DEVELOPMENT

5.2.1 PROTECTED AREA MANAGEMENT

The land owned by Council adjoins Morton National Park to the north and west. Most of the national park has been dedicated as the Ettrema Wilderness area; the only part that is not wilderness is the previously cleared area north of the Yarramunmun Creek bridge. The National Parks and Wildlife Service is responsible for the management of both areas. A Plan of Management has not been prepared for either area.

The close proximity of these dedicated areas has implications for the use of the land owned by Council. The opportunities and constraints should be carefully considered. Council should not, for example, undertake any actions that may prejudice the aims and objectives of the NPWS for the management of the wilderness area. The presence of the wilderness area and national park offer an opportunity for any development on the Council land, but co-operation between the Council and the NPWS is essential.

5.2.2 RECREATIONAL DEVELOPMENT

The environmental consequences of commercial recreational developments consist of direct and indirect impacts. The removal of habitat to construct a recreational facility is an example of a direct impact. An increase in the use of nearby walking tracks is an example of an indirect impact. Development of a well managed recreational facility could also have a positive benefit for the area, where many of the above existing impacts could be addressed.

6 RECOMMENDATIONS

Changes to the existing management regime and public use of the area are needed to protect and enhance the natural values of the area. To assist in the management of the flora and fauna associated with the Yalwal area, consideration should be given to incorporating them into the Plan of Management.

i. Vehicle tracks should be rationalised. Most of the side tracks off the main loop road should be closed and rehabilitated.

ii. There should be no vehicle access to the mining area on the crown land in the southern part of the study area, where the steep topography precludes track stability.

iii. Stock grazing should cease on land owned by Council.

iv. Council should undertake a program to control noxious weeds.

v. Adequate and well maintained public toilets should be provided in a central location.

vi. The Council and the NPWS should liaise regarding the provision of picnic facilities in the area; it may not be necessary to duplicate some facilities.

vii. Regeneration should be encouraged in cleared areas; the removal of stock and controls on vehicle use will assist regeneration.

viii. Only local native tree species should be utilised in plantings around any development that occurs in the area. Exotic trees are out of character with the area.

ix. The NPWS should remove the stand of the exotic tree species *Robina pseudocacia* growing near Yarramunmun Creek in Morton National Park.

x. A fire management plan should be part of the Plan of Management for the area. This must be prepared in close liaison with the NPWS, who manage much of the surrounding land.

xi. No walking tracks, track signs or maps showing tracks in or near Morton National Park should be developed or installed unless the NPWS has been consulted.

xii. The theme for the proposed recreational development is appropriately "the wilderness experience". This places responsibilities on the proponent and on the public to ensure that the wilderness values are not compromised.

* * * * *

7 REFERENCES

Baines, J. (1981). *Australian Plant Genera.* The Society for Growing Australian Plants, Surrey Beatty & Sons Pty Ltd, NSW, 406p.

Bishop, K. A. & Bell, J. D. (1978a). Aspects of the Biology of the Australian Grayling *Prototroctes maraena* Gunther Pisces: Prototroctidae. *Aust. J. Freshwater Res.*, 1978, 29, 743-61.

Bishop, K. A. & Bell, J. D. (1978b). Observations on the Fish Fauna below Tallowa Dam (Shoalhaven River, New South Wales) during River Flow Stoppages. *Aust. J. Mar. Freshwater Res.* 1978m 29m 543-9.

Briggs, J. & Leigh, J. (1996). *Rare or Threatened Australian Plants.* CSIRO, Canberra, 466p.

Christidis, L. & Boles, W. (1994). *The Taxonomy and Species of Birds of Australia and its Territories.* Royal Australasian Ornithologists Union, Victoria.

Cogger, H. (1992). *Reptiles and Amphibians of Australia.* Reed, Sydney, revised ed., 775p.

Grant, T. R. (1991). The Biology and Management of the Platypus *Ornithorhynchus anatinus* in NSW. NSW National Parks and Wildlife Service, Sydney.

Evans, R. (1997). Yalwal and Environs, Proposed Management Plan, Preliminary Report. Prepared for Shoalhaven City Council, August.

The Ecology Lab Pty Ltd (1998). Experimental Releases from Danjera Dam, Comparison of Two Release Events. Prepared for Shoalhaven City Council, March.

Harden, G. (ed.) (1990-1993). *Flora of New South Wales. Volumes 1 to 4.* Royal Botanic Gardens/University of NSW Press, Sydney.

Kevin Mills & Associates Pty Limited (1993). Rare Plants and Animals in the Shoalhaven. A report prepared for Shoalhaven City Council, Nowra.

Kevin Mills & Associates Pty Limited (1996). Flora and Fauna Assessment, Upgrading of Braidwood Road, HMAS Albatross to Bulee Gap, City of Shoalhaven. A report prepared for Shoalhaven City Council, Nowra.

Kevin Mills & Associates Pty Limited (1996). Ecological Assessment, Two Rivers Walking Track, Sections 1 and 2, Shoalhaven River to Braidwood Road. Prepared for Shoalhaven City Council, Nowra.

Mills, K. (1988a). Rare Plants of the Ettrema-Shoalhaven Area of Morton National Park and nearby areas, New South Wales, in *Fitzroy Falls and Beyond*, The Budawang Committee, pp. 313-316.

Mills, K. (1988b). Conservation of Rare Rainforest Plants in the Illawarra Region of New South Wales. Inventory, Assessment and Recommendations for Management. Report prepared for the National Parks & Wildlife Service of New South Wales, June, 118p.

Mills, K. (1989). Fauna of Morton and Budawang National Parks, New South Wales: Inventory, Conservation and Management. A Dicussion Paper prepared for the Nowra District Advisory Committee of the National Parks and Wildlife Service of New South Wales, March.

Mills, K. (1996a). Vegetation Survey Methods and Natural Vegetation Types in the Coastal Parts of the City of Shoalhaven, New South Wales. *Illawarra Vegetation Studies* (7), Coachwood Publishing, Jamberoo, NSW.

Mills, K. (1996b). Botanically Significant Plant Species in the Coastal Shoalhaven Region, New South Wales. *Illawarra Vegetation Studies* (8), Coachwood Publishing, Jamberoo, NSW.

Mills, K. (1998). Birds Observed in the Ettrema-Shoalhaven Wilderness Area: 1980-1998. The author, unpubl.

National Parks and Wildlife Service of New South Wales (1998). Review of Environmental Factors; Closure and Rehabilitation of Yalwal Creek Fire Trail. Nowra District, unpubl. NPWS, 21p.

New South Wales (1974). *National Parks and Wildlife Act 1974.* NSW Government Printer, Sydney.

New South Wales (1995). *Threatened Species Conservation Act 1995.* NSW Government Printer, Sydney.

Strahan, R. (1995). *The Mammals of Australia.* Australian Museum/Reed Books, Sydney, 756p.

Triggs, B. (1996). *Tracks, Scats and Other Traces. A Field Guide to Australian Mammals.* Oxford University Press Australia, Melbourne, 340p.

Wager, R. & Jackson, P. (1993). The Action Plan for Australian Freshwater Fishes. Australian Nature Conservation Agency, June.

Walker, J. & Hopkins, M. (1984). Vegetation. In *Australian Soil and Land Survey, Field Handbook.* McDonald, R., Isbell, R., Speight, J., Walker, J. & Hopkins, M. (1990) (eds). Inkata Press, Melbourne, 2nd ed., pp.58-86.

APPENDIX 1
VEGETATION SURVEY SHEETS

Vegetation Survey Sheet

Site No.: Y1

Vegetation Type: TER-ANG Red Gum - Angophora Forest

Location: East of Danjera Dam, Yalwal — Date: 23/3/98

Grid Reference: 34°55'50" 150°22'53" — Land Tenure: Council

Geology: Yalwal volcanics — Soil Type: Sand — Topography: Moderate slope

Altitude: 100m — Slope: Moderate — Aspect: North

Vegetation: (1 rare to 5 dominant)

Canopy: 50-70% cover, 20m+ high

Eucalyptus tereticornis	4
Eucalyptus eugenioides	4
Angophora floribunda	2

Middle Canopy:
nil

Understorey: 30-40% cover, <3m high

Persoonia linearis	1	*Notelaea longifolia*	1
Bursaria spinosa	2	*Rapanea variabilis*	1
Olearia viscidula	3	*Ozothamnus diosmifolium*	1

Ground Cover: 60-70% cover, <1m high

Stipa ramosissima	2	*Dodonaea viscosa*	1
Calochlaena dubia	4	*Stipa* sp.	2
Leucopogon juniperinus	1	*Gahnia aspera*	2
Dianella revoluta	1	*Leucopogon lanceolata*	1
Aristida sp.	1		

Vines:

Eustrephus latifolius	1
Clematis aristata	1
Geitonoplesium cymosum	1

Epiphytes:
nil

Rare or Threatened Plant Species: — Name:
Nil

Vegetation Survey Sheet

Site No.: Y2

Vegetation Type: PUN-AGG Grey Gum - Stringybark Forest/Woodland

Location: Yalwal (old mine workings) Date: 23/3/98

Grid Reference: 34°55'55" 150°22'37" Land Tenure: Crown

Geology: Yalwal voncanics Soil Type: Sand Topography: Top of narrow ridge

Altitude: 150m Slope: Gentle Aspect: West

Vegetation: (1 rare to 5 dominant)

Canopy: 50-70% cover, 20m+ high

Eucalyptus punctata	4
Eucalyptus agglomerata	4
Eucalyptus beyeriana	2
Eucalyptus gummifera	1

Middle Canopy:
nil

Understorey: 50% cover, <3m high

Eucalyptus beyeriana	2	*Acacia terminalis*	1
Persoonia linearis	2	*Dillwynia juniperinus*	1
Oxylobium ilicifolium	2	*Allocasuarina littoralis*	1
Dodonaea triquetra	1	*Choretrum candollei*	1
Acacia implexa	1	*Jacksonia scoparia*	1

Ground Cover: 70% cover, <1m high

Lepidosperma laterale	1	*Entolasia stricta*	1
Leucopogon juniperinus	1	*Lomandra confertifolia*	3
Acacia terminalis	1	*Lomandra glauca*	1
Dampiera purpurascens	1		
Lomandra multiflora	2		

Vines:

Hardenbergia violacea	1

Epiphytes:
nil

Rare or Threatened Plant Species: Name:
Nil

Vegetation Survey Sheet

Site No.: Y3

Vegetation Type: BAC-WRF Ironwood Warm Temperate Rainforest

Location: Yalwal (old mining area) Date: 23/3/98

Grid Reference: 34°55'53" 150°22'42" Land Tenure: Crown

Geology: Metamorphic rocks Soil Type: Topography: Gully floor/lower slopes

Altitude: 90m Slope: Level/gentle Aspect: South

Vegetation: (1 rare to 5 dominant)

Canopy: 10% cover, 20m high emergents

Eucalyptus tereticornis	1

Middle Canopy: 80-100% cover, 10m high

Ficus coronata	3	*Stenocarpus salignus*	1
Backhousia myrtifolia	5	*Pittosporum undulatum*	1
Eriostemon trachyphyllus	1		

Understorey: 10-20% cover, <3m high

Backhousia myrtifolia	2	*Pittosporum undulatum*	1
Persoonia linearis	1	*Eriostemon trachyphyllus*	2
Hymenanthera dentata	2	*Astrotricha latifolia*	1
Notelaea longifolia	1		

Ground Cover: 10-20% cover, <1m high

Doodia aspera	2	*Asplenium flabellifolium*	2
Adiantum aethiopicum	2	*Maytenus silvestrus*	1
Platysace lanceolata	2	*Notelaea longifolia*	2
Dianella caerulea	1	*Pseuderanthemum variabile*	1
Stenocarpus salignus	1	*Pellaea falcata*	1

Vines:

Eustrephus latifolius	1	*Parsonsia straminea*	1
Morinda jasminoides	1	*Geitonoplesium cymosum*	1
Pandorea pandorana	1		
Stephania japonica	1		

Epiphytes:

Pyrrosia rupestris	2

Rare or Threatened Plant Species: Name:

Nil

Vegetation Survey Sheet

Site No.: Y4

Vegetation Type: CAS-CUN River Oak Forest

Location: Yarramunmun Creek, immediately above the bridge, Yalwal Date: 23/3/98

Grid Reference: 34°55"08" 150°23'22" Land Tenure: Freehold (?)

Geology: Sedimentary Soil Type: Alluvial Topography: Valley floor beside stream

Altitude: 50m Slope: Level Aspect: East/West

Vegetation: (1 rare to 5 dominant)

Canopy: 70-80% cover, 25m high

Casuarina cunninghamiana	5
Eucalyptus saligna/E. botryoides	2
Eucalyptus elata	1

Middle Canopy: 80-90% cover, 8-10m high

Tristaniopsis laurina	2
Casuarina cunninghamiana	3
Stenocarpus salignus	1

Understorey: 80% cover, 1-4m high

Acacia floribunda	1	*Tristaniopsis laurina*	1
Leptospermum polygalifolium	3	*Duboisia myoporoides*	1
Baeckea virgata	1	*Ceratopetalum apetalum*	1
Prostanthera lasianthos	2	*Grevillea arenaria*	2
Stenocarpus salignus	1	*Acacia mearnsii*	1

Ground Cover: 20-40% cover, <1m high

Lomandra longifolia	2	*Opercularia aspera*	1
Adiantum aethiopicum	4	*Astrotricha latifolia*	1
Calochlaena dubia	1		

Vines:
nil

Epiphytes:
nil

Rare or Threatened Plant Species: Name:
Nil

APPENDIX 2
STRUCTURAL FORMATION CLASSES IN AUSTRALIAN VEGETATION COMMUNITIES

Crown Separation	D Closed or dense	M Mid-dense	S Sparse	B Very sparse	I Isolated plants	L Isolated clumps
Field criteria	Touching - overlap	Touching - slight separation	Clearly separated	Well separated	Isolated	Isolated
Crown separation ratio	<0	0-0.25	0.25-1	1-20	>20	>20
Growth Form	Structural Formation Classes					
T Tree	Closed forest	Open forest	Woodland	Open woodland	Isolated trees	Isolated clump of trees
M Tree mallee	Closed mallee forest	Open mallee forest	Mallee woodland	Open mallee woodland	Isolated mallee trees	Isolated clump of mallee trees
S Shrub	Closed shrubland	Shrubland	Open shrubland	Sparse shrubland	Isolated shrubs	Isolated clump of mallee shrubs
Y Mallee shrub	Closed mallee shrubland	Mallee shrubland	Open mallee shrubland	Sparse mallee shrubland	Isolated mallee shrubs	Isolated clump of mallee shrubs
Z Heath shrub	Closed heathland	Heathland	Open heath	Sparse heath	Isolated heath shrubs	Isolated clump of heath shrubs
C Chenopod shrub	Closed chenopod shrubland	Chenopod shrubland	Open chenopod shrubland	Sparse chenopod shrubland	Isolated chenopod shrubs	Isolated clump of chenopod shrubs
Crown class	D Closed or dense	M Mid-dense	S Sparse	B Very sparse	I Isolated plants	L Isolated clumps
Foliage cover	>70	30-70	10-30	<10	<1	<1
Growth Form	Structural Formation Classes					
G Tussock grass	Closed grassland	Grassland	Open grassland	Sparse grassland	Isolated grasses	Isolated clump of tussock grasses
H Hummock grass	Closed hummock grassland	Hummock grassland	Open hummock grassland	Sparse hummock grassland	Isolated hummock grasses	Isolated clump of hummock grasses
D Sod grass	Closed sod grassland	Sod grassland	Open sod grassland	Sparse sod grassland	Isolated sod grasses	Isolated clump of sod grasses
V Sedge	Closed sedgeland	Sedgeland	Open sedgeland	Sparse sedgeland	Isolated sedges	Isolated clump of sedges
R Rush	Closed rushland	Rushland	Open rushland	Sparse rushland	Isolated rushes	Isolated clump of rushes
F Forb	Closed forbland	Forbland	Open forbland	Sparse forbland	Isolated forbs	Isolated clump of forbs
E Fern	Closed fernland	Fernland	Open fernland	Sparse fernland	Isolated ferns	Isolated clump of ferns
O Moss	Closed mossland	Mossland	Open mossland	Sparse mossland	Isolated mosses	Isolated clump of mosses
L Vine	Closed vineland	Vineland	Open vineland	Sparse vineland	Isolated vines	Isolated clump of vines

Based on Walker & Hopkins (1984)

APPENDIX 3
LIST OF PLANT SPECIES FOR THE YALWAL STUDY AREA
* Introduced species

PTERIDOPHYTA (Ferns)

ADIANTACEAE
Adiantum aethiopicum L.
Adiantum hispidulum Sw.

ASPLENIACEAE
Asplenium flabellifolium Cav.

BLECHNACEAE
Blechnum cartilagineum Sw.
Blechnum minus (R. Br.) Ettingsh.
Blechnum nudum (Labill.) Mett. ex Luerssen
Doodia aspera R. Br.

CYATHEACEAE
Cyathea australis (R. Br.) Domin

DAVALLIACEAE
Davallia pyxidata Cav.

DENNSTAEDTIACEAE
Pteridium esculentum (Forster f.) Cockayne

DICKSONIACEAE
Calochlaena dubia (R. Br.) M. Turner & R. White

GLEICHENIACEAE
Gleichenia dicarpa R. Br.

LINDSAEACEAE
Lindsaea microphylla Sw.

OSMUNDACEAE
Todea barbara (L.) T. Moore

POLYPODIACEAE
Pyrrosia rupestris (R. Br.) Ching

SINOPTERIDACEAE
Cheilanthes sieberi Kunze
Pellaea falcata (R. Br.) Fee

GYMNOSPERMAE (Conifers)

ARECACEAE
**Phoenix canariensis* Hort. Ex Chaboud

ZAMIACEAE
Macrozamia communis L. Johnson

ANGIOSPERMAE (Flowering Plants)

ACANTHACEAE
Pseuderanthemum variabile (R. Br.) Radlk.

AMARANTHACEAE
Alternanthera denticulata R. Br.

ANTHERICACEAE
Arthropodium milleflorum (DC) J. F. Macbr.

APIACEAE
Actinotus helianthi Labill.
**Foeniculum vulgare* Miller
Platysace lanceolata (Labill.) Druce

APOCYNACEAE
Parsonsia straminea (R. Br.) F. Muell.

ARALIACEAE
Astrotricha latifolia Benth.

ASCLEPIADACEAE
**Araujia hortorum* Foum.
**Gomphocarpus fruticosa* (L.) R. Br.
Marsdenia rostrata R. Br.
Tylophora barbata R. Br.

ASTERACEAE
**Bidens pilosa* L.
Bracteantha bracteata (Vent.) Anderberg & Haegi
Cassinia aculeata (Labill.) R. Br.
Cassinia quinquefaria R. Br.
Cassinia trinerva Wakef.
**Cirsium vulgare* (Savi) Ten.
**Conyza albida* Willd. ex Sprengel
**Hypochaeris radicata* L.
Olearia stellulata (Labill.) DC.
Olearia viscidula (F. Muell.) Benth.
Ozothamnus diosmifolius (Vent.) DC.
Senecio quadridentatus Labill.
Sigesbeckia orientalis L.
**Sonchus oleraceus* L.
**Tagetes minuta* L.
Vittadinia cuneata DC.

BIGNONIACEAE
Pandorea pandorana (Andrews) Steenis

CAMPANULACEAE
Wahlenbergia gracilis (Forster f.) Schrader

CASUARINACEAE
Allocasuarina littoralis (Salisb.) L. Johnson
Casuarina cunninghamiana Miq.

CELASTRACEAE
Celastrus australis Harvey & F. Muell.
Maytenus silvestris Lander & L. Johnson

CHENOPODIACEAE
**Chenopodium ambrosioides* L.
Einadia hastata (R. Br.) A. J. Scott

COMMELINACEAE
Commelina cyanea R. Br.

CONVOLVULACEAE
Dichondra repens Forster & Forster f.

CUNONIACEAE
Ceratopetalum apetalum D. Don
Ceratopetalum gummiferum Smith

CYPERACEAE
Eleocharis sphacelata R. Br.
Gahnia aspera (R. Br.) Spreng.
Lepidosperma filiforme Labill.
Lepidosperma laterale R. Br.
Schoenoplectus mucronatus (L.) Palla ex Kerner

DILLENIACEAE
Hibbertia scandens (Willd.) Gilg

ELAEOCARPACEAE
Elaeocarpus reticulatus Smith

EPACRIDACEAE
Leucopogon juniperinus R. Br.
Leucopogon lanceolatus (Smith) R. Br.
Melichrus urceolatus R. Br.

EUPHORBIACEAE
Breynia oblongifolia Muell. Arg.
Claoxylon australe Baillon
Phyllanthus gasstroemii Muell. Arg.
Phyllanthus hirtellus F. Muell. ex Muell. Arg.

FABACEAE
FABOIDEAE (subfamily)
Daviesia ulicifolia Andrews
Dillwynia juniperina Lodd.
Glycine tabacina (Labill.) Benth.
Hardenbergia violacea (Schneev.) Steam
Indigofera australis Willd.
Jacksonia scoparia R. Br.
Kennedia rubicunda (Schneev.) Vent.
Oxylobium ilicifolium (Andr.) Domin
**Robinia pseudoacacia* L.

MIMOSOIDEAE (subfamily)
Acacia cognata Domin
Acacia filicifolia Cheel & Welch
Acacia floribunda (Vent.) Willd.
Acacia implexa Benth.
Acacia mearnsii De Wild.
Acacia obtusifolia Cunn.
Acacia oshanesii F. Muell. & Maiden
Acacia terminalis (Salisb.) J. F. Macbr.
Acacia ulicifolia (Salisb.) Court

GERANIACEAE
Geranium solanderi Carolin

GOODENIACEAE
Coopernookia barbata (R. Br.) Carolin
Dampiera purpurea R. Br.

Goodenia hederacea Smith

JUNCACEAE
Juncus prismatocarpus R. Br.
Juncus usitatus L. A. S. Johnson

JUNCAGINACEAE
Triglochin procerum R. Br.

LAMIACEAE
Plectranthus graveolens R. Br.
Prostanthera lasianthos Labill.
Prostanthera violacea R. Br.

LAURACEAE
Cassytha pubescens R. Br.

LOBELIACEAE
Isotoma axillaris Lindley
Lobelia alata Labill.

LOMANDRACEAE
Lomandra confertifolia (F. M. Bailey) Fahn
Lomandra glauca (R. Br.) Ewart
Lomandra longifolia Labill.
Lomandra multiflora (R. Br.) J. Britt.

LORANTHACEAE
Amyema congener (Sieber ex Schultes & Schultes f.) Tieghem
Amyema pendulum (Sieber ex Sprengel) Tieghem
Muellerina eucalyptoides (DC.) Barlow

MALVACEAE
**Modiola caroliniana* (L.) G. Don
**Sida rhombifolia* L.

MENISPERMACEAE
Stephania japonica (Thunb.) Miers

MORACEAE
Ficus coronata Spin

MYRSINACEAE
Rapanea howittiana Mez
Rapanea variabilis (R. Br.) Mez

MYRTACEAE
Angophora floribunda (Smith) Sweet
Backhousia myrtifolia Hook. f. & Harvey
Baeckea virgata (Forster & Forster f.) Andr.
Eucalyptus agglomerata Maiden
Eucalyptus beyeriana L. Johnson & K. Hill
Eucalyptus bosistoana F. Muell.
Eucalyptus elata Dehnh.
Eucalyptus eugenioides Sieber ex Sprengel
Eucalyptus gummifera (Sol. ex Gaertner) Hochr.
Eucalyptus punctata DC.
Eucalyptus saligna Smith / *E. botryoides* Smith
Eucalyptus tereticornis Smith / *E. botryoides* Smith
Kunzea ambigua (Smith) Druce
Leptospermum emarginatum H. A. Wendl. ex Link

Leptospermum polygalifolium Salisb.
Leptospermum rotundifolium (Maiden & E. Betche) F. Rodway ex Cheel
Leptospermum trinervium (Smith) J. Thompson
Melaleuca linariifolia Smith
Tristaniopsis laurina (Smith) Peter G. Wilson & Waterhouse

OLEACEAE
Notelaea longifolia Vent.

ONAGRACEAE
Ludwigia peploides (Kunth) Raven

PASSIFLORACEAE
**Passiflora edulis* Sims

PHILESIACEAE
Eustrephus latifolius R. Br.
Geitonoplesium cymosum (R. Br.) A. Cunn. ex Hook.

PHORMIACEAE
Dianella caerulea Sims
Dianella revoluta R. Br.
Stypandra glauca R. Br.

PHYTOLACCACEAE
**Phytolacca octandra* L.

PITTOSPORACEAE
Billardiera scandens Smith
Bursaria spinosa Cav.
Pittosporum revolutum Aiton
Pittosporum undulatum Vent.

PLANTAGINACEAE
**Plantago lanceolata* L.

POACEAE
Aristida vagans Cav.
**Axonopus affinis* Chase
Bothriochloa macra (Steud.) S. T. Blake
Cymbopogon refractus (R.Br.) A. Camus
Cynodon dactylon (L.) Pers.
Echinopogon ovatus (G. Forst.) P. Beauv.
Entolasia stricta (R. Br.) Hughes
Imperata cylindrica P. Beauv. var. *major* (Nees) C. E. Hubb.
Microlaena stipoides (Labill.) R. Br.
Oplismenus imbecillus (R. Br.) Roem. & Schult.
**Paspalum dilatatum* Poir.
**Pennisetum clandestinum* Hochst. ex Chiov.
Poa sp. (small)
Poa labillardieri Steud.
Sporobolus indicus (L.) R. Br.
Stipa sp.
Stipa scabra Lindl.
Stipa ramosissima (Trin.) Trin.
Themeda australis (R. Br.) Stapf

POLYGONACEAE
Persicaria decipiens (R. Br.) K. L. Wilson
**Polygonum arenastrum* Boreau
Rumex brownii Campd.

PROTEACEAE
Banksia spinulosa Smith
Grevillea arenaria R. Br.
Grevillea sericea (Smith) R. Br.
Hakea dactyloides (Gaertner) Cav.
Lomatia ilicifolia R. Br.
Lomatia myricoides (Gaertner f.) Domin
Persoonia linearis Andrews
Stenocarpus salignus R. Br.

RANUNCULACEAE
Clematis aristata R. Br. ex DC.

RHAMNACEAE
Pomaderris ferruginea Sieber ex Fenzl

ROSACEAE
**Cotoneaster* sp.
Rubus parvifolius L.
Rubus rosifolius Smith

RUBIACEAE
Morinda jasminoides Cunn.
Opercularia aspera Gaertner
Pomax umbellata (Gaertner) Sol. ex A. Rich.

RUTACEAE
**Citrus limonia* Osbeck *s. lat.*
Eriostemon trachyphyllus F. Muell.
Zieria cytisoides Smith

SANTALACEAE
Choretrum candollei F. Muell.
Exocarpos cupressiformis Labill.

SAPINDACEAE
Dodonaea triquetra Wendl.
Dodonaea viscosa Jacq. subsp. *angustifolia* (DC.) J. West

SOLANACEAE
**Cestrum parqui* L'Her
**Datura* sp.
Duboisia myoporoides R. Br.
**Solanum pseudocapsicum* L.
Solanum pungetium R. Br.

STERCULIACEAE
Brachychiton populneus (Schott & Endl.) R. Br.
Commersonia fraseri Gay

TREMANDRACEAE
Tetratheca thymifolia Smith

TYPHACEAE
Typha orientalis C. Presl.

ULMACEAE
Trema aspera (Brongn.) Blume

URTICACEAE
Urtica incisa Poiret

VERBENACEAE
Clerodendrum tomentosum R. Br.

VIOLACEAE
Hymenanthera dentata R. Br. ex DC.
Viola hederacea Labill.

VITACEAE
Cayratia clematidea (F. Muell.) Domin

APPENDIX 4
CONSERVATION CODES FOR RARE OR THREATENED AUSTRALIAN PLANTS
(Briggs & Leigh 1996).

The Distribution Category

1 Known by one collection only.

2 Geographic range in Australia is less than 100 km.

3 Geographic range in Australia is greater than 100 km.

The Conservation Status

X Presumed Extinct: taxon not collected or otherwise verified over the past 50 years despite thorough searching in all known and likely habitats, or of which all known wild populations have been destroyed more recently.

E Endangered: taxon in serious risk of disappearing from the wild within 10-20 years if present land use and other threats continue to operate. This category includes taxa with populations possibly too small (usually less than 100 individuals) to ensure survival even if present in proclaimed reserves.

V Vulnerable: taxon not presently Endangered, but at risk over a longer period (20-50 years) of disappearing from the wild through continued depletion, or which occurs on land whose future use is likely to change and threaten its survival.

R Rare: taxon which is rare in Australia (and hence usually in the world) but which currently does not have any identifiable threat. Such species may be represented by a relatively large population in a very restricted area or by smaller populations spread over a wide range or some intermediate combination of distribution pattern.

K Poorly Known: taxon that is suspected, but not definitely known, to belong to one of the above categories. At present, accurate field distribution information is inadequate.

C Reserved: indicates taxon has at least one population within a national park, other proclaimed conservation reserve or in an area other-wise dedicated for the protection of flora. The taxon may or may not be considered adequately conserved within the reserve(s), as reflected by the conservation status assigned to it. Where applicable, the 'C' symbol immediately follows the conservation status symbol in the written code, e.g. 2RC.

The Size-class of all Reserved Populations

a 1000 plants or more are known to occur within a conservation reserve(s).
i Less than 1000 plants are known to occur within a conservation reserve(s).
- The reserved population size is not accurately known.
t Total known population reserved.
+ Overseas occurrence (included if the taxon has a natural occurrence overseas).

APPENDIX 5
ANNOTATED LIST OF MAMMAL SPECIES FOR YALWAL AND SURROUNDING AREA

Nomenclature is based on *The Mammals of Australia* (Strahan 1995).
Introduced species are indicated by an asterisk *.

ORNITHORHYNCHIDAE

Platypus *Ornithorhynchus anatinus*

The Platypus was observed in Yalwal Creek below Danjera Dam in 1986 (K. Mills) and is known to occur in the Burrier area (see, for example, Robinson 1988). The species is likely to occur in all major streams in the area.

TACHYGLOSSIDAE

Short-beaked Echidna *Tachyglossus aculeatus*

This widespread and relatively common species would certainly occur in the Yalwal area. It has been recorded in the Boolijah Creek area (K. Mills).

Brown Antechinus *Antechinus stuartii*

This widespread and relatively common species would certainly occur in the Yalwal area, although its presence has not been confirmed.

PHASCOLARCTIDAE

Koala *Phascolarctos cinereus*

The Koala certainly once occurred in the Yalwal area, because of the presence of extensive stands of Forest Red Gum, a favoured food tree. The known records of the Koala from anywhere near Yalwal were from Colymea Creek many years ago and the western side of Morton National Park.

VOMBATIDAE

Common Wombat *Vombatus ursinus*

The Common Wombat occurs in the Yalwal area, where its diggings and burrows are ubiquitous. It is often seen at night on the edges of the cleared land.

PETAURIDAE

Sugar Glider *Petaurus breviceps*

The Sugar Glider is a common and widespread arboreal mammal in the region. It has previously been observed at Yalwal (K. Mills) and was heard in forest in the southern part of the study area during this study.

PSEUDOCHEIRIDAE

Greater Glider *Petauroides volans*

The Greater Glider is a common and widespread species in the forests of the region. It is known to occur in forests along the Shoalhaven River and is expected to occur in the Yalwal area.

Common Ringtail Possum *Pseudocheirus peregrinus*

The Common Ringtail Possum was recorded during this study and has previously been observed in the study area (K. Mills); it is a common and widespread arboreal mammal in the region

ACROBATIDAE

Feathertail Glider *Acrobates pygmaeus*

The Feathertail Glider is a widespread species but is rather cryptic and is seldom seen. It is expected to occur in the Yalwal area. The closest known record is from Bundanon, where two animals were killed by a cat in early 1985.

PHALANGERIDAE

Common Brushtail Possum *Trichosurus vulpecula*

The Common Brushtail Possum was recorded during this study and has been previously observed in the area (K. Mills).

MACROPODIDAE

Eastern Grey Kangaroo *Macropus giganteus*

The Eastern Grey Kangaroo is common in Morton National Park. It is regularly observed in the Yalwal area.

Common Wallaroo *Macropus robustus*
The Common Wallaroo is moderately common in and adjacent to Morton National Park. It is occasionally observed in the Yalwal area. It was recorded during this study.

Red-necked Wallaby *Macropus rufogriseus*
The Red-necked Wallaby is moderately common in Morton National Park and in adjacent areas. It is occasionally observed in the Yalwal area (e.g. in 1988, K. Mills).

Brush-tailed Rock-wallaby *Petrogale penicillata*
The Brush-tailed Rock-wallaby may occur along the major clifflines in the Yalwal area, as it does along the Shoalhaven River. Except for small areas of rock outcrops to the south, there is no good habitat on the Council land.

Swamp Wallaby *Wallabia bicolor*
The Swamp Wallaby is common in the forests throughout the region. It is occasionally observed at Yalwal. It was recorded during this study.

RHINOLOPHIDAE
Eastern Horseshoe-bat *Rhinolophus megaphyllus*
This bat was recorded in the southern part of the study area in March 1998. The bats inhabit the old mine workings.

EMBALLONURIDAE
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*
This threatened bat species was recorded at Yalwal during this study, along Yarramunmun Creek.

VESPERTILIONIDAE
Chocolate Wattled Bat *Chalinolobus morio*
This bat was recorded in forest in the southern part of the study area during this study.

MURIDAE
Water-rat *Hydromys chrysogaster*
The Water-rat probably occurs on the larger streams in the Yalwal area, although there are apparently no records from this area.

Bush Rat *Rattus fuscipes*
The Bush Rat is a common and widespread native species likely to occur in the Yalwal area.

Black Rat* *Rattus rattus*
The Black Rat is a ubiquitous introduced species. It probably occurs in areas of habitation near the study area.

CANIDAE
Dingo *Canis lupus dingo*
The Dingo is known to inhabit Morton National Park and adjacent areas, where it is occasionally observed. One Dingo was seen in Bundundah Creek valley in 1980 (K. Mills).

Dog* *Canis lupus*
The feral Dog is likely to occur in the area. It is present throughout most of the region.

Fox* *Vulpes vulpes*
The Fox occurs at Yalwal. It is probably mainly associated with cleared land on which Rabbits occur.

FELIDAE
Cat* *Felis catus*
The feral Cat is likely to occur in the area. It is present throughout most of the region.

LEPORIDAE

Rabbit* *Oryctolagus cuniculus*

The Rabbit occurs on the cleared land at Yalwal. It does not appear to be very common, for dung and diggings were scarce.

BOVIDAE

Cattle* *Bos taurus*

Domestic Cattle graze the Council land at Yalwal and the adjacent freehold land.

APPENDIX 6
LIST OF BIRD SPECIES FOR YALWAL AND SURROUNDING AREA

Notes:

a. Estimate of abundance in New South Wales.
Six orders of magnitude were defined by Morris, McGill and Holmes (1981) to describe maximum population size in any given year:

Rare (R)	< 100
Scarce (S)	100 - 1,000
Uncommon (U)	1,000 - 10,000
Moderately common (MC)	10,000 - 100,000
Common (C)	100,000 - 1,000,000
Abundant (A)	> 1,000,000

b. Source of record.
1. Recorded in the Ettrema-Shoalhaven Wilderness Area (K. Mills).
2. Recorded previously in the Yalwal area (K. Mills).
3. Observed in the Yalwal area during the study.

c. Introduced bird species are indicated by an asterisk (*).

d. Family, order and nomenclature of scientific names and common names are based on *The Taxonomy and Species of Birds of Australia and its Territories* (Christidis & Boles 1994).

Family/Species		Abundance in NSW[a]	Record[b]
PHASIANIDAE			
Stubble Quail	*Coturnix pectoralis*	A	1,2
ANATIDAE			
Musk Duck	*Biziura lobata*	MC	1
Black Swan	*Cygnus atratus*	C	1,2
Australian Wood Duck	*Chenonetta jubata*	A	1,2,3
Pacific Black Duck	*Anas superciliosa*	A	1,2,3
Grey Teal	*Anas gracilis*	A	1
PODICIPEDIDAE			
Australasian Grebe	*Tachybaptus novaehollandiae*	A	1,2,3
Hoary-headed Grebe	*Poliocephalus poliocephalus*	C	1
ANHINGIDAE			
Darter	*Anhinga melanogaster*	MC	1
PHALACROCORACIDAE			
Little Pied Cormorant	*Phalacrocorax melanoleucos*	A	1,2,3
Little Black Cormorant	*Phalacrocorax sulcirostris*	A	1,2
Great Cormorant	*Phalacrocorax carbo*	C	1,2
ARDEIDAE			
White-faced Heron	*Egretta novaehollandiae*	A	1,2
White-necked Heron	*Ardea pacifica*	C	1
Nankeen Night Heron	*Nycticorax caledonicus*	C-MC	1
ACCIPITRIDAE			
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	U	1,2,3
Brown Goshawk	*Accipiter fasciatus*	MC	1,3
Wedge-tailed Eagle	*Aquila audax*	MC	1,2
FALCONIDAE			
Peregrine Falcon	*Falco peregrinus*	U	1,2
Nankeen Kestrel	*Falco cenchroides*	C	1,2

RALLIDAE			
Dusky Moorhen	*Gallinula tenebrosa*	A	1
Eurasian Coot	*Fulica atra*	A	1,2
TURNICIDAE			
Painted Button-quail	*Turnix varia*	MC	1
CHARADRIIDAE			
Black-fronted Dotterel	*Elseyornis melanops*	C	1
Masked Lapwing	*Vanellus miles*	A	1,2
COLUMBIDAE			
White-headed Pigeon	*Columba leucomela*	MC	1
Brown Cuckoo-Dove	*Macropygia amboinensis*	C	1,2
Common Bronzewing	*Phaps chalcoptera*	A	1,2
Brush Bronzewing	*Phaps elegans*	MC	1,2
Crested Pigeon	*Ocyphaps lophotes*	A	1
Wonga Pigeon	*Leucosarcia melanoleuca*	MC	1,2,3
Topknot Pigeon	*Lopholaimus antarcticus*	MC	1
CACATUIDAE			
Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*	MC	1,2
Gang-gang Cockatoo	*Callocephalon fimbriatum*	MC	1,2,3
PSITTACIDAE			
Musk Lorikeet	*Glossopsitta concinna*	MC	1,2
Little Lorikeet	*Glossopsitta pusilla*	C	1
Australian King-Parrot	*Alisterus scapularis*	C	1,2,3
Crimson Rosella	*Platycercus elegans*	A	1,2,3
Eastern Rosella	*Platycercus eximius*	A	1,2
Turquoise Parrot	*Neophema pulchella*	U	1
CUCULIDAE			
Pallid Cuckoo	*Cuculus pallidus*	C	1,2
Brush Cuckoo	*Cacomantis variolosus*	M	1,2
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	C	1,2,3
Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*	C-MC	1
Shining Bronze-Cuckoo	*Chrysococcyx lucidus*	S	1
Channel-billed Cuckoo	*Scythrops novaehollandiae*	U	1
STRIGIDAE			
Powerful Owl	*Ninox strenua*	U	1
Southern Boobook	*Ninox novaeseelandiae*	C	1,2
PODARGIDAE			
Tawny Frogmouth	*Podargus strigoides*	A	1
AEGOTHELIDAE			
Australian Owlet-nightjar	*Aegotheles cristatus*	A	3
APODIDAE			
White-throated Needletail	*Hirundapus caudacutus*	A	1
ALCEDINIDAE			
Azure Kingfisher	*Alcedo azurea*	MC	1,2
HALCYONIDAE			
Laughing Kookaburra	*Dacelo novaeguineae*	A	1,2,3
Sacred Kingfisher	*Todiramphus sanctus*	A	1,2

MEROPIDAE			
Rainbow Bee-eater	*Merops ornatus*	A	1,2
CORACIIDAE			
Dollarbird	*Eurystomus orientalis*	MC	1,2
MENURIDAE			
Superb Lyrebird	*Menura novaehollandiae*	C	1,2,3
CLIMACTERIDAE			
White-throated Treecreeper	*Cormobates leucophaeus*	A	1,2,3
Red-browed Treecreeper	*Climacteris erythrops*	C	1,2
Brown Treecreeper	*Climacteris picumnus*	A	
MALURIDAE			
Superb Fairy-wren	*Malurus cyaneus*	A	1,2,3
Variegated Fairy-wren	*Malurus lamberti*	C	1,2
Southern Emu-wren	*Stipiturus malachurus*	MC	1
PARDALOTIDAE			
Spotted Pardalote	*Pardalotus punctatus*	A	1,2,3
Striated Pardalote	*Pardalotus striatus*	A	1,2
Pilotbird	*Pycnoptilus floccosus*	MC	1
Rockwarbler	*Origma solitaria*	MC	1,2,3
Yellow-throated Scrubwren	*Sericornis citreogularis*	A	1
White-browed Scrubwren	*Sericornis frontalis*	A	1,2,3
Large-billed Scrubwren	*Sericornis magnirostris*	A	1
Chestnut-rumped Heathwren	*Hylacola pyrrhopygia*	MC	1
Brown Gerygone	*Gerygone mouki*	A	1,3
Brown Thornbill	*Acanthiza pusilla*	A	1,2,3
Buff-rumped Thornbill	*Acanthiza reguloides*	A	1,2,3
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	A	1,2
Yellow Thornbill	*Acanthiza nana*	A	1,2,3
Striated Thornbill	*Acanthiza lineata*	A	1,2
Southern Whiteface	*Aphelocephala leucopsis*	A	
MELIPHAGIDAE			
Red Wattlebird	*Anthochaera carunculata*	A	1,2
Little Wattlebird	*Anthochaera chrysoptera*	C	1,2
Noisy Friarbird	*Philemon corniculatus*	A	1,2,3
Bell Miner	*Manorina melanophrys*	A	1
Lewin's Honeyeater	*Meliphaga lewinii*	A	1,2,3
Yellow-faced Honeyeater	*Lichenostomus chrysops*	A	1,2,3
White-eared Honeyeater	*Lichenostomus leucotis*	A	1,2
Yellow-tufted Honeyeater	*Lichenostomus melanops*	A	1,2,3
Fuscous Honeyeater	*Lichenostomus fuscus*	A	1
Brown-headed Honeyeater	*Melithreptus brevirostris*	A	1,2,3
White-naped Honeyeater	*Melithreptus lunatus*	A	1,2
Crescent Honeyeater	*Phylidonyris pyrrhoptera*	MC	1,2
New Holland Honeyeater	*Phylidonyris novaehollandiae*	A	1,2
White-cheeked Honeyeater	*Phylidonyris nigra*	A	1
Tawny-crowned Honeyeater	*Phylidonyris melanops*	MC	1
Eastern Spinebill	*Acanthorhynchus tenuirostris*	A	1,2,3
Scarlet Honeyeater	*Myzomela sanguinolenta*	C	1,2
White-fronted Chat	*Epthianura albifrons*	C	
PETROICIDAE			
Jacky Winter	*Microeca fascinans*	A	1,2,3
Scarlet Robin	*Petroica multicolor*	C	1
Flame Robin	*Petroica phoenicea*	C	1
Rose Robin	*Petroica rosea*	C	1,2,3

Eastern Yellow Robin	*Eopsaltria australis*	A	1,2,3
CINCLOSOMATIDAE			
Eastern Whipbird	*Psophodes olivaceus*	A	1,2,3
Spotted Quail-thrush	*Cinclosoma punctatum*	MC	1,2
NEOSITTIDAE			
Varied Sittella	*Daphoenositta chrysoptera*	C	1,2,3
PACHYCEPHALIDAE			
Crested Shrike-tit	*Falcunculus frontatus*	C	1,2,3
Olive Whistler	*Pachycephala olivacea*	MC	
Golden Whistler	*Pachycephala pectoralis*	A	1,2,3
Rufous Whistler	*Pachycephala rufiventris*	A	1,2,3
Grey Shrike-thrush	*Colluricincla harmonica*	A	1,2,3
DICRURIDAE			
Black-faced Monarch	*Monarcha melanopsis*	C	1,2
Leaden Flycatcher	*Myiagra rubecula*	C	1,2
Satin Flycatcher	*Myiagra cyanoleuca*	MC	1
Restless Flycatcher	*Myiagra inquieta*	A	1,2
Magpie-lark	*Grallina cyanoleuca*	A	1
Rufous Fantail	*Rhipidura rufifrons*	C	1,2,3
Grey Fantail	*Rhipidura fuliginosa*	A	1,2,3
Willie Wagtail	*Rhipidura leucophrys*	A	1,2,3
Spangled Drongo	*Dicrurus bracteatus*	MC	
CAMPEPHAGIDAE			
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	A	1,2
White-bellied Cuckoo-shrike	*Coracina papuensis*	MC	1,2
Cicadabird	*Coracina tenuirostris*	MC	1,2
White-winged Triller	*Lalage sueurii*	MC	1,2
ORIOLIDAE			
Olive-backed Oriole	*Oriolus sagittatus*	C	1,2
ARTAMIDAE			
White-browed Woodswallow	*Artamus superciliosus*	A	1
Dusky Woodswallow	*Artamus cyanopterus*	A	1,2
Grey Butcherbird	*Cracticus torquatus*	A	1,2,3
Australian Magpie	*Gymnorhina tibicen*	A	1,2,3
Pied Currawong	*Strepera graculina*	A	1,2,3
Grey Currawong	*Strepera versicolor*	MC	1
CORVIDAE			
Australian Raven	*Corvus coronoides*	A	1,2,3
Little Raven	*Corvus mellori*	A	
CORCORACIDAE			
White-winged Chough	*Corcorax melanorhamphos*	C	1,2,3
PTILONORHYNCHIDAE			
Green Catbird	*Ailuroedus crassirostris*	MC	1
Satin Bowerbird	*Ptilonorhynchus violaceus*	C	1,2,3
MOTACILLIDAE			
Richard's Pipit	*Anthus novaeseelandiae*	A	1,2
PASSERIDAE			
Red-browed Finch	*Neochmia temporalis*	A	1,2,3
Beautiful Firetail	*Stagonopleura bella*	U	1

DICAEIDAE			
Mistletoebird	*Dicaeum hirundinaceum*	A	1,2,3
HIRUNDINIDAE			
Welcome Swallow	*Hirundo neoxena*	A	1,2
Tree Martin	*Hirundo nigricans*	A	1
SYLVIIDAE			
Clamorous Reed-Warbler	*Acrocephalus stentoreus*	A	1,2
Rufous Songlark	*Cincloramphus mathewsi*	A	1
ZOSTEROPIDAE			
Silvereye	*Zosterops lateralis*	A	1,2,3
MUSCICAPIDAE			
Bassian Thrush	*Zoothera lunulata*	C	1,2
STURNIDAE			
Common Starling*	*Sturnus vulgaris*	A	1,2

Yalwal Tourism Potential

Background and Discussion paper

July 1998

INDEX

1. Introduction

This paper considers the alternative use options for the Yalwal site to assist the Working Committee and provide a basis for further discussion of the options with the stakeholders. It is based on the site assessment and the Background Paper prepared in May 1998. This paper considered the current markets for the Shoalhaven area, the possible stakeholders views on the development of the area and the opportunities for further development.

This paper is designed to assist the Task Force in assessing the implications of future use options and in determining preferred directions and should be considered in conjunction with the Background and Discussion paper entitled *Yalwal Tourism Potential*, issued in April 1998.

Issues considered in this paper include:

- The guiding principles which should govern any development and the inherent conflict with current use.
- The conflicts between current use and guiding principles.
- The options which are consistent with the guiding principles
- The implications of those options and the initiatives necessary to realise them.
- The next steps

2. Guiding principles

Any proposals for tourism use at Yalwal should be consistent with guiding principles which govern future strategies for the area controlled by Council and the adjoining lands. These principles revolve around:

- Integrity of the water supply
- Environmental values
- Heritage values
- Cultural values
- Management of adjoining protected areas

In assessing alternative tourism development opportunities and their feasibility, the objective should not only be to work within principles but also to enhance them. This will, in turn, largely dictate target markets and define the scope and scale of use and development. (Diagram 1).

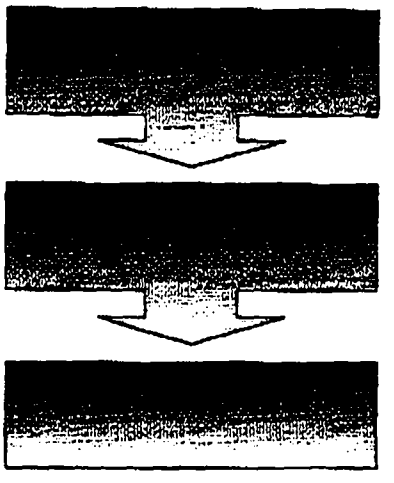


Diagram 1 – The logic flow of tourism use recommendations

The significance of the overall guiding principles strongly suggests that the target markets will be restricted and that some markets may not be compatible with the priorities of the area. It is also clear that there is major misalignment between the current dominant use and the principles and that the high impact outdoor activities threaten the environmental values and the heritage of the site.

There are also several other determining factors that will need to be considered in possible tourism development at Yalwal. These include:

- Private or public sector development
- Nature of tenure (and brokerage of this tenure between agencies)
- Level of investment
- Opposition of current users given that future use is unlikely to accommodate them
- Impact of current user opposition on new users and the process of change

These are in addition to the typical factors (such as market analysis and level of resources) that will be considered in this appraisal.

3. The current use-desirable future conflict

The following diagram (Diagram 2) illustrates a combination of factors that summarise a 'coming-together' of a number of aspects related to Yalwal's future tourism use and its current position as a recreation destination.

The current position, identified as the bottom left-hand corner of the following diagram, is characterised by low 'managerial' presence or intervention and low alignment with the desired guiding land management principles. It could also be said that a large segment of the current users would rate low on a scale of willingness to accept regulation, particularly as that regulation would conflict with the characteristics of their current usage.

A high level of appreciation for and willingness to accept prescribed usage principles and guidelines, however, is highly correlated with the actual upholding of these principles. In other words, the environmentally sensitive users want to see some form of control and protection in place to ensure the integrity of the environment and protection of cultural and heritage values.

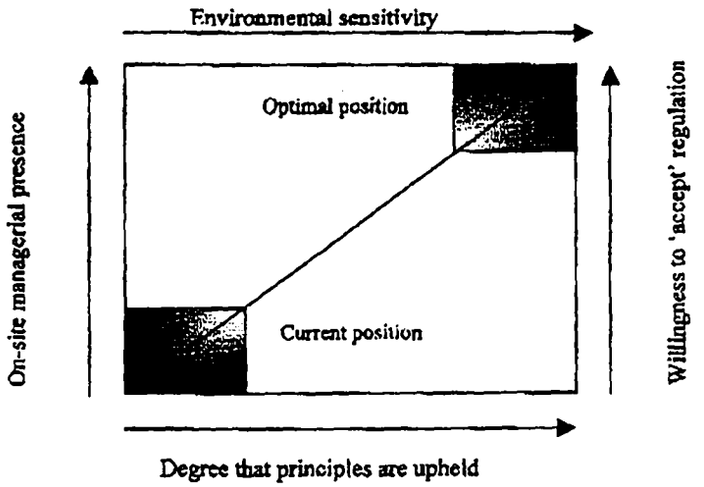


Diagram 2 – Yalwal tourism use matrix

The implications of this matrix in terms of target market selection that produces the closest alignment with the desired position:

- Target markets are likely to have a well-defined value set in terms of issues related to environmental sustainability
- They are likely to seek out experiential tourism where learning is a component
- This target is also likely to appreciate nature-based activity
- They will appreciate the need for regulation in such an environment

Past research has shown that certain socio-demographics may be associated with this target description.

- Tertiary education

- Above average income

- Persons in involved in professional, scientific and managerial activities

Thi is supported by recent research into the profile of members of the Foundation for National Parks and Wildlife Gondwana program in New South Wales found that 50% had a first or second University degree and a further 22% some tertiary education. 48% had household incomes over $60,000 pa and the majority of those in employment were in professional or managerial roles or self-employed. The age group included 70% under 54 years of age.

This group would generally recognise the priorities in managing the environment, the fragility of the landscape and the importance of protecting the heritage assets of the Yalwal area.

Such a target profile is not typical of the visitor to the Shoalhaven area. The Shoalhaven is more closely associated with recreation reflecting traditional market patterns such as caravan parks, boating, four wheel driving. The current markets are more likely to be from lower income groups, drawn from areas with industrial concentration (Southern and Western Sydney and the Illawarra) with fewer educational opportunities and a lower level of concern for the environment.

There is a gap between a target market which would respond to the principles and the current visitor pattern which has consequences for the success and timing of any tourism development in the area. In other words, if the ideal target profile required to uphold Yalwal principles more closely matched the profile of visitors to the surrounding area, the task would be much easier.

4. Current visitor profile

This section should be read in conjunction with the material contained in the background paper provided in May.

The Domestic Tourism Monitor surveys Australians travelling within their own country with the Illawarra Region taking in Wollongong, Shoalhaven, Wingecarribee, Kiama and Shellharbour LGAs. The area is heavily dependent on the Sydney market, with 64% of visits and 61% of nights spent in the region are by Sydney residents. Another 30% of visits come from elsewhere in NSW or from the ACT.

In 1996-97 the Illawarra region attracted 2,248,000 visitors who spent 7.3 million nights in the region. This was a slight decrease on the previous year in terms of visits but the number of nights maintained a strong upward curve.

The survey provides data on income, occupation, lifecycle and age and use of accommodation. The following tables compare the region with the profile of all visitors to destinations within the State (including Sydney)

Table 1 Annual Income of visitors to the Illawarra Region

Annual income	Illawarra Region %	NSW %
Under $10,000	31.0	29.3
$10-15,000	7.3	8.6
$15-20,000	7.0	6.8
$20-30,000	14.8	15.4
$30-40,000	13.6	14.9
More than $40,000	26.3	25.0
	100	100

Source : Domestic Tourism Trends in NSW 1995/96 – 1996/97, Tourism NSW 1998
Note: Income of respondent, not household, base = visits

The region attracts a proportion of business visitors, which combined with the effect of the Southern Highlands as an up-market destination probably lifts the income profile. Compared with an area such as the Blue Mountains/Hawkesbury, however, there are more visitors in the lower income brackets and a smaller proportion in the higher categories.

Table 2 Lifecycle of visitors to Illawarra Region

Life cycle	Illawarra Region %	NSW %
Dependent children	6.5	5.5
Younger solos	16.4	15.7
Young marrieds	4.9	5.4
Younger families	10.7	9.5
Single adults	4.1	4.6
Married adults	8.1	7.9
Families	26.5	28.2
Older families	6.7	5.5
Older couples	13.2	14.6
Older solos	2.9	3.1
	100	100

Source : Domestic Tourism Trends in NSW 1995/96 – 1996/97, Tourism NSW 1998
Note: Visitors 14 years of age and over; Base - visits

While there is no major deviation from the State average, there is greater propensity for younger persons and families, although the Blue Mountains/Hawkesbury would attract fewer persons in the older categories and particularly the young marrieds/younger families (22% compared with 16%).

Table 3 Occupation of visitors to the Illawarra Region

Occupation	Illawarra Region %	NSW %
Home duties	6.9	8.5
Retired not employed	20.1	20.1
Student	9.0	6.2
Clerical/scale	13.1	13.2
Semi-skilled worker	7.8	8.9
Service/foreperson	9.8	8.9
Self-employed/manager/ supervisor	14.0	12.7
Professional/technical	16.7	17.0
Manual work	2.3	2.9
Skilled Agricultural/other	0.3	1.5
	100	100

Source : Domestic Tourism Trends in NSW 1995/96 – 1996/97, Tourism NSW 1998
Note: Visitors 14 years of age and over; Base - visits

There is a slightly higher penetration of the semi-skilled, manual and skilled agricultural workers categories. When compared, for example, with the Blue Mountains/Hawkesbury region the Illawarra has a significantly lower penetration of the self-employed/manager and professional categories

5. Product Possibilities

The following table represents an unqualified list of product that is broadly in line with the optimal position in Diagram 2. It does not consider factors such as feasibility from a financial perspective (investment or return) or the issue of land tenure.

Built facilities

- Up-market self contained cabins
- Self contained cabins appealing to mid-market along the lines of the Jemby Rinjah style in a small environmental resort.
- A small visitors centre as a base for interpretation, guided walks, mountain bike hire, convenience foods and for camping permits.
- An enclosed area for secure car parking.

Associated activities

Developments within the reserve and associated natural areas could include:

- Marked and graded mountain-bike trails
- Marked and graded walking trails
- Established remote camping site (toilets, safe fireplace)
- Viewing points

Visitor activities

For visitors to Yalwal the range of activities which could be developed include:

- Guided interpretation walks at weekends
- School group visits during the week
- Mountain biking, both recreational and events
- A base for long distance walking (several days).
- Canoeing on the dam
- Rock climbing and abseiling

These are all consistent with the guiding principles.

Excluded would be:

- Horse riding, (proximity to Wilderness areas)
- Trail biking;
- Bush bashing and four wheel drive activities except on hardened roads

The preferred outcome which meets the needs of the market and conforms to the principles would be a controlled site with a standard of accommodation suited to the needs of the environmentally sensitive market.

6. Implications of development

Any development of the area will require a substantial change in the way Yalwal is managed. This include controlled access, defined development principles and a restoration program to take advantage of the site's intrinsic integrity. Positioning Yalwal as a tourist area will require promotion and a long term commitment to realising the value of the assets.

To secure the development of any built facilities will either require private land or, if on public land the option of:

- Council developing facilities to be operated under lease;
- Council's own caravan park operations developing and operating a new facility designed for the market; or
- A long term (60 years +) lease to a private developer to enable any development to be financed

Any built development is high risk, unlikely to be able to be developed on commercial terms, particularly in the short term.

To control the area and provide some income flow will require

- Fee to enter.
- Fee to camp.
- Fee to park the car more than 24 hours (either in or outside secure area).

Unless fees are charged for access, there is no way the site can raise sufficient funds from visitor activities or tourist developments to cover the costs involved in managing the site, based on a minimum $100,00 per year. The level of revenue to be gained from any other activity will be minimal. At $5 per car it would require 20,000 vehicles a year to cover the costs involved in maintaining the site.

A commercial accommodation development within the area will not produce immediate revenue for Yalwal. Finding a prospective operator who would develop any facilities on the site would be difficult and could involve significant negotiation.

The cost to develop a site would be high and the risks sufficiently great that Shoalhaven Water would be unable to secure more than a nominal fee for the use of a site, and any rental would probably be based on a share of revenue, rather than a fixed fee. There could also be a need for an initial rent-free period covering the development period and probably the first six to twelve months of operation to enable any business firstly, to take the risk and secondly, to build sufficient volume to make it viable.

Any sporting activities such as rock climbing on area controlled by Shoalhaven Water carry serious risk implications, the public liability aspect will need to be explored. Encouraging risk activities is more likely to expose Shoalhaven Water to the potential for legal action.

Collecting fees is only justified if the fees collected exceed the cost of collection. Collecting fees will also require a road barrier to preclude access. A road barrier also precludes the road being used for through traffic and had implications for emergency use.

Unless the fee collection responsibility is vested in a resident, eg operator of a visitor centre or accommodation property, it will only occur at weekends and during holiday periods. If a resident operator is vested with the fee collection responsibility they would expect to be recompensed with a proportion of the fee collected.

Any increase in use under controlled conditions will require monitoring the impact of such use. This will involve benchmarking the current status of sensitive areas and monitoring over time.

The markets which are potential visitors to an environmentally sensitive area such as Yalwal are not necessarily four-wheel drivers. Some road upgrading may be required to enable smaller two wheel drive vehicles to access the site.

Any move to limit the use of off-road four wheel drive and trail bikes in the region is likely to generate an aggressive response and involve security and safety issues, as well as damage to any facilities.

To realise these opportunities will require a more detailed assessment of the costs and benefits, and the ability to make a development site available. Any development should be consistent with ESD principles, using approaches such as those contained in a number of Federal Government studies on remote tourist sites and the use of solar power, waste disposal and waste water management techniques.

It should also recognise the principles incorporated in the National Parks and Wildlife Service' Draft Nature Tourism and Recreation Strategy.

7. The next steps

The task force on Yalwal should consider the options and the implications of the alternatives and whether it has the necessary powers to close the site to free public access and whether it is prepared to do so. This is the critical decision.

Once this decision is reached:

- the group should rank the options and their acceptability as a basis for future analysis;
- the consultants should undertake a more comprehensive assessment of the options and the costs and revenue implications. This will include the questions incorporated in our Background and Discussion paper of May;
- there should be further consultation with the interested groups;
- the consultants should complete their Stage 1 report which recommends whether or not to proceed further and identify the way the project can be developed, managed and promoted.

Dain Simpson Associates
11 Grafton Street
Woollahra NSW 2025
Australia

Fax Cover Sheet

DATE	**AUGUST 3 1998**		
TO:	Bill Tomkinson/Russ Evans	**FAX:**	**02 4429 3170**
FROM:	Dain Simpson	**PHONE:**	61 2 9369 3414
	Dain Simpson Associates	**FAX:**	61 2 9369 3304
RE:	Yalwal		
CC:			

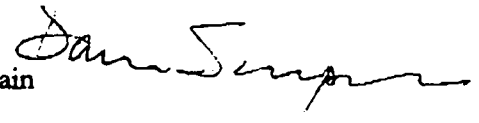
Number of pages including cover sheet: 13

Message

Dear Bill ,

Russ will be in shortly to collect this document for tomorrow's meeting. I can also send it on e-mail if that would help.

Regards,

Dain 

AN ABORIGINAL ARCHAEOLOGICAL STUDY FOR THE MANAGEMENT PLAN FOR YALWAL, NEW SOUTH WALES SOUTH COAST

A Report to the Shoalhaven City Council

by

Robert Paton

Robert Paton Archaeological Studies Pty. Ltd.
14 Fenton Street
Downer, A.C.T. 2602
06 2414879 015 483544
email: rpaton@dynamite.com.au

July 1998

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1. INTRODUCTION

The Shoalhaven City Council, in conjunction with the New South Wales National Parks and Wildlife Service and the Department of Land and Water Conservation is preparing a Management Plan for the old gold mining area of Yalwal near Nowra (Figure 1). As part of the Plan, the present archaeological investigation for Aboriginal sites was commissioned to collect data to help manage this resource. Work for this study was undertaken by Robert Paton from Robert Paton Archaeological Studies Pty Limited.

1.1. Project Aims

The aims of this investigation were to:

1. To assess the direct and indirect impacts of current uses of the area on Aboriginal sites in or adjacent to Yalwal.

2. liaise with representatives of the local Aboriginal community and document any places of cultural significance to them.

3. to provide recommendations on future management of any sites found in the area based on their regional and local significance.

1.2. Project Tasks

To fulfil the aims of the project the following tasks were identified:

1. Review the literature on the local and regional prehistory and post-contact history of the Shoalhaven area in the vicinity of Yalwal. This should include reports on the previous consultancies conducted in the general area.

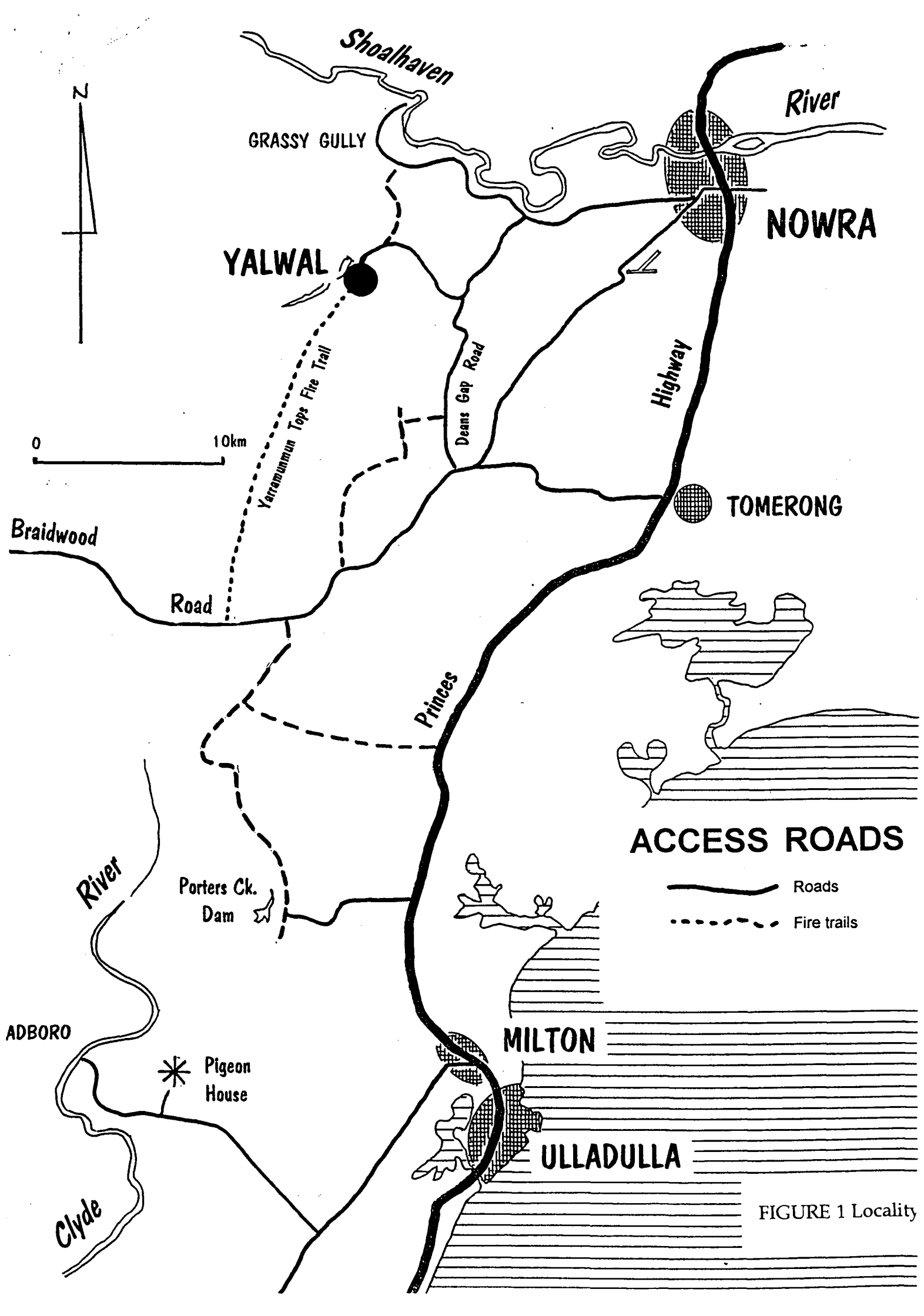

FIGURE 1 Locality

2. Carry out a search of the Aboriginal Sites Register and consult with relevant staff to determine if any sites are recorded in the area or are known and not yet recorded.

3. Using data from 1 & 2 above, topographic maps, land use information etc. establish a model of archaeological sensitivity for the subject area.

4. Develop a survey design for identifying or recording sites within areas having a high sensitivity for containing sites. The survey design should focus on those areas which may be directly impacted by human activity - present and prospective.

5. Conduct a survey for archaeological sites according to the design and record sites found. All relevant features such as percentage ground visibility, potential for sub surface deposits to be identified and described.

6. Consult the local Aboriginal Land Council, other relevant Aboriginal groups and individuals concerning their views on the area. Obtain pertinent information about the area's significance and document any traditional knowledge which may be provided.

7. Prepare a written report on the results of the fieldwork in accordance with the standard reporting format of NPWS. Recommendations are required for the management of recorded sites.

1.3. Fieldwork

Fieldwork was undertaken in late April and June, 1998 by consultant archaeologist Robert Paton and Mr Jason Davidson representing the Nowra Local Aboriginal Land Council.

2. ENVIRONMENTAL SETTING

The old gold mining area of Yalwal is an area of approximately 2 kilometres by 0.5 kilometres located about 30 kilometres inland from Nowra on the eastern edge of the Great Dividing Range (Figure 2).

In terms of Aboriginal occupation models, the environmental conditions which would have been encountered by the Aboriginal occupants of the region would clearly have been important. This is because availability of natural resources such as plants, animals, raw materials for implements, and water, will have affected the pattern of prehistoric land use and, in turn, the distribution of Aboriginal archaeological sites.

From an archaeological point of view the landscape within the study area can be divided into two distinct Zones which are likely (based on previous studies - see below) to have differing archaeological signatures.

Zone 1 Rugged Hills and Escarpment This Zone comprises about 40 percent of the total project area, and is mainly confined to the portion south of the cemetery. It is characterised by very rugged terrain drained by small ephemeral creeks. Landforms in this zone range from steep hills with shallow soils and outcropping Permian rocks to incised valleys with occasional overhanging sandstone. Because of its general ruggedness, lack of standing water, it is considered that this land unit would have been inhabited irregularly, and by small groups. Occupation, where it did occur, was probably confined to rock overhangs.

Zone 2 Creek Valley This Zone comprises about 60 percent of the project area. It is composed of the valley of Danjera Creek, as it exists after partial flooding by Danjera Dam. The remaining strip of mildly to moderately undulating ground is typical of that favoured by Aboriginal people for camping (see below). The residues of these ancient campsites are seen today as scatters of stone artefacts which fringe many of the regions waterways. However, in some important respects the Yalwal area differs from other similar localities. Firstly, the lower margins of Danjera Creek, where one would typically expect to see campsites, has been inundated by the waters of Danjera Dam. Secondly, the upper margins of the valley, which now form the banks of Danjera Dam, have been heavily scarred by recreational four

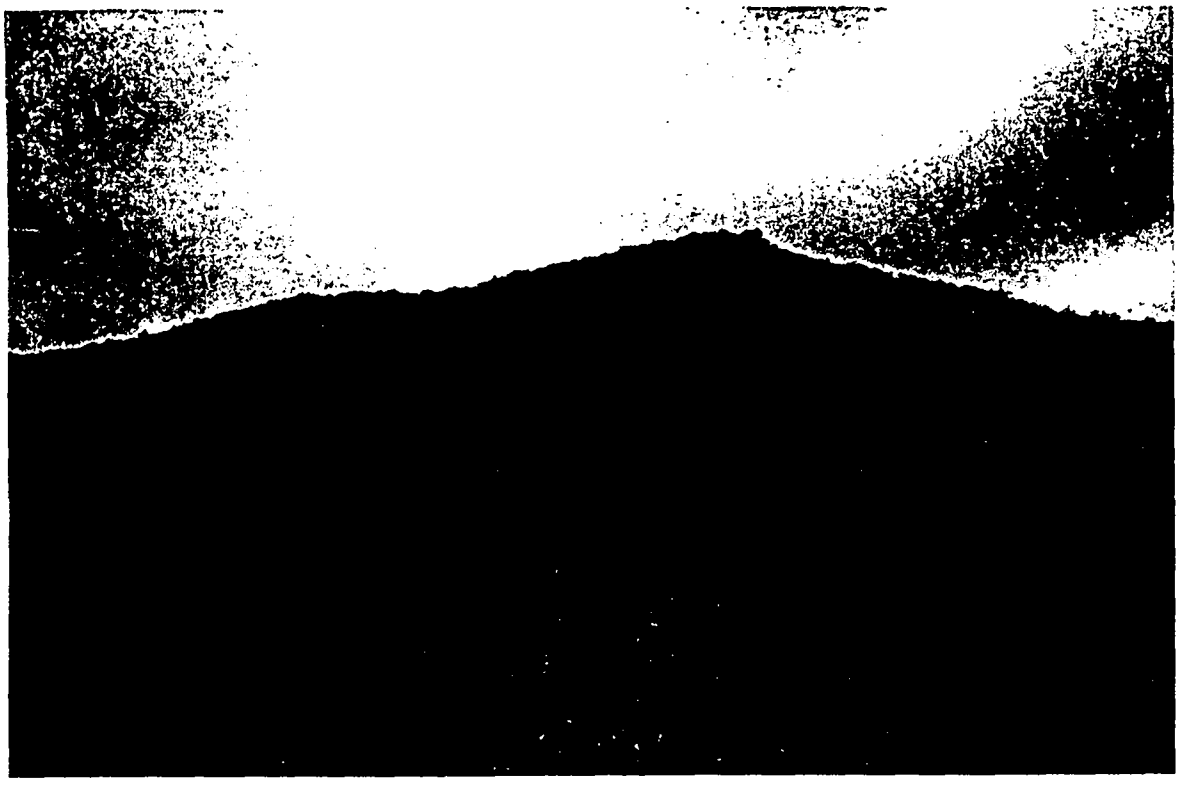

PLATE 1 The southern portion of the study area showing the rugged terrain, viewed from the cemetery.

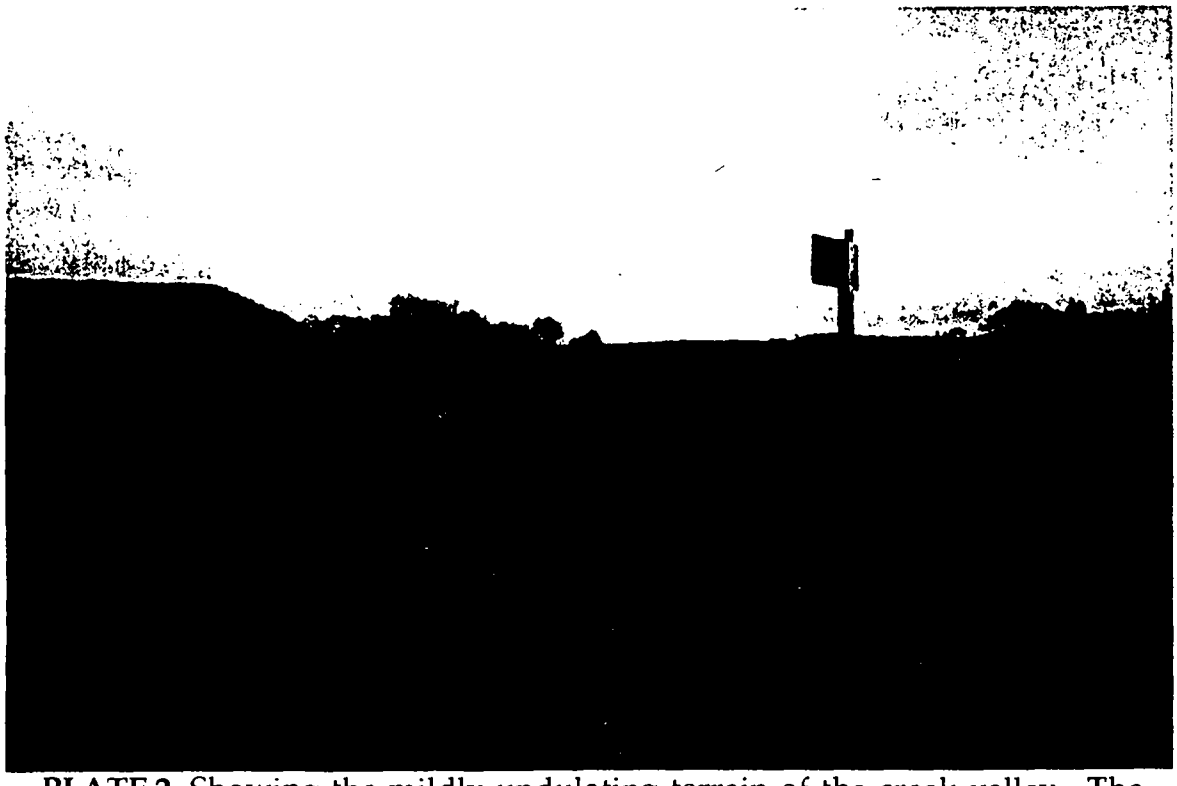

PLATE 2 Showing the mildly undulating terrain of the creek valley. The excellent exposure on the tracks is illustrated.

wheel drive vehicles and trail bikes. This activity has resulted in massive displacement of the upper sediments (which typically contain cultural materials). In combination these two post-contact events may have effectively turned an area which would have been of moderate archaeological sensitivity to one in which little, if any materials will be located.

3. ARCHAEOLOGICAL SETTING

3.1. Local Studies

A search of the NPWS site register at Head Office indicates that there are no known Aboriginal archaeological sites within the study area. The NPWS search indicates that within a 2 kilometre radius of the subject area there are four recorded Aboriginal archaeological sites consisting of axe grinding grooves (ie. Stone 1996a; 1996b; 1996c). However, these local studies are sparse and do not give a very good picture of the regional archaeological context. To begin to understand this context, and thus the archaeological potential of the study area, one has to consider a number of broader studies in similar environments.

3.2. Regional context

Previous studies along the south coast of New South Wales have demonstrated Aboriginal occupation of the region dating back to the height of the last glacial period some 20,000 years ago (Lampert, 1971; Bowdler, 1976). During this period sea level was much lower than it is today and consequently the shoreline was up to 16km to the east of the present coast. Present sea levels stabilised some 6-7,000 years ago and most coastal sites date from this period. Coastal sites older than 7,000 years would have been submerged by rising sea levels associated with the melting of the glaciers and ice-caps.

The most commonly encountered archaeological sites in the region are shell middens and open campsites represented by scatters of stone artefacts. Rockshelter sites are also a feature of the regional archaeological record. Lampert (1971) divided these occupation sites into three basic groups:

1. Specialised foreshore sites focussing on the exploitation of coastal resources such as fish, shellfish and marine birds (eg. Durras North, Wollumboola and Wattamolla) where specialised fishing equipment was used (eg. spears tipped with bone points and shell fish hooks).

2. Specialised estuarine sites focussing on the exploitation of inland resources.

3. Sites besides creeks or estuaries near the seashore where a range of inland and coastal resources were used (e.g. Burril Lake, Currarong and Curracurrang).

The archaeology of the forested hinterland, relevant for the present investigation, is known mainly from studies undertaken by Poiner (1976) and Byrne (1983), Boot (1993) and Knight (1996).

Poiner (1976) argued that Aboriginal occupation of the south coast usually focused upon the resource rich and dependable coastline with occasional hunting and gathering forays into the forested hinterland when the coastal resources were in short supply.

Byrne (1983) completed a systematic study of some of the southern NSW forests and discovered that the most frequently occurring sites in the hinterland are small, surface scatters of stone artefacts. Byrne (1993) found that these sites are most likely to be found on flat ground along ridgelines or on gentle slopes overlooking creeklines. Byrne (1983) interpreted the abundance of small open campsites along ridgelines in the hinterland as reflecting patterns of movement through the generally rugged terrain rather than the result of long-term settlement.

Byrne's (1983) report is important not only because he describes the suite of small campsites he found, but also because it emphasises the problems of discovering sites in this difficult terrain. He decisively points to the need for the development of new methods of survey to find sites and to understand their character. His recognition of this need gave a fillip to research directed towards developing new approaches.

At about the same time the Department of Prehistory and Anthropology at the Australian National University was continuing its study of sites along the NSW South Coast near Kiola, under the Directorship of Mr Ian Farrington, Lecturer in Prehistory. Until this point the work, involving Honours students, had primarily focussed on the coastal strip. However, interest began to shift inland as it became apparent that many sites were visible along public roads and forest tracks. Several years later, students have recorded several hundred sites in the hinterland between Ulladulla and Moruya. These sites provide a significant resource for understanding the nature of hinterland occupation.

Recently, the archaeological data gathered by the students over the years has been compiled and analysed by Knight (1996). Knight (1996) acknowledges that the analysis of the collated data was carried out at a basic level. However, several important trends in site type distribution were identified. These are as follows.

1) Sites were found to occur in varying degrees throughout all of the environmental zones present in the region.

2) The vast majority of hinterland sites are small surface scatters of stone artefacts numbering less than ten artefacts. Most artefacts at these sites are amorphous flakes and flaked pieces made from quartz, which occurs naturally throughout the region.

3) Site complexity (in terms of frequency occurrence of formal tools at sites) appears to be higher for artefact scatters of the hinterland zone compared to along the coast. In the hinterland zone, formal tool occurrence is apparent for sites of all sizes on all land form features.

4) Large open artefact scatters in the hinterland zone tend to be located at high point linear feature junctions. These locations also tend to be indirectly associated with nearby river or stream valleys.

5) Hinterland valley locations exhibit a lower frequency of larger sites. However, the largest artefact scatters recorded in the study are located on or near stream bank features. The highest frequency of sites containing formal tools also occur at valley locations. It would therefore appear that site size

and site complexity is influenced by close proximity to permanent water, mainly large creeks and rivers.

6) Rock shelter sites and grinding groove sites are essentially influenced by geomorphological factors. However, there also appears to be some degree of Aboriginal site selection in operation with regard to the location of grinding grooves.

As part of his PhD Thesis, Boot (1993) carried out extensive research in the hinterland region west of Nowra. In the course of the field surveying, Boot (1996) recorded a total of 410 open artefact scatters, 294 isolated finds and one midden site. Based on the analysis of the data, Boot (1993) made the following observations for site distribution in his study area.

1) The greatest density of sites tend to occur along major river valleys and broad well watered ridgelines.

2) Major river valleys show a much higher overall artefact density compared to other environmental zones.

3) The largest sites (in terms of artefact numbers) occurred within the major river valleys. The smallest sites occur at high altitudes, showing that the exploitation of these high altitude areas was not intensive.

Boot (1993) states that the data indicates that Aboriginal people accessed all areas of the south coast hinterland, but that major river valleys appeared to have been favoured over other environments. Some major ridgelines also appear to be a focus of activity, particularly those that were heavily forested (Boot 1993). These areas of high resource availability were probably repeatedly visited and occupied for long periods. Most of the open sites recorded in the hinterland are small, and are likely to be representative of short term campsites (Boot 1993).

In addition to the field survey, Boot (1993) excavated a total of 10 sites. Seven of these sites were rock shelters, with the remaining three sites being open artefact scatters. Boot (1993) has obtained radiocarbon dates for each of these sites. For the rock shelters, the dates range between 250+ 80 BP and

12040 + 630 BP (years Before Present). For the open sites, the dates ranged between 850 + 160 BP and 4050 + 210 BP.

These dates show conclusively that the coastal ranges were occupied during the late Pleistocene. Prior to Boot's investigation, the oldest dates for Aboriginal occupation of the coastal ranges was 3770 + 150 BP, which was obtained by Flood (1980) from the Sassafras 1 site (Boot 1993).

Based on these findings, Boot (1993) is now of the opinion that Aboriginal occupation of the south coast hinterland during the Pleistocene was probably widespread but sparse. Boot (1993) further postulates that occupation of the hinterland became widespread and very dense in the last 4000 years, particularly since around 3000BP.

3.3 A predictive model

The above factors are clearly significant for predicting potential archaeological sensitivity within the environments of the subject. The southern 40 percent of the area is, for example, very rugged and poorly watered, and therefore unlikely to contain sites (Zone 1 - predicted to be of low archaeological sensitivity). The creek system (Zone 2) does contain ample water year-round , and there are, localised areas within the valley where the terrain is comparatively flat and where occupation may have been focussed. However, as mentioned previously, such areas are likely to have been either submerged by Danjera Dam or destroyed by the activities of recreational vehicles.

4. METHODOLOGY

4.1. Survey Methods

The main focus of the survey was the ubiquitous vehicle tracks found throughout the study area (Figure 2).

The tracks were walked by a team of three people. As the tracks were generally no more than 3 metres wide, this method provided excellent coverage.

Ground surface visibility along the tracks was very good, approximately 80%. Ground surface visibility away from the track was generally very poor (less than 5%), with grass, leaf litter, and dense vegetation obscuring the ground.

Fortunately, the tracks provided a good sample of the defined environmental zones and thus allowed an adequate test of the predicted model of occupation outlined above.

4.2. Coverage analysis

Witter (Witter and Hughes 1983) discusses the concept of *actual* area surveyed for any study, given that conditions of ground surface visibility and sedimentation etc. will vary from area to area. This is a useful measurement, to allow cultural resource managers to assess surveys from adjacent areas, and it also allows some meaningful calculation of the actual sample size surveyed.

Witter has calculated actual areas surveyed via the formula: (D1) x (s) x (v) x (b) = (D2) where:

D1 = area in metres square surveyed. In this case approximately 45,000 square metres was intensively surveyed, given that the surveyors covered 15,000 metres (3 surveyors covering 5km each) in distance and intensively viewed an area of about 3 metres (the approximate with of the track) around the line along which they walked (ie.

15,000 metres surveyed viewing about 3 metres around their transect: 15,000 x 3 = 45,000).

s = index of sedimentation

0.1 = aggrading surface
0.5 = stable or uncertain
1.0 = degrading surface **(applies in this case)**

v = index of visibility

0.1 = negligible visibility
0.2 = 10% visibility
0.5 = 20% visibility
1.0 = 30% and greater visibility **(applies in this case)**

b = background effects (ie. the presence of natural quartz)

0.1 = massive amounts of natural quartz
0.5 = small amounts of natural quartz **(applies in this case)**
0.9 = minimal amount of natural quartz
1.0 = no natural quartz

D2 = distance in square metres of effective coverage.

Applying the formula the following calculation results:

45,000 x 1.0 x 1.0 x 0.5 = 22,500 square metres.

If we consider that the entire study area is approximately 1,000,000 square metres, the actual coverage is about 2.5 percent. This is a significant coverage sample.

5. RESULTS OF THE SURVEY

Despite an intensive inspection, no Aboriginal archaeological sites were located. The probable reasons for this result are discussed below.

Firstly, consideration has to be given to the proposition that sites are evident in the area, but were not detected due to poor conditions of ground

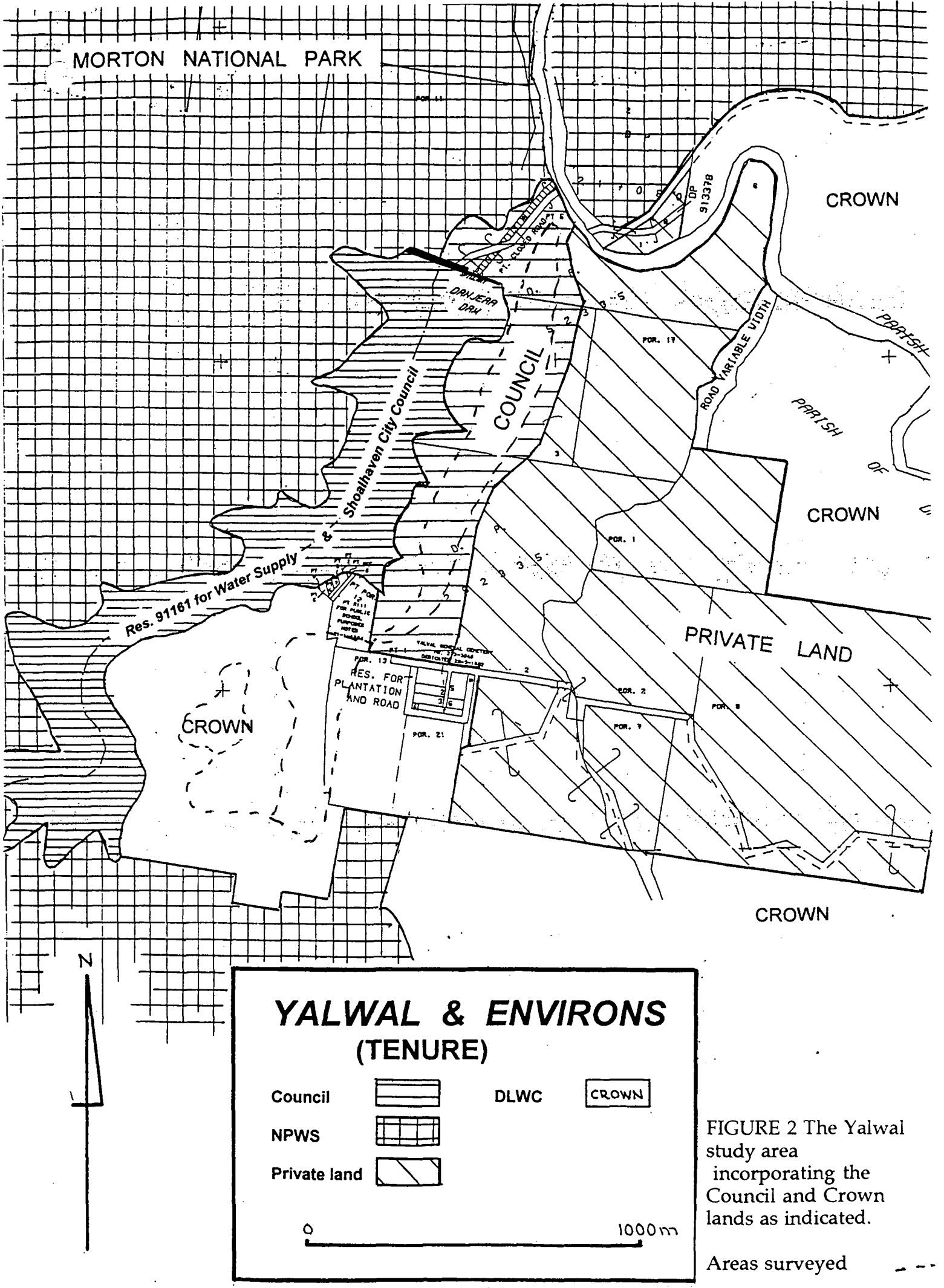

FIGURE 2 The Yalwal study area incorporating the Council and Crown lands as indicated.

Areas surveyed

surface visibility. Clearly conditions of surface visibility will affect how many sites are found. Visibility may also skew the results of a survey. If, for example, conditions of ground surface visibility vary dramatically between environmental zones, then this in turn will be reflected in the numbers of sites reported for each zone. That zone with the best visibility may be reported as having the most sites (because they are visible on the ground), while another zone with less visibility, but perhaps more sites, will be reported as having very little occupation.

For this study conditions of ground surface visibility were on average good across the entire surveyed section of the study area, being in the range 80 -100% percent. These conditions of visibility were due largely to the presence of roads throughout the area. Where the ground was obscured it was usually through the presence of grasses or leaf litter. As this was fairly uniform across the investigated area, it may be taken as a constant variable, and ignored when considering site proportions between micro environmental zones. It is extremely unlikely, therefore, that the paucity of sites in the area can be ascribed to the prevailing conditions of ground surface visibility.

A second, and more likely scenario, is that the lack of sites, particularly in Zone 2 the creek valley, is due largely to the highly disturbed nature of the area. As described above, much of the terrain has been either significantly disturbed or inundated by the Dam. If sites were present, they are likely to have been severely disturbed, or totally destroyed in this environment.

A final scenario involves the possibility that there are actually very few sites in the area investigated. Certainly, this is likely in the less disturbed, but more rugged, Zone 1. In the opinion of the consultant, this factor, combined with the highly disturbed nature of this landscape, is the main reason for the lack of Aboriginal archaeological sites in the area investigated.

6. SITE MANAGEMENT RECOMMENDATIONS

On the face of it, it would appear that Aboriginal archaeological sites are a non-issue in the management of the study area. I would caution, however, that sites may still be undetected, particularly in the creek valley (Zone 2). These sites, most likely artefact scatters, may be present either buried within disturbed sediments, or under the grasses and leaf litter in areas of poor visibility. The fact that they may be highly disturbed does not affect their protection status under the NPWS Act. It is an offence under the NSW NPWS Act to disturb or destroy an Aboriginal archaeological relic without the written consent of the Director.

I would argue, therefore, that despite the apparent low archaeological sensitivity of the study area care needs to be taken during any planned rehabilitation or construction works. Staff should be made aware of the potential for sites being present, and the Nowra Local Aboriginal Land Council should be engaged in discussions about any potential works in the area and its future management (see blow). As part of the engagement process, I would strongly recommend that the Land Council be invited to monitor any works in the area.

If any unrecorded archaeological materials are noted during rehabilitation or construction, work on that part of the project should cease and the NSW NPWS District Manager and the Zone Archaeologist must be informed. Mitigative measures can then be formulated in consultation with interested parties.

Copies of this report should be supplied to:

The NPWS Zone Archaeologist (3 copies)
P.O. Box 2115
Queanbeyan, NSW. 2602. The recommendations in this report should be endorsed by the Zone Archaeologist.

7. ABORIGINAL CONSULTATION

The Yalwal area lies entirely within the boundaries of the Nowra Local Aboriginal Land Council. Mr Jason Davidson, a trained Sites Officer, participated in the survey on behalf of the Land Council. Mr Davidson agreed with the recommendations in this report and was happy that the Land Council had been consulted as part of the management process. He expressed a desire on the Land Councils behalf to be engaged in the on-going management of the area. The present land Claim over the area is a good indication of the Aboriginal communities close attachment to this region.

A copy of this report should be sent to the Nowra Local Aboriginal Land Council.

BIBLIOGRAPHY

Boot, P. 1994 Recent research into the prehistory of the hinterland of the south coast of New South wales. In Sullivan, M. et al *Proceedings of the 1993 Australian Archaeological Survey Conference, NARU, Darwin.*

Bowdler, S. 1976. Hook, line and dillybag: an interpretation of an Australian coastal shell midden. *Mankind,* 10:248-258.

Byrne, D. 1983 *The Five Forests: an archaeological and anthropological investigation,* National Parks and Wildlife Service, Sydney.

Flood, J. 1980 *The Moth Hunters : Aboriginal prehistory of the Australian Alps,* Australian Institute of Aboriginal Studies, Canberra.

Knight, T. 1996 *The Batemans Bay Forests Archaeological Project: site distribution analysis.* A report to the Australian Heritage Commision, Canberra.

Lampert, R. J. 1971. *Burril Lake and Currarong: coastal sites in southern New South Wales. Terra Australis I.* Australian National University, Canberra.

Macfarlane, I. 1987 *An analysis if inter-site variability along the NSW South Coast, BA Hons.* thesis, Unpublished BA Hons thesis, Department of Prehistory and Anthropology, Australian National University, Canberra.

Poiner, G. 1976. The process of the year among Aborigines of the central and south coast of New South Wales. *Archaeology and Physical Anthropology in Oceania.* 11:186-206.

Stone, T. 1996a *The archaeological sensitivity of the proposed Two Rivers walking track between the Shoalhaven and Clyde Rivers.* A report to the Shoalhaven City Council

Stone, T. 1996b *An archaeological survey of ttwo sectionsof the proposed Coolendel walking track near Nowra* A report to the Shoalhaven City Council

Stone, T. 1996c *An archaeological survey of the proposed Two Rivers walking track between the Shoalhaven and Clyde Rivers.* A report to the Shoalhaven City Council

Sullivan, M. 1982 *Aboriginal shell middens in the coastal landscape of New South Wales,* Unpublished PhD thesis, Department of Prehistory and Anthropology, Australian National University, Canberra.

Towle, C.C. 1942 An arrangement of stones and some rock drawings. *Victorian Naturalist*: 58.

Various Honours student projects from the Department of Prehistory and Anthropology, The Australian National University, Canberra.

Witter and Hughes 1983 *An archaeological investigation of the Bowning to Boorowa gas pipeline,* Anutech, Canberra.

Figure 43. Homeward Bound quarry, internal tunnel, site C, map 5

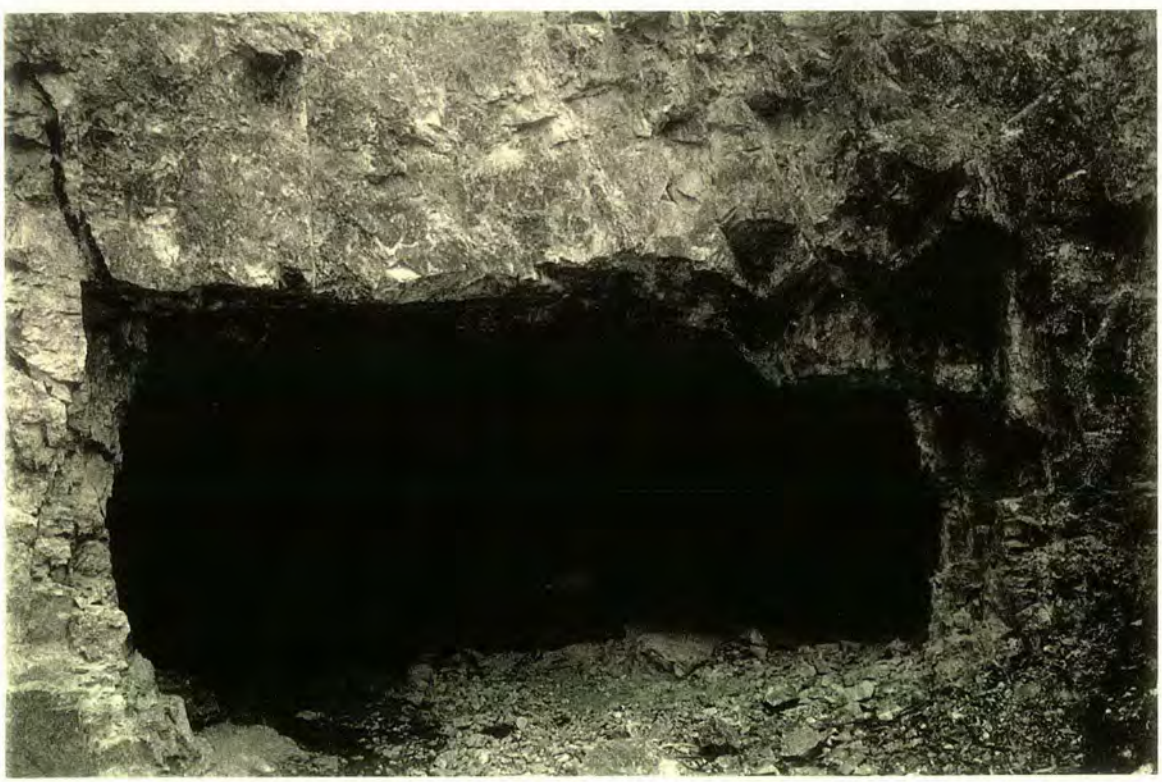

Figure 44. Homeward Bound quarry, site A, centre tunnel, map 5

Figure 45. Homeward Bound quarry, west face, looking south across the Pioneer No 3 quarry towards site B, map 5

Figure 46. Pioneer No 3 quarry, tunnel, facing north, site F,map 5

Figure 47. Homeward Bound quarry, east face

Figure 48. Homeward Bound quarry, west face, tunnel at bottom

Figure 49. Star quarry, internal tunnel

Figure 50. Star quarry, upper tunnel, external

Figure 51. Embankments for house site, near Star and Homeward Bound quarries

Figure 52. Spencer's quarry, site I, map 5

Figure 53. Floor of Pioneer No 2 quarry, facing south

Figure 54. Culvert entrance to Pioneer No 2 quarry, facing south

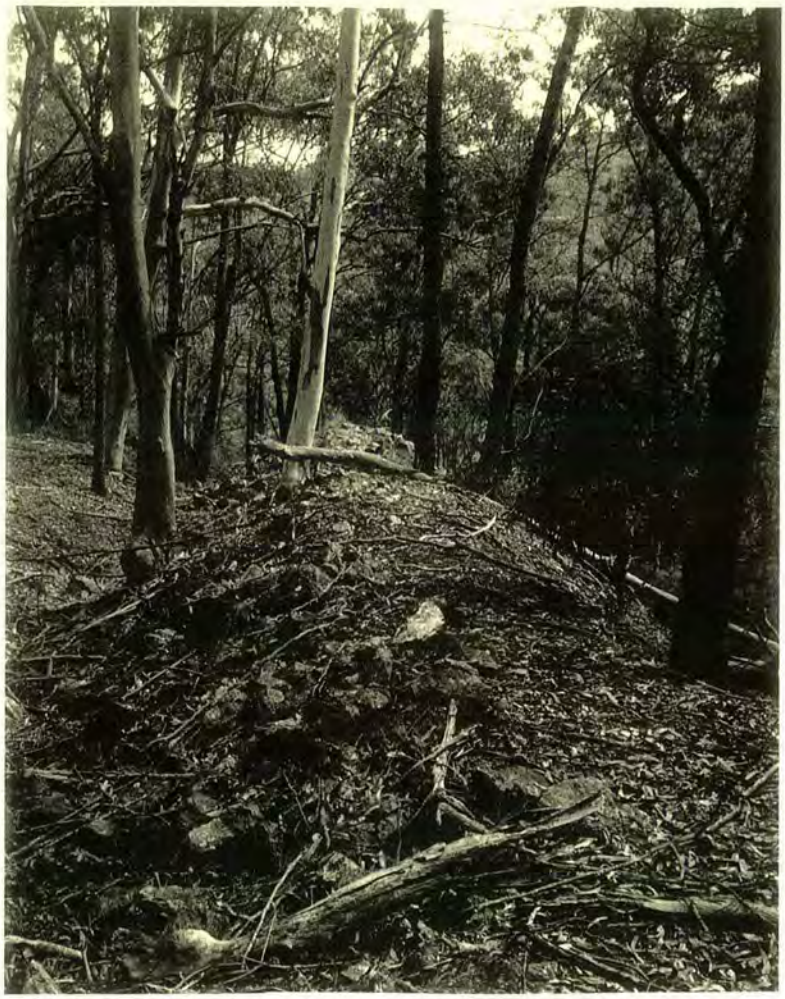

Figure 55. Mullock heap near mouth of Pioneer No 1 quarry

Figure 56. Tramway culvert near Pioneer No 2 quarry, facing south east

Figure 57. Pioneer No 1 quarry, facing south towards drop shaft

Figure 58. Pioneer No 1 quarry, east face

Figure 61. Caledonian workings, tunnel

Figure 62. Caledonian workings, Sandeman's cut

Figure 63. Golden Quarry No 3 adit

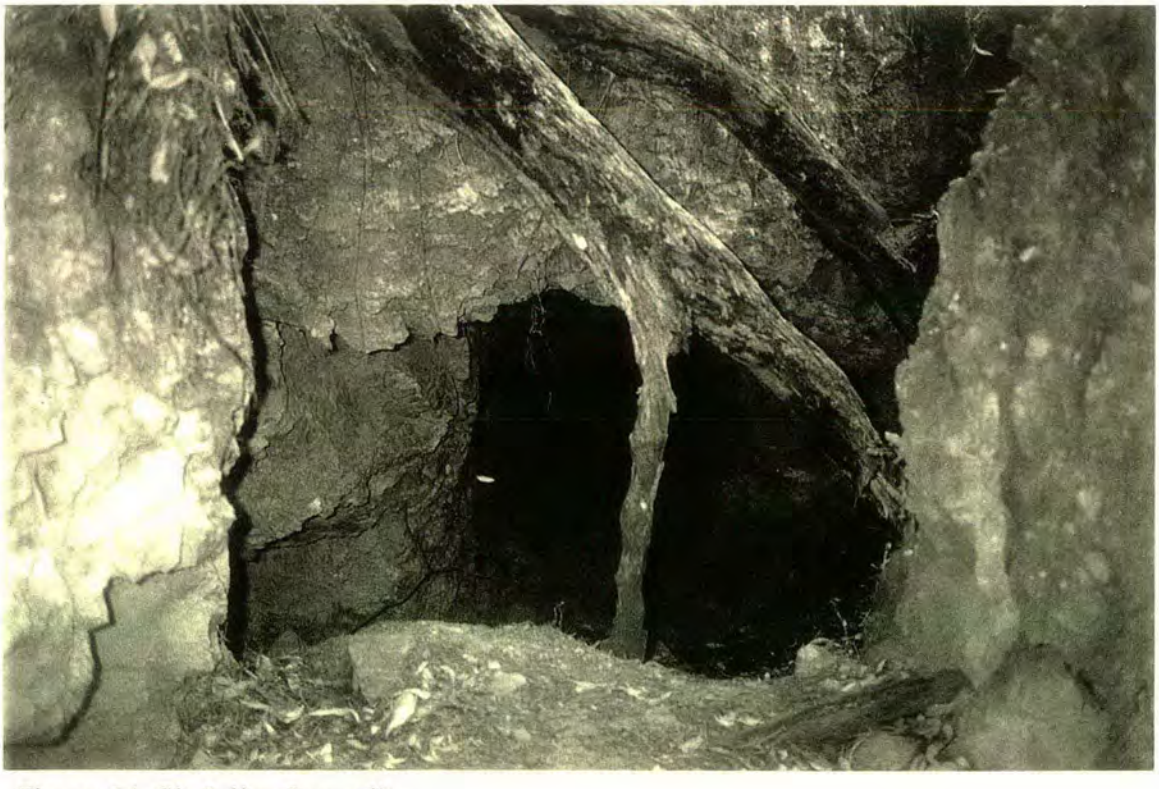

Figure 64. Sir Julian Leg adit

Figure 65. Pioneer tramway, north of main track near Black Lode

Figure 66. Embankments near Black Lode

Figure 67. Black lode workings

5. HERITAGE ASSESSMENT

5. HERITAGE ASSESSMENT

5.1 Assessment Criteria

As indicated above, the criteria employed in this study for assessing the heritage significance of post-contact remains at Yalwal are those used by the Australian Heritage Commission for assessing places nominated to the Register of the National Estate. Several of these criteria are relevant to Yalwal, and accordingly the place has been assessed against them, as set out below.

It must be emphasised that the following assessment applies only to those aspects of the Yalwal landscape that have been created by the activities of Europeans. It does not apply to any indigenous features or to the natural environment as these are beyond the scope of this study and of the expertise of the consultants. Any heritage significance Yalwal may possess in these areas should be assessed independently by appropriately qualified professionals.

5.2 Statement of Significance

Criterion A.4 *Its importance in the course, or pattern, of Australia's natural or cultural history:*
Importance for association with events, developments or cultural phases which have had a significant role in the human occupation and evolution of the nation, State, region or community.

Yalwal is significant for its association with the goldrush period in Australian history and for its longevity as a mining centre, operations continuing there for a period of nearly a century. It was the principal scene of goldmining operations in the Nowra/Shoalhaven region for this entire period and was also a major goldmining centre in New South Wales from the late 1870s to the early 1900s. The extensive mine workings still evident at Yalwal testify to its erstwhile importance and durability as a goldmining centre. The small cemetery is also important both as a relic of the mining community that once existed at Yalwal and for its incidental demonstration of the harshness of life in a remote mining settlement, one headstone recording the deaths from diphtheria of three children from one family in the space of 48 hours.

Criterion B.2 *Its possession of uncommon, rare or endangered aspects of Australia's natural or cultural history:*
Importance in demonstrating a way of life, custom, process, land-use, function or design no longer practised, in danger of being lost, or of exceptional interest.

Yalwal is significant as an uncommon historic mining centre where, because of the generalised distribution of gold in the local ore body, mining was carried out mainly by open-cut or quarrying methods for over half a century from the late 1870s onward. There are few other historic goldmining centres in Australia that demonstrate the application of such techniques from such an early date.

Criterion C.2 *Its potential to yield information that will contribute to an understanding of Australia's natural or cultural history:*
Importance for information contributing to a wider understanding of the history of human occupation of Australia.

Yalwal is important for its potential to yield information about historic mining techniques and their development over an extended period. Both individually and in their interrelationships, the open quarries, the shafts, drives and other workings, the remains of alluvial mining, the networks of tramways and the surviving machinery and hut sites can demonstrate how mining operations were carried out at various times, how the ore was transported and how it was treated to extract the gold. All of these remaining features and structures are important elements of the cultural landscape at Yalwal. The 1896 five-head stamping battery is of particular significance as the only surviving intact piece of machinery left at Yalwal.

Criterion D.2 *Its importance in demonstrating the principal characteristics of: (I) a class of Australia's natural or cultural places; or (II) a class of Australia's natural or cultural environments:*
Importance in demonstrating the principal characteristics of the range of human activities in the Australian environment (including way of life, custom, process, land-use, function, design or technique).

Yalwal is important as a good example of a goldmining centre in that it retains almost all of the tunnels, quarries, tramways and machinery sites that were established during its nearly 100 years' of operation. It is also significant as a particular type of goldmining centre, one at which open-cut methods or quarrying were, from an early date, the most favoured and productive techniques employed by the miners.

Criterion F.1 *Its importance in demonstrating a high degree of creative or technical achievement at a particular period:*
Importance for its technical, creative, design or artistic excellance, innovation or achievement.

The remains of the mining industry at Yalwal are important because they demonstrate a considerable degree of technical innovation in mining and transporting large quantities of ore. The open-cut or quarrying methods used at Yalwal are evidence of an innovative response to the difficulties presented by the nature of the local ore body. The mines also have an extensive system of tramways, two of which were constructed as inclined tramways as a solution to the problem of conveying the ore down steep slopes to the processing sites.

Criterion G.1 *Its strong or special associations with a particular community or cultural group for social, cultural or spiritual reasons:*
Importance as a place highly valued by a community for reasons of religious, spiritual, symbolic, cultural, educational or social associations.

The cemetery at Yalwal has important religious, spiritual and social associations for the small local farming community, especially members of the pioneering Fletcher family, as several of their forebears lie buried in the cemetery.

6. CONSERVATION POLICY

6. CONSERVATION POLICY

6.1 Introduction

The object of this section of the report is to provide clear policy guidelines for the future care and maintenance of those aspects of the post-contact landscape at Yalwal that have been assessed by this study as having heritage significance. The overall purpose of these guidelines is to ensure that the European heritage significance of the place is retained.

It should be noted that the policies articulated in this section refer only to the conservation of Yalwal as the means of protecting its heritage values. The policies are not concerned with site interpretation or arrangements for visitation, except in so far as they promote appreciation and retention of Yalwal's heritage. Specific recommendations for site interpretation and visitation form the subject of the next section of the report. As the primary need is to conserve the heritage values of the place, it must be understood that these recommendations are properly subordinate to the conservation policy guidelines. In other words, site interpretation and visitation should have as little impact on heritage values as possible, lest they degrade or destroy the very thing they are intended to promote.

6.2 General Policies

In keeping with the overall purpose of the policy guidelines, there is a need for the formal adoption and acceptance of the statement of significance and conservation policies as set down in this report.

Policy 1.1 The statement of significance should be accepted as the basis for the recognition and permanent retention of the European heritage of Yalwal.

The implementation of this policy should entail the inclusion of Yalwal as a designated heritage place in a schedule to Shoalhaven City Council's Local Environment Plan. Similarly, the place should be included as a specified heritage area in the Illawarra Regional Plan, in accordance with clause 124 (b) of that plan. The incorporation of Yalwal in schedules to these plans will constitute a formal recognition of Yalwal's European heritage values and provide them with a substantial measure of protection.

By way of additional recognition and protection, it is strongly recommended that Yalwal be nominated to the Register of the National Estate and to the NSW Heritage Register. Nomination forms for the respective registers can be obtained from the Australian Heritage Commission and the NSW Heritage Office, or in the latter case the form can be downloaded from the relevant site on the Internet. The statement of significance elaborated in this document should serve as the basis for the nomination to the RNE.

Policy 1.2 The conservation of Yalwal should be carried out in accordance with the articles laid down in the Charter for the Conservation of Places of Cultural Significance ('the Burra Charter').

The Burra Charter is the nationally accepted set of principles that guides the conservation of places of heritage significance. A commitment to these principles is important for ensuring that conservation work at Yalwal is carried out in conformity with accepted practices and standards, and by experienced conservation professionals. A copy of the Burra Charter articles is attached as Appendix 2 to this report.

Policy 1.3 The specific policies and recommendations put forward in this report should be formally endorsed as the guidelines for the conservation management of Yalwal.

Based on the articles of the Burra Charter, the particular policies and recommendations of this report provide directions for the conservation of physical remains of heritage significance at Yalwal. Endorsement by Shoalhaven City Council would be a further important step towards ensuring that these policies and recommendations are adhered to in any conservation work that is undertaken.

6.3 Specific Policies

The following policy statements provide guidance on specific aspects of the conservation of Yalwal.

Policy 2.1 All existing structures and features of post-contact heritage significance at Yalwal should be maintained and conserved.

These strictures apply to all quarries, shafts and tunnels, tramways, remains of alluvial mining activity, machinery, machinery and hut sites, and the cemetery. The policy entails regular and ongoing maintenance of these structures and features, together with the careful reconstruction of deteriorated components with compatible or sympathetic materials. How this applies to individual structures and features is dealt with in detail below under Policy 2.2.

It is recognised that a number of the remaining structures, namely most of the machinery sites, are usually covered by the waters of Danjera Dam. As such, it is virtually impossible to carry out any active conservation works. Under these circumstances, the structures should simply be left as they are. There is one small exception to this, concerning the base of Chapman's battery (for which, see under Policy 2.2).

By way of a corollary to the policy statement, there is a requirement that no activities should be undertaken or allowed that threaten the heritage structures and features at Yalwal. Such activities would include anything that leads to further erosion of the hillsides and which may thus undermine some of the tramways and cause sections of them to collapse. They would also include any disturbance to the alluvial mining remains in Sawpit Gully and to the various machinery and hut sites.

Nothwithstanding the corollary, there are some features of the site that present potential dangers to visitors and may require some form of intervention. These features are the tunnels and shafts and the tops of the quarries. If it is found that these features present an unacceptable risk to the public, some form of barrier will need to be erected to prevent

visitors from respectively entering or falling into them. With the exception of the short tunnel leading into the base of the Homeward Bound quarry, the entrances to tunnels and shafts should be barricaded respectively with lockable heavy steel mesh gates and with solid metal grilles, rather than completely blocked off with solid walls. Gates and grilles of this kind would enable visitors to see into the tunnels and shafts without danger, allowing them to appreciate the effort and skill involved in constructing these works. The steel mesh gates blocking the entrance to tunnels could be opened to permit guided tours of the tunnels, should this ever become a desired option, and at other times they could be securely locked for safety reasons. Such a system is used at various well-visited limestone caves in NSW. Solid metal grilles of the type envisaged here to block the entrances to shafts have been successfully used to cover deep shafts at the former mining centre of Yerranderie in the Blue Mountains National Park.

In similar fashion, safety barriers might also need to be constructed at the tops of quarries. These should cause as little interference as possible with the mining remains and should not be constructed of materials that jar with the landscape. Construction using concrete and tubular steel is not supported. Ramps and barriers of treated timber are preferred as they would tend to blend in better with the surrounding scenery. A model for such structures is provided by the timber ramp, barrier and viewing platform that has been erected at the Big Hole geological feature in the Braidwood area.

Policy 2.2 Specific conservation measures should be undertaken for some individual features or structures at Yalwal.

This applies to the Chapman battery, the tramways and the cemetery.

Chapman Stamping Battery

When Danjera Dam is full, the base of the Chapman stamping battery is covered by water. Over time, the water may cause corrosion of the lower parts of the battery, leading to its eventual collapse. One obvious solution is to move the battery, but the Burra Charter is unequivocal in its opposition to this option. Article 9 of the Charter states: 'A building or work should remain in its historic location. The moving of all or part of a building or work is unacceptable unless this is the sole means of ensuring its survival.'

The reason for retaining a structure in its historic location is that re-location takes it out of its historical context and diminishes its heritage value. This is a particularly important consideration with Chapman's battery as it is the only substantial piece of mining equipment remaining at Yalwal and one that is still standing in its original working location, close to the metal and stone blocks on or near which the battery's engine and other machinery were sited. It is therefore recommended that a masonry wall be built on the reservoir side of the battery, the wall being of sufficient height to keep the base of the battery permanently out of the water.

Tramways

Most of the tramways are in good condition, though some parts are in danger of collapsing, have already collapsed, have been cut through by later mine workings or have been covered

by debris from mine or roadmaking activity. Where parts of the tramways are in danger of collapsing, they should be shored up with compatible materials used in a sympathetic style of construction. This is particularly important for those parts of the tramway that will be incorporated in the walking tracks for visitors to Yalwal. To assist in their conservation, all remnant tramways should be cleared of any vegetation such as saplings whose roots would progressively damage them and lead to their ultimate destruction. Such growth should in any case be cleared from those sections of tramways incorporated in walking tracks as they would constitute obstructions for visitors.

In those cases where sections of tramways have already collapsed, been cut through or covered over, they should be left as they are. The only exception is for those parts of the tramways that visitors will traverse as part of the walking tracks. Although the ideal solution would be to reconstruct these sections in matching fashion using the same materials, this is not a realistic option because later mining cuts and erosion have removed any foundation on which a reconstruction could be securely based. If a walking track is to pass over one of these areas, then small bridges complete with safety rails should be built over them. Like the ramps and barriers proposed for the tops of quarries, these bridges should be constructed in treated timber to blend in with the surroundings. In constructing them, there should be as little disturbance as possible to the ends of the tramways on which, of necessity, the bridges will rest.

As it is, the main area in which a walking track is likely to pass over a cut or collapsed section of tramway is where part of a tramway has been destroyed by the later cuts of the Hidden Treasure mine. In this instance, it is recommended that the walking track pass below the cuts, rather than over them. The question of constructing a bridge would then not arise.

Cemetery

It is noted that some conservation works were carried out on the cemetery from funding provided a decade ago by the Bicentennial Authority. There is a need for conservation to continue as needs be on the cemetery structures.

A submission from the Shoalhaven Historical Society states that several unmarked graves lie outside the small fenced-off area containing headstones which stands within the original larger boundaries of the cemetery. The submission calls for the restitution of the cemetery to its original gazetted boundaries.

After the NSW government passed the *Conversion of Cemeteries Act* in 1974, the National Trust of Australia (NSW Branch) repeatedly expressed its outright opposition to the act, the provisions of which allowed historic cemeteries to be converted into rest parks or pioneer parks. This opposition to the re-use of historic cemeteries has been re-stated again recently in the *National Guidelines for the Conservation of Cemeteries* (pp. 11-12) produced by the Australian Council of National Trusts (1996). In its opposition to the re-use of historic cemeteries, the National Trust has been most concerned about the destruction of the cemeteries' heritage values through the removal or relocation of headstones and other cemetery structures and features. The National Trust strongly advocates the retention of all of the original features of a cemetery and their precise reinstatement according to original plans.

There appears to be no evidence that the greater part of Yalwal cemetery had any formal cemetery layout, other than a division into denominational areas, and contained no headstones or other structures. It seems therefore that there is nothing to reinstate in the greater part of the original Yalwal cemetery compound. On the other hand, the apparent excision of this large area from the original cemetery grounds runs counter to the general drift of the National Trust concerns that re-use of historic cemeteries degrades their heritage significance. It also conflicts with the Trust's strong recommendation that 'any plan to re-use areas of a cemetery should be preceded by ... consideration of the social consequences, particularly the attitude of families of those interred.'*

In the light of the National Trust's attitude and guidelines, it is recommended that the cemetery be restored to its original area and that other uses - such as the grazing of cattle, as claimed by Shoalhaven Historical Society - be strictly prohibited. In addition, the Historical Society should be asked to provide whatever details it has of unmarked burials in the cemetery. After verification of these details with the Registrar General of Births, Deaths and Marriages in NSW, they could be recorded on a simple memorial erected in the cemetery. A full record of all those known to have been interred in the cemetery should be maintained by Shoalhaven City Council, Shoalhaven Historical Society and other relevant bodies. This record should include good quality 35mm colour transparencies ('slides') of all existing headstones. In the event that any headstones are damaged by vandalism or other means, the transparencies can serve as a photographic guide to their restoration and/or reconstruction.

Policy 2.3 New buildings and other structures are permitted at Yalwal, provided they are constructed and sited in a manner sympathetic to the area and its heritage values.

Historically, the buildings that existed at Yalwal were mostly of timber and iron construction, while the roads in the area were unsealed. Such structures as a caretaker's cottage, visitors' centre, kiosk, amenities block, trail markers and signage that may be erected in the area should be built to simple designs and constructed of what might be termed traditional Yalwal materials - timber and iron. The buildings should be low-rise and should be designed in such a way as to blend in with the landscape. Use of brick, Besser block and similar building materials is not supported.

Walking tracks, roads and parking and camping areas at Yalwal should be unsealed or, at the most, covered with gravel. It would be grossly inappropriate for tar macadam, concrete or similar hardstanding to be laid down in the area.

Buildings and parking areas should be sited away from items of heritage value so that they do not impinge on their immediate surroundings and detract from their heritage value. This mostly affects the cemetery and Chapman's battery. Conversely, as these two items are the most vulnerable in the area, any caretaker's cottage or the like should be sited close enough to both of them to deter acts of vandalism.

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* National Trust of Australia (NSW), *Cemeteries: A National Trust Policy Paper*, Sydney, NTA (NSW), May 1986, p. 23. See also Chris Johnston, 'The care of cemeteries', in Celestina Sagazio (ed.), *Cemeteries: Our Heritage*, Melbourne, National Trust of Australia (Vic), 1992, p. 153.

Policy 2.4 The place should be interpreted to demonstrate and promote its heritage significance.

Walking tracks should be established to take visitors to most of the main sites, trail markers provided, and signage erected to explain each site and its significance. The proposed walking tracks and sites to be visited are spelled out in far greater detail in the ensuing section of the report. As it is envisaged that the walks would be self-guided, a leaflet should be produced to show the routes of the suggested walks and provide brief explanatory notes of the sites visited. These notes would serve to complement the signage. The leaflet should be a simple production, possibly consisting of a single page printed on both sides and folded in three. Some very useful practical information on the production of leaflet guides and the provision of appropriate signage and trail markers appears in a free booklet from the NSW Heritage Council entitled *Guidelines for Heritage Trails*. Although this publication is primarily designed for heritage trails within cities and towns, it would nonetheless be a valuable reference tool for the Yalwal project. It is recommended that Council obtain a copy of this booklet from the NSW Heritage Office.

Consideration should also be given to the erection of a visitors' centre which would house a not-too-elaborate display summarising the history of Yalwal and highlighting its main mining achievements. The display should rely heavily on pictorial material, particularly reproductions of old photographs showing what Yalwal and its mine workings looked like in the town's heyday.

6.4 Summary of Conservation Policies

Policy 1.1 The statement of significance should be accepted as the basis for the recognition and permanent retention of the European heritage of Yalwal.

Policy 1.2 The conservation of Yalwal should be carried out in accordance with the articles laid down in the Charter for the Conservation of Places of Cultural Significance ('the Burra Charter').

Policy 1.3 The specific policies and recommendations put forward in this report should be formally endorsed as the guidelines for the conservation management of Yalwal.

Policy 2.1 All existing structures and features of post-contact heritage significance at Yalwal should be maintained and conserved.

Policy 2.2 Specific conservation measures should be undertaken for some individual features or structures at Yalwal.

Policy 2.3 New buildings and other structures are permitted at Yalwal, provided they are constructed and sited in a manner sympathetic to the area and its heritage values.

Policy 2.4 The place should be interpreted to demonstrate and promote its heritage significance.

7. SITE VISITATION RECOMMENDATIONS

7 SITE VISITATION

Introduction

In forming recommendations on site visitation and walking tracks the consultants have been guided by the need to provide access to the key features of the field in a structured manner, with as little overlap as possible. We have also been particularly concerned with safety aspects, for the field possesses an uncommonly large number of hazards. With regard to the latter point the fact that no one yet has been injured at Yalwal may provide some reassurance. However, this is of little comfort when considering the impact of a much larger projected visitor intake, particularly one encompassing children of primary school age. A map is provided highlighting the proposed route and some of the high risk areas.

It should be stressed that the consultants do not see the safety issue as insurmountable. However, it can only be finally resolved by consultation with persons specialised in these issues, such as mining engineers and emergency services personnel. Some aspects are obvious and can be addressed generally from the outset. They include the very deep shafts, tunnels, and the steep quarry faces. For example, there are a number of very deep shafts, at last count six, most of which are concealed by scrub. These should all be covered with a wire mesh grid. On this there can be no argument.

More problematic are the tunnels, of which there are a much larger number. For example, there were 13 tunnels (three at the Golden Crown, two at the Golden Quarry, one at the Caledonian, two at the Star, one at Pioneer 3 and two at the Homeward Bound plus the Albion and the Sir Julian Leg adit) where the entrance was invitingly intact, and at least another six where there had been some degree of collapse. In addition, there were a number of deep narrow cuts with a partly enclosed roof, the most obvious being the two cuts at Hidden Treasure and the three at the Caledonian workings. Some of the tunnels are excellent examples of their type and may well be worth allowing a degree of visitor access. The cuts are also excellent examples of their type. However, the degree of safety in providing access needs careful assessment. For example, the safety risks of the cuts appear to be more obvious, as they are steep and narrow and more likely to provide rock collapse. Comments are not made below on all the adits or tunnels, it being taken that all require an access and risk assessment.

With regard to the quarries, the floors appear relatively safe, though the prospect of rock falls near the face needs to be addressed. A different issue arises with the top of the face, where the risks are more obvious, particularly where the face is more than two or three metres in height. One solution is not to draw attention to any of these areas, in the hope that they would not be accessed. However, that at best would be an uncertain remedy. Even the most moderately curious visitor would want to view at least some of the quarries, in particular the Homeward Bound, from an elevated vantage point. A better option, therefore, would be to provide for one or more look-outs with some protective fencing. This issue is addressed more specifically below.

A further issue is the practicality and desirability of providing additional tracks and the refurbishment of existing ones. The latter is essential along the main track below the access track to the Caledonian workings, as this part of the main track is substantially degraded and hazardous. There are a number of areas where a new track would be necessary, the most significant being in providing access to the Pioneer tramway. Elsewhere, particularly along the tramway itself, the main construction effort would be refurbishment. Logistics aside, there are clearly a number of environmental matters to be taken into account in providing better or new tracks, for example, the impact on soil erosion and vegetation.

The proposed walking tracks (numbers in parenthesis refer to sites on overview maps)

Short walking track

Two walking tracks are proposed, a short one for the more elderly, less able, or more hurried visitor and a long one for the fitter and more adventurous. The short track would include the Chapman battery and the Golden Crown, the latter being in many regards a miniature of the Yalwal field.

The first point of interest on the field is the cemetery. This is the most significant reminder of the human presence at Yalwal, there being several headstones standing. Most house sites were located north of Danjera Creek, that is outside the project area, and are in any event below the normal inundation level. Whether the cemetery is included as one of the points of interest on one of the walking tracks depends of the location of the carpark. If it is to be located near the cemetery then the cemetery becomes the first point of interest on the track. If, however, the carpark is located further towards the mines near the Yarramunmun fire trail, then the cemetery, while still a point of interest, is not a part of either walking track. The latter option is the one favoured by the consultants, for to do otherwise would negate the rationale for having a short walking track, the distance between the cemetery and the mines being too great for many less able visitors.

The numbering system adopted on the overview map assumes that the car park, and therefore both tracks, would commence further on towards the mines near the Yarramunmun fire trail. A path would need to be cut through to the Chapman battery, but this would not be a difficult task. From the Chapman battery (1) the path would follow the bottom track to the Golden Crown processing site (2), and then follow the tramway (3) past the two tunnels and then back to the main track, with a detour to the top of the main quarry (4). This quarry is certainly not the deepest on the field, but could still be regarded as hazardous. Thus, some form of guardrailing would be needed. Depending on where this is placed, the route could include the next cut and upper adit, before exiting via the track to the north of the cut, passing a burnt out vehicle, and then back to the main track and the car-park.

There is the question of whether the battery should be removed to higher ground to put it out of reach of the water level in the lake. The consultants are guided by the terms of the Burra Charter, which advocates a cautionary approach to changing a place of heritage significance. Removal of the battery would to a large degree destroy the integrity of the site, which is the only one left on the field where machinery can still be found. Figure 12 illustrates well the relationship of the battery to other site components. The prospect of removal also raises the question of where to, particularly if it is to be shifted some distance from the site. It is recommended, therefore, that funding be sought for the construction of a concrete barrier around the site to allow visitor access and keep the dam waters away.

Long walking track

The long track would follow the short track to a point, say twenty metres, south of the most southerly adit on the Golden Crown site. At this point a footbridge could be constructed to take visitors over Sawpit Creek onto the opposite bank. At this juncture, however, there is a dilemma. One of the key features of the field is the Pioneer tramway. However, if access is to be provided directly to the tramway from this point, a zig zag track would be needed, which at this juncture would be very steep, it being essential that the track join the tramway north of the Hidden Treasure cuts. The reason for this is that the cuts dissect the tramway in two places and they could only be crossed via a footbridge which would be some ten metres above the floor of the cuts. An alternative, and the option recommended by the consultants, is that the route pass the Albion (6), onto the main track, then cut back and ascend the hill on a more gentle incline, passing below the Hidden Treasure (5) before joining the tramway (7) through a small series of zig zags to the north of the cuts. A detour track could be constructed to the Hidden Treasure.

The tramway route would require some clearing of vegetation and stabilisation of the embankments and upslope areas. However, the tramway appears to be in relatively good condition for much of its length. An exception is the area immediately north of the Victory, where there has been a substantial scree collapse over the tramway. The next site is the Pioneer tunnel (10) and following that the Pioneer processing site.(9) Most of the latter site is under water, the main structure remaining being a concrete wall which would have held part of the chute. The processing plant is cut back into the rock face at this point and is very steep and dangerous to approach. There should, therefore, be a guard rail and fencing provided at this point. The next site is the Homeward Bound processing site (11), which, as discussed in the site inventory, is of considerable importnace as it is virtually intact with regard to layout. From there the route would follow the inclined tramway (12)

to the hopper site and the Homeward Bound upper (21) and Star middle (24) tunnels. A supplementary track could be provided to the Homeward Bound lower tunnel (19), however, it would need to be constructed anew as the existing track (20) is in places very narrow.

As the proposed route will pass through the Homeward Bound upper tunnel to the Homeward Bound quarry (18), safety aspects are paramount. If the tunnel was declared unsafe, then obviously the proposed route would need to be reassessed. However, countless numbers of visitors have been using the tunnel for decades with no reported incidents of rock fall or collapse, and with one exception it is difficult to see why the safety prospects would be any different now. The exception relates to the upper part of the west face of the quarry directly above the three tunnel entrances into the quarry. While not clearly visible from the west face, from the south east face it is clear that there is a major rock fissure in this area. This may have been caused by mine work over several decades or it may be a natural feature. Whatever its origins, however, it does need to be checked out and some geological assessment made of its future stability.

Once on the quarry floor the route is clear as a path (or former tramway) runs from the mouth of the tunnel into the Pioneer No 3 quarry (15). Some work would, however, need to be done to provide access around the large rock face separating both quarries, a path being either cut into the rock or a small footbridge provided. The drop shaft in the Pioneer No 3 quarry is dangerous and should be covered. Once out of the Pioneer No 3 quarry the route follows the existing path and railway past the galvanised tank, then past the adit to Spencer's workings and the culvert to the mouth of the Pioneer No 1 quarry (13). A short side track could be provided to the Pioneer No 2 quarry (14) from the vicinity of the culvert.

There are a number of hazards in the area. Both quarries can be entered, although the Pioneer No 2 entrance is some height above the floor and may require fencing off. Similarly, the drop shaft in the Pioneer No 1 quarry would need covering. Other hazards are the narrow neck of rock which separates the Pioneer 1 and 2 quarries and the narrow neck of rock separating the quarry of the Pioneer No 2 mine from a crevasse to the south of the quarry. Another hazard is the top of the west face of the Pioneer no 1 quarry where a track ends abruptly at this spot, providing a hazard for the unwary. Guard rails may need to be put around both quarries.

From the Pioneer No 1 quarry there is a track leading back down the hill to the main track and past the Victory (29) and Fountainhead (30) mines. The former mine is of no particular moment and can be ignored, however, there is a track to the Fountainhead which constitutes two small but neat quarries of some interest. From here there are two options, firstly to proceed direct to the Caledonian workings (31 & 32) or to include a detour to the top of the face of the Homeward Bound quarry. There is a well defined track leading to the south east face of the quarry, there being particularly good views of the west face from this area. This track also passes near site 25, the house site, and the Star quarry (22, but not 23). Thus there is material of interest to most visitors in this area. The consultants recommend, therefore, that a detour be provided to this area, access being dependent upon the provision of adequate fencing and look-outs and also the covering of at least two very deep shafts.

The Caledonian workings provide an excellent example of cuts and are easily accessible. There are obvious safety issues to be addressed here, however, particularly as in one cut several boulders are poised precariously upon the horizontal wooden roof supports. From the Caledonian, the main track is followed back to the car-park.

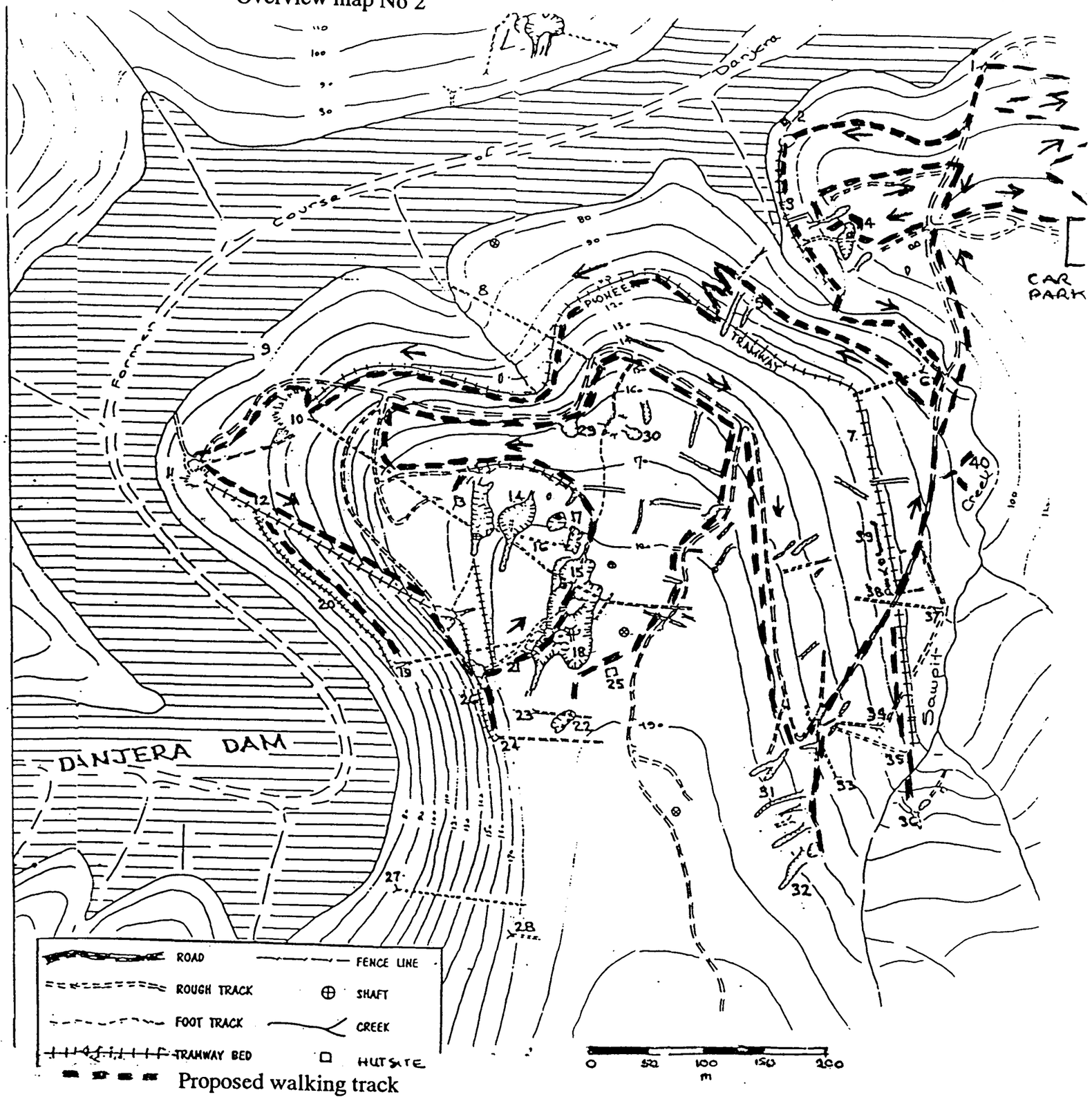
The only other sites requiring some attention are the mines at the junction of the main track with the Pioneer railway, the Golden Quarry sites and the alluvial workings. In this area the Black Lode workings (38 and 39) are adjacent to the main track on the north side and therefore likely to attract the curiosity of most visitors. The shafts (one in particular) and adits are located very close to the track and can, therefore, be regarded as hazardous. This area would, therefore, require some attention.

A separate detour could also be provided following the railway south to the Golden Quarry mines (34, 36 and 37, but not 33 or 35). It is noted, however, that the railway site is badly disturbed in this

area and would require some reconstruction. In addition, because of the location of the mine sites at the head of Sawpit Creek, there may be more potential for environmental damage here than elsewhere. If this detour is to be undertaken the visitors could exit onto the main track via the Usher. The alluvial workings (40) require signposting and a short track to the more obvious workings on the west side of Sawpit Creek. The caveat regarding potential environmental damage applies here as well.

Overview map No 2

1 CHAPMAN BATTERY
2 GOLDEN CROWN MACHINERY SITE
3 TRAMWAY
4 GOLDEN CROWN MINE
5 HIDDEN TREASURE MINE
6 ALBION TUNNEL
7 PIONEER TRAMWAY
8 PAUL'S TUNNEL
9 PIONEER MACHINERY SITE
10 PIONEER TUNNEL
11 HOMEWARD BOUND MACHINERY SITE
12 INCLINED TRAMWAY
13 PIONEER No.1 OPEN CUT
14 PIONEER No.2 OPEN CUT
15 PIONEER No.3 OPEN CUT
16 PIONEER CROSS CUT
17 SPENCER WORKINGS
18 HOMEWARD BOUND OPEN CUT
19 HOMEWARD BOUND LOW LEVEL TUNNEL
20 TRAMWAY
21 HOMEWARD BOUND HIGH LEVEL TUNNEL
22 STAR QUARRY
23 STAR No.1 TUNNEL
24 STAR No.2 TUNNEL
25 HOUSE SITE
26 TRAMWAY
27 STAR No.3 TUNNEL
28 PINCOMBE ADIT
29 VICTORY QUARRY
30 FOUNTAIN HEAD WORKINGS
31 CALEDONIAN WORKINGS
32 THOMAS CUT
33 SIR JULIAN LEE ADIT
34 GOLDEN QUARRY & No.1 ADIT
35 GOLDEN QUARRY & No.2 ADIT
36 GOLDEN QUARRY & No.3 ADIT
37 USHER TUNNEL
38 BLACK LODE WORKINGS
39 LOADING PLATFORM
40 ALLUVIAL WORKINGS



Proposed walking track

8. APPENDICES

Appendix 1: Criteria for the Register of the National Estate

Background Notes

AUSTRALIAN HERITAGE COMMISSION

CRITERIA FOR THE REGISTER OF THE NATIONAL ESTATE

CRITERION A:

ITS IMPORTANCE IN THE COURSE, OR PATTERN, OF AUSTRALIA'S NATURAL OR CULTURAL HISTORY

A.1 Importance in the evolution of Australian flora, fauna, landscapes or climate.

A.2 Importance in maintaining existing processes or natural systems at the regional or national scale.

A.3 Importance in exhibiting unusual richness or diversity of flora, fauna, landscapes or cultural features.

A.4 Importance for association with events, developments or cultural phases which have had a significant role in the human occupation and evolution of the nation, State, region or community.

CRITERION B:

ITS POSSESSION OF UNCOMMON, RARE OR ENDANGERED ASPECTS OF AUSTRALIA'S NATURAL OR CULTURAL HISTORY

B.1 Importance for rare, endangered or uncommon flora, fauna, communities, ecosystems, natural landscapes or phenomena, or as a wilderness.

B.2 Importance in demonstrating a distinctive way of life, custom, process, land-use, function or design no longer practised, in danger of being lost, or of exceptional interest.

CRITERION C:

ITS POTENTIAL TO YIELD INFORMATION THAT WILL CONTRIBUTE TO AN UNDERSTANDING OF AUSTRALIA'S NATURAL OR CULTURAL HISTORY

C.1 Importance for information contributing to a wider understanding of Australian natural history, by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.

C.2 Importance for information contributing to a wider understanding of the history of human occupation of Australia.

MTA HOUSE 39 BRISBANE AVENUE BARTON ACT 2600 PHONE (06) 217 2111 FAX (06) 217 2095
GPO BOX 1567 CANBERRA ACT 2601 AUSTRALIA

CRITERION D:

ITS IMPORTANCE IN DEMONSTRATING THE PRINCIPAL CHARACTERISTICS OF:
(I) A CLASS OF AUSTRALIA'S NATURAL OR CULTURAL PLACES; OR
(II) A CLASS OF AUSTRALIA'S NATURAL OR CULTURAL ENVIRONMENTS

D.1 Importance in demonstrating the principal characteristics of the range of landscapes, environments or ecosystems, the attributes of which identify them as being characteristic of their class.

D.2 Importance in demonstrating the principal characteristics of the range of human activities in the Australian environment (including way of life, philosophy, custom, process, land use, function, design or technique).

CRITERION E:

ITS IMPORTANCE IN EXHIBITING PARTICULAR AESTHETIC CHARACTERISTICS VALUED BY A COMMUNITY OR CULTURAL GROUP

E.1 Importance for a community for aesthetic characteristics held in high esteem or otherwise valued by the community.

CRITERION F:

ITS IMPORTANCE IN DEMONSTRATING A HIGH DEGREE OF CREATIVE OR TECHNICAL ACHIEVEMENT AT A PARTICULAR PERIOD

F.1 Importance for its technical, creative, design or artistic excellence, innovation or achievement.

CRITERION G:

ITS STRONG OR SPECIAL ASSOCIATIONS WITH A PARTICULAR COMMUNITY OR CULTURAL GROUP FOR SOCIAL, CULTURAL OR SPIRITUAL REASONS

G.1 Importance as a place highly valued by a community for reasons of religious, spiritual, symbolic, cultural, educational, or social associations.

CRITERION H:

ITS SPECIAL ASSOCIATION WITH THE LIFE OR WORKS OF A PERSON, OR GROUP OF PERSONS, OF IMPORTANCE IN AUSTRALIA'S NATURAL OR CULTURAL HISTORY

H.1 Importance for close associations with individuals whose activities have been significant within the history of the nation, State or region.

Appendix 2: Charter for the Conservation of Places of Cultural Significance ('the Burra Charter')

THE AUSTRALIA ICOMOS CHARTER FOR THE CONSERVATION OF PLACES OF CULTURAL SIGNIFICANCE (THE BURRA CHARTER)

Preamble

Having regard to the International Charter for the Conservation and Restoration of Monuments and Sites (Venice 1966), and the Resolutions of the 5th General Assembly of the International Council on Monuments and Sites (ICOMOS) (Moscow 1978), the following Charter was adopted by Australia ICOMOS on 19th August 1979 at Burra Burra. Revisions were adopted on 23rd February 1981 and on 23 April 1988.

Definitions

ARTICLE 1. For the purpose of this Charter:

1.1 *Place* means site, area, building or other work, group of buildings or other works together with associated contents and surrounds.

1.2 *Cultural significance* means aesthetic, historic, scientific or social value for past, present or future generations.

1.3 *Fabric* means all the physical material of the *place*.

1.4 *Conservation* means all the processes of looking after a place so as to retain its *cultural significance*. It includes maintenance and may according to circumstance include *preservation*, *restoration*, *reconstruction* and *adaptation* and will be commonly a combination of more than one of these.

1.5 *Maintenance* means the continuous protective care of the *fabric*, contents and setting of a *place*, and is to be distinguished from repair. Repair involves *restoration* or *reconstruction* and it should be treated accordingly.

1.6 *Preservation* means maintaining the *fabric* of a *place* in its existing state and retarding deterioration.

1.7 *Restoration* means returning the EXISTING *fabric* of a *place* to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

1.8 *Reconstruction* means returning a *place* as nearly as possible to a known earlier state and is distinguished by the introduction of materials (new or old) into the *fabric*. This is not to be confused with either recreation or conjectural reconstruction which are outside the scope of this Charter.

1.9 *Adaptation* means modifying a *place* to suit proposed compatible uses.

1.10 *Compatible use* means a use which involves no change to the culturally significant fabric, changes which are substantially reversible, or changes which require a minimal impact.

Conservation Principles

ARTICLE 2. The aim of *conservation* is to retain the *cultural significance* of a *place* and must include provision for its security, its *maintenance* and its future.

ARTICLE 3. *Conservation* is based on a respect for the existing *fabric* and should involve the least possible physical intervention. It should not distort the evidence provided by the *fabric*.

ARTICLE 4. *Conservation* should make use of all the disciplines which can contribute to the study and safeguarding of a *place*. Techniques employed should be traditional but in some circumstances they may be modern ones for which a firm scientific basis exists and which have been supported by a body of experience.

ARTICLE 5. *Conservation* of a *place* should take into consideration all aspects of its *cultural significance* without unwarranted emphasis on any one aspect at the expense of others.

ARTICLE 6. The conservation policy appropriate to a *place* must first be determined by an understanding of its *cultural significance*.

ARTICLE 7. The conservation policy will determine which uses are compatible.

ARTICLE 8. *Conservation* requires the maintenance of an appropriate visual setting: e.g., form, scale, colour, texture and materials. No new construction, demolition or modification which would adversely affect the setting should be allowed. Environmental intrusions which adversely affect appreciation or enjoyment of the *place* should be excluded.

ARTICLE 9. A building or work should remain in its historical location. The moving of all or part of a building or work is unacceptable unless this is the sole means of ensuring its survival.

ARTICLE 10. The removal of contents which form part of the *cultural significance* of the *place* is unacceptable unless it is the sole means of ensuring their security and *preservation*. Such contents must be returned should changed circumstances make this practicable.

Conservation Processes

Preservation

ARTICLE 11. *Preservation* is appropriate where the existing state of the *fabric* itself constitutes evidence of specific *cultural significance*, or where insufficient evidence is available to allow other conservation processes to be carried out.

ARTICLE 12. *Preservation* is limited to the protection, *maintenance* and, where necessary, the stabilisation of the existing *fabric* but without the distortion of its *cultural significance*.

Restoration

ARTICLE 13. *Restoration* is appropriate only if there is sufficient evidence of an earlier state of the *fabric* and only if returning the *fabric* to that state reveals the *cultural significance* of the *place*.

ARTICLE 14. *Restoration* should reveal anew culturally significant aspects of the *place*. It is based on respect for all the physical, documentary and other evidence and stops at the point where conjecture begins.

ARTICLE 15. *Restoration* is limited to the reassembling of displaced components or removal of accretions in accordance with Article 16.

ARTICLE 16. The contributions of all periods to the place must be respected. If a *place* includes the *fabric* of different periods, revealing the *fabric* of one period at the expense of another can only be justified when what is removed is of slight *cultural significance* and the *fabric* which is to be revealed is of much greater *cultural significance*.

Reconstruction

ARTICLE 17. *Reconstruction* is appropriate only where a *place* is incomplete through damage or alteration and where it is necessary for its survival, or where it reveals the *cultural significance* of the *place* as a whole.

ARTICLE 18. *Reconstruction* is limited to the completion of a depleted entity and should not constitute the majority of the *fabric* of the *place*.

ARTICLE 19. *Reconstruction* is limited to the reproduction of *fabric*, the form of which is known from physical and/or documentary evidence. It should be identifiable on close inspection as being new work.

Adaptation

ARTICLE 20. *Adaptation* is acceptable where the *conservation* of the *place* cannot otherwise be achieved, and where the *adaptation* does not substantially detract from its *cultural significance*.

ARTICLE 21. *Adaptation* must be limited to that which is essential to a use for the *place* determined in accordance with Articles 6 and 7.

ARTICLE 22. *Fabric* of *cultural significance* unavoidably removed in the process of *adaptation* must be kept safely to enable its future reinstatement.

Conservation Practice

ARTICLE 23. Work on a *place* must be preceded by professionally prepared studies of the physical, documentary and other evidence, and the existing *fabric* recorded before any intervention in the *place*.

ARTICLE 24. Study of a *place* by any disturbance of the *fabric* or by archaeological excavation should be undertaken where necessary to provide data essential for decisions on the *conservation* of the *place* and/or to secure evidence about to be lost or made inaccessible through necessary *conservation* or other unavoidable action. Investigation of a *place* for any other reason which requires physical disturbance and which adds substantially to a scientific body of knowledge may be permitted, provided that it is consistent with the conservation policy for the *place*.

ARTICLE 25. A written statement of conservation policy must be professionally prepared setting out the *cultural significance* and proposed *conservation* procedure together with justification and supporting evidence, including photographs, drawings and all appropriate samples.

ARTICLE 26. The organisation and individuals responsible for policy decisions must be named and specific responsibility taken for each such decision.

ARTICLE 27. Appropriate professional direction and supervision must be maintained at all stages of the work and a log kept of new evidence and additional decisions recorded as in Article 25 above.

ARTICLE 28. The records required by Articles 23, 25, 26 and 27 should be placed in a permanent archive and made publicly available.

ARTICLE 29. The items referred to in Articles 10 and 22 should be professionally catalogued and protected.

Words in italics are defined in Article 1.

3.3 Historical Photographs

Figure 1. View of Yalwal from the south (Andrews)

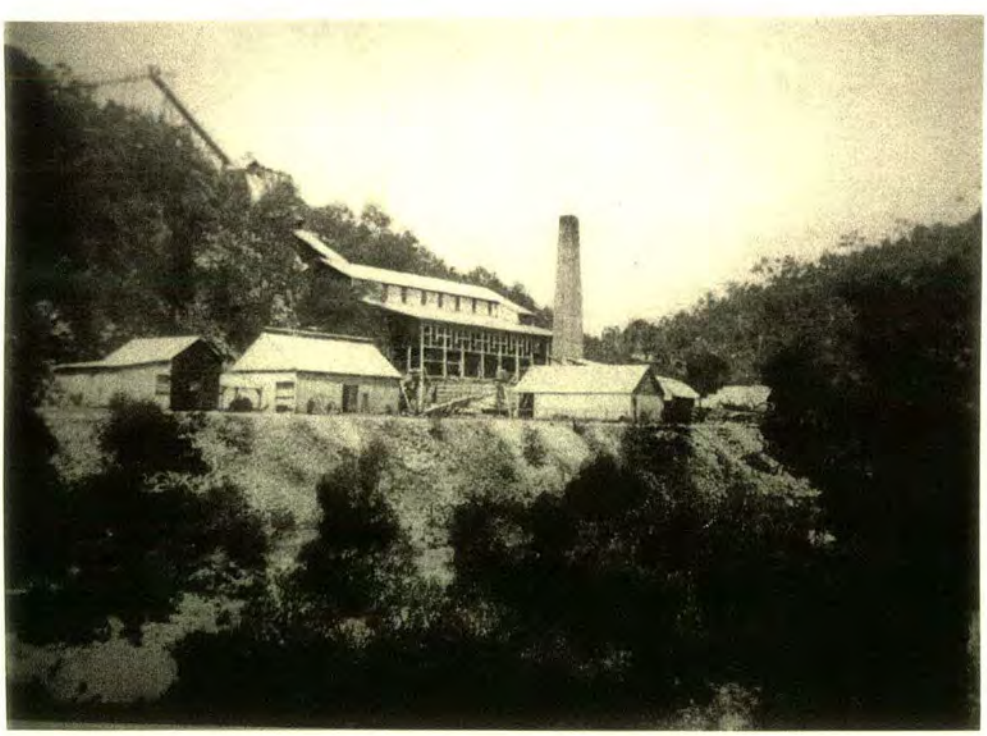


Figure 2. Pioneer processing plant (Andrews)

Figure 3. Homeward Bound processing site, cyanide vats in foreground (Andrews)

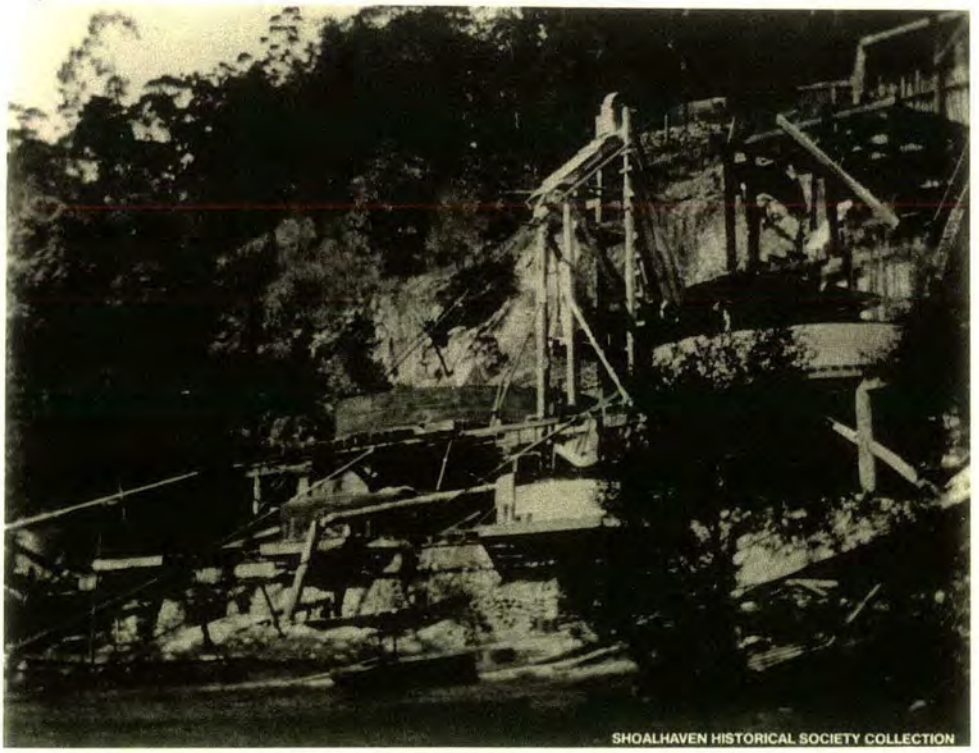


Figure 4. Pioneer cyaniding works (Nowra and District Historical Society)

Figure 5. Homeward Bound quarry, facing south towards site B (Andrews)

Figure 6. Homeward Bound quarry, view uncertain, but probably the east face (Pittman)

Figure 7. Hauling fly wheel up Danjera Gap road (Nowra and District Historical Society

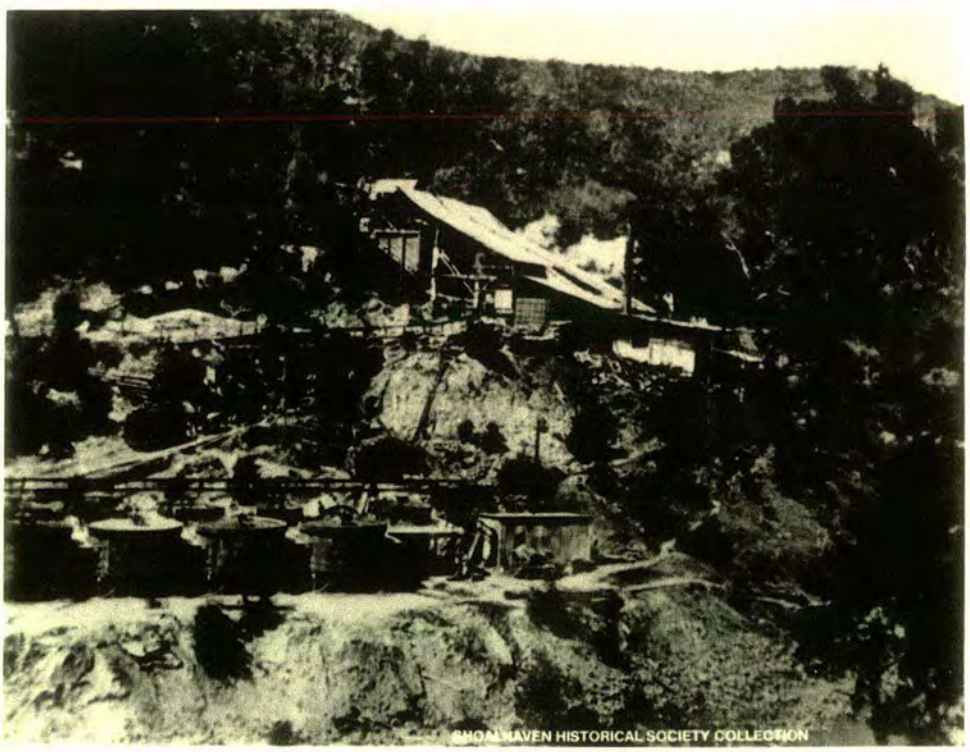


Figure 8. Homeward Bound plant, cyanide tanks at front left (Nowra and District Historical Society)

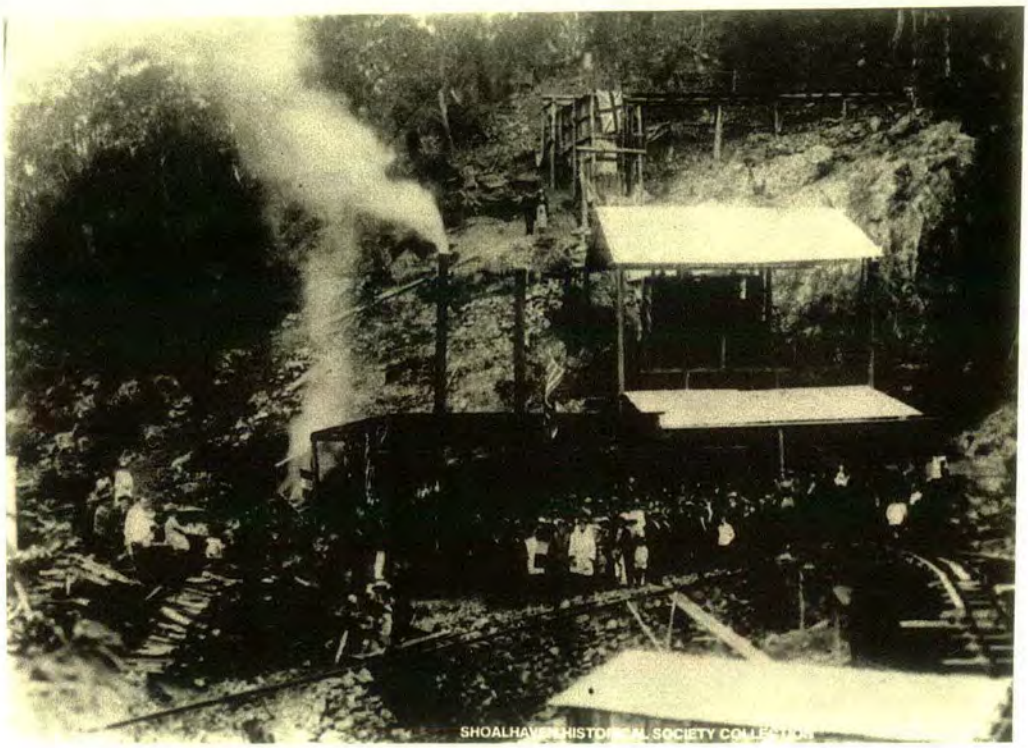


Figure 9. Golden Crown processing plant (Nowra and District Historical Society)

Figure 10. Yalwal, town view on north bank (Nowra and District Historical Society)

4. PHYSICAL ANALYSIS

4.1 Site Inventory and Descriptions

4.1 SITE INVENTORY AND DESCRIPTIONS

Introduction

The Yalwal mining field is physically complex, the complexity arising not only because of the large number of different mining operations that took place over a period of well over 50 years, but the interrelationships between the various mines, ownership changing frequently, particularly through the process of amalgamation. This changing ownership also affected the relationship between the various mines and the processing plants, which was already complicated because only a few mine owners could afford to erect their own plants, they being, therefore, dependent upon the crushing machines of other mine owners. There is not necessarily anything unique about this latter characteristic as it is evident on many other mining fields where operations were conducted primarily by small groups of working miners. What complicates the situation in Yalwal's case, however, is that for a time this mode of operation was suspended during a period of amalgamations and large scale and highly capitalised company involvement. This did not apply to all the leases, but certainly to most of them.

An additional complication is the topography of the field, the terrain being particularly challenging. For example, the field was dissected by Danjera Creek, and most of the mines were located either on the summit or on the steep slopes of the surrounding hills. Because of the necessity to be located near adequate water supplies, all processing plants, with the possible exception of the Golden Crown, were located some distance from the mines. These logistics ensured that the internal transport network was in turn complex, some of the solutions indicating a high degree of inventiveness.

This section of the report presents a description and interpretation of the various sites within the study area, with particular attention to the interrelationships between the mines and processing plants and the transport systems. For ease of reference the mode of description will follow broadly the numbering system developed by Russ Evans and subsequently adjusted by the consultants. This map is referred to in the text as the overview map (no 1), and the numbering system follows closely the route that the consultants will be suggesting for visitor purposes.

References are made to railways, it being stressed that in a number of instances we are talking about horse drawn trucks, not engines with locomotive power. It should also be stressed that the identifying of certain sites as railways is to a degree speculative. In some instances we have documentary evidence, in others we must rely on deduction. It should also be stressed that all measurements are approximate, a quarry referred to, for example, as measuring 20 m x 10 m, can be read as twenty metres long by about ten metres wide. The numbering before each site description refers to the numbering on the overview map.

Non mining sites

There are a number of sites outside the immediate study area which are, nevertheless, important to the social history of Yalwal. The most obvious of these sites is the cemetery, this being the most significant reminder of the human presence at Yalwal. There are several headstones standing, including that of the three Payne children, who passed away in a 48 hour period from diphtheria in May 1911. The cemetery is located en route to and within reasonable proximity to the mines and for this reason is included on the walking track itinerary (see section 4.2). Two other sites which are not so obvious, yet which are in reasonably close proximity to the Yalwal road are the old stone packed access track through Yalwal Gap and the building foundations and concrete cricket pitch at Monaghan's Paddock near Yarramunmun Creek. According to John Fletcher the cricket pitch was located in an area known as the cricket paddock and was used by the Yalwal residents, games being played against visiting teams from towns such as Burrier. The house was owned by Harry Fletcher, Monaghan being a much later owner. Because of their distance from the mines these two sites could not be included in a walking track itinerary. However, they should be highlighted and signposted as part of an overall visitor strategy.

Other important sites are located some considerable distance from the mines and the Yalwal road

and could not at this stage be included on the walking track itinerary or be part of an overall visitor strategy. According to Gary Usher and John Fletcher these sites included the numerous foundations and in some cases chimneys of former homesteads located along Yarramunmun Creek towards Deane's Flat, the brick kilns which are located halfway between Yalwal and Deane's Flat, the race-course at Deane's Flat near the area referred to as the clayhole, and the remains of the butcher's shop and slaughter yards owned by the Fletchers. Bricks from the kiln were used in the mines and machinery works, and produce from the farms such as meat, corn and milk were sold in Yalwal. The race course was used by the Yalwal residents. These sites are obviously important for they indicate that there was a strong economic and social association between Yalwal and surrounding rural areas. Another important rural association was through logging, the timber being used as railway sleepers and fuel for the boilers. Most of the timber was extracted from Crown land along the Yalwal Gap road, towards McKenzie station and along Yarramunmun Creek towards Fletcher's Flat.

Mining sites

1. Chapman's battery (map 1)

This is a recent site, representing the last phase of mining operations on the Yalwal field prior to the construction of Danjera dam. The five head battery is in excellent condition and the site has a high degree of integrity.(figures 11 and 12) To the south of the battery site are metal and stone blocks upon or near which machinery would have been set such as a jaw crusher. The battery is set within a wooden frame, which may have served as a shelter, the roof of which has long since been removed. It was driven by a petrol engine, which is still in place. The battery was secured by vertical and horizontal wooden beams, the latter abutting upon a concrete area upon which would have been the amalgamating tables, the tailings being disposed of further downhill. The battery is of a considerable vintage and was probably brought onto the site from another mining field. To the west of this site is a flat area about 6 m x 4 m, which may have been the site of a temporary residence for the owner, the site being littered with debris. Near this site is a water tank and ship's tank, and between there and the battery an old truck (figure 13). While some of this material has no particular heritage value it is related to the mining operations and therefore of interpretative value.

2, 3 & 4. Golden Crown complex (map 2)

There were several phases of working at the Golden Crown. The first reports of mining were in 1880, the mine being acquired in 1883 by a Mr Kelly, also the owner of the Pinnacle mine. There is a reference to his having crushed 60 tons from the Golden Crown in that year. There is no report of any crushing plant having been erected at the Golden Crown until 1923, however, the crushing likely to have taken place, therefore at the Pinnacle plant. Work commenced on the erection of a processing plant in August 1923, the 1925 report referring to the treatment of sand and slimes, an extension of the processing plant and to ore being extracted from below the tramway at the bottom level. In 1926 the operations were taken over by Wilkinson Amalgamated Yalwal Gold Mines and additional machinery installed. While the plant was put up for sale in 1928, there is a reference in 1932 to ore from the Star mine being treated at the Golden Crown site. The mine was also worked from 1946 to 1948 by Cumming and Jackson.

The Golden Crown complex is in some ways a miniature replica of the Yalwal field, for it has a quarry, tunnels, railway and processing plant. The tunnels and quarries are in good condition and the railway easily traversable. Approaching the site from Chapman's battery is a large flat area, down slope of which is the processing plant (site A). Ten metres north west and down slope of this open area is a small concrete structure with some metal bolts embedded (figure 14). Five metres further down slope is another concrete structure, with a concrete spillway and five metres down slope again further concrete foundations, north east of which are the concrete and iron remains of cyanide vats (figure 16). These latter two sites are normally located below water level.

A railway (site B) runs in a south, then south east direction up Sawpit Creek in the direction of two tunnels, the first one (site C) being located 50 m to the south east (figure 15). Some sleepers can be found on the track just south of this tunnel. The second tunnel (site D) is located 35 m further to the

south east. Between the two tunnels and above the railway is a large scree slope the scree slope (figure 17). Down slope from site D is a stone packed track (site E) leading into Sawpit Creek. This was possibly part of the access track between the mines and the Pinnacle battery, for in dry weather the ore could have been carted down the track, then down the creek bed, if dry, and across Danjera Creek to the battery. The date of construction of the railway is uncertain, however, it is very likely that it was built in the same year as the processing plant, that is 1923.

The main quarry site can only be approached from the main track, there being no sensible access from the railway or tunnel level. From the main track an access path heads south west for 35 m, passing a hut site, of which the footings for the chimney remain (figure 18). This path ends in an open area of ground overlooking a narrow cutting, 25 m long (site F). The main quarry (site G) measures 28 m x 12 m and is about 10 m deep at the most (figure 19). In the north corner of the quarry is a deep, timbered shaft (figure 20). Twenty eight metres to the north west of the quarry is a 20 m cut (site H) of about 5 m depth, from which a path leads in a westerly then northerly direction down hill in the direction of Chapman's battery, another abandoned truck adorning the track (figure 21). Sixteen metres south west of the quarry and below the level of the quarry is a tunnel (site I), the scree slope extending the whole distance down the hill to the tramway (figure 22). The date of the various mine workings is uncertain. However, the main quarry (site G) would have been one of the earliest, if not the earliest development at this mine, and the shaft in the north end of the quarry would have been sunk to connect with the southernmost tunnel (site D) and to act as a pass for transporting stone. The location and direction of the track from the cut (site H) and the presence of an abandoned vehicle suggest that it may have been worked by Chapman.

5. Hidden Treasure

This site comprises two large cuts, one of which has wooden supporting beams still in place and large scree and mullock slopes (figure 24) No account of this mine has come to hand, the field evidence suggesting that it was a late addition, dating to the post 1900 period, for the cuts are across the tramway and, therefore, post date it.

6. Albion

This tunnel was referred to in the 1890 Annual Report, it being stated that both it and the Usher had been efficiently worked by adits and trenches, and large quantities of highly pyritic stone with gold had been cut through (figure 23). However, the yield had not been good enough to warrant the erection of a crushing plant. Andrews (1901) states that the drive was 40 m long.

7. The tramway

The Pioneer tramway is one of the key features of the field. It was, however a late addition, arising from the amalgamation of the Pioneer with Hay and party, the new company being called the Yalwal Gold Mining Company. In the 1898 Annual Report it was stated that a tramway 30 chains in length had been constructed and a small winding engine placed above the stone crusher at the Pioneer plant for bringing the ore from the claims in Sawpit Gully. For the most part the tramway is very well preserved, being several metres wide and in some cases with stone embankments a metre or more high to shore the track up on the steeper slopes (figures 25, 26 and 27). The only areas of collapse or disruption are at the Hidden Treasure (see above) and in the gully below the Victory claim.

8. Paul's tunnel

This has not been located and there is no reference to it in the mining literature.

9 & 10. Pioneer tunnel and processing plant (map 3)

Work on the Pioneer tunnel commenced in 1890, the tunnel being driven for a distance of 274 m by 1891 (figure 28). The tunnel was built to convey ore for all three Pioneer quarries to the battery. For this purpose a tramway was built in the tunnel, the ore being conveyed from the quarries to the

tunnel through a number of passes or drop shafts. According to Andrews (1901) the tunnel was about 40 m below the floor of the Pioneer No 3 quarry.

The Pioneer processing plant was a relatively late addition to the field, for in late 1890 the Pioneer ore was being crushed at the Homeward Bound battery, the 40 head stampers not being erected until 1892. Usually the plant is submerged. However, enough was exposed in the recent drought to provide some idea of the dimensions of this plant. Directly below the main track and the scree slope emanating from the Pioneer tunnel is a 15 m concrete wall with a hole in the centre, which would have held the chute for carrying the ore into the plant below (figure 30). At this point the cliff face is sheer and very hazardous to approach. The cliff face has been excavated below this point to a depth of 20 m, the wall of the cliff being alternatively faced with layers of concrete, packed stone and exposed rock (figure 29).

The processing plant is located near Danjera creek, 20 m or more below the chute hole. It comprises a concrete floor measuring 60 m x 30 m, with concrete pylons two metres high being set back into the face of the cliff for a distance of 10 m (figure 31). The date of the concrete foundations is uncertain. They may have been associated with the very first crushing operations at the Pioneer or they may be of a later vintage. Nevertheless, the area set back into the face would clearly have held the jaw crushers and the battery, the engines being set on concrete blocks in front.

At the front of the concrete foundations facing Danjera Creek are four square holes. These may have been discharge holes for the tailings and slimes which would have been processed below in the cyanide vats, this being a much later phase of operations. The tailings were originally allowed to drain into the Creek, a cyanide plant not being erected until 1898. About 15 m to the west of the concrete foundations is a sizeable brick wall (figure 32).

11. Homeward Bound processing plant (see map 4)

The Homeward Bound processing plant was one of the older ones on the field, the company purchasing a plant in 1885. Prior to that date their ore was crushed at the Fernbank battery and then McArthur's battery. In 1887 the Company bought McArthur's 10 head battery and fixed it on the present processing site. A 20 head stamp was erected in 1889 and expanded to 40 heads in 1890, the cyanide plant not being erected until 1898.

For the most part the plant is above the normal water level and can be regarded at least in layout as almost complete. The plant was built on a number of levels, with the cyanide plant being built close to the creek and north of the crushing area. The recent drought exposed a number of features normally submerged, but these did not include the cyanide plant. They included two large flat areas, one below the processing plant measuring and 10 m x 25 m, and another 20 m north, measuring 12 m x 15 m. This latter area was built up by stone embankments (figure 36 a). Down hill from the former area are the remains of several small concrete structures and a large scatter of pipes and bricks (figure 36). This may have been the location of the pumping plant.

At the northern end of the processing plant are two areas of weathered concrete, the largest of which measures 12 m x 5 m and shows evidence of having held large upright wooden beams. This would have been the location for the 40 head stamper (figures 33 and 34). Seven metres south east of this is a small area of concrete and bolts. These would have held the engine and boilers. Two metres further south east are two pits each three metres in length and containing the remains of four large upright wooden beams (figure 36 b). This was undoubtedly the site of the original 10 head stamper, which would have included two sets of five head stamps. The area between the stamps would have received the ore from the jaw crusher, which was located above the site, in a small rectangular area now covered with crushed rock, a few bolts and a small but very heavy metal slab. Immediately above the jaw crusher was the terminus for the inclined tramway.

12, 19 & 20. Inclined tramway, Homeward Bound lower tunnel, tramway from mine and Homeward Bound upper tunnel

The inclined tramway (figure 35) was built in 1890, the ore being conveyed from the upper

Homeward Bound tunnel to a hopper, where the trams were filled and sent by gravitation to the rock breaker and ore bin, the truck speed being regulated by the up trucks and a brake wheel. The inclination of the tramway was between 11 and 15 degrees, and the length was about 200 metres.

About fifty metres above the jaw crusher is a track to the lower Homeward Bound tunnel. This tunnel is located immediately below the old tunnel (21). It was constructed in 1901, being driven for 114 m at a depth of 33 m below the floor of the quarry. It was extended by 4.5 m in that year, the 1902 report stating the length and depth to be 116 m and 36.5 m respectively. Wooden uprights are located near the entrance, and the remains of a hut or shed and railway tracks are still in evidence (figures 37 and 38). The intended purpose of this tunnel is, however, not entirely clear. It does not appear to have been connected by winze with the upper tunnel and was not connected to the floor of the workings by a pass. However, the presence of a rail track suggests that some ore was extracted and it can only be presumed that the rail track continued on to intersect with the inclined tramway.

The inclined tramway terminates at a point where there is a large semicircular excavation below the tramway line from the tunnel. This would have been the site for the hopper bin. Above the bin is another tramway site which leads to the upper Homeward Bound and the middle Star tunnels (figures 39 and 40). Work on the upper Homeward Bound tunnel commenced in 1880, it being driven in 64 m to meet a 21 m shaft. The depth of the shaft gives some indication of the height of the floor of the workings above the tunnel. Though not stated in the reports, the mode of operation would have been to use the tunnel as a pass for the ore, which would have been transported from the tunnel to the battery site. In 1888 it was stated that stoping had been carried on from a depth of about 15 m, the whole of the lode between that depth and the surface having been crushed. By 1889 the tunnel had been driven in 114 m, and according to Andrews, in 1891 there were several passes in the floor of the workings, the tunnel then being six metres below the floor.

18. Homeward Bound quarry (map 5)

At its longest and widest the quarry measures 100 m x 50 m, it being dissected throughout its length, though not evenly, by a track, which would have held a railway (figure 42). From historical photographic evidence (figure) it can be verified that the practice was to run the railway up against the face of the workings, the ore being placed directly into the trucks. The southern end of the quarry is by far the deepest, being well over 50 m in height. The west portion of the quarry (site A) is 90 m long, but relatively narrow, measuring 15 m across at its widest, the north part of this portion being broken and uneven. There were two areas of working in the east portion, sites C and D, the former being by far the largest. Figures 45 and 48 provide some indication of the steepness of the west face and figure 47 of the east face.

Site A includes three entrances or exits for the Upper Homeward Bound tunnel over a distance of 25 m. The largest of these is shown at figure 44. To the south of the tunnels is a narrow, deep cut, 30 m long and four metres wide (site B and figure 41). Site C measures 70 m x 40 m and was worked hard up to the east face of the quarry. Five to ten metres east of the railway are two tunnels and a small area of quarrying, the two tunnels having been connected previously (figure 43). It is possible that these tunnels were part of the Upper Homeward Bound tunnel when the floor of the workings was much higher, particularly as the tunnel was much longer than the present one. Site C is separated from the next area of workings (site D) by an area of rock measuring 25 m x 25 m. Site D measures 20 m x 30 m and, like site C, extends to the abrupt east face of the quarry. At their northern ends, sites A and D abut onto the Pioneer 3 workings, which physically are now part of the same quarry, the separating wall of rock having been removed sometime between 1928 and 1931. For most of the historical period, however, the adjoining Pioneer 3 and Homeward Bound quarries were physically separate.

13, 14, 15, 16 and 17. Pioneer quarries (map 5)

The Pioneer workings were one of the earliest of significance on the field, being first commented on in 1872. Pioneer No 3 (sites E, F, G and H and site 15 on the overview map), as the name implies, was the most recent of the three quarries and adjoins the Homeward Bound quarry on the latter's

northern boundary. The workings at site E measure 15 m x 12 m, and are at about the same level as the workings in the Homeward Bound quarry. A tunnel is located in the north west corner (figure 46), and a very deep shaft is located 10 metres east of site E. Site F measures 30 m x 20 m, the floor being about five to ten metres below that of site E and the Homeward Bound. There is a drop shaft (or pass) near the centre of the site and a tunnel in the north face of the site leading under the workings at site G, which are about 10 metres higher and physically separated by a ten metre long wall of rock from the workings at site F. Site G measures 45 m x 15 m and is no more than 5 m deep. Site H measures 35 m x 12 m and is suspended some 20 to 30 m above the present floor of Pioneer No 3. It is a relic from the very earliest period of workings when the quarry would have been no more than ten to fifteen metres deep.

The workings at site I (site 17 on the overview map) are located about five metres north west of site G, and were referred to by Andrews in his 1923 map as Spencer's workings (figure 52). They comprise a small open cut measuring 15 m x 7 m and three metres in depth, with tunnels in the north west and northern walls, the latter clearly connecting with a nearby cut which adjoins a track which probably held a railway (site J). This railway connects by way of a track to Pioneer No 3 (the track having too much slope and being too uneven to form part of a railway) and runs to the north of Pioneer No 1 and 2 quarries, passing through a 25 m culvert cut through solid rock, 12 m to the north and several metres below Pioneer No 2 quarry (figure 56). The railway terminates at Pioneer No 1 and may have been used to transport ore to a drop shaft in Pioneer No 1. It may, however, also have served to cart ore from all three Pioneer quarries to the Homeward Bound battery, for work on the Pioneer tunnel did not commence until 1890 and the processing plant was not completed until 1892, all ore prior to that date being processed in the Homeward Bound plant.

Pioneer No 2 quarry (site 14 on the overview map and site K on map no 5) adjoins Pioneer No 1 to the south east, the quarry walls almost touching at one point. The quarry measures 45 m x 25 m, the face of the workings being between 15 and 20 m high. Remnants of the different floors can be found, the two most obvious being an adit on the south west face and a pass emanating from a 45 m cut to the south of the quarry (figure 53). Both these features are suspended at a considerable height above the present floor. There is a short track cut through stone at the northern end of the quarry, this being some considerable height above the existing floor and clearly relating to an earlier period of working (figure 54). One enigma is the absence of any evidence of how the ore was retrieved from the present floor of the quarry, there being no signs of any drop shaft or track leading to the tramway (site J). There is a 25 m mullock heap atop the west face of the quarry, and 20 m to the north (10 metres south of the railway) is a very deep shaft.

The Pioneer No 1 quarry (site no 13 on the overview map and site L on map no 5) measures 60 m x 15m on the floor at its widest point, the face of the workings being between 20 m and 30 m high (figure 58). The floor of the quarry is very clean and at the southern end there is a two metre wide 15 m cut, in the fore front of which is a drop shaft or pass (figure 57). At the northern end of the quarry is a track cut through stone and leading down to the drop shaft. The track is part of the railway referred to above, though the track leading to the drop shaft is on too much of a slope to have been part of this system, at least in the latter years. This cutting clearly relates to an earlier period of working as it is some height above the present floor of the quarry. Not far from this point are two long mullock heaps (figure 55). There were obviously several periods of working in the quarry and remnants of the different floors can be seen on the sides of the quarry walls. Atop the south face of the workings there are the remnants of what appears to be a hut site, and atop the 15 m cutting is a stone packed embankment which, it is postulated, may have connected with a railway from near the Upper Star Upper tunnel. A 15 m mullock heap is located atop the west face.

22, 23, 24, 25, 26 and 27. Star tunnels and quarry (map 5)

The Star workings were one of the earliest and more unsuccessful mining efforts on the field, a considerable sum of money being spent on tunnels and quarrying with little return. There was no processing plant, the owners crushing their ore at other plants. Three tunnels were constructed, the lower (no 3) being completed in 1881, the upper (no 1) in 1887 and the middle (no 2) either in 1885 or in the period 1890-92. In 1883 it was reported that a tramway had been laid from the lower tunnel to a processing plant, but no sign of either the tramway or tunnel have been found. In 1900

the Star was amalgamated with Hay's other leases and there was a report of a tramway being laid to the Pioneer battery. It is possible that the tramway referred to was that identified as site M, map 3, the ore being obtained from the upper tunnel and deposited down the Pioneer 1 drop shaft. On the other hand the reference could be to the middle tunnel (site 24), this being on the same level as the Homeward Bound upper tunnel and very likely connected by a railway (site 26) to that tunnel.

The Star quarry (site 22) is located directly south of and above the Homeward Bound quarry. It measures 23 m x 15 m and is between 10 and 15 m deep. The quarry is intersected by the upper (no 1) Star tunnel (figures 49 and 50), which was driven originally underneath the quarry, which was worked by the system of drop shafts or passes as used in the adjoining Homeward Bound and Pioneer quarries. Subsequent workings have, however, cut through the roof of the tunnel. To the south of the Star quarry are two narrow cuts about 10 metres long and joined by a track leading down to the tunnel entrance, west of which is an area of stone embankments and a scree slope. Thirty metres below this area is the commencement of a railway track which terminates near the top of Pioneer No 1.

Atop the east face of the Star quarry are stone embankments surrounding a very deep shaft, and twenty five metres north east of the quarry is a residential site (site 25 and figure 51) set on neat stone packed embankments and set in a cutting. These embankments held two houses as evidenced by the remains of two chimneys, and was intersected by a footpath. About 50 m north of the house site and to the east of the Homeward Bound are several costeans and a very deep shaft.

28, 29 and 30. Pincombes, Victory and Fountainhead

Pincombes adit has not been found. The Fountainhead was mentioned in 1878 and again, along with the Victory, in 1890, the results from both being disappointing. Both workings constitute small quarries.

31 and 32. The Caledonian

The Caledonian workings were taken up in 1883 and amalgamated with the Star in 1887, Andrews stating that in 1887 a road was being cut round the hillside to convey the ore to a battery, which would have been the Homeward Bound, there being references to crushings at this battery in 1889. In 1890 there is a reference to a lode in the mine being pierced by tunnels, one 91 m below the main range and another 30.5 m lower. The main period of activity was in the early 1890's when very rich lodes were struck. An article in the Australian Town and Country Journal in 1895 discussed the process of working the Caledonian mines by following the quartz leaders in preference to taking the whole body of rock in a face as was the case of many of the other mines. Some of the leaders were "immensely rich", but narrow, ranging in width from between 7.6 and 15.2 centimetres. At this point in time the Caledonian ore was being crushed at the Pioneer battery. This description is important for it underlines that the ore in these mines was very different to that occurring elsewhere on most other leases, where the predominant mode of working was by the open cut method. The ore required, therefore, a different mode of working.

There are three adits and four cuts at the Caledonian workings. Several of the cuts have horizontal wooden supports still in place. The main area of workings commences about sixty metres south along the junction of the access track with the main track. Andrews (1901) has described the first cut as Isons, the second as Sandeman's, it being 30.5 m long and nine metres high, and the third as Underwoods, about one chain in length and nine metres deep. On his 1923 map Andrews includes a fourth known as Thomas' cut. These cuts were collectively known as the Caledonian workings. Andrews also stated that there were two tunnels, one of which was probably that referred to in 1890. This lower tunnel has however, not been located, and is probably now buried under the immense scree slope between the access track and the Pioneer railway.

Using Andrew's nomenclature as a guide Ison's cut commences from the main access southwest into the face of the hill. It appears to end abruptly at a scree slope, however the cut continues beyond and atop that (figure 59). A tunnel is located above and to the north of the cut. Underwood's cut also commences close to the access track, the main feature of interest here being the several

boulders poised precariously above the floor of the cut by several horizontal wooden beams (figure 60). There is a tunnel located between Underwoods and Sandeman's about ten metres back from the access track (figure 61). Sandeman's cut also commences close to the access track (figure 62). A partly obscured tunnel is located 20 m south of the junction of the access track and the main track.

The method of transportation is problematic. Andrews' 1901 report refers to a track being built in 1887 for taking the ore to the Homeward Bound. This track could only have been the current access track and the main track, for prior to the building of the Pioneer railway there was no other route to the battery. In the early 1890's the ore from the Caledonian leases was, however, crushed at the Pioneer battery. The amalgamation of the Pioneer leases in 1897 with Hay's other leases and the construction of the Pioneer railway in 1898 suggests that from thence forth the ore was transported by the railway via the main track. This would, however, have entailed a reasonably steep descent.

33, 34, 35, 36, 37, 38, 39 and 40. Golden Quarry, Sir Julian Leg adit, the Usher, the Black Lode and the alluvial workings

For interpretative purposes these workings can be regarded as constituting a single complex as they are strung out along Sawpit Creek and the Pioneer railway. Other than what is in Andrews' 1901 report there is, however, very little information available on these mines and their sequence of development. According to Andrews a tunnel, presumably the Golden Quarry no 1 adit, was driven 63 m and 118 oz were won, but there is little other information. The description of the sites is in two parts, firstly, those south of the main track and, secondly, those north of the main track at the junction of the main track and the Pioneer railway.

South of the main track the railway (site A) is relatively indistinct as the ground has been considerably disturbed. However, some small stone packed embankments can be seen. Seventy metres from the junction the railway is intersected by a track (site B). This track runs from a large stone embankment at the mouth of the Golden Quarry no 1 adit (site C) past the Usher mine and onto the main track, in the direction of the Albion. It is not clear if this track pre dates or post dates the railway, however, the fact that it has been cut through the railway embankments suggests the latter. Originally the track may have been a means of getting ore from the no 1 adit onto the railway trucks, the original purpose in building the railway to Sawpit Creek being to tap the leases in the creek following their amalgamation with Hay's other leases in 1897. With regard to the Usher, it is possible that the ore was conveyed up the track to the junction with the railway, however this would be a difficult if not hazardous manoeuvre. More likely it was conveyed downhill past the Albion, down Sawpit Creek and across Danjera Creek to be crushed at either the Eclipse or Pinnacle batteries, all these operations being included in Hay's leases after 1897. The track may have been cut through the railway line long after the abandonment of the railway to convey ore to the batteries at the Golden Crown or even Chapman's.

The embankment at the mouth of the Golden Quarry no 1 adit is located 30 m south west of the intersection between the track and the railway, and the Golden Quarry no 1 adit is located atop the embankment. Forty metres uphill to the west of the adit are two small quarries, one of which has a shaft at its southern end. Five metres down hill from this latter site is a one metre square forge site. Forty metres to the south of the quarries and on about the same level is a cutting which faces north west into the Sir Julian Leg adit (site D and figure 64). No evidence has been found of the Golden Quarry no 2 adit.

Back to the intersection of the track and railway, it is noted that Andrews (1923) has the railway running south west above the Golden Quarry no 1 adit. This, however, is not correct. The railway clearly continues south, passing below the embankment near the mouth of the Golden Quarry no 1 adit and continuing for at least another 20 metres south. Some stone packed embankments can be seen in this area, but there has been further ground disturbance and it is not, therefore, entirely clear where the track terminates. There is a 20 m long area of double width which may have been a loading area for ore from the Golden Quarry no 3 adit (site E and figure 63), this mine being located on the east side of Sawpit Creek about 60 m south east of where the railway terminates. Atop of the adit is a small quarry measuring 15 m x 5 m and five metres in depth. A track joins the quarry on the east side and continues down Sawpit Creek on the east bank. About 25 m down the track and

four metres up the east slope is a stone packed embankment which would have held a hut site, there being no other obvious use for it.

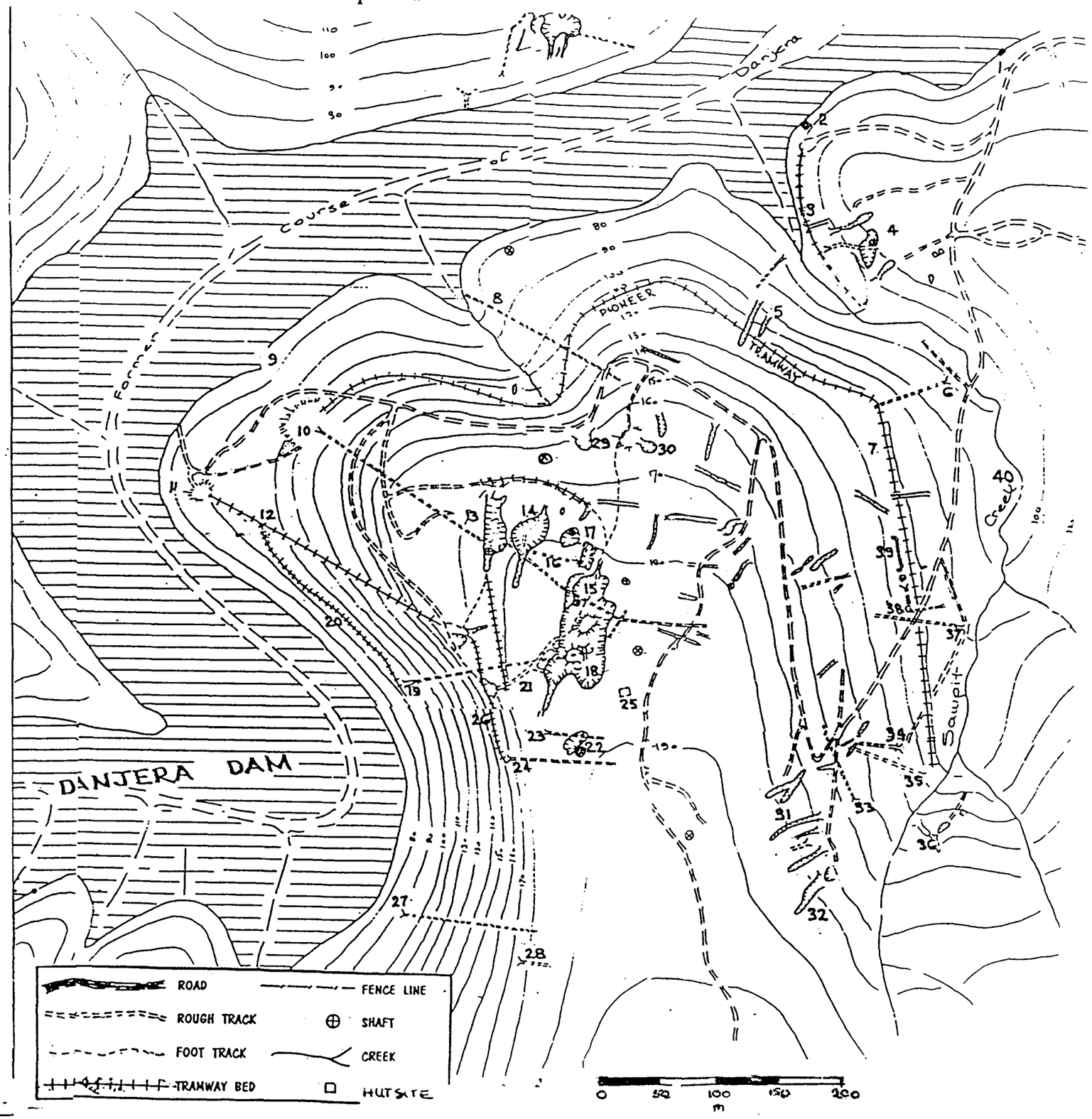
There are a number of references to alluvial workings (no 40 on the overview map) in Sawpit Creek. These workings are small scale but extensive, extending the whole length of the creek on both sides from the crossing on the main track to the vicinity of the Golden Quarry no 3 adit. The workings are not complex, suggesting that only pan and cradle, short sluice or tom were ever used, there being no evidence of races or dams and, therefore, sluicing activity. Most of the workings are identified by small round holes with hummocks of earth nearby, these being known as pothole tailings. Other workings, however, involved small areas of paddocking, where a face has been cut into the bank and a small tail race constructed for draining the culvert, the wash dirt being either processed on site, if there was enough water, or more likely taken down to the creek for washing.

Immediately to the north of the intersection of the railway (figure 65) and the main track are the Black Lode workings, comprising two shafts, a tunnel (figure 67) and two sets of embankments. The northern most embankment is 30 m long and has been referred to as a holding platform (figure 66) as it is likely that it was constructed for loading ore onto the rail trucks, it being located five metres above the railway. It may also have served to hold several huts or sheds but there is no evidence of their presence.

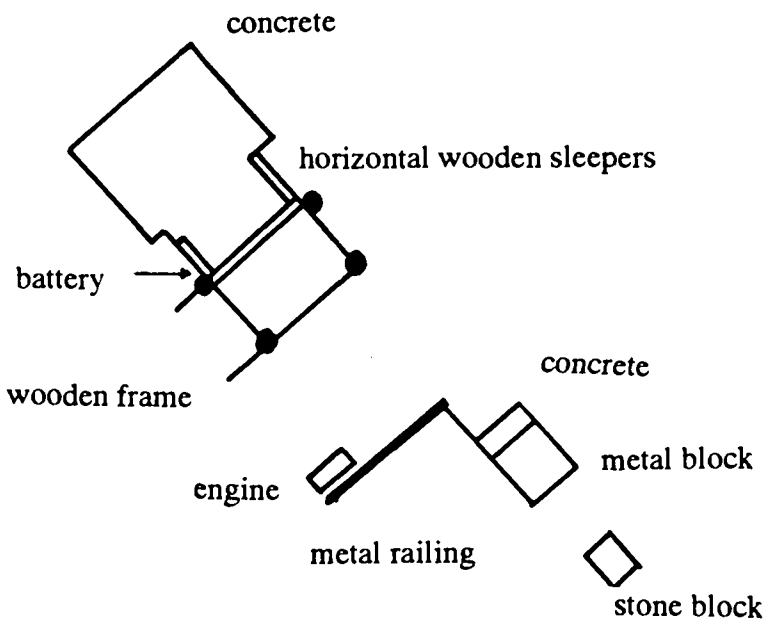
4.2 Site Maps

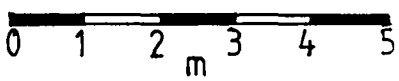
Overview map No 1

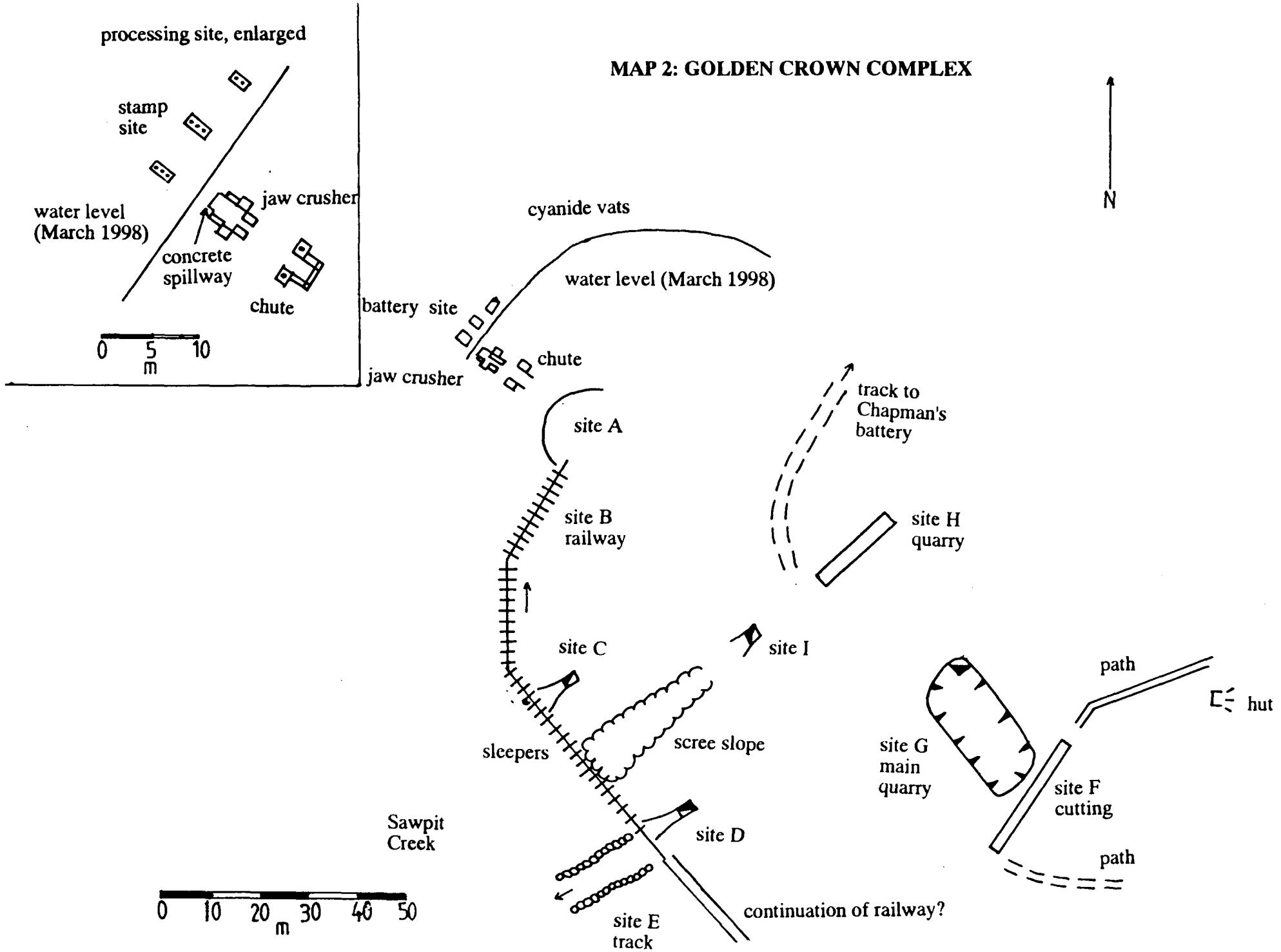
1 CHAPMAN BATTERY
2 GOLDEN CROWN MACHINERY SITE
3 TRAMWAY
4 GOLDEN CROWN MINE
5 HIDDEN TREASURE MINE
6 ALBION TUNNEL
7 PIONEER TRAMWAY
8 PAIR'S TUNNEL
9 PIONEER MACHINERY SITE
10 PIONEER TUNNEL
11 HOMEWARD BOUND MACHINERY SITE
12 INCLINED TRAMWAY
13 PIONEER No.1 OPEN CUT
14 PIONEER No.2 OPEN CUT
15 PIONEER No.3 OPEN CUT
16 PIONEER CROSS CUT
17 SPENCER WORKINGS
18 HOMEWARD BOUND OPEN CUT
19 HOMEWARD BOUND LOW LEVEL TUNNEL
20 TRAMWAY
21 HOMEWARD BOUND HIGH LEVEL TUNNEL
22 STAR QUARRY
23 STAR No.1 TUNNEL
24 STAR No.2 TUNNEL
25 HOUSE SITE
26 TRAMWAY
27 STAR No.3 TUNNEL
28 PINCOMBE ADIT
29 VICTORY QUARRY
30 FOUNTAIN HEAD WORKINGS
31 CALEDONIAN WORKINGS
32 THOMAS CUT
33 SIR JULIAN LEG ADIT
34 GOLDEN QUARRY No.1 ADIT
35 GOLDEN QUARRY No.2 ADIT
36 GOLDEN QUARRY No.3 ADIT
37 USHER TUNNEL
38 BLACK LODE WORKINGS
39 LOADING PLATFORM
40 ALLUVIAL WORKINGS



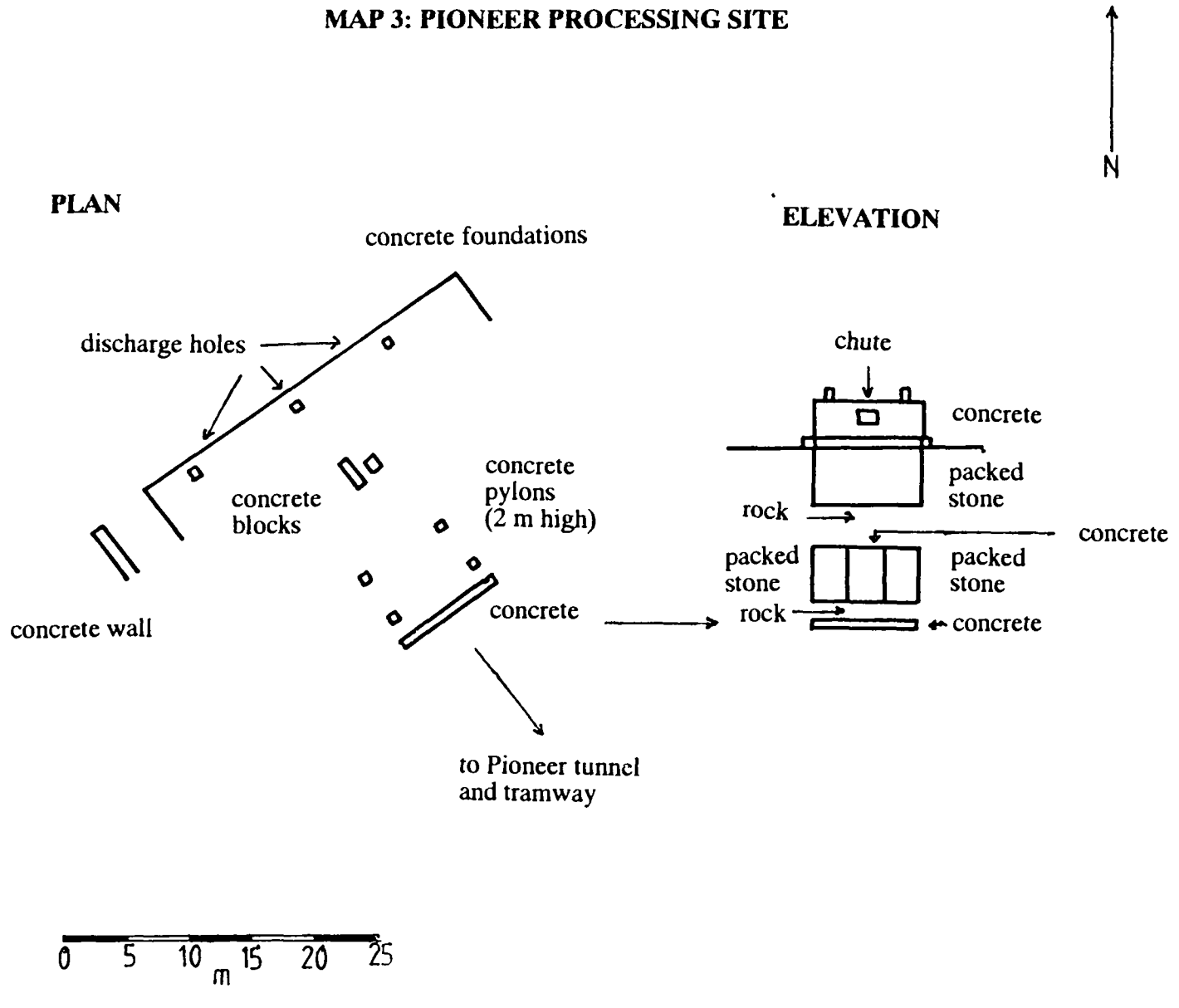
MAP 1: CHAPMAN'S BATTERY



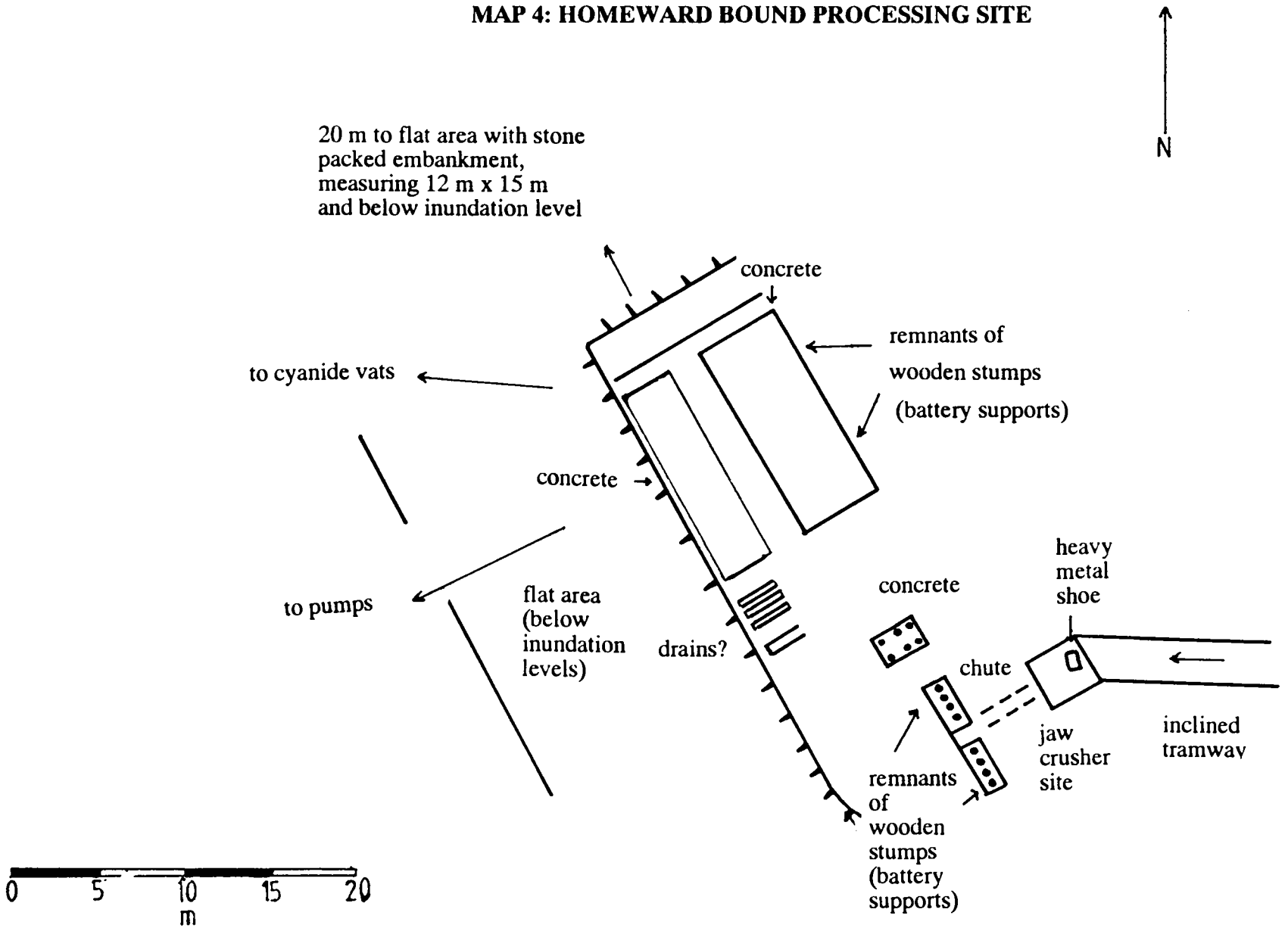



processing site, enlarged
stamp site
water level (March 1998)
jaw crusher
concrete spillway
chute
0 5 10 m
MAP 2: GOLDEN CROWN COMPLEX
N
cyanide vats
water level (March 1998)
battery site
chute
jaw crusher
site A
track to Chapman's battery
site B railway
site H quarry
site C
site I
path
hut
sleepers
scree slope
site G main quarry
site F cutting
Sawpit Creek
site D
path
site E track
continuation of railway?
0 10 20 30 40 50 m

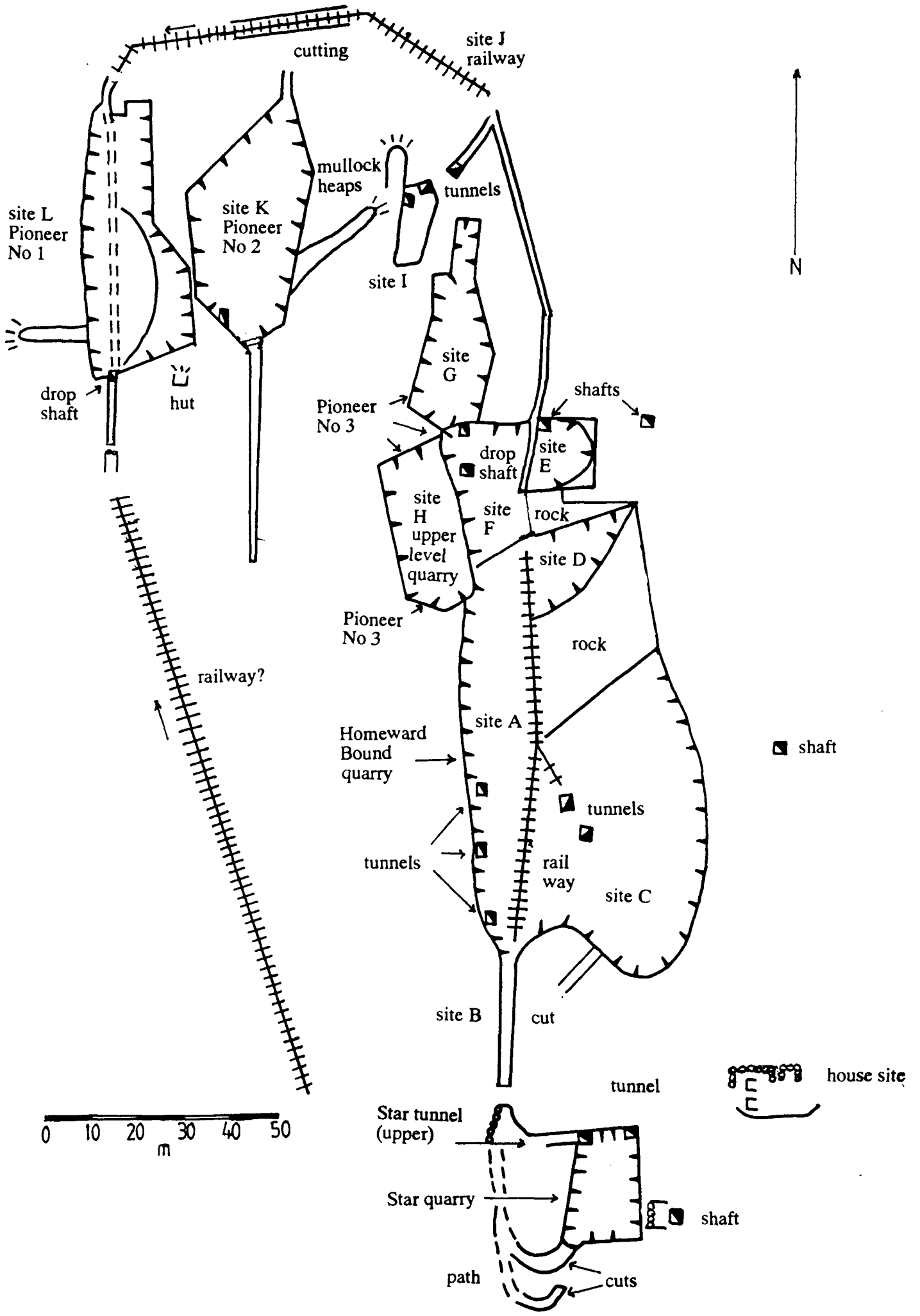
MAP 3: PIONEER PROCESSING SITE



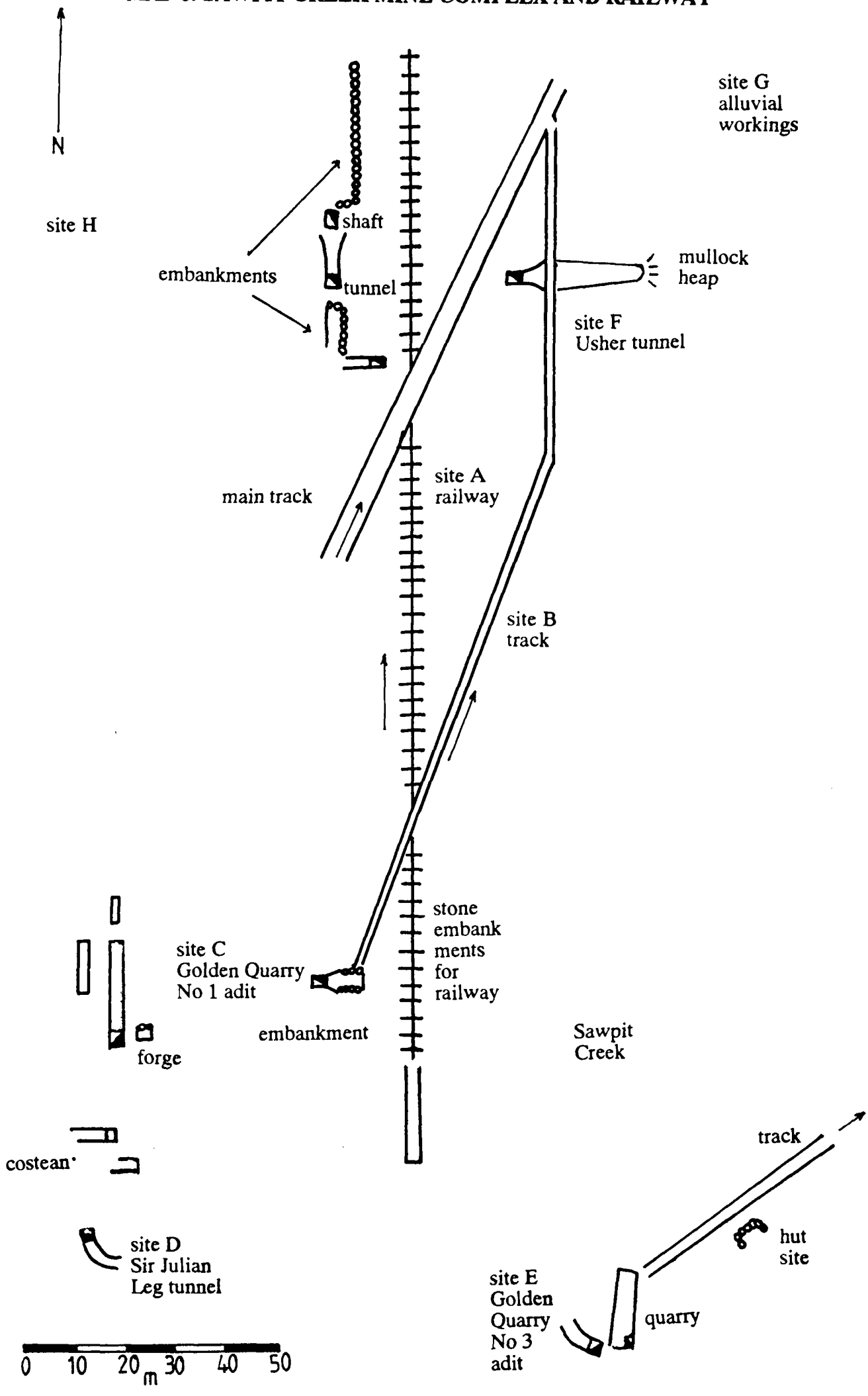
MAP 4: HOMEWARD BOUND PROCESSING SITE



MAP 5: HOMEWARD BOUND, PIONEER AND STAR QUARRIES



MAP 6: SAWPIT CREEK MINE COMPLEX AND RAILWAY



4.3 Site Photographs

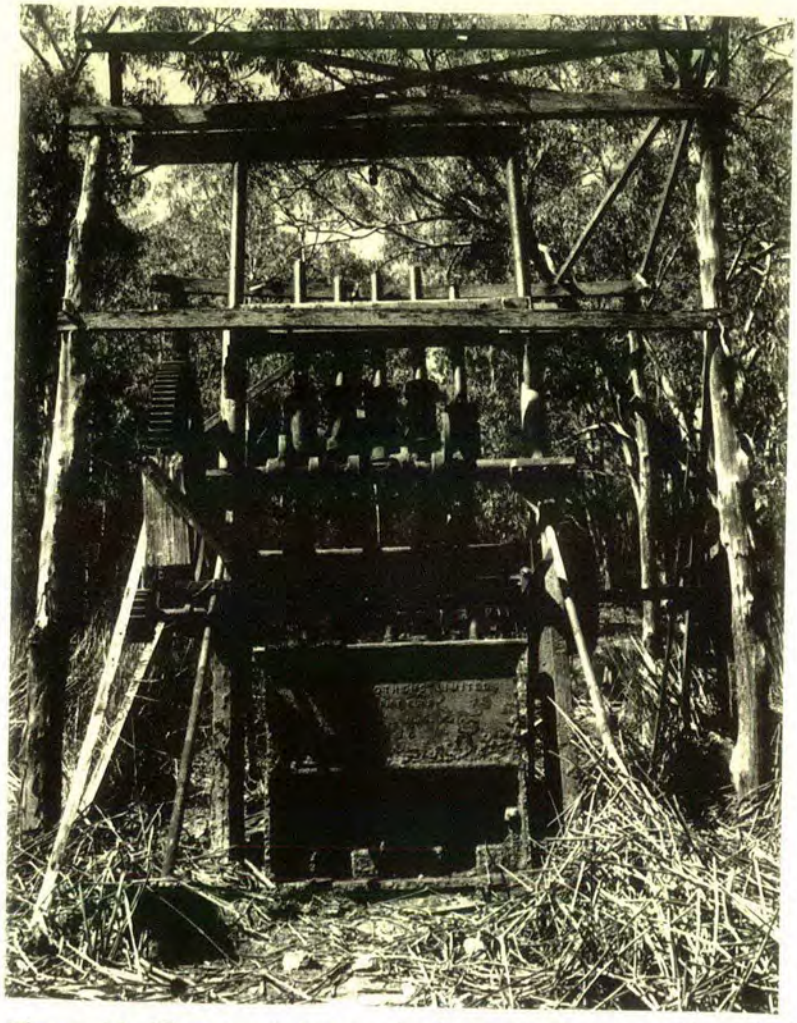


Figure 11. Chapman's battery looking south, area of inundation in foreground

Figure 12. Chapman's battery, looking north

Figure 13. Chapman's battery, abandoned truck

Figure 14. Golden Crown processing site. chute

Figure 15. Golden Crown tunnel (site C)

Figure 16. Golden Crown processing site, concrete spillway or chute looking towards concrete blocks for stamp site (normally under water)

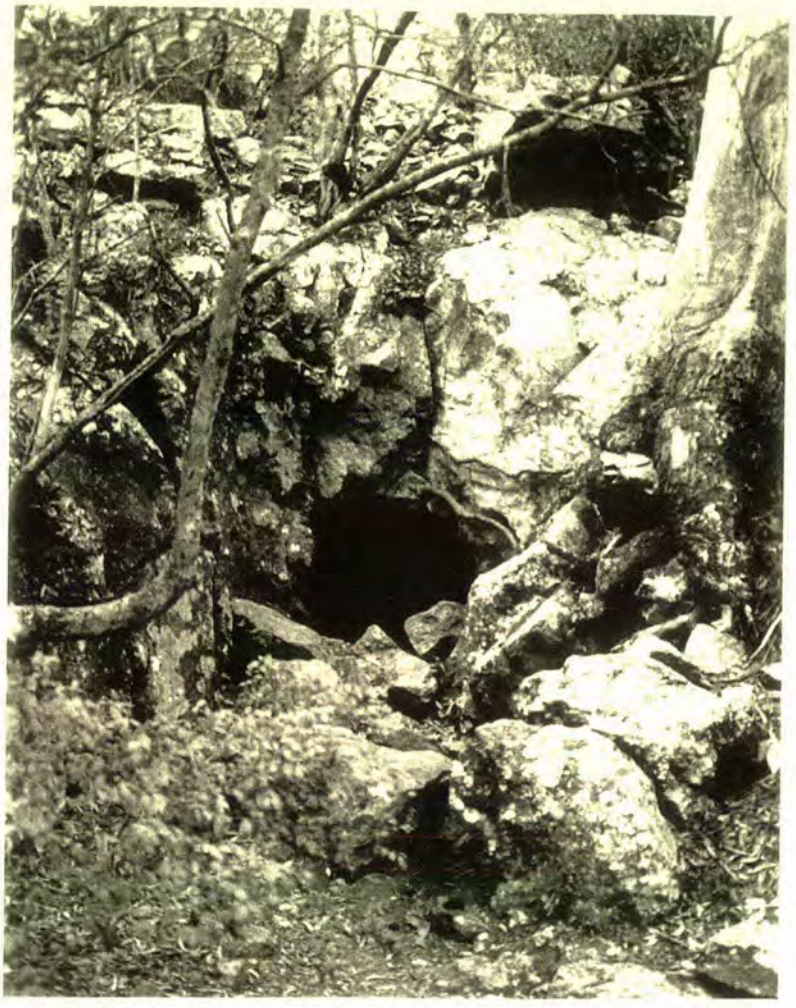


Figure 17. Golden Crown, tunnel (site D)

Figure 18. Golden Crown, hut site

Figure 19. Golden Crown, main quarry, looking north, site G

Figure 20. Golden Crown, main quarry, drop shaft, site G

Figure 21. Golden Crown, top cut, site H

Figure 22. Golden Crown, upper tunnel, site I

Figure 23. Albion tunnel

Figure 24. Hidden Treasure, railway passes over top of cut

Figure 25. Pioneer tramway

Figure 26. Pioneer Tramway

Figure 27. Pioneer Tramway

Figure 28. Pioneer tunnel

Figure 29. Pioneer processing plant, back end of site

Figure 30. Pioneer processing plant, chute

Figure 31. Pioneer processing plant, concrete platform, normally inundated

Figure 32. Pioneer preocessing plant, brick wall, normally inundated

Figure 33. Homeward Bound processing plant, concrete area, site for 40 head stamps

Figure 34. Homeward Bound processing plant, concrete foundations, facing north

Figure 35. Homeward Bound, inclined tramway, facing north west

Figure 36. Homeward Bound processing plant, pump area? normally inundated

Figure 36 a. Remains of wooden supports for 10 head stamp, Homeward Bound

Figure 36 b. Embankments for sheds, normally inundated

Figure 37. Homeward Bound lower tunnel

Figure 38. Homeward Bound lower tunnel, tramway

Figure 39. Star, middle tunnel

Figure 40. Homeward Bound upper tunnel, west entrance

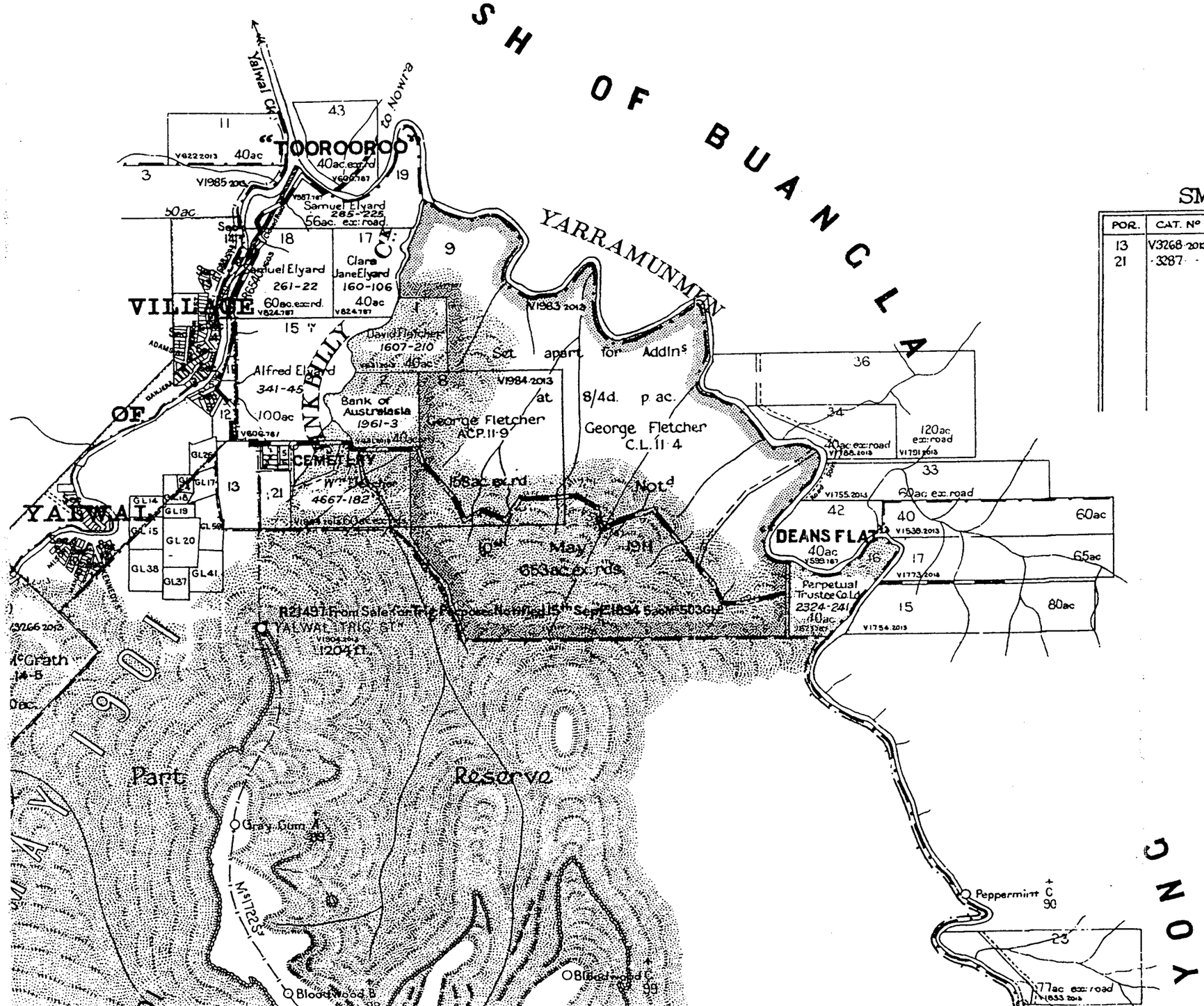
Figure 41. Homeward Bound quarry, site B

Figure 42. Homeward Bound quarry, facing south along tramway towards site B

Parish ..... boundaries shewn thus .....
Reserve from Conditional Purchase within a Goldfield .....
Reserve from Sale .....
Town or Village .....
Reserve fr. Sale & Lease .....
Gold Field .....
Classified Areas .....
Public Roads .....

Dedicated 29·3·92

Catalogue	Allot.N°	Name	a	r	p
M6273Gb	1	Church of England	1	0	0
do	2	Presbyterian	0	2	0
do	3	Wesleyans	0	2	0
do	4	Jews	0	0	20
do	5	Roman Catholic	0	3	30
do	6	Independents	0	1	10
do	7	General Cemetery	0	3	0



Historic Map No. 5
Yalwal, June 1938:
showing the Elyard family properties and the cemetery with the accompanying key (above) to its denominational divisions

SMALL PORTIONS

POR.	CAT. N°	NAME	AREA
13	V3268·2013	George Fletcher pt Spl 143	26·0·30
21	·3287· -	George Fletcher ACP.18·2	12·0·0

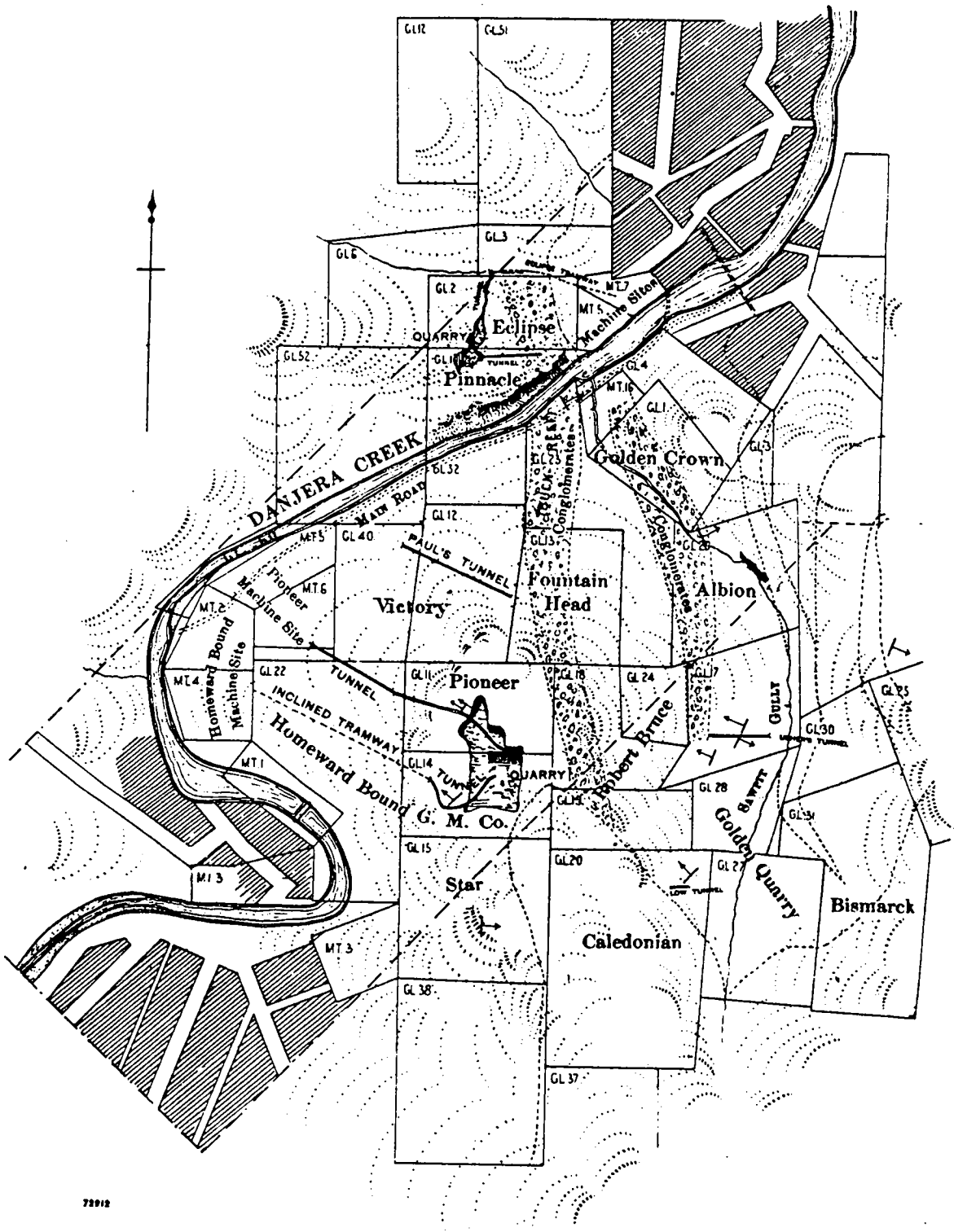
Historic Map No. 4
Yalwal, 1901: showing the Mining Leases

PLAN

Showing Gold Workings, &c., in the

VILLAGE OF YALWAL

Scale 0 ——— 4 ——— 8 **Chains**



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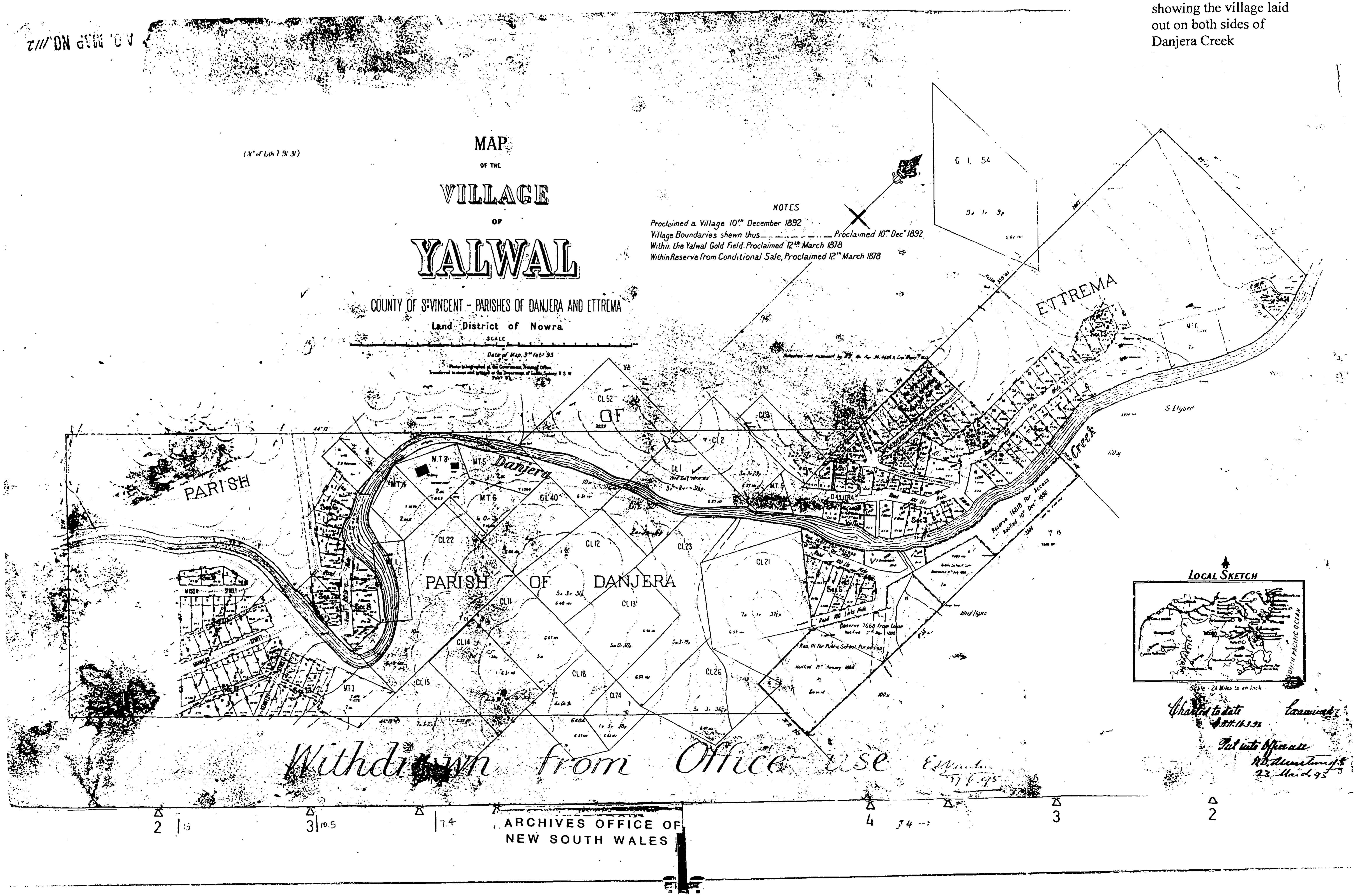
Historic Map No. 3
Yalwal, February 1893: showing the village laid out on both sides of Danjera Creek



MAP
OF THE
VILLAGE
OF
YALWAL
COUNTY OF St VINCENT - PARISHES OF DANJERA AND ETTREMA
Land District of Nowra
SCALE
NOTES
Proclaimed a Village 10th December 1892
Village Boundaries shewn thus Proclaimed 10th Dec 1892
Within the Yalwal Gold Field. Proclaimed 12th March 1878
Within Reserve from Conditional Sale, Proclaimed 12th March 1878
PARISH OF DANJERA
PARISH OF ETTREMA
Danjera Creek
G L 54
CL 52
CL 12
CL 13
CL 18
CL 21
CL 22
CL 26
LOCAL SKETCH
Withdrawn from Office use
ARCHIVES OFFICE OF
NEW SOUTH WALES