COWAL GOLD OPERATIONS

HERITAGE MANAGEMENT PLAN

June 2023

Revision Status Register

Section/Page/ Annexure DP&E	Revision Number and Document Number	Amendment/Addition	Distribution	Approval Date
New Document	HMP 2003	N/A	District Historical Society, BSC, Lake Cowal landholders / residents	September 2003
Update	HMP 2022	Administrative Amendments	District Historical Society, BSC	November 2022
Update	HMP June 2022	Minor updates for Currency	District Historical Society, BSC	November 2023

PREFACE

This Heritage Management Plan (HMP) was originally prepared in September 2003 in accordance with the requirements of former Condition 3.3(a)(i) of the Cowal Gold Operations Development Consent (DA 14/98) (as dated August 2003).

As described within this HMP, the *Cowal Gold Project Environmental Impact Statement* (EIS) (North Limited, 1998) assessed non-indigenous heritage for the Lake Cowal area and found no items of non-indigenous heritage significance that would be impacted by Cowal Gold Project activities.

Subsequent to the EIS and granting of Development Consent (DA 14/98) on 26 February 1999, five items of non-indigenous heritage located in the Cowal Gold Project area and surrounds were listed and gazetted under on the *Bland Local Environmental Plan* (LEP) in November 1999. The items were the Cowal West Homestead, Quarters, Sheds and Stables (located within ML 1535), and the graves on Lake Cowal Station (located 6 km north of Marsden). The location of these items is shown on the Figures within this HMP.

As described in the approved *Cowal Gold Operations Processing Rate Modification Environmental Assessment* (Evolution, 2018), demolition of the Cowal West Homestead Complex (i.e. the Homestead, Quarters, Sheds and Stables) was approved for the *Cowal Gold Mine E42 Modification Modified Request Environmental Assessment* (Barrick, 2008), and occurred during 2011 to 2012. The relocation and reconstruction of the Shearing Shed at the Lake Cowal Conservation Centre was completed in April 2013.

As a result, the management measures, monitoring and reporting requirements within this HMP, which are relevant to the former Cowal West Homestead Complex, no longer remain applicable to the currently approved CGO.

As described in the *Cowal Gold Operations Processing Rate Modification Environmental Assessment* (Evolution, 2018), no registered historic heritage items would be potentially impacted by the Processing Rate Modification, Mod 16 or SSD 10367. Therefore, no further revisions to this HMP are considered necessary.

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1 INTRODUCTION

The Cowal Gold Operations (the CGO [herein referred to as the Project]) is located approximately 38 kilometres (km) north-east of West Wyalong, New South Wales (NSW) (Figure 1). Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of the CGO. Development of the CGO is approved to occur within Mining Lease (ML) 1535 and ML1791.

Development Consent (DA 14/98) for the CGO (including the Bland Creek Palaeochannel Borefield water supply pipeline) was granted by the Minister for Urban Affairs and Planning under Part 4 of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 26 February 1999. Development Consent (DA 2011/64) for the operation of the Eastern Saline Borefield was granted by the Forbes Shire Council on 20 December 2010.

The Minister for Planning granted approval for the *Cowal Gold Operations Underground Development Project as* State-significant Development No. 10367 under Section 4.38(2) of the EP&A Act on 30 September 2021 and to modify DA 14/98 through *Modification No.16* (herein referred to as Mod 16) under Section 4.55(2) of the EP&A Act.

DA14/98 generally allows:

- Mining operations until 2040.
- Ore processing at a rate of 9.8 Mtpa.
- Tailings and waste rock emplacement on site.
- Operation of a range of ancillary mining infrastructure.

SSD 10367 generally allows:

- Underground stope mining until 2040.
- Backfilling the stopes with cemented paste made from tailings.
- Development of ancillary infrastructure including a box-cut to the underground mine and a paste fill plant.

Condition 3.1(a)(i) for the mine and pipeline requires the preparation of the enclosed Heritage Management Plan (HMP). This revised Heritage Management Plan (HMP) has been prepared to reflect the conditions of DA 14/98 and SSD 10367 as approved on 30 September 2021 and supersedes all former versions of the HMP. Copies of the approved development consents for Mod 16 and SSD 10367 are available on Evolution's website (www.evolutionmining.com.au).

The consent conditions and the corresponding sections of this Plan that address the conditions are outlined below:

Consent Condition		Section
3.1	**Heritage Management** The Applicant shall: (i) prepare and implement a Heritage Management Plan (HMP) for the development to the satisfaction of the Secretary. The plan shall be prepared in consultation with Bland District Historical Society, BSC, and Lake Cowal landholders/residents and address non-indigenous cultural heritage issues associated with the development.	Sections 2 to 8

1.1	1.1 Adherence to terms of DA, EIS, etc. (a) The Applicant will carry out the development: (i) generally in accordance with the EIS; and (ii) in accordance with the conditions of this consent; and (iii) in accordance with all written directions of the Planning Secretary made under condition *Note: The general layout of the development is shown in Appendix 2* 1.1(b); (b) Consistent with the requirements in this consent, the Planning Secretary may make written directions to the Applicant in relation to: (i) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this consent, including those that are required to be, and have been, approved by the Planning Secretary; and (ii) the implementation of any actions or measures contained in any such document referred to in paragraph (a). (c) The conditions of this consent and directions of the Planning Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and the document/s listed in condition (a)(i). In the event of an inconsistency, ambiguity or conflict between any of the document/s listed in condition (a)(i), the most recent document prevails to the extent of the inconsistency, ambiguity or conflict.	Section 1
1.7	Staging, Combining and Updating Strategies, Plans or Programs (a) With the approval of the Planning Secretary, the Applicant may: (i) prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program); (ii) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined); (iii) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development); and (iv) combine any strategy, plan or program required by this consent with any similar strategy, plan or program required by other consents for the Cowal Gold Operations. (b) If the Planning Secretary agrees, a strategy, plan or program may be staged or	Section 7

<table>
<tr><td></td><td>updated without consultation being undertaken with all parties required to be consulted in the relevant condition in this consent.
(c) If the Planning Secretary agrees, a strategy, plan or program may be staged without addressing particular requirements of the relevant condition of this consent if those requirements are not applicable to the particular stage.</td><td></td></tr>
<tr><td>6.1</td><td>6.1 Air Management (a) Impact Assessment Criteria The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated from the Cowal Gold Operations do not cause exceedances of the criteria listed in Tables 3, 4 and 5 at any residence on privately-owned land.</td><td>5.1.1.2</td></tr>
<tr><td>6.1</td><td>Impact Assessment Criteria
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<tr><th>Pollutant</th><th>Averaging period</th><th>[d] Criterion</th></tr>
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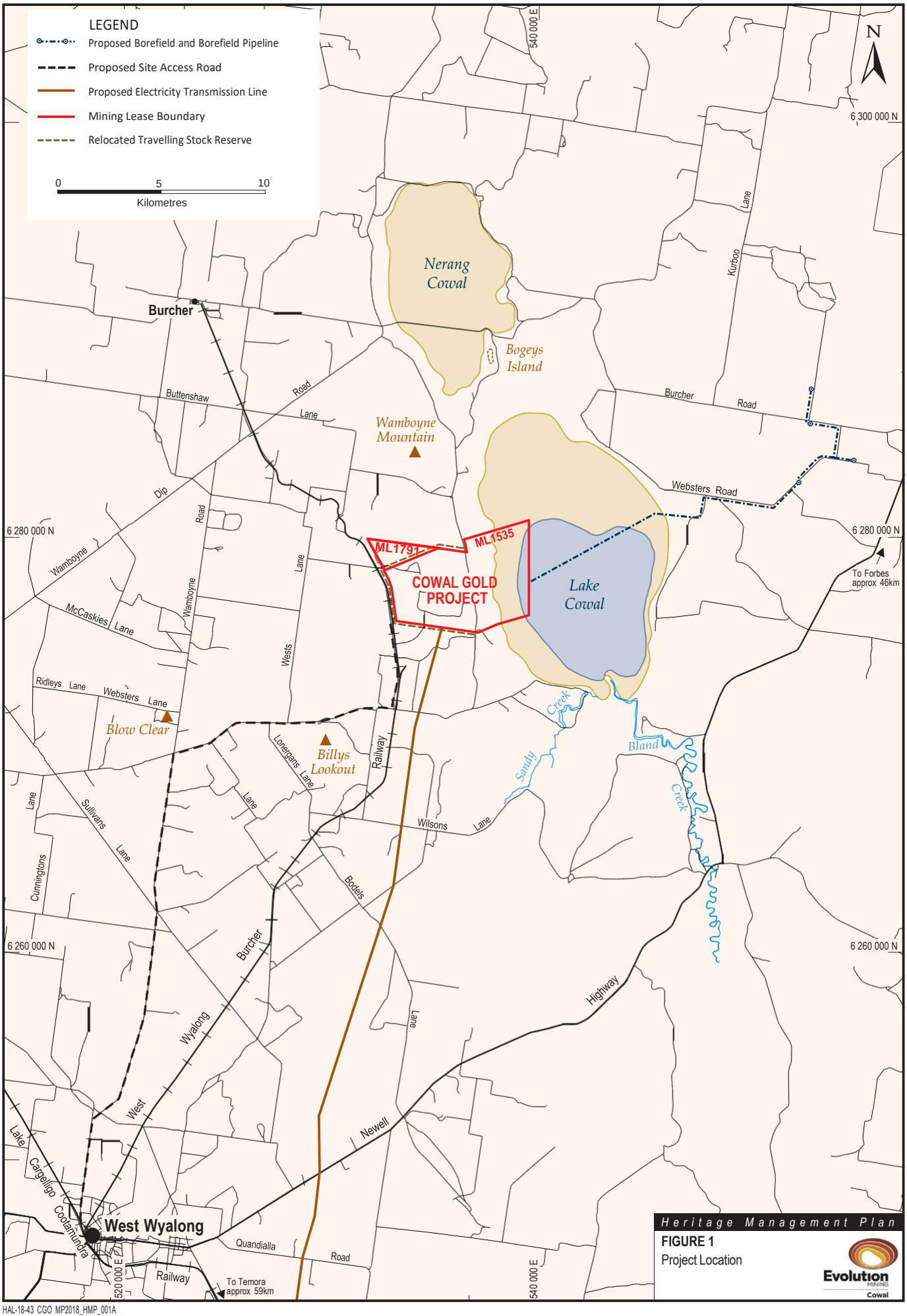
Table 5: Long term impact assessment criteria for deposited dust
<table>
<tr><th>Pollutant</th><th>Averaging period</th><th>Maximum increase in deposited dust level</th><th>Maximum total deposited dust level</th></tr>
<tr><td>[c] Deposited dust</td><td>Annual</td><td>[b] 2 g/m2/month</td><td>[a] 4 g/m2/month</td></tr>
</table></td><td>5.1.1.2 and 9.</td></tr>
<tr><td>6.3(b)</td><td>Blasting Frequency
The Applicant may carry out a maximum of 1 blast a day for the Open Cut Operations on site. This condition does not apply to blasts required to ensure the safety of the mine or its workers.
Note: For the purposes of this condition a blast refers to a single blast event, which may involve a number of individual
blasts fired in quick succession in a discrete area of the mine.</td><td>Sections 5.1.1.1 and 7.</td></tr>
<tr><td>9.1 (c)</td><td>Revision of Strategies, Plans and Programs
Within 3 months of:
(i) the submission of an annual review under condition 9.1(b) above;
(ii) the submission of a non-compliance or incident notification under condition 9
(iii) the submission of an audit under condition 9.2 (a) below;
(iv) the approval of any modification to the conditions of this consent; or
(v) a direction of the Planning Secretary under condition 1.1(b) of this consent;
the suitability of existing strategies, plans and programs required under this consent will be reviewed by the Applicant.
If necessary, to either improve the environmental performance of the development or cater for a modification or comply with a direction, the strategies, plans and programs required under this consent will be revised, to the satisfaction of the Planning Secretary. Where revisions are required, the revised document will be submitted to the Planning Secretary for approval within six weeks of the review.
Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the development.</td><td>Section 7 and section 10.2</td></tr>
<tr><td>9.1 (b)</td><td>Annual Review
By the end of March each year, or as otherwise agreed with the Planning Secretary, the Applicant shall review the environmental performance of the Cowal Gold Operations to the satisfaction of the</td><td>Section 10.1</td></tr>
</table>

	Planning Secretary. This review will: *(i) describe the development that was carried out in the previous calendar year, and the development* *that is proposed to be carried out over the next year;* *(ii) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the:* *• the relevant statutory requirements, limits or performance measures/criteria;* *• the monitoring results of previous years; and* *• the relevant predictions in the EIS;* *(iii) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;* *(iv) identify any trends in the monitoring data over the life of the development, including the ongoing* *interaction between the Cowal Gold Mine and Lake Cowal;* *(v) identify any discrepancies between the predicted and actual impacts of the development, and* *analyse the potential cause of any significant discrepancies; and* *(vi) describe what measures will be implemented over the next year to improve the environmental* *performance of the development.*	
9.1	(d) Community Environmental Monitoring and Consultative Committee (i) The Applicant shall establish and operate a Community Environmental Monitoring and Consultative Committee (CEMCC) for the Cowal Gold Operations to the satisfaction of the Planning Secretary. This CEMCC will: • be comprised of an independent chair and at least 2 representatives of the Applicant, 1 representative of BSC, 1 representative of the Lake Cowal Environmental Trust (but not a Trust representative of the Applicant), 4 community representatives (including one member of the Lake Cowal Landholders Association); • be operated in general accordance with the Department's *Community Consultative Committee Guidelines: State Significant Projects* (2019 or its latest version); and • monitor compliance with conditions of this consent and other matters relevant to the operation of the Cowal Gold Operations during the term of the consent. *Note: The CEMCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.* (ii) The Applicant shall establish a trust fund to be managed by the Chair of the CEMCC to facilitate the functioning of the CEMCC, and pay $2000 per annum to the fund for the duration of gold processing operations. The annual payment shall be indexed according to the Consumer Price Index (CPI) at the time of payment. The first payment shall be made by the date of the first Committee meeting. The Applicant shall also contribute to the Trust Fund reasonable funds for payment of the independent Chairperson, to the satisfaction of the Planning Secretary (iii) At least four years prior to mine closure the Applicant shall, in consultation with the CEMCC, identify and discuss post-mining issues, particularly in relation to reduced employment and consequent impacts on West Wyalong, and develop a mine workforce phase out plan. This plan shall be reviewed and updated in consultation with the CEMCC at the commencement of the final year of mining operations. (iv) The Applicant shall, in consultation with the CEMCC, develop appropriate strategies to support activities which promote special interest tourism related to the co-existence of mining and the Lake Cowal environment.	Section 9.1.
9.2	(a) Independent Environmental Audit (i) By the end of July 2016, and every 3 years thereafter, unless the Planning S otherwise, the Applicant shall commission and pay the full cost of an Indepen Audit of the Cowal Gold Operations. This audit will: • be prepared in accordance with the *Independent Audit Post Approval Requir*	Section 10.3.

	amended from time to time); • be led and conducted by a suitably qualified, experienced and independent team of experts (including ecology and rehabilitation experts, and in field's specified by the Planning Secretary) whose appointment has been endorsed by the Secretary; • be carried out in consultation with the relevant agencies, BSC and the CEMCC; • assess whether the development complies with the relevant requirements in this consent, and any strategy, plan or program required under this consent; and • recommend appropriate measures or actions to improve the environmental performance of the development and any strategy, plan or program required under this consent.	
9.3	**9.3 Notification** (a) Incident Notification The Planning Secretary will be notified in writing via the Major Projects website immediately after the Applicant becomes aware of an incident. The notification will identify the development (including the development application number and the name of the development if it has one) and set out the location and nature of the incident. Subsequent notification requirements will be given, and reports submitted in accordance with the requirements set out in Appendix 8. (b) Non-Compliance Notification The Planning Secretary will be notified in writing via the Major Projects website within seven days after the Applicant becomes aware of any non-compliance. A non-compliance notification will identify the development and the application number for it, set out the condition of consent that the development is noncompliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. *Note: A non-compliance which has been notified as an incident does not need to also be notified as a noncompliance*	Section 10.5
9.4	The Applicant shall: (a) make the following information publicly available on its website: (i) the EIS; (ii) current statutory approvals for the development; (iii) approved strategies, plans or programs required under the conditions of this consent; (iv) a comprehensive summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this consent; (v) a complaints register, which is to be updated on a monthly basis; (vi) minutes of CEMCC meetings; (vii) the last five annual reviews; (viii) any independent environmental audit, and the Applicant's response to the recommendations in any audit; and (ix) regular reporting on the environmental performance of the development, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent; (x) any other matter required by the Planning Secretary; (b) keep this information up to date, to the satisfactory of the Planning Secretary.	Section 8.2 and 10.4



Heritage Management Plan

FIGURE 1

Project Location

Evolution MINING Cowal

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1.1 ML 1535 CONDITIONS OF AUTHORITY

The NSW Division of Resources and Geoscience (DRG), within the DPIE, regulates the conditions of authority for ML 1535 which includes requirements that relate to the reporting of noise monitoring results within the Annual Environmental Monitoring Report (AEMR) (now known as the Annual Review). Condition 26 provides:

> ***Annual Environmental Management Report (AEMR)***
>
> *26. (1) Within 12 months of the commencement of mining operations and thereafter annually or, at such other times as may be allowed by the Director-General, the lease holder will lodge an Annual Environmental Management Report (AEMR) with the Director-General.*
>
> *(2) The AEMR will be prepared in accordance with the Director-General's guidelines current at the time of reporting and contain a review and forecast of performance for the preceding and ensuing twelve months in terms of:*
>
> *(a) the accepted Mining Operations Plan;*
>
> *(b) development consent requirements and conditions;*
>
> *(c) Environment Protection Authority and Department of Land and Water Conservation licences and approvals;*
>
> *(d) any other statutory environmental requirements;*
>
> *(e) details of any variations to environmental approvals applicable to the lease area; and*
>
> *(f) where relevant, progress towards final rehabilitation objectives.*
>
> *(3) After considering an AEMR the Director-General may, by notice in writing, direct the lease holder to undertake operations, remedial actions or supplementary studies in the manner and within the period specified in the notice to ensure that operations on the lease area are conducted in accordance with sound mining and environmental practice.*
>
> *(4) The lease holder shall, as and when directed by the Minister, cooperate with the Director-General to conduct and facilitate review of the AEMR involving other government agencies and the local council.*

The above and the development consent condition requirements for the Annual Review (formerly the AEMR) are addressed in Section 10.1.

1.2 ML 1791 CONDITIONS OF AUTHORITY

The NSW DRG regulates the conditions of authority for ML 1791 which includes requirements that relate to the reporting of noise monitoring following an environmental incident. Condition 5 outlines the requirements of the lease holder following an environmental incident:

> **5. Environmental Incident Report**
> The lease holder will provide environmental incident notifications and reports to the Secretary no later than seven (7) days after those environmental incident notifications and reports are provided to the relevant authorities under the *Protection of the Environment Operations Act 1997.*

1.3 OBJECTIVES AND SCOPE

The primary objective of this HMP is to establish a non-indigenous heritage management strategy for the Project that complies with consent conditions by providing:

- a summary of non-indigenous heritage issues which arise in relation to the Cowal Gold Project;
- potential impacts on identified non-indigenous heritage items relating to Project operations;

- management measures for existing non-indigenous heritage items; and
- mechanisms in relation to community consultation and complaints, and reporting regarding non-indigenous heritage.

The Cowal Gold Project Environmental Impact Statement (EIS) (North Limited, 1998) assessed non-indigenous heritage for the Lake Cowal area and found no items of non-indigenous heritage significance that would be impacted by Project activities. Subsequent to the Project EIS and granting of the Development Consent in 1999, five items of non-indigenous heritage items in the Project area have been listed on the Bland Local Environmental Plan (LEP) and are discussed in this HMP.

The HMP is structured as follows:

Section 1: Outlines the objectives of the plan and details relevant consent conditions.

Section 2: Provides a historical overview of non-indigenous heritage in the Lake Cowal area.

Section 3: Discusses proposals to investigate Aboriginal involvement in non-indigenous heritage.

Section 4: Identifies non-indigenous heritage items.

Section 5: Identifies potential impacts on non-indigenous heritage items.

Section 6: Details management measures for non-indigenous heritage items.

Section 7: Presents monitoring requirements for non-indigenous heritage.

Section 8: Presents Stakeholder consultation requirements.

Section 9: Outlines reporting requirements for non-indigenous heritage related issues.

In accordance with consent condition requirements, Bland District Historical Society (BDHS), Bland Shire Council (BSC) and Lake landholders/residents will be consulted during the preparation of this management plan. The HMP will be prepared to the satisfaction of the Planning Secretary or delegate of Department of Planning and Environment (DPE).

2 HISTORICAL OVERVIEW OF NON-INDIGENOUS HERITAGE IN THE LAKE COWAL AREA

2.1 HISTORICAL STUDY

A historical study of the Lake Cowal area was undertaken by the BDHS in 1993 (attached as Appendix A). This study found that the first settlers arrived in the neighbourhood of Wyalong in 1833 and 1834. Following this occupation, a second wave of pioneers arrived in 1842 to the area bringing their wives and families. Apart from pastoral stations settled within the Wyalong district, very little settlement occurred prior to 1885.

Gold mining was prevalent in the Wyalong district and in 1899 it was reported by the government geologist that the Wyalong goldfield was the most productive in the Colony. When the Wyalong goldfield gradually reduced production it was not to the doom of the township, as by 1900 it was evident that wheat growing had become established in the Wyalong district with an area of 11,900 acres sown to cropping and an expected yield of 12 bushels to the acre.

Cowal Station, occupying 16,000 acres on the eastern side of Lake Cowal was leased in 1842 by Thomas J. Atkins. Annual rental of Cowal Station in 1866 was £75 and Atkins also held Cowal No.2 Station of 16,000 acres for £38 annual rental. Billabong Station (south of Lake Cowal) and Caragabal Station (east of Billabong Station) were taken up by John Rodd in 1842 (HMC, 2003). At the turn of the century, Cowal West (known at the time as Lake Cowal West) was listed as one of the principal properties in the Lake Cowal area and comprised 8,000 acres. For a more detailed account of the non-indigenous heritage of the region, refer to Appendices A and B.

Examination of the LEP was undertaken for the Project EIS (North Limited, 1998) to identify any listed heritage items within the Project Mining Lease (ML). At the time of the EIS preparation (and subsequent granting of Development Consent) the LEP did not list any heritage items of local, regional or state heritage significance within the Project development application area.

The EIS concluded that while no significant items of non-indigenous heritage significance were known, if the construction or development of the Project identified items of non-indigenous heritage significance, appropriate identification and management measures would be employed (North Limited, 1998).

Subsequent to the Project EIS and granting of the Development Consent in 1999, five items of non-indigenous heritage have been listed on the LEP within the vicinity of Lake Cowal. The listed items are located at the Cowal West Homestead Complex, herein referred to as Cowal West (Figures 2 and 3) and Lake Cowal Station.

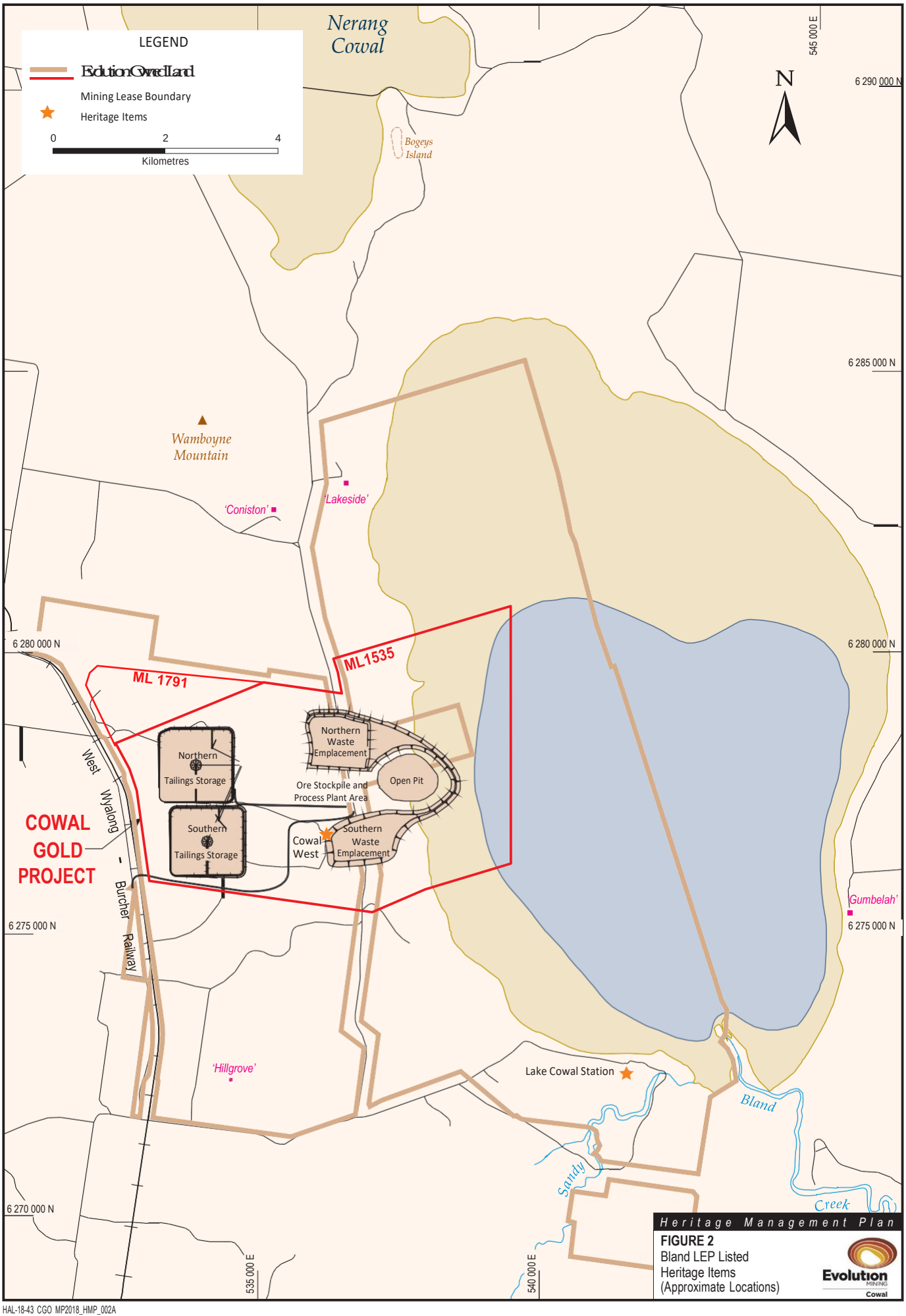
Following the listing of non-indigenous heritage items (Cowal West) within ML 1535 and outside ML 1535 (Graves at Lake Cowal Station), a heritage archiving project was undertaken to provide a historical record of the listed non-indigenous heritage items. Heritage Management Consultants Pty Ltd (HMC) were commissioned by Barrick Gold Australia Ltd (Barrick) to produce a report titled “Cowal Gold Project European Heritage Assessment and Recording of Homestead Complex” (attached as Appendix B) and also to provide an archival photographical record of the listed non-indigenous heritage items. All works for the archival process were conducted in accordance with the *Heritage Information Series - How to Prepare Archival Records of Heritage Items* (NSW Heritage Office, 1998) and the *Heritage Information Series - Guidelines for Photographic Recording of Heritage Sites, Buildings and Structures* (NSW Heritage Office, 1994).

2.2 ORAL HISTORY

Oral family histories provided to the Project relating to the historical occupation of the properties “Cowal West” and “Lake Cowal” in the Lake Cowal area (Figure 2) are repeated below (Note that the property named “Lake Cowal” is not the same property as that referred to as “Lake Cowal Station” at which the graves are located).

2.2.1 Lake Cowal

Prior to 1897 the property named Lake Cowal was owned by Henry Ricketson who died at Caufield, Victoria in 1900. In 1897 Lake Cowal, then occupying 164,000 acres, was purchased from the Ricketson family by Samuel Wilson Snr. From 1885 Samuel Wilson Jnr. managed the property until his death in 1935.



Heritage Management Plan

FIGURE 2
Bland LEP Listed Heritage Items (Approximate Locations)

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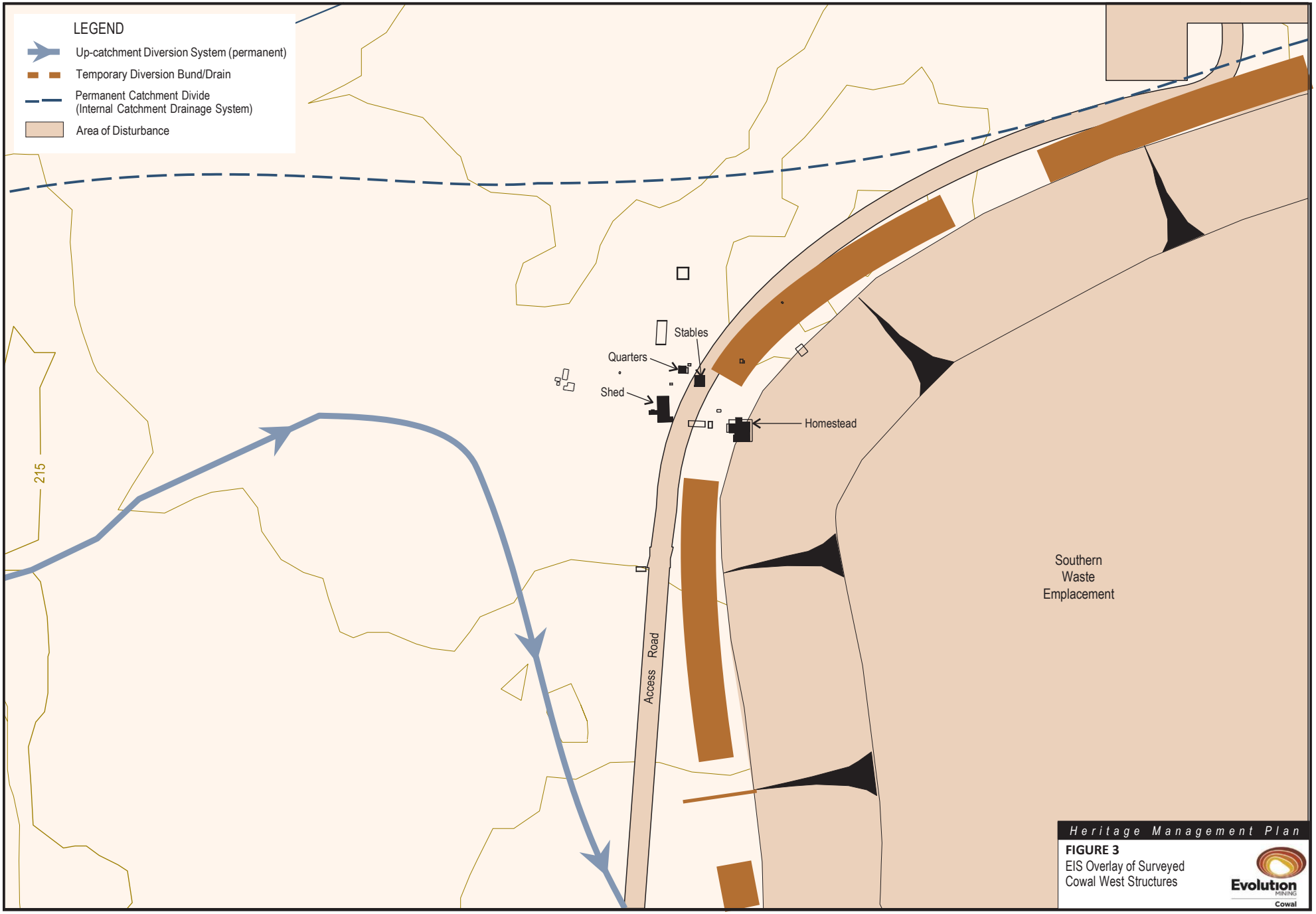

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Lake Cowal homestead was built in 1890 and was partly destroyed by fire in 1928. The bricks used in construction of the homestead were made, and the timber cut and milled, on the property. The homestead was 70 squares in area, had cavity walls and had high ceilings of 10-12 ft. The veranda surrounded the house, and was 12 feet wide with a ceiling. The kitchen and staff quarters were separate buildings to the rear of the homestead, constructed in the same period.

Samuel Wilson Snr., on acquiring Lake Cowal in 1987, improved the land and increased the stocking rate from 84,000 sheep to 107,000 sheep. His sheep and wool products were shown at a number of exhibitions and won a gold medal for Lake Cowal wool at an exhibition at Chicago. Samuel Wilson Snr. was the first President of the West Wyalong Show Society and first President of the BSC. His sons, Leslie and Charles, owned the well known properties in the region of "Corran" and "Caloola" respectively and his sister, Mrs MacDonnell, owned "Milly Milly".

In 1913-14 a large area of the Lake Cowal lease was resumed, contributing to the establishment of the farming centres of Clear Ridge and Blow Clear. 1938 saw the homestead portion of the property sold to HPR (Reg) Coles. HPR Coles held the property for a short time before selling it to WA (Will) Buttenshaw, owner of the neighbouring property "Laurel Park".

Will Buttenshaw and family commenced occupation of "Lake Cowal" in 1945 and constructed a new homestead that incorporated a number of the original buildings not destroyed by the 1928 fire. Will died soon after in December 1946. The property was run as an estate until 1950 when Will's son WR (Bill) Buttenshaw purchased the remaining estate shares of other family members.

Some time later the original Lake Cowal woolshed, employing 48 blade-shears, were converted into a machined six-stand shearing shed, one of the earliest sheds in the area to use shearing machines. The woolshed was almost completely demolished by a windstorm in the 1970's and a new shed was constructed near the bulk electricity lines (constructed in 1961). The Ronaldson and Tippett engine that powered the shearing stand was given to the West Wyalong Historical Society.

Lake Cowal (now comprising 8,000 acres) was managed by Bill Buttenshaw until 2000 when he retired with his wife and daughters from farming and grazing. Since 2000 the property has been leased to Helena and Geoff West of "Lake View".

2.2.2 Cowal West

Frank Allen occupied the property Cowal West for a number of years until his death in 1904, aged 68. Frank was born in Maine, USA in 1835 and was one of nine children. In 1853 Frank and his older brother departed New York on the ship "Rockland" bound for the Victorian gold rush.

Frank failed to make his fortune in the goldfields and settled at Lambing Flat (now the town of Young). He became partner in a produce business and married his cousin's widow Annie, who died soon after the birth of their son Charles.

In 1868 Frank married Isabella Clarke from Young. Frank, Isabella and the produce business moved to Grenfell after the finding of gold in that area. Most of their eleven children were born there. Later Frank sold the business and moved his family to Whego Station and then to "Cowal West" where he lived until his death.

3 ABORIGINAL INVOLVEMENT IN NON-INDIGENOUS HERITAGE

In accordance with Section 9.3 of Consent 1467 granted under section 90 of the *National Parks and Wildlife Act 1974*, a regional cultural heritage study will be completed within 3 years of commencement of construction. The study will identify areas of significance to Aboriginal people including areas within Evolution's land to be considered for future conservation.

Aboriginal involvement in non-indigenous heritage will be studied within this regional study. The regional cultural heritage study will include the history of contact between Aboriginal people and European settlers (NPWS, pers. comm., 21 May 2003).

4 NON-INDIGENOUS HERITAGE ITEMS

No items of national or state non-indigenous significance will be affected by the construction and operation of the Project. Items of local non-indigenous heritage significance located in the vicinity of the Project are discussed below.

4.1 ITEMS OF LOCAL HERITAGE SIGNIFICANCE UNDER BLAND LOCAL ENVIRONMENTAL PLAN 1993

Development consent for the Cowal Gold Project was granted on 26 February 1999. Subsequent to that date, five items in the Lake Cowal area were listed as heritage items under *Bland Local Environmental Plan 1993* (the LEP). The listings were effected by way of an amendment to the LEP which was gazetted in November 1999.

The items are:

- The Cowal West Homestead, Quarters, Sheds and Stables (1890) (Portion 347,Lake Cowal Road, Parish of Corringle) (Figures 2 and 3); and
- Graves on Lake Cowal Station (Newell Highway, 6km north of Marsden on Lake Cowal Station. Note that the graves, situated at the property named "Lake Cowal Station" on the east of Lake Cowal, are not at the property named "Lake Cowal" situated south of Lake Cowal as identified on Figure 2).

The history of Cowal West is detailed in the attached report titled European Heritage and Assessment and Recording of Homestead Complex (HMC, 2003) (Appendix B).

Clauses 21 to 23 of the LEP impose constraints upon development on, or in the vicinity of, items listed as heritage items. However, under the *Environmental Planning and Assessment Act 1979* where an existing development consent expressly or by necessary implication authorises the carrying out of development, that development may be carried out notwithstanding constraints imposed later in time by way of a local environmental plan (or any other planning instrument).

In the case of the Cowal Gold Project, two of the four structures comprising the Cowal West homestead (the Stables and the Homestead), are situated within the Project area of disturbance, namely, the north western edge of the Southern Waste Emplacement and the Access Road (Figure 3). Construction of the mine in the manner authorised by the development consent requires the removal of these structures.

The two remaining structures forming part of the Cowal West Homestead [the Quarters (referred to as the Shearer's Quarters in HMC, 2003) and the Shed] are situated just outside the proposed area of disturbance. Further discussions with stakeholders regarding the future management of these structures will be held during the life of the Project. Any development on or in the vicinity of these structures will take place in accordance with the requirements of clauses 21 to 23 of the LEP (set out below). In the meantime, measures will be undertaken to maintain their local heritage value, as set out in Section 6 of this HMP.

Clauses 21 to 23 of the LEP provide as follows:

> *21. (1) In respect of a building, work, relic, tree or place that is a heritage item, a person will not-*
>
> *(a) demolish or alter the building or work;*
> *(b) damage or remove the relic, or excavate for the proposed of exposing the relic;*
> *(c) damage, despoil or destroy the tree or place; or*
> *(d) erect a building on, or subdivide, land on which the building, work or relic is situated or on the land which comprises the place,*
>
> *except with the consent of the Council.*
>
> *(2) Before granting consent to a development application relating to a heritage item, the Council will consider the impact of the development or adjacent development on the heritage significance of the item.*
>
> *(3) The Council will not grant consent to the demolition of a heritage item unless:*
> *(a) the Council has notified the Heritage Council of its intention to grant consent; and*
> *(b) the Heritage Council has no objection to the granting of consent.*
>
> *(4) The Heritage Council is taken to have no objection unless it notifies the Council of its objection not later than 28 days after receiving notice of the Council's intention to grant consent.*
>
> *(5) The Council may grant consent to partial demolition of a heritage item without further notification, if it considers the partial demolition is of a minor nature and will not adversely affect the item's heritage significance.*

Clause 22 of the LEP discusses development in the vicinity of heritage items:

> *22. The Council shall not consent to an application for consent to carry out development on land in the vicinity of a heritage item unless it has made an assessment of the effect the carrying out of that development will have on the heritage significance of the item and its setting.*

Clause 23 of the LEP discusses conservation incentives relating to heritage items:

> *23. Nothing in this plan prevents the Council from granting consent to the use for any purpose of a building that is a heritage item or of the land on which that building is erected where, in the opinion of Council –*
>
> *(a) the use would have little or no adverse effect on the amenity of the locality; and*
> *(b) conservation of the building depends on the Council granting consent.*

4.1.1 Other Items of Non-Indigenous Heritage

The assessment carried out by Heritage Management Consultants (HMC) on behalf of the Project also identified buildings, structures and items in the vicinity of the Project that contain a level of local heritage significance, namely:

- Lake Cowal Homestead Complex – located on the southern boundary of Lake Cowal (Figure 2);
- Lake Cowal Woolshed – located approximately 1.4km south of the Lake Cowal Homestead Complex;
- Lake Cowal Shearer's Quarters – located on Sandy Creek between the Lake Cowal Homestead Complex and the Lake Cowal Woolshed (not to be confused with the Cowal West Quarters listed on the Bland LEP);
- Rattey's house – located on Lot 38; and
- Survey Markers – located at the junctions of Lots 38, 31 and 37.

All of the above items are located on Evolution owned land outside ML 1535. No historical heritage items were discovered during the site inspection for MOD 16 nor are they predicted to occur within the site boundary of CGO due to highly disturbed nature of the land.

The Analysis of Evidence conducted by HMC (2003) describes these items in relation to NSW Historical Themes (Appendix B). A brief description of the items is provided below:

Lake Cowal Homestead Complex

The Lake Cowal Homestead complex is directly related to the second generation of pastoral runs in the Lake Cowal region, and together with its woolshed and shearing quarters appears to have historical associations and physical remains of potential heritage significance (HMC, 2003).

Lake Cowal Woolshed

The Lake Cowal Woolshed is a large shed that is possibly one of the earliest shed to be converted to mechanical shearing. The shed is in ruin, and is beyond effective conservation, but its recording would salvage potentially important historical and technological evidence of local and regional significance. The original shearer's quarter were adjacent to the shed and may have left archaeological evidence (HMC, 2003).

Lake Cowal Shearer's Quarters

The Lake Cowal Shearer's Quarters are of yet unknown age, but appear to be early 20th century in date. They are potentially of greater significant than the Cowal West quarters.

Rattey's house

Rattey's house is closely associated with a prominent Australian, due to his war record, who also typified small-scale settlement in the Lake Cowal area (HMC, 2003).

Survey Markers

The survey marker trees appear related to subdivision of the lake bed blocks in the 1920's, and are interesting evidence of the survey of the local area (HMC, 2003).

None of the above buildings, structures or items are listed on the LEP or NSW State Register. As such, they were not considered at the time of the EIS (North, 1998) for potential impacts from mining activities or mitigation measures. However, due to the HMC consideration that both the Lake Cowal Woolshed and Lake Cowal Shearer's Quarters posses a reasonable degree of significance, a heritage assessment will be conducted on these items during the life of the Project to determine their heritage value (HMC, 2003).

5 IMPACTS ON NON-INDIGENOUS HERITAGE

5.1 COWAL WEST

An historical heritage assessment has been completed for the project to address the impacts of Mod 16 on historical heritage items, cultural value and archaeological resources.

One heritage item is listed in the Underground Development Project area boundary (Lot 7 DP 753083) in Schedule 5 of the Bland LEP: Cowal West Group comprising homestead, quarters, sheds and stables (heritage item I11) however, these heritage elements were approved for relocation and no longer exists. The relocation and reconstruction of the Shearing Shed at the Lake Cowal Conservation Centre was completed in April 2013.

Lake Cowal is also listed on the RNE, for which the listing does not include cultural heritage values. Mod 16 will not impact this listing or any cultural heritage values held by Lake Cowal, as associated surface disturbance is wholly within the site boundary of CGO.

No historical heritage items were discovered during the site inspection nor are they predicted to occur within the site boundary of CGO due to highly disturbed nature of the land.

5.1.1 Operational Emissions

Operational emissions that are considered to have the potential to adversely impact on heritage items include blasting (vibration and overpressure) and dust deposition. These emissions are considered to have minimal impacts on the listed heritage items and their impacts and mitigation measures are discussed in the following sections.

5.1.1.1 Blast Emissions - Vibration and Overpressure

Predictions of the level of Project blast emissions at the nearest potentially affected residences was conducted by Richard Heggie and Associates Pty Ltd (Richard Heggie Associates, 1997). The predictions were based on a Maximum Instantaneous Charge (MIC) of 213 kilograms (kg) and a typical Project blast design (Richard Heggie and Associates, 1997). Figures 4 and 5 (Richard Heggie and Associates, 1997) indicate the maximum predicted ground vibration level and the maximum predicted airblast overpressure level for varying distances away from the blast zone.

Cowal West is located approximately 2 km from the blast zone (Richard Heggie and Associates, 1997), and the EIS assessment indicated:

- the maximum predicted ground vibration level of 0.34 millimetres per second (mm/s) at Cowal West was well within the Australian and New Zealand Environmental and Conservation Council (ANZECC) criteria of 5 mm/s and the long-term regulatory goal of 2 mm/s; and
- the maximum predicted airblast overpressure level of 104 decibels (dB) (Linear Peak) at Cowal West was also well within the 115 dB (Linear Peak) criterion.

Australian Standard AS 2187.2-2006 *Explosives – Storage, transport and use. Part 2: Use of explosives* (AS 2187.2) denotes for heritage buildings that may be susceptible to structural damage, maximum levels of Peak Vector Sum vibration levels and Airblast levels (dB re 20 micropascals [μPa]) of 5mm/s, and 133 dB(Linear Peak) respectively. The relevant section of AS 2187.2 is provided as Appendix C.

The predicted levels of 0.34 mm/s and 104 dB (Linear Peak) are well under the set maximum levels for heritage buildings, hence blasting is not predicted to have any significant effects on the Quarters (referred to as the Shearer's Quarters in HMC, 2003) and the Shed. All blasting will be done in accordance with the BLMP and Consent Conditions 6.3 and 8.4(b).

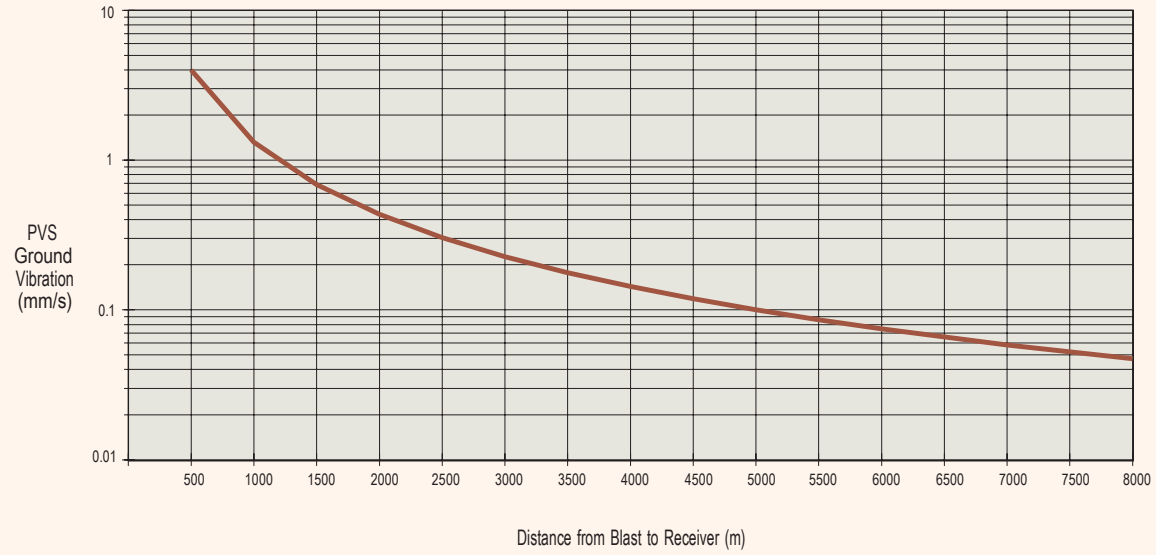

Figure 4 Peak Vector Sum Ground Vibration

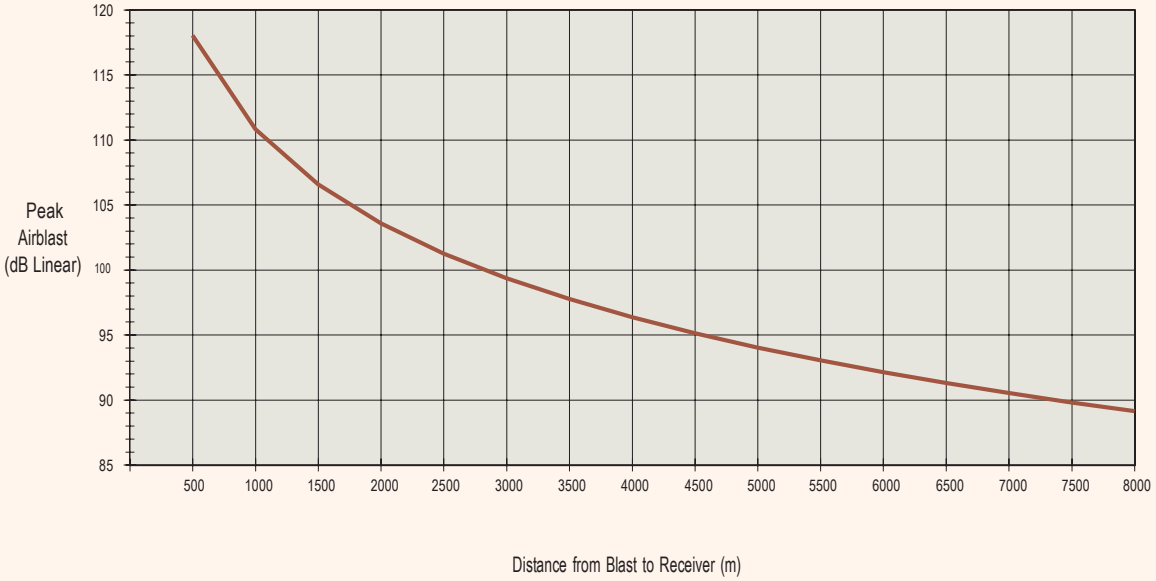

Figure 5 Peak Airblast

5.1.1.2 Dust Emissions

Pavel Zib and Associates (1997) identified potential dust emission sources from mining operations as:

- areas disturbed by construction activities;
- areas disturbed by mining activities, including waste emplacement areas and other portions of the mine site exposed to wind;
- waste rock handling and stockpiling activities (including loading and unloading, spreading and shaping of waste);
- movement of vehicles on unsealed roads for general mining activities;
- topsoil stripping and stockpiling;
- drilling and blasting; and
- crushing, screening, transport and preparation of ore.

The AQMP provides a dust management and monitoring strategy for the CGO as required by Consent Conditions 6.1:

- air quality safeguards and procedures for dealing with dust emissions;
- details on how and when the mine operation is to be modified to minimise the potential for dust emissions; and
- dust monitoring locations and measures to continue baseline monitoring.

The only potential effects of dust deposition on the Quarters (referred to as the Shearer's Quarters in HMC, 2003) and the Shed (as they will be uninhabited) have since been demolished in accordance with requirements and are no longer a consideration for dust impacts.

6 NON-INDIGENOUS HERITAGE MANAGEMENT MEASURES

CGO is currently in an established state with very limited new disturbance planned. All disturbance planned for the CGO is to occur in previously disturbed areas that have already been subject to clearance protocols. Additional to this, the very small area of approved undisturbed area at the CGO will be subject to clearances and verified with the site Ground Disturbance Procedure as required.

6.1 COWAL WEST

Heritage Regulation 2012 outlines minimum standards with respect to the maintenance and repair of buildings, works and relics that are listed on the NSW State Heritage Register or within a precinct that is listed on that Register. Standards outlined in the *Heritage Regulation 2012* relate to the following:

- weatherproofing;
- fire protection;
- security; and
- essential maintenance.

Cowal West is listed in the LEP and not on the NSW State Register. As such, *Heritage Regulation 2012* does not apply. However, *Heritage Regulation 2012* will be used as a guide where practicable for any maintenance and repairs conducted on the Quarters (the Shearer's Quarters in HMC, 2003) and the Shed.

Management measures that will be implemented with regard to the Quarters (referred to as the Shearer's Quarters in HMC, 2003) and the Shed include:

- Erection of fences around the Quarters (the Shearer's Quarters in HMC, 2003) and the Shed to minimise potential for damage due to vehicle movements and general machinery movements.

6.1.1 Bland District Historical Society

The BDHS have indicated to Barrick (and subsequently Evolution) that they have no historical interest in Cowal West and that they are in favour of an archival photographical record for Cowal West (BDHS, pers. comm., 6 May and 24 June 2003).

Subsequent to a meeting between Barrick and BDHS, BDHS forwarded a letter to Barrick on the 24 June 2003 stating that they have "no historical interest in the buildings [Cowal West] at the Mine Site", and they support any decision that Barrick makes in regards to the items at Cowal West (BDHS letter attached as Appendix D).

6.1.2 Archival Records

An archival record of the items of heritage value at Cowal West was undertaken in May 2003 by Dr Michael Pearson of HMC. HMC advised the Cowal West Complex contained items of local significance, primarily the Shed, and to a lesser degree, the Stables. Subsequently, photographic records were produced for relevant Cowal West structures. All photographic records were conducted in accordance with the *Heritage Information Series - Guidelines for Photographic Recording of Heritage Sites, Buildings and Structures* (NSW Heritage Office, 1994). Prior to removal of the Cowal West Homestead building, a photographic record was conducted for inclusion into the archival record for Cowal West in accordance with the above-mentioned guidelines.

Storage of the archival records will be conducted in accordance with the *Heritage Information Series - How to Prepare Archival Records of Heritage Items* (NSW Heritage Office, 1998). Storage will include the original copy being lodged with BSC, Bland Shire Library, Barrick and subsequently handed over to Evolution.

6.1.3 Dust Mitigation

Further Dust mitigation measures are no loger considered applicable as the structures listed as the Quarters, and Shed have been removed in accordance with previously stated requirements.

The proposed management strategy is to visually monitor dust accumulation in any remaining structures and if dust accumulation is considered to be affecting its heritage value.

6.2 UNEXPECTED FINDS PROTOCOL

Considering no existing items of heritage significance were found during register searches or are predicted to occur within the existing boundary of CGO no specific mitigation measures are required to be implemented during construction or operation of the project. An unexpected finds protocol will be added to the existing Heritage Management Plan (HMP) for CGO to be applied to existing operations.

The unexpected finds protocol will provide guidance to the construction and operational workforce should works uncover historic heritage items that may indicate relics. The unexpected finds protocol is provided below:
In the event of discovery of new historical sites within CGO, the following protocols apply:

- if the find meets the materiality threshold, work will immediately but temporarily cease and a minimum of 5 m around the site will be secured to protect the find with temporary fencing/ flagging. The materiality threshold includes:
    - bonded bricks, timber or stones appearing in formation indicating a wall, foundations or floor;
    - a well or cistern, which are usually constructed of brick, sandstone and in this region may be granite;
    - soil with artefact concentrations such as bottles and broken glass, broken crockery, metal, pins and leather, as this type of feature may be a rubbish pit and indicate other as yet undiscovered features; and
    - a collection of bricks that show evidence of early manufacture such as narrower than modern bricks, inconsistent colour and material and striations across the length;

- the find will be immediately reported to the relevant supervisor, environmental manager or other nominated staff member;

- an archaeologist will be contacted to assess the find, where relevant, and determine if it is clearly a relic or has moderate to high potential to be a relic (this may require additional research) – if possible, identification would be competed over email using photographs and if necessary, the archaeologist will attend the site;
- if the find is determined to be a relic, a 146 notification (of the NSW Heritage Act 1977) is to be forwarded to the Heritage Council who will be consulted on the appropriate management measure;
- if the find is assessed and is not a relic, work inside the area that was made a no-go area can re-commence; and
- any new sites will be added to the HMP.

7 MONITORING

In accordance with Consent Condition 3.1 the Environmental personnel shall monitor annually, the effectiveness of management measures outlined in this HMP. As the structures referred to in the HMP have been removed, monitoring of these is no longer applicable.

In accordance with Consent Condition 9, Evolution will Review of Strategies, Plans and Programs Within 3 months of:

(i) the submission of an annual review under condition 9.1(b) above;
(ii) (ii) the submission of a non-compliance or incident notification under condition 9.3(a) or 9.3(b) below;
(iii) (iii) the submission of an audit under condition 9.2 (a) below;
(iv) (iv) the approval of any modification to the conditions of this consent; or
(v) (v) a direction of the Planning Secretary under condition 1.1(b) of this consent;

The suitability of existing strategies, plans and programs required under this consent will be reviewed by the Applicant.

If necessary, to either improve the environmental performance of the development or cater for a modification or comply with a direction, the strategies, plans and programs required under this consent will be revised, to the satisfaction of the Planning Secretary. Where revisions are required, the revised document will be submitted to the Planning Secretary for approval within six weeks of the review.

Condition 1.7 of DA 14/98 allows for the staging and combining and updating of strategies, plans and programs. Due to the specific nature of the heritage management plan and the limited scope, Evolution has decided to keep the HMP as a standalone management plan within the Environmental Management System.

8 ROLES AND RESPONSIBILITIES

Environmental Management Role	Responsibility
Sustainability Superintendent	• Maintains project approvals, ensuring approval obligations are suitable for the continued operation of the CGO. • Ensures all CGO approval documents are submitted as required by licences, development consent and mining lease conditions and other permits. • Manages consultants involved in CGO approvals processes. • Works with relevant government agencies and consultants to ensure necessary project approvals are achieved. • Promotes and enhances Evolution's reputation and relationship with the Government regulators, local landholders and other stakeholders. • Maintains the implementation of the environment management system and governance programs to ensure the CGO maintains compliance with applicable environmental obligations and minimises environmental harm and risk. • Oversees the environmental monitoring and reporting program. • Coordinates external environmental audits and site visits, acting as primary contact on environmental matters. • Supports Sustainability Manager's responsibilities. • Responsible for site environmental monitoring, including external consultant monitoring and reporting. • Implementation and compliance with EMPs, environmental approvals, licensing and permits. • Responsible for annual internal auditing and reporting (e.g. CGO Annual Review). • Public monthly reporting of environmental monitoring data. • Environmental Management System implementation and optimisation. • Scheduling of Corrective Action Preventative Action (CAPA) follow up for audits. • Significant environmental aspects and formal risk assessments and Management of Change program supervision. • Objectives, targets and CAPA tracking. • Workplace interactions, planned general inspections and internal audit scheduling. • Pre-starts, awareness packs and training days input. • Maintenance of the community complaints register.
Sustainability Manager	• Act as the appointed "Environmental Officer" on behalf of the operation. • Oversees the development and implementation of Environment and Social Responsibility (ESR) management systems and governance programs to ensure the operation maintains compliance with applicable environmental and social obligations (internal and external). • Promotes and enhances Evolution's reputation and relationship with the broader community and stakeholders through positive consultation, proactive engagement and compliance with relevant legislation and permitting conditions. • Manages stakeholder engagement for the CGO through community meetings, media, publications and site visits. • Works with relevant government agencies and consultants to ensure necessary project approvals are achieved. • Oversees the implementation of organisational policies, standards, plans and procedures. • Oversees the environmental monitoring program to meet the environmental obligations. • Oversees the development and management of ESR risks. • Manages the ongoing implementation and compliance of the Wiradjuri Native Title Agreement. • Coordinates cultural heritage matters ensuring compliance with relevant NSW legislation and the Indigenous Archaeology and Cultural Heritage Management Plan. • Leads, coaches and mentors a dynamic team to provide high quality ESR service and support to the CGO. • Establishes training and awareness programs for employees, contractors and visitors to site in relation to the ESR management plans developed to comply with ESR obligations and Evolution's policies in relation to ESR management and performance.

	• Oversees the governance programme to monitor compliance and performance of department managers, supervisors, employees, and contractors against the ESR management programmes. • Oversees the establishment of environmental monitoring objectives to meet the requirements of environmental obligations and stakeholder expectations. • Acts as the spokesperson for all ESR matters related to the operations. • Oversees the preparation and delivery of internal and external reports as per ESR obligations. • Promotes Evolution's ESR strategy by educating staff and contractors. • Oversees the development and implementation of cultural heritage and European heritage awareness program for all employees, contractors and visitors to the operation. • Responsible for the development of the rehabilitation, biodiversity offsets, mine closure and land strategies, and oversees the implementation of associated programs and activities. • Responsible for the annual strategic planning for the environmental function, facilitating the development and implementation of performance metrics, work programs, and operating and capital budgets.
General Manager	• Provides adequate resourcing to support site environmental management and implementation of environmental management • Provide strategic direction. • Responsible for management of Evolution staff and all contractors.
Mining Manager	• Responsible for ensuring all mining works are carried out in accordance with the mining lease and operational areas and other relevant approvals and legislation. • Provide strategic direction.
General Staff and Contractors	• All general staff members trained in environmental procedures and protocols as part of the induction process and regular site meetings. • All general staff members responsible for immediately reporting environmental incidents. • All general staff members responsible for undertaking works in an environmentally sound manner and in accordance with EMPs and site commitments.

9 STAKEHOLDER CONSULTATION

9.1 COMMUNITY ENVIRONMENTAL MONITORING AND CONSULTATIVE COMMITTEE

A CEMCC will be set up for the Project in accordance with Consent Condition 8.7. The condition is reproduced below:

> ***9.1 Community Consultative Committee***
>
> *Community Environmental Monitoring and Consultative Committee (CEMCC)*
>
> *The Applicant shall:*
>
> *(i) The Applicant shall establish and operate a Community Environmental Monitoring and Consultative Committee (CEMCC) for the Cowal Gold Operations to the satisfaction of the Planning Secretary. This CEMCC will:*
> *• be comprised of an independent chair and at least 2 representatives of the Applicant, 1 representative of BSC, 1 representative of the Lake Cowal Environmental Trust (but not a Trust representative of the Applicant), 4 community representatives (including one member of the Lake Cowal Landholders Association);*
> *• be operated in general accordance with the Department's Community Consultative Committee Guidelines: State Significant Projects (2019 or its latest version); and*
> *• monitor compliance with conditions of this consent and other matters relevant to the operation of the Cowal Gold Operations during the term of the consent.*
>
> *Note: The CEMCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.*
>
> *(ii) The Applicant shall establish a trust fund to be managed by the Chair of the CEMCC to facilitate the functioning of the CEMCC, and pay $2000 per annum to the fund for the duration of gold processing operations. The annual payment shall be indexed according to the Consumer Price Index (CPI) at the time of payment. The first payment shall be made by the date of the first Committee meeting. The Applicant shall also contribute to the Trust Fund reasonable funds for payment of the independent Chairperson, to the satisfaction of the Planning Secretary*
>
> *(iii) At least four years prior to mine closure the Applicant shall, in consultation with the CEMCC, identify and discuss post-mining issues, particularly in relation to reduced employment and consequent impacts on West Wyalong, and develop a mine workforce phase out plan. This plan shall be reviewed and updated in consultation with the CEMCC at the commencement of the final year of mining operations.*
>
> *(iv) The Applicant shall, in consultation with the CEMCC, develop appropriate strategies to support activities which promote special interest tourism related to the co-existence of mining and the Lake Cowal environment.*
>
> *The CEMCC will comprise representatives of BSC, Lake Cowal Foundation Limited (LCFL), two Evolution representatives and four community representatives including one from the Lake Cowal Landholders Association.*

The CEMCC will provide opportunities for members of the community to attend CEMCC meetings to discuss specific issues relevant to them, including dust-related issues. This will be achieved by landholders making a request to the CEMCC regarding a particular issue, or by the landowner registering a complaint in the complaints register. Landowners who register complaints will be invited to join in discussion of the issue at the next CEMCC meeting.

Items of discussion at these meetings will include mine progress, reporting on environmental monitoring, complaints, rehabilitation activities and any environmental assessments undertaken.

9.2 COMPLAINTS REGISTER

A complaints register will be maintained by the CGO in accordance with Consent Condition 9.1 and

Information recorded in the complaints register with respect to each complaint will include:

- date of complaint;
- name, address and telephone number of complainant;
- nature of complaint; and
- response action taken to date.

An initial response will be provided to the complainant within 24 hours. Preliminary investigations into the complaint will commence within 48 hours of complaint receipt.

In the event that the complainant is not satisfied with Evolution's response to the complaint an independent investigation will be undertaken.

10 ENVIRONMENTAL MANAGEMENT, TRAINING, AUDITING AND REPORTING

10.1 ANNUAL REVIEW

An Annual Review will be prepared in accordance with the relevant requirements of DPE in accordance of condition 9.1 and submitted to the Planning Secretary. Consent Condition 9.1 (b) is reproduced below:

Annual Review
By the end of March each year, or as otherwise agreed with the Planning Secretary, the Applicant shall review the environmental performance of the Cowal Gold Operations to the satisfaction of the Planning Secretary. This review will:
(i) describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year;
(ii) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the:
• the relevant statutory requirements, limits or performance measures/criteria;
• the monitoring results of previous years; and
• the relevant predictions in the EIS;
(iii) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
(iv) identify any trends in the monitoring data over the life of the development, including the ongoing interaction between the Cowal Gold Mine and Lake Cowal;
(v) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
(vi) describe what measures will be implemented over the next year to improve the environmental performance of the development.

The Annual Review will report on the following non-indigenous heritage-related issues:

- new items of non-indigenous heritage significance identified by the CGO within the ML (Section 7.3);
- new listings of non-indigenous heritage significance items on the LEP or NSW State Heritage Register within the ML (Section 7.3);
- a brief overview of maintenance conducted on listed non-indigenous heritage items (Section 6.1); and
- a summary of results from any monitoring, management and maintenance measures undertaken.

The annual review will be made available via the Cowal Gold Operation website and submitted to the Planning Secretary for assessment.

10.2 REVISION OF STRATEGIES AND PLANS

In accordance with condition 9.1(c) of DA 14/98, this HMP will be reviewed within three months of:

- the submission of an Annual Review under Condition 9.1(b);
- the submission of an non-compliance or incident notification under Condition 9.3(a) or 9.3(b);
- the submission of an audit under Condition 9.2(a);
- the approval of any modification to the conditions of this consent; or
- any direction of the Planning Secretary under Condition 1.1(b) of this consent.

Where this review leads to revisions of this plan, then within six weeks of the review, the revised HMP will be submitted for the approval of the Planning Secretary of the DPE (unless otherwise agreed with the Planning Secretary). The revision status of this HMP is indicated after the title page of this HMP.

This HMP will be made publicly available on Evolution's website (www.evolutionmining.com.au) in accordance with DA 14/98 condition 9.4(a)(iii).

10.3 INDEPENDENT ENVIRONMENTAL AUDIT

An Independent Environmental Audit will be conducted in accordance with DA 14/98 condition 9.2(a) and SSD 10367 condition C11. Condition 9.2(a) is reproduced below:

9.2 Independent Auditing and Review

(a) Independent Environmental Audit

(i) By the end of July 2016, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:

- *be prepared in accordance with the Independent Audit Post Approval Requirements (2020 or as amended from time to time);*
- *be led and conducted by a suitably qualified, experienced and independent team of experts (including ecology and rehabilitation experts, and in field's specified by the Planning Secretary) whose appointment has been endorsed by the Secretary;*
- *be carried out in consultation with the relevant agencies, BSC and the CEMCC;*
- *assess whether the development complies with the relevant requirements in this consent, and any strategy, plan or program required under this consent; and*
- *recommend appropriate measures or actions to improve the environmental performance*

This process provides a mechanism by which environmental management and monitoring at the CGO can be assessed against relevant Development Consent, mining lease and licence conditions.

10.4 ACCESS TO INFORMATION

In accordance to condition 9.4 of DA 14/98, Evolution will make information accessible to the public and will keep all relevant information up to date to the satisfaction of the Planning Secretary.

9.4 Access to Information

The applicant shall:

(a) make the following information publicly available on its website:
  (i) the EIS;
  (ii) current statutory approvals for the development;
  (iii) approved strategies, plans or programs required under the conditions of this consent;
  (iv) a comprehensive summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this consent;
  (v) a complaints register, which is to be updated on a monthly basis;.
  (vi) minutes of CEMCC meetings;
  (vii) the last five annual reviews;
  (viii) any independent environmental audit, and the Applicant's response to the recommendations in any audit; and
  (ix) regular reporting on the environmental performance of the development, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent;
  (x) any other matter required by the Planning Secretary; and

(b) keep this information up to date, to the satisfaction of the Planning Secretary.

10.5 NOTIFICATION

Incidents are defined in DA 14/98 as:

A set of circumstances that causes or threatens to cause material harm to the environment.

In accordance with DA 14/98 condition 9.3(a), Evolution will notify the DPE in writing via the Major Projects website, immediately after becoming aware of an incident. Evolution will provide the relevant agencies with a detailed report on the incident, and any further reports that may be requested. These reports will outline as a minimum, the development (including the development application number), the location and the nature of the incident which has occurred.

Evolution will maintain a record of and report on any incidents. The Evolution Incident Report Form will be completed when recording incidents at the site.

A non-compliance is defined within DA 14/98 as:

An occurrence, set of circumstances, or development, that is a breach of this consent but is not an incident.

In accordance with DA 14/98 condition 9.3(b), Evolution will notify the DPE in writing via the Major Project website within seven days after becoming aware of any non-compliance. Evolution will provide in writing to the DPIE a detailed report of the non-compliance which identifies, the development application number for the condition with which the CGO is non-compliant, the way in which the CGO does not comply and the reason for the non-compliance. The CGO will also provide details around any actions which have been or will be taken, to address the non-compliance.

10.6 TRAINING

Evolution Mining CGO conducts General Environmental Awareness Training and Cultural Heritage Training for employees and contractors to promote awareness of Cowal Gold (CGO) surrounding environment, heritage and areas of significance and the protection and enhancement of these areas.

11 REFERENCES

Bland Shire Council (1993) *Bland Local Environmental Plan*.

Bland Local Environmental Plan (2011).

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APPENDIX A

LAKE COWAL HISTORICAL RESEARCH

LAKE COWAL HISTORICAL RESEARCH.

Including a summary of European settlement and activities in the West Wyalong, Marsden, Wamboyne/Burcher, Billys Lookout, Blow Clear and Ungarie areas with emphasis on the mining history and its economic and social contribution to the development of the area.

Prepared by The Bland Historical Society. 1993.

EARLY HISTORY OF THE DISTRICT.

In 1817 Surveyor General John Oxley was sent by Governor Lachlan Macquarie to discover what happened the Lachlan and Fish Rivers. These rivers caused geographers a problem because they both flowed inland in different directions. In 1817 Oxley established his depot on the Lachlan and in April with Allan Cunningham and ten companions, started down the river.

This journey brought him into the area under discussion and we read in his diary the first recorded description of this area. His description was very unfavourable, which is surprising, because this land eventually became one of the best wheat producing areas in New South Wales.

Whilst in the vicinity of Mt Amyot Oxley said: "It is impossible to fancy a worse country than the one we are now travelling over, intersected by swamps and small lagoons in every direction; the soil a poor clay and covered with stunted useless timber." OXLEY: P 20-21. The timber referred to was the mallee scrub and this district would be north of Lake Cowal.

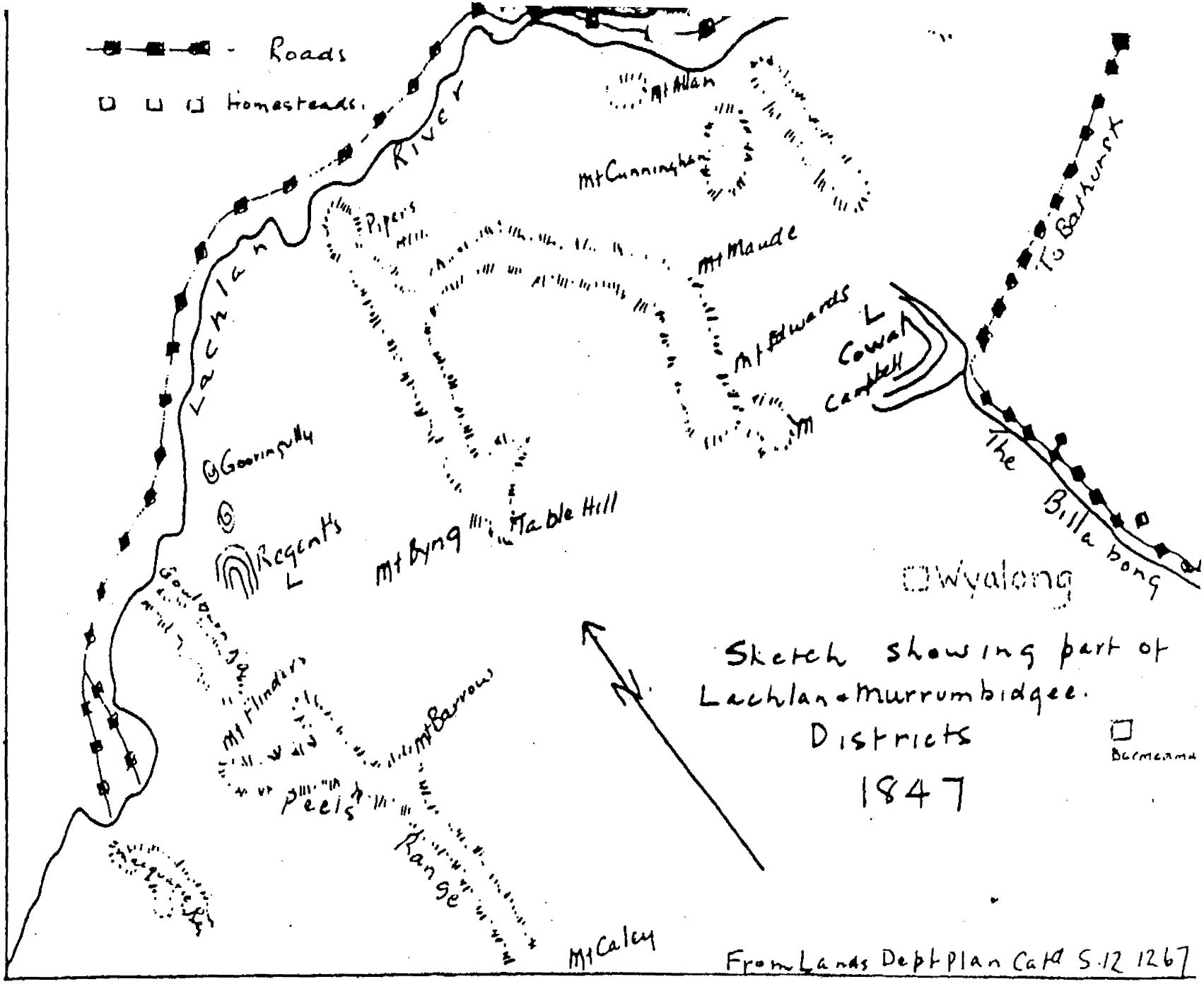
In the Mt Melville district which on this occasion was more than usually flooded, he said:" I am forced to conclude that in common seasons this whole tract is badly watered. The soil of the country we passed over was poor and cold clay but there were many rich levels which, could they be drained and defended from the inundations of the river, would amply repay cultivation." Oxley concluded that these flats were entirely unsuited for cattle, the grass being too swampy and the good portions mentioned above being overcrowded with bushes, swamps and lagoons. He did not consider it a safe or desirable grazing country.

In the neighbourhoods of Mts Maude, Edwards and Campbell he described the country as "poor and as barren as can well be imagined; the soil a light red sand, acacia scrubs, small box trees and a few miserable cypresses." OXLEY: p.43.

He said from the want of timber, grass and water it would never be inhabited by civilised man. His prophesy was not true for this district, now called Ungarie, north west of the township of West Wyalong, is the centre of one of the greatest wheat producing districts in the State.

The Surveyor General was struck by the physiography of the region. The few hills which the region possessed usually terminated on their westward side in a perpendicular bluff to a height of two or three hundred feet.

It was in this district the Oxley first noticed what was surely gold country! He observed that the hills to the south


Roads
Homesteads
Lachlan River
Mt Allan
Mt Cunningham
Pipers
Mt Maude
Mt Edwards
L Cowal
Campbell
To Bathurst
The Billabong
Gooringully
Regents
Mt Byng
Mable Hill
Owyalong
Goulburn Range
Mt Flinders
Mt Barrow
Peels
Range
Mt Caley
N
Sketch showing part of Lachlan & Murrumbidgee Districts
1847
Barmedman
From Lands Dept Plan Cata S.12 1267

were "curiously composed of pudding stone in very large masses - (granite), the lower stratum being a coarse granite intermingled with pieces of quartz. OXLEY: p52.

Fortunately Oxley's gloomy opinion of this region did not deter the squatters in their westward drive. These squatters "concentrated for a time on the south, and, in a few years, dotted settlements all over the country from the old cedar huts of Illawarra to Lake George and the Lachlan." Roberts: "Squatting Age in Australia" p.3. The Lachlan formed the boundary of the Nineteen Counties. By 1835, the thick black line of the Nineteen Counties remained as solid as ever on the map as the legal limit of settlement, but, actually it had been crossed in all directions." Roberts p5.

Oxley had first explored the Bland in 1817 when he camped for a considerable time near the Weddin Mountains. He tried to explore the Bland Creek but was only able to go as far as Euroka where he was blocked by water. There was so much water about that he considered he had discovered an inland sea and marked his name on a tree at the edge of the water. This tree stood for many years until an unimaginative Free Settler chopped it down and burned it. What Oxley considered as an inland sea was merely the backed up waters of the Lachlan River and Lake Cowal which had filled up the Bland Creek and spread across the plains.

Major Thomas Mitchell (later Sir Thomas) the next Surveyor General of New South Wales set out in 1826 to further explore the Bland country which he called "The Levels". He got as far as where the Bland Road joins Curraburrama and Bland Stations. He camped in a belt of timber halfway between these two stations at a place called Major's Point. He was forced back, as Oxley had been, because of a Lachlan flood which he thought was an inland sea.

The first settlers in the neighbourhood of Wyalong seem to have been a family of Gibson Brothers who took up a run near the Bland in 1833 and Mr Glass who settled on the Bland in 1834. Some of the early settlers were Mr Oakes (Back Creek) - 1835; Mr Myles at Morangorell in 1836 and who sold to Donald McGregor in 1843. John Bray from Crookwell opened Narraburrah in 1836 and Horatio Roberts and Wade also from Crookwell opened Carrumbee in 1836. They sold to John Shourd and John Mason in 1840. Abel Burke opened Bland Creek in 1838 and in the same year John Levitt took up a station near Grogan. He sold to Thomas Burrett of Wentworth Falls in 1839. Moses Beard opened up a run on the Bland Creek opposite Abel Burke in 1840. John Trott opened the Billabong in 1842 and sold it to James Marsden in 1852.

Following the squatting and occupational period of the first settlers who took up pastoral runs about 1842, there came a secondary wave of pioneers, bringing with them their wives

and families. Apart from the pastoral stations very little settlement had taken place within the Wyalong district prior to 1885.

John Rodd had taken up Billabong Pastoral Run in 1842. The Billabong Run extended through Mallee Plains to the area where the twin towns of Wyalong and West Wyalong were later established. Rodd later sold to James Marsden in 1852. The Government Gazette of New South Wales, 1842, included the following lessees in the Lachlan Distict No 6:

No 3	Lessee	William Atkins	Run Cowal	16000 acres
No 129	Lessee	John Rodd	Run Caragabal	26880 acres
No 130	Lessee	John Rodd	Run Billabong	40000 acres
No 149	Lessee	Levi Stonestreet	Run Tregalona	25600 acres

In 1849, two years after the Waste Lands Act was passed allowing squatters to take up Runs we find the following names:

Cartwright	John	Barmedman Run	36000 acres
Burke	Abel	Back Creek	28400 acres
Gibson	Alice	Bland	44800 acres
Rodd	John	Billabong	40000 acres
Stonestreet	Levi	Tregalana	25600 acres
Walton	John	Bland	100 square miles
Atkins	William	Cowal	16000 acres

In 1852 John Regan, brother of Denis Regan who had married Sarah Musgrave commenced exploring back country for station property. In a few years he had caused much of the country to be opened up and shifted the location of the outback from Young to what is now Wyalong. On one occasion John Regan set off with a Mr Wood and after passing the Billabong came to another creek. Their tethered horses wandered off and after finding them had difficulty in finding their camp again. They called the creek 'Humbug' and this simple expression showed the feeling of the two men towards the creek that had so long deluded them.

Mr Wood was impressed with the land and sent Mr Walsh as overseer to take possession of the run until he (Wood) was able to occupy it. Walsh entered into partnership with Wood and called the station Merrengreen and stocked it with cattle and horses. This was the farthest outback station in south west New South Wales. In 1859 Thomas and James White explored Humbug Creek, taking up land which they called Ballangama. Mr Woodhouse took up Hiawatha and Thomas and Abraham Wood set up on the Humbug Creek calling their station Wallandry.

The next land explored by John Regan was the Merool now known as Wyalong. The first man on the Merool was an American negro named Sims and known as Black Sims. He took up Coonaparra run in 1859 and was in possession two years before another settler came to the district. His run

reverted to the Crown when he was arrested for cattle stealing and sentenced to ten years imprisonment.

In 1861 William Marshall acquired a large area on The Merool and called it Buddigower and in the same year George Harman took up Quondarry. Moses Beard late of the Bland took up land on the Merool calling the station Merool Creek. Samuel Pawsey of Mandamah was followed by Hamilton Hume, nephew of the explorer at Mandamah West.

By the Land Act 1884 called the Subdivision of Runs Act, the old Runs were converted into Pastoral Holdings. Thus we find that Lake Cowal No 701 includes the Clear Ridges, Lower Billabong, Billabong Back and Wombine Runs.

The first major area to be alienated from the original Lake Cowal Run was proclaimed in 1885 as Lake Cowal No 162. The secondary Lake Cowal Station was acquired by John Bloyd Donkin and was situated on the eastern side of Bland Creek, downstream from Marsdens. The homestead was near Fishermans Bend where the Bland Creek turns north-west to empty into Lake Cowal. A number of smaller holdings were taken up in the Lake Cowal area, along the perimeter extending from Wamboyne through Billys Lookout to Clear Ridge. In the Marsdens district the smaller holdings were mainly situated between the village and the Booberoi Hills fronting the road to Wyalong.

The land upon which the town of Wyalong now stands was formerly part of Camping Reserve 6387, Parish of Mugga, County of Bland, within the leasehold area of Billabong Holding No 61 held in 1889 by Henry Ricketson and also part of Wyolong (Wyalong) Resumed area No 410. Prior to this the Leasehold area was part of Mugga Swamp Run held in 1866 by McIntosh and Oakes and by H. Ricketson in 1879. The Resumed area part of Upper Wyolong (Wyalong) No 1 Run was held in the same year by E.A. Phillips and P. Besnard and 1879 by J. Cox and M. Callaghan. The present location of West Wyalong lies wholly in the latter run only. HANSON: 1889

There was hardly any other settlement in this locality until 1889. In this year we find the names of holders of Conditional Leases or Conditional Purchases taken up a few miles north and north west of the present township of West Wyalong. The holders were as follows: William, Robert and Elizabeth Gagie, Wilfred Wells Jnr, and William Lange. Then followed in the early nineties a little to the south, John and Phillip Bolte, Donald Rankin and Phillip Ryan. G.W. Neeld came in 1893 and became an important figure in the history of the district.

The gradual falling off of the goldfield did not mean the doom of the two townships as witnessed in other townships for it was found as far back as 1898 that the district was

most suitable for agricultural pursuits and particularly wheat growing. It was evident that wheat growing had become established by 1900 because the estimated area under wheat in the Wyalong district in that year was 11900 acres with an expected yield of 12 bushels to the acre.

At the turn of the century the principal properties in the Lake Cowal area were:

LAUREL PARK: taken up in 1885 by Patrick and Thomas Frost, comprised an area of 4960 acres and was situated on the southern side of Wamboyne Hill. Frost Brothers sold to Henry Buttenshaw in March, 1898 for 17/6 per acre including 3000 well bred sheep.

LAKE COWAL WEST: adjoined the southern side of Laurel Park and was acqired by Frank Allen. It comprised of 8000 acres. Allen sold to Beaufroy Green. After a series of misfortunes, including the homestead being gutted by fire, Green sold to Key Perry. Perry did not reside on the property, but placed it under the management of William McNair, who had come to Billys Lookout in 1885. Lake Cowal West was sold in the 1920's to William J. Hammond who took up residence with his only son Roy and three younger daughters. The property was subdivided in the late 1920's following the death of William Hammond.

LAKESIDE: Taken up by James H. Palmer, comprised of 4000 acres. Palmer sold to William S. English in 1907 for 10/- an acre. English renamed the property "Weelona".

LAKE VIEW: selected by Charles West in 1888.

PINE GROVE: 2400 acres, selected by Henry Thomas Broadribb in 1887.

HILLSIDE: 800 acres, situated on the eastern side of Billys Lookout was taken up by Moses (Harry) Fleming who was employed on Lake Cowal.

CORRAN: selected by Samuel Stewart and situated opposite Fellmans and Weelona and fronting the Billys Lookout Road.

ELLERSLIE: joined Flemings block and a forest lease on the northern boundary, on the west by Girdlers Tank lease and fronting the road leading to the Marsdens-Wyalong Road.

MILLY MILLY: selected by Roderick Charles McDonell and comprised 3000 acres. It was proclaimed as a settlement lease area on 23 January 1904.

CALOOLA: taken up by Mr Rawsthorne, followed by James Hay, and Steve Vinecombe. In 1922 it was acquired by Charles Wilson (second son of Samuel Wilson). It was purchased by

Wilson: Samuel

WILSON: SAMUEL.

b. 14 Oct 1863, Geelong.
d. 25 Nov 1935, Potts Point, 72 yrs.
Bd South Head Cemetery.
Son of Samuel Wilson and Margaret Reid.
Married Margaret E. McClean of "Boona West", Condobolin.

Thomas J. Wilson (no relation to Charles) in 1926. Caloola was proclaimed as a settlement lease area on 27 July, 1895 for an annual rental of £40.

Later the forest area between Harry Flemings and Ellerslie was taken up by Samuel Pellow.

Two small blocks were taken up at Billys Lookout by Victor Beazley and Mervyn Whiley. Portion of Beazley's block was situated where Billys Lookout village had been.

GOLD MINING.

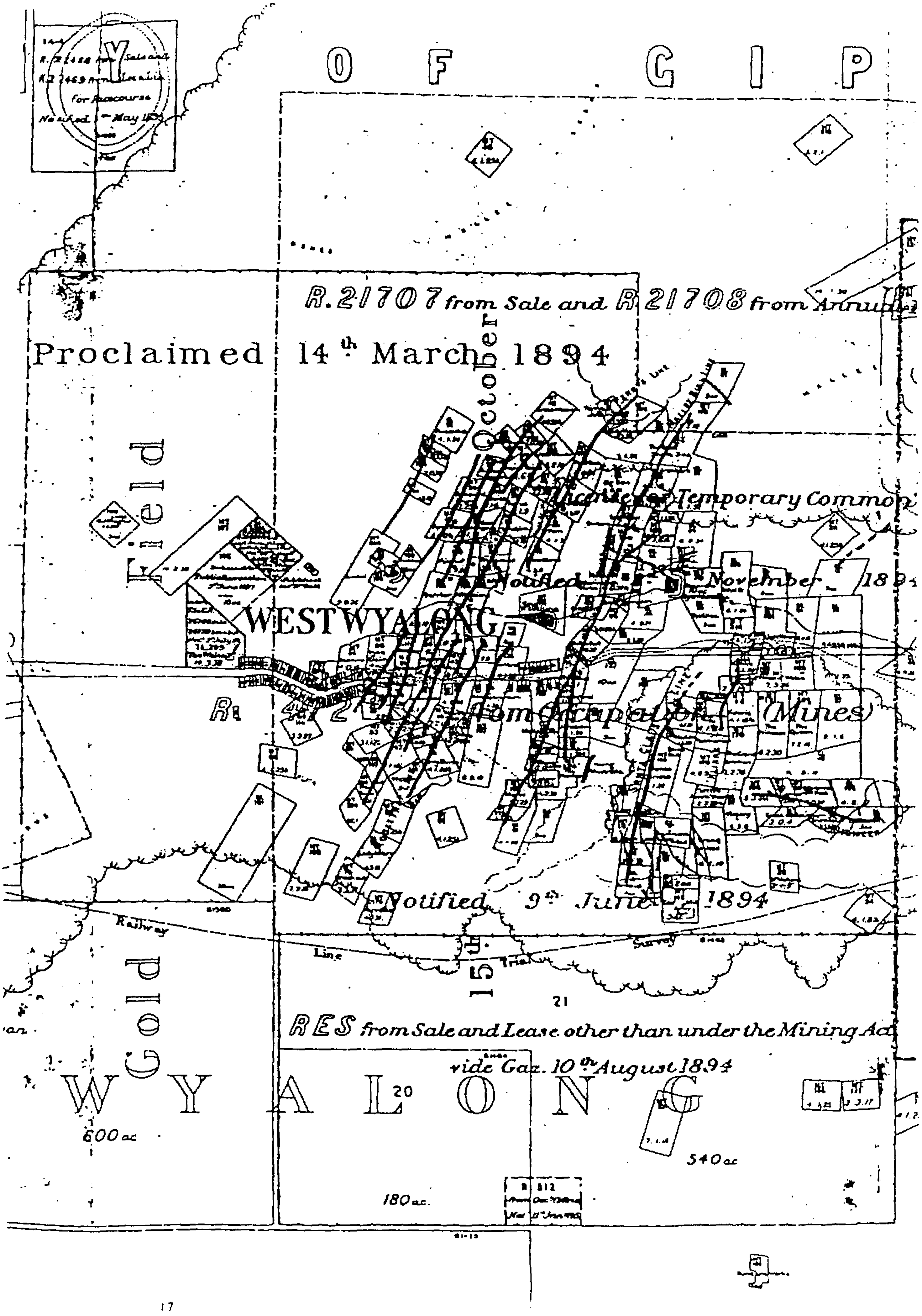
Gold occurs in many types of rock in the form of lodes, veins and impregnations, the breaking up of which form surface and alluvial deposits. Pure gold is seldom found in nature; silver, copper, iron, platinum and other metals are found with it.

The geology of Wyalong is difficult to describe, because with the exception of a few widely separated low elevations such as the old hospital hill, standing at the N.E. of Wyalong and Pine Hill and Pine Ridge, the underlying rocks are nowhere visible at the surface.

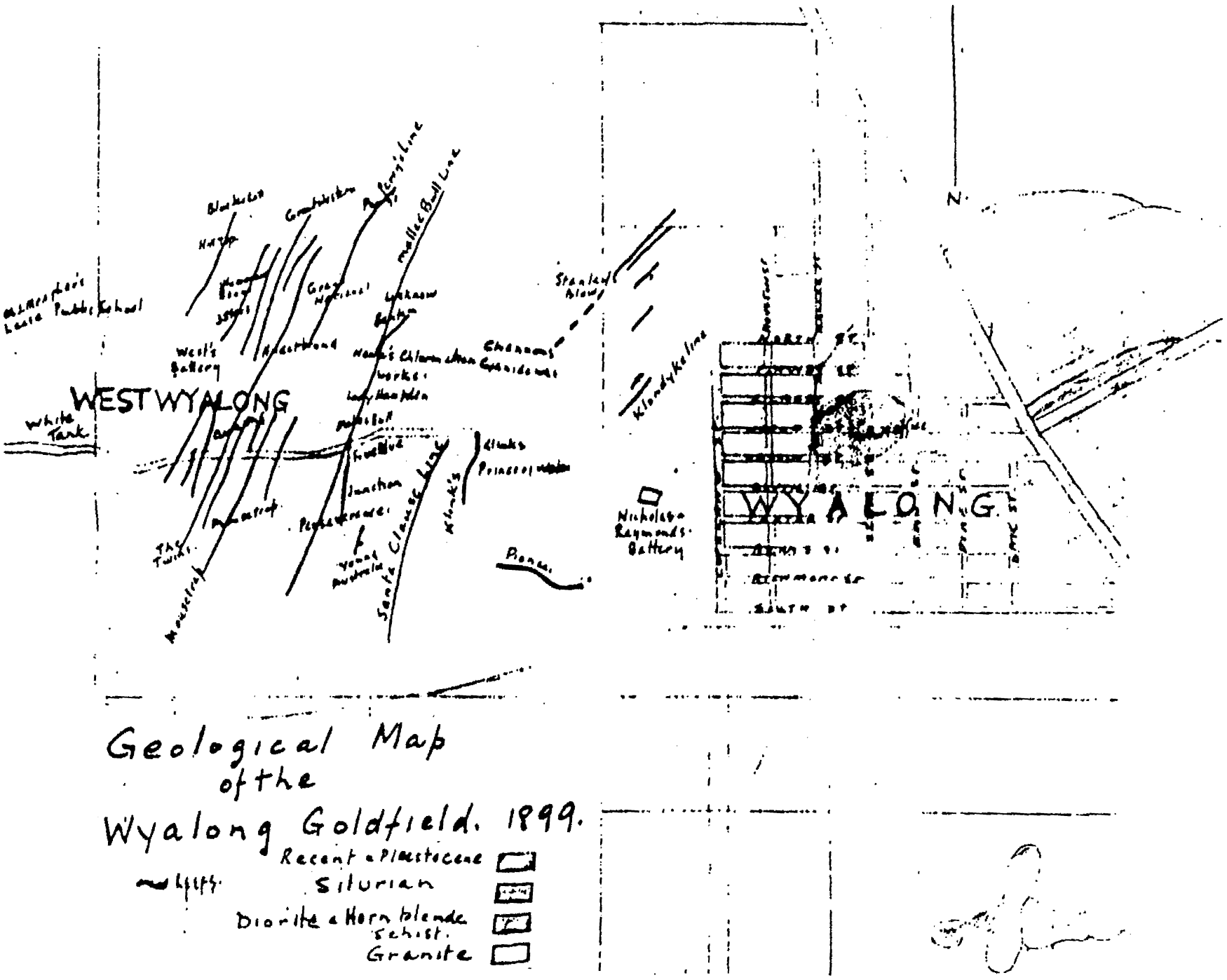
The underlying beds are concealed by an overcovering of Post Tertiary accumulations of several feet of red soil, so that the geologist must make his observations by an examination of the surface soil or by the use of shafts made by miners in prospecting. The difficulty was increased in the case of Wyalong because of the lack of knowledge of geology of the surrounding districts.

In 1899 the Government Geologist, Mr E.F. Pittman reported that the Wyalong goldfield had been developed so vigorously that it was then the most productive in the Colony. He went on to say: " The altitude of Wyalong is almost 800 feet above sea level, and I think that there must have been during the Tertiary period, well-defined channels through which the drainage of this elevated district found its way to the sea, or to the Tertiary basin, or lake (at least 900 feet thick), which exists near the junction of the Murray and Darling Rivers. In these drainage channels the gold derived from the denudation of the auriferous reefs must have been concentrated."

In the frenzied search for gold in the first years of the goldfield at Wyalong, reports came in of discoveries in the surrounding areas. These included Yalgogrin, Buddigower, Billys Lookout, Hiawatha and Blow Clear and areas in closer proximity to the diggings. Gold was discovered at Hiawatha on Portions 10 and 12 on Good Friday, 1898 by Conway and Ryan and it was traced to the adjoining crown lands. All the



OF GIP
R. 21707 from Sale and R 21708 from Annual
Proclaimed 14th March 1894
15th October
Gold Field
WEST WYALONG
Temporary Common
Notified November 189
from Occupation (Mines)
Notified 9th June 1894
Railway
Line
Survey
21
RES from Sale and Lease other than under the Mining Act
vide Gaz. 10th August 1894
WYALONG
20
600 ac
540 ac
180 ac.
17



Geological Map
of the
Wyalong Goldfield. 1899.

Recent & Pliestocene
Lyells Silurian
Diorite & Hornblende Schist.
Granite

NEELD'S MINE
BACK ROW: ERNEST NEELD: HARRY NEELD:
RICHARD NEELD
FRONT (second from left) MRS RICHARD
NEELD: (5th from left) MRS L HYDE

NEELD'S GOLD MINE AIR DRILL AT WORK

reef at Hiawatha were in granite, which seemed to occupy a large portion of the surrounding country and seemed to be continuous with the Wyalong mass. The reefs struck east and west and dipped to the north in contrast to the Wyalong reefs, which had a general north south trend.

In the neighbourhood of Wyalong, there are roughly two main geological areas which can be readily be distinguished and their boundary line approximately known. The larger of these is occupied solely by granite and it is in this area which possibly contains rocks of much greater age than the granite, is occupied by highly altered sedimentary strata and igneous rocks of intrusive character. J.WATT: "Report on Wyalong Goldfield" p10. The granite extends for miles in a northerly and probably continues without break to Hiawatha - a distance of 8 miles north west from Wyalong. Auriferous reefs have been discovered at Hiawatha. The granite also extends south as well as west to Yalgogrin.

Almost the whole area of the goldfields is occupied by loosely aggregated sandy and clayey materials which are largely the result of the decomposition and disintegration in situ of the underlying granites and diorites. The red colour of the deposits is probably due to the presence of oxide of iron. The iron oxide itself is derived from the biotite and hornblende present in the granite. The decomposition of these minerals sets free the oxide of iron.

The red colour of the surface soils in dry regions such as Wyalong is more characteristic than in most regions for in this latter region "the decaying organic matter has a bleaching effect due to the reduction of the ferric oxide and its partial removal in a soluble form. Part of the oxide of iron has separated out in the form of small ironstone concretions which present rounded pseudo-water-worn appearance due to their mode of origin." J. WATT p. 12

"In the absence of well marked outcrops it was the presence of these fragments that led to the discovery of gold at Wyalong." J. WATT pl. Small rounded particles of quartz were noticeable on the small Mallee flat which extends between the township of Wyalong and Pine Ridge. Although during heavy rain, water evidently flows over this flat, there does not seem to be any depth of deposit there or any accumulation of gravel but the loose rounded stones are weathered irregularly over the surface and through the red soil.

The gold present in the Wyalong goldfield was so fine that it was not readily detected except by aid of a lens.

Mr Neeld Snr had joined his sons, who had come to Wyalong previously. He selected a piece of land and was preparing to use it in the normal way. The ironstone nodules had

naturally attracted his attention because he had experience in the Ballarat and Bendigo goldfields and also in Fiji. The first gold was found in quartz on the Pioneer Claim reef. While Mr Neeld Snr was prospecting the first claim one of his sons located gold-bearing stones just outside the selection and about 10 chains to the east of the former site. The reef from which these stones came was soon located and was afterwards known as the Dead Rabbit Claim and later still as the Easter Gift. Work was considerably impeded by the thick mallee scrub.

The third discovery was made by Harry Neeld on Klink's line of reef and was known as Harry's Find. It remained in the Neeld family and paid large dividends. Discoveries were made on sites known afterwards as Red Flag and the Currajong Mine, but no prospecting was done there. The most important discovery was made towards the end of October when some of the sons discovered gold-bearing rocks in the vicinity of what was known as the Prospecting Claim.

The family decided to peg out claims on 16 December, 1893; firstly the Prospecting Claim, then Harry's Find and thirdly the Pioneer Claim, fourthly the Christmas Gift and lastly The Dead Rabbit. J. WATT: p6.

Men began to arrive from the day the gold was reported and by the end of January 1894 there were about 500 men on the goldfield. It was not until the following March, when the first parcels of ore were crushed at Barmedman and good results shown, that the big rush took place and by the end of that month 10000 had arrived on the goldfield.

The fact that the field was worked so successfully was in no small measure due to the character of the ground, which over all parts of the goldfield could be worked with pick and shovel alone down to at least 150 feet. This made the sinking of shafts very inexpensive. As J. Watt observed (p 7): "As a consequence of this many of the reefs have been profitably worked which, had the ground been hard, would certainly have been abandoned."

By the end of 1894 there were six crushing machines at Wyalong, but these were reduced to four and two chlorination works erected when it was recognised that chlorination was the most suitable process for the treatment of rich ore.

In 1894 the following crushings took place at Barmedman and show varying rich ore:

	Tons	yielded	oz.	dwt	grs.
Neeld	13	"	6	4	.
Cassin	12½	"	9	3	.
Neeld No 2	17	"	72	16	.
Perry & Party	17	"	42	18	.
Conway " "	22	"	103	5	.

Keeth	"	28¼	"	67	. .
Fraser	"	10½	"	39	6 .
Gorman	"	37	"	77	12 .
Smith	"	6	"	8	14 .
McMahon	"	4	"	10	. .
Lawry	"	14¼	"	14	18 .

The greatest drawback to the development of the Wyalong goldfield was the scarcity of water and as there were no large watercourses in the vicinity, the warden had to set aside tanks and have races excavated.

One of the outstanding differences of this goldfield from others in Australia was the almost complete absence of alluvial gold. "The existence of so many rich veins at the surface makes it extremely probable that these veins have suffered denudation to some extent. Had the other circumstances been favourable alluvial deposits would have been formed. In the absence of these deposits we must therefore conclude they have not been so." J. WATT p. 14.
The unfavourable circumstances are:
a. the absence of hills and gullies in this flat country, where natural sluicing operations could take place.
b. The small of rain is another big factor.
c. The extremely fine state of the gold set free would mean that it would be scattered by the action of the wind and rain storms so prevalent in these regions.

As to the question why was this goldfield so long undiscovered, it may be pointed out that this was due to:
i. The absence of alluvial deposits, already explained above.
ii. The level nature of the ground with its almost universal covering of red soil.
iii. The absence of fresh water.
iv. The sparsely settled condition of the surrounding country, and
v. The very fine condition of the gold.

During 1895 the claims were steadily developed although there was some falling off of population, due to the discovery of gold elsewhere in Australia. The scarcity of water retarded an even greater development because water was very necessary in crushing operations. Coupled with this was the refractory nature of the ore from below water level. These factors tended to keep down returns. However it was established that the reefs were payable below water level.

The following is a list of mine depths in 1895:

Hildebrands	245 ft	White Reef	185 ft
Hidden Treasure	225	Barrier	180
Pressers	210	Bantam	170
Bolte's	193	Currajong	160
Snowden & Party	185	Welcome Stranger	150.

White Reef, Currajong, and Welcome Stranger gave splendid returns.

During 1895 the new large battery of Nicholas and Raymond commenced work and was in constant use. Climo and Co also erected large works at a cost of £8000 for the treatment of tailings. The number of miners engaged was 8600, 500 less than the year before but the Report of the Department of Mines, 1895, hastens to add that the figures would rise again as several mines intended putting on more men.

The record year was reached in 1897 when 34750 oz were obtained. In that year "Wyalong produced more gold than any other mining division in the Colony." J.WATT: p7.

The Wyalong "Argus", dated January 5, 1898 in its editorial was justly proud that "no outside capital had yet come into the Wyalong field....."

In 1900 there was drop in the yield on the Wyalong goldfield because the mines were treating low grade ores which had been accumulating. The number of miners which had been 1600 in 1899 dropped to 1200 in 1900. In 1907 the number of miners fell to 462 and by 1910 only 150 men were employed on the goldfield.

The gold yields for each of the years of production were as follows:

1895	15634 tons of stone yielded	24497 ounces of gold
1896		
1897	30750	33900
1898	30940	34582
1899	15116	44675
1900	22387	32425
1905	10555	24708
1910		9000
1915		3800

1920 - The yield had practically ceased.

In 1920 the Department of Mines Report stated that "Gold mining has almost ceased in this division." Thus a most important period in the history of Wyalong came to an end. Anyone interested in the progress of Wyalong during the first quarter century must have rejoiced that Wyalong had indeed found its staple, not the golden metal, but the golden grain.

Gold had been found in the Wyalong district long before it was found in Wyalong itself, in such places as Temora (or Bakers) 1879, Barmedman 1882, and later Reefton in 1895.

Before finishing the history of the Wyalong Goldfield we pause to remember the tragedy of the Barrier Mine disaster which took place on Saturday, 13 January, 1912, when five

miner lost their lives, through an inrush of carbon dioxide gas. Those who died were Frank McGuire, Jack Mulhall, Bert Navin, Jack Navin, and Rupert Nicholson.

Because of the conditions at the "Main Camp" (White Tank) the establishment of a township was considered to be an urgent necessity. Surveyor J. Richmond was given instructions in February, only two months after the discovery of gold to lay out a township for the new goldfield. He selected a site about one and three quarter miles east of the Main Camp. His reasons for selecting this site so far from the mining field were that: "It was necessary to keep off the area of the gold deposits; its suitability from a sanitary viewpoint; its proximity to the main Barmedman Road and its generally healthy location." Richmond completed the survey of the first four sections by 6 March, but this was considered insufficient it was extended to fourteen sections.

The whole of the township of Wyalong proper is mainly situated on a farm selected by the Neeld family, while the town of West Wyalong is built on farms owned by George Bolte and John Ryan. The whole of the township of West Wyalong is built on the farm of John Ryan, while the northern boundary of George Bolte's property extended from about Paul Meagher's residence to Central Railway Station and south to include Pig Tank. The farms of Neeld, Bolte and Ryan were resumed by the Government for mining purposes.

Joining Bolte's property on the west, south and south-east were the farms of Con Ryan, Philip Bolte, John Bolte and Donald Rankin. On the northern side of the goldfield were Robert Gagie and Sons, William Lange, Jacob Haub, Christopher Haub, Niel Nielsen, Conrad Hildebrand, E.T. Clark, Jacob Rootes and Sons, Wilfred Wells and Donald Fraser.

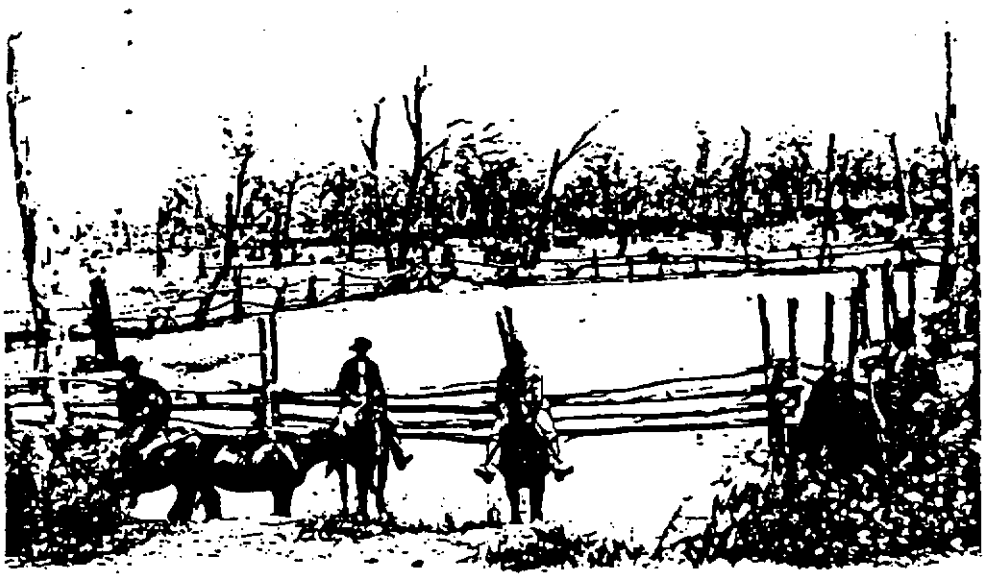
Wyalong, the original name of the old run and Parish, was decided upon as the name of the new township after consultation with the Mining Wardens, who also approved the street names. Most of the streets bear the names of the pioneers of the field or officials connected with its early history.

Early in March, 1894 there were no buildings whatever on the ground, but by 3 May, 120 to the value of £20 each had been erected. By the police returns the total population within 5 miles of Wyalong Courthouse, including both townships was, at the end of 1894, 4215 of which 3825 were males and 930 females, exclusive of children. Dept of MINES RECORD, 1894 p25. Wyalong was proclaimed a Village on 23 June, 1894 having obtained the necessary approval from Governor Duff on 19 June 1894.

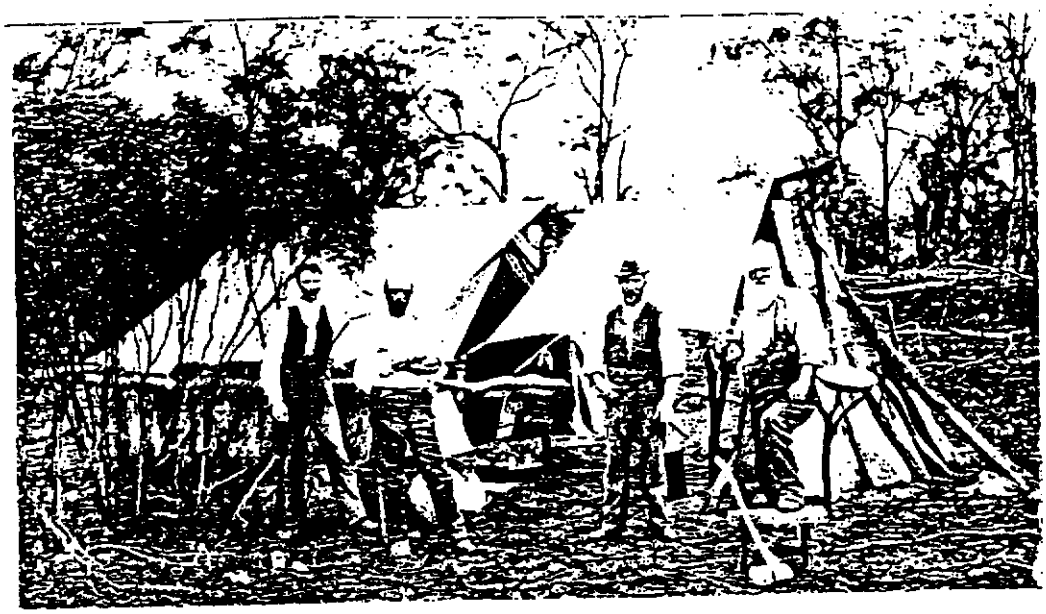
The demand for alotments at West Wyalong continued, and the expected transfer of residential population or business activities from Main Camp to the Government Township did not occur. A huge population soon gathered round the White Tank "and notwithstanding my warning and advice an irregular narrow street was formed on the very quartz claims whereby the Main Camp or Wyalong West became an established fact". DEPT OF MINES REPORTS, 1894. p25. The warden was unable to lay a street 99 feet wide with cross streets of the same width in a position not likely to be auriferous, in accordance with allotments in the already surveyed town 2½ miles distant.

Finally, after much agitation Surveyor Richmond was instructed on 6 April, 1895 to survey the occupied area at West Wyalong (late Main Camp) and to prepare a design plan with the Main Street 66 feet wide.

The final survey of Main Street was carried out by Surveyor V.F. Tozer on 28 December, 1895 and the many irregularities and encroachments were at last straightened out.

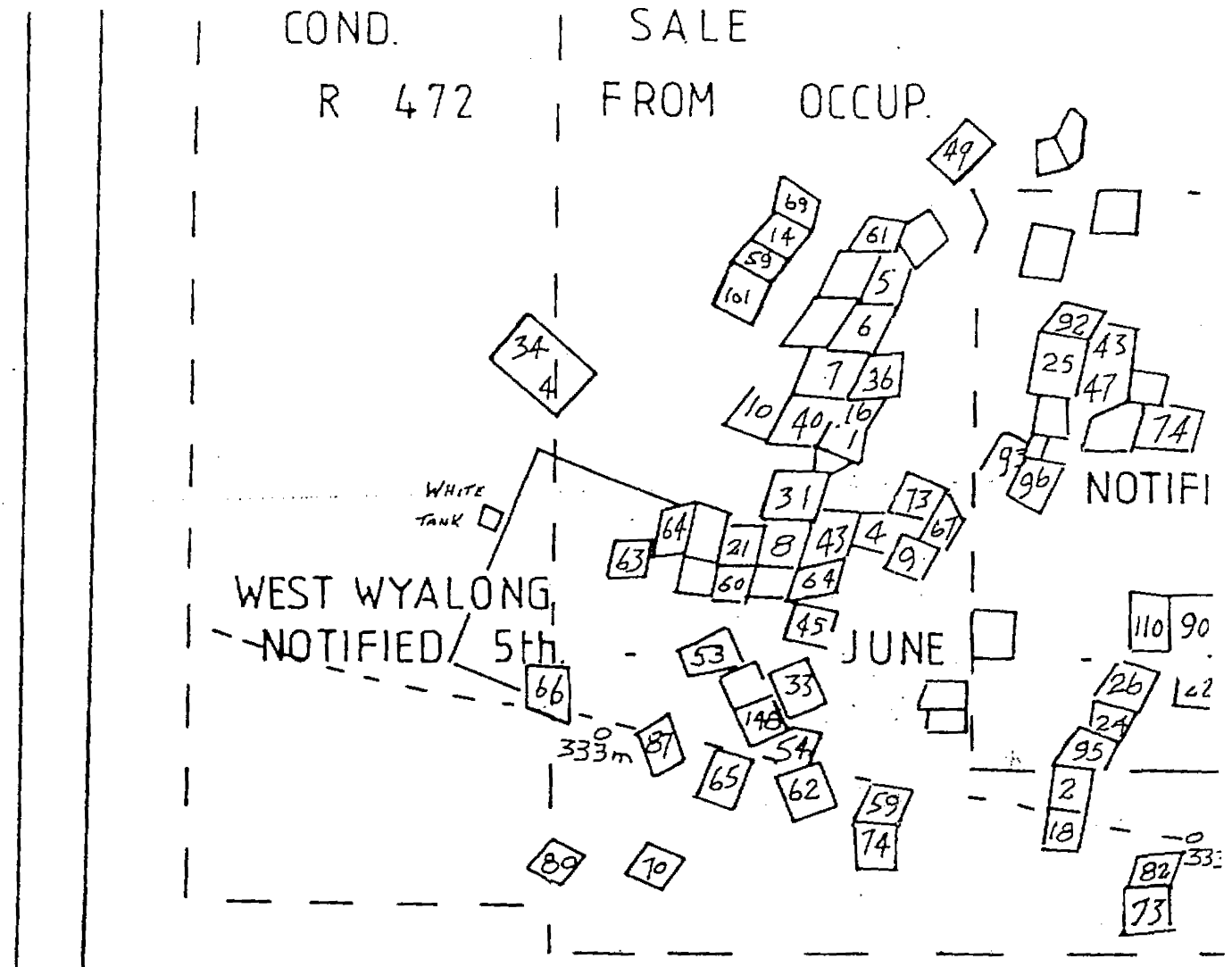


The White Tank, an outpost of Wyalong No I Station and water supply for the goldfields in 1894.



Early Days at Wyalong. "A Prospectors' Camp."

"A Peep into a Gold Mine."—In the 300-ft. Level, Neild's Mine. A reef 15-ft. wide.



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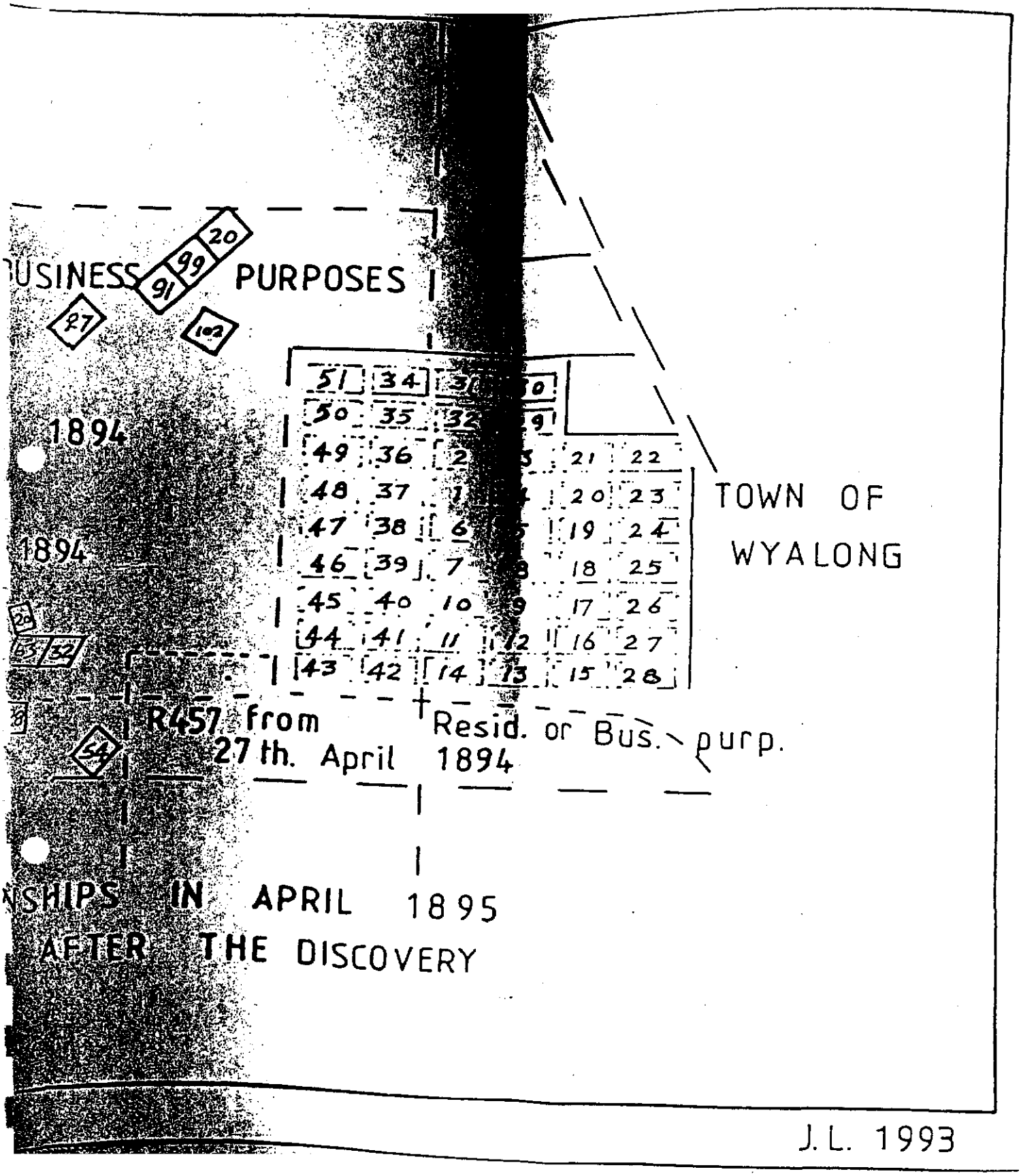
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TOWN OF
WYALONG
R457 from
27th. April 1894
Resid. or Bus. purp.
SHIPS IN APRIL 1895
AFTER THE DISCOVERY
J.L. 1993

MARSDENS.

Following the progress of the squatters and settlers to the inland of the Colony, small villages sprang up.

One of these was Marsdens (later Marsden), the name being derived from James Marsden who "took up" Lake Cowal Station in 1852 and also acquired the Billabong Run. The name Marsdens persisted until it was changed to Marsden in 1912.

The original village, thought to have commenced about 1866 was situated two miles along the eastern side of the Forbes Road from the location known as the crossroads and it was apparently a scattered hamlet.

Robert Butler and Thomas Williams were the first innkeepers with the first hotel being erected possibly before 1866. There were two butchers, a saddlery and a school. The police station - a structure with a shingle roof - was situated adjacent to the police paddock, further upstream on the eastern side of the Bland Creek. A senior officer, a constable and a black tracker were attached to the station. Next was the "Pig and Whistle" conducted by Mr and Mrs Thomas Williams. About four miles along the Forbes Road was a roadside shanty which mainly sold bottled liquor. This shanty was reputed to have been visited several times by members of Ben Hall's bushranging gang. James Marsden established a dairy on the Bland Creek and sent butter to Forbes during the gold rush getting up to three shillings per pound for it.

A Post Office was established in 1866 and Lands Department records show that the township of Marsdens on the Bland Creek was surveyed in November, 1875. The design was approved by the Department on 30 May, 1877 and mention was made that a bridge was required over the creek. The Marsdens Post Office was flooded during the heavy November rains of 1878.

The Post Office was connected by telegraph to Morangorell and Young in 1875, the poles for this line being carted by Mr William Hughes (1830-1916) of Thuddungra.

By this time the Police Station was erected, but it was not until 21 July, 1879 that the first Court of Petty Sessions was established at Marsden, with Stipendiary Magistrate Mr S. Robinson.

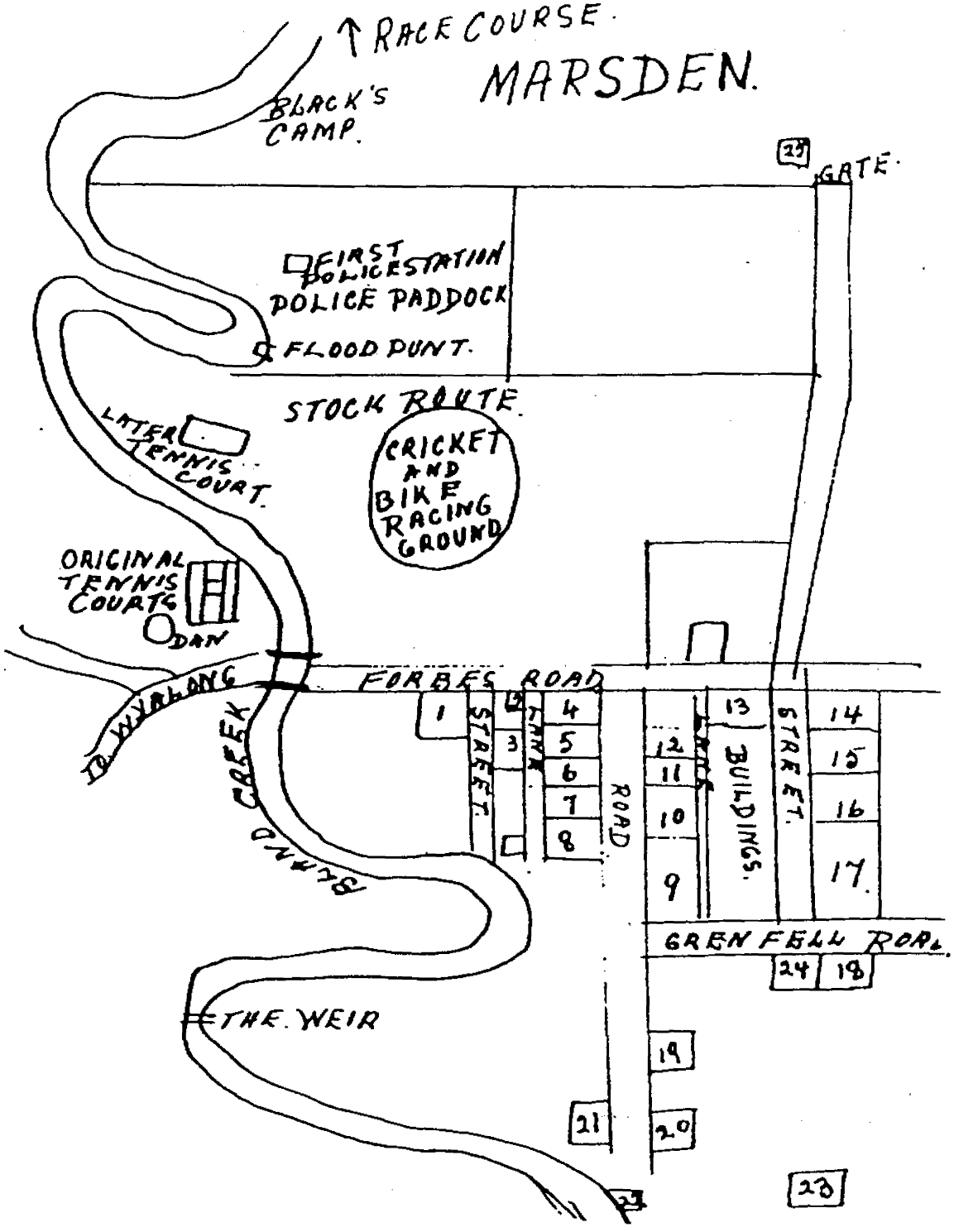
With the evolvement of the cross roads intersection two miles south of the original village and following the outbreak of the Wyalong goldfields in 1894, the road to the goldfields and further afield became a very busy route.

Early in 1886 a reserve adjacent to the cross roads was

surveyed for a Government Township. The site was marked out for the two principal streets - Bimbella Street running north and south and Grenfell Road running east and west. Buildings of a more substantial nature and more modern in appearance were erected at the new site. The Police Station had a court room where Petty Sessions were held and there was a lock-up and stables. The Police Station closed on 20 April, 1931.

Other public buildings and business premises were: Marsden Hotel, Royal Hotel (rebuilt after a fire in 1882 and owned by Michael Curry), Post Office, School of Arts, blacksmith's shop, general stores conducted by Mr Thomas, W.J. Dempsey, and Collins and Hunter. Cobb and Co had a coach house and stables. There was Jenkins the saddler, and Samuel Pawsey's butchery and slaughter yards. Sam Flood had a Chinese garden to which he brought water by means of a water wheel from the creek. The race course and sports grounds and the Marsden Hall were all well patronised until the mid-twenties when the population began to decline.

Names of some of the families living in Marsdens before 1880 were John MacPherson, Charles Smith, William Meldren, Henry Meldren, Mrs E. Moriset, R. Rainey, James Ritchie, and Michael and Minnie Curry. Michael, who died 1899, aged 45 years, is believed to be the brother of Mrs Patrick Walsh Snr and is buried in the Walsh tomb in Grenfell Cemetery. The discovery of gold in 1894 and the beginning of a town at Wyalong made Marsden less important as a centre. With motor cars being introduced into the district about 1909 and with the improvement in roads and people shopping in larger centres helped in the decline of the town. Also the fact that the railway line had been built from Stockinbingal to Caragabel in 1916 rather than through Marsden again took away from the town.


↑ RACE COURSE.
MARSDEN.
BLACK'S CAMP.
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GATE.
FIRST POLICE STATION
POLICE PADDOCK
FLOOD PUNT.
STOCK ROUTE.
LATER TENNIS COURT.
CRICKET AND BIKE RACING GROUND
ORIGINAL TENNIS COURTS
DAN
WYALONG
FORBES ROAD
BANNO CREEK
THE WEIR
1
STREET.
3
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BUILDINGS.
STREET.
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GRENFELL ROAD
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copy (w. slip)

WAMBOYNE.

The first mine put down in the district was in 1902 on the Trig Hill in Quinlan's "Nerang Cowal State Forest". The Mines Department paid £1 per foot to have the shaft sunk by the Ellis Brothers but there was no gold.

Gold was found in 1905 by Harry Kaiser in what is now the Burcher district, formerly Wamboyne (County of Gipps, Parish of Bena, Portion 4, No on Map 136). The workings went to a depth of eight metres long and three metres wide. H.F. Fitzgerald and party worked the mine in 1941. Up to 1967, 270 grams of gold worth $288 was produced.

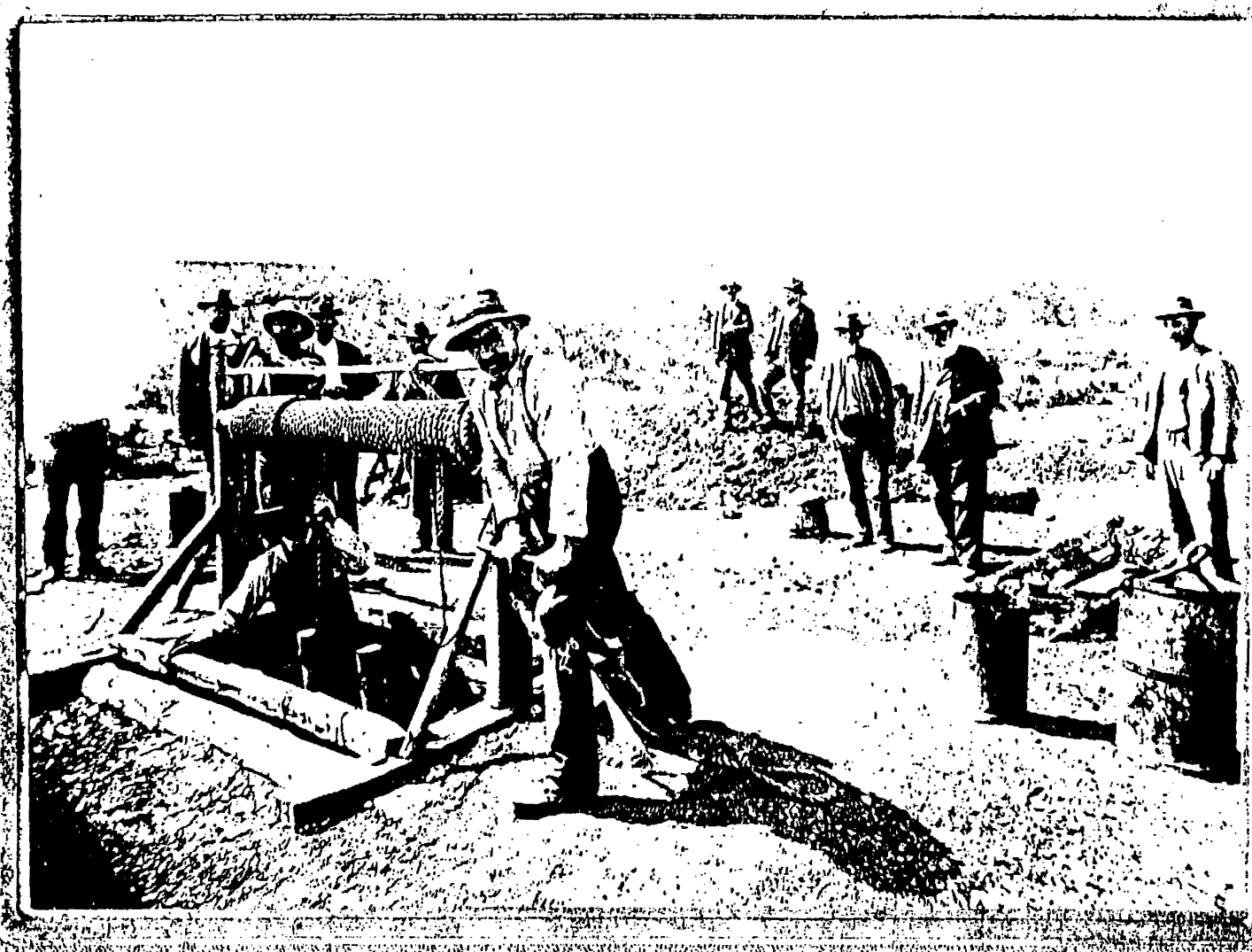
There was quite a rush for a while and Kaiser's Hill was a hive of activity. Harry and Alf Nelson put down a shaft on "Wilga Vale" (No 177 on Map) and Harry Leadbitter Snr sank a shaft on top of the hill, but there was no gold in either. Leadbitter went to a big gully on Mark Fitzgerald's "Uplands". He struck a little gold at fifty feet, but went down to ninety feet and all he found was pipe clay. This came in handy for people for the whitening of their fireplaces - they came for miles around in order to obtain some.

Kaiser was on a good reef, but it was never a bonanza. The ore was carted to West Wyalong by Bullock teams to be crushed. The carriers were Jim Hughes and Herb Beazley. This mine petered out about 1909. The Wyalong Advocate, 18 May 1906 reported that Keyser (sic) was down 30 feet on a new reef with 10 tons at grass which was to be treated at the Billys Lookout Battery. It was also reported that Nelson, Leonard, Easdale and a couple of others had not discovered anything.

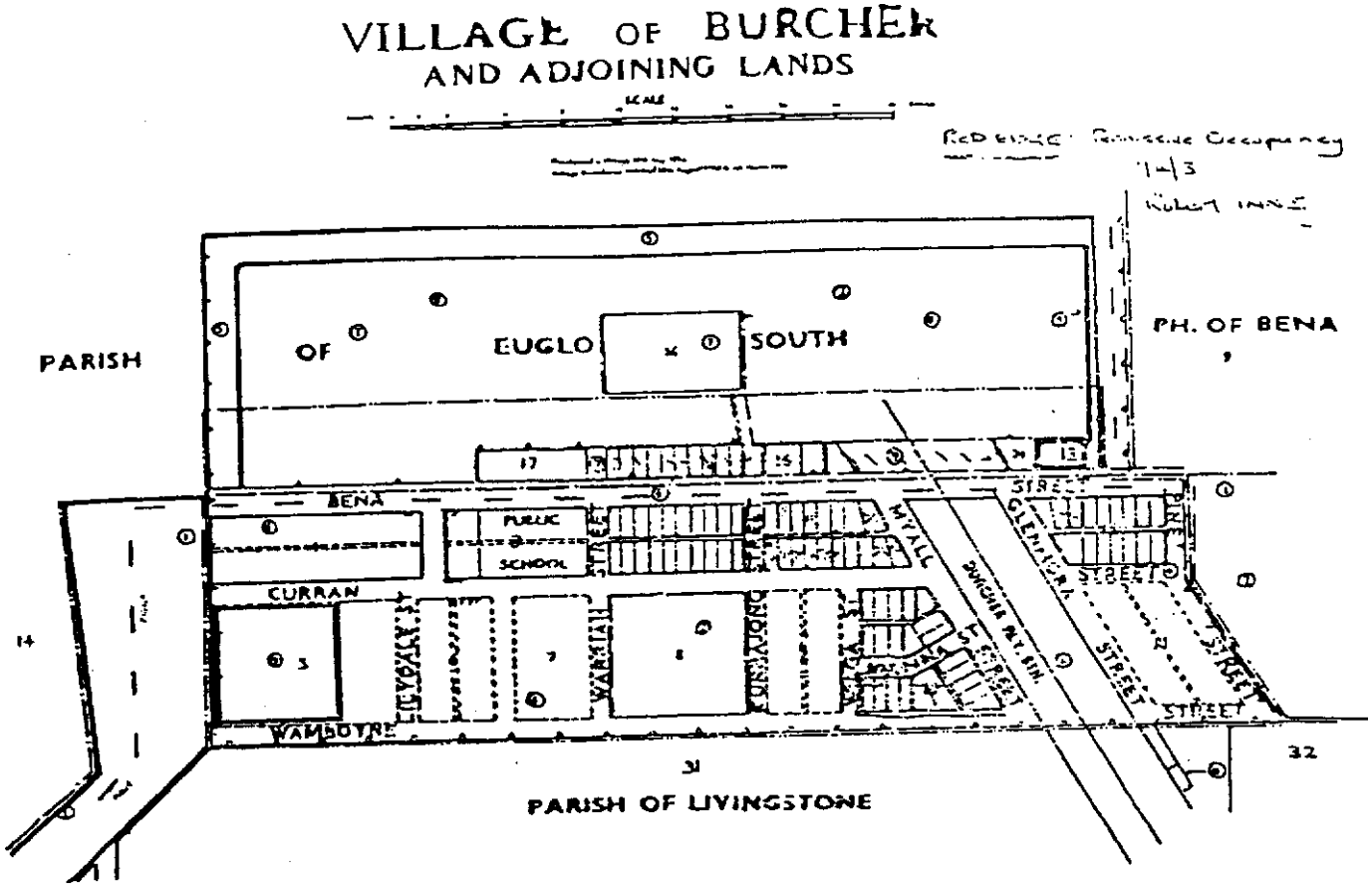
The Wamboyne Gold Mine (County of Gipps, Parish of Coringle, Portion 12, No 133 on the Map) was first worked in 1907. Later in 1935 G.W.J. Murray and party and in 1939 this was worked by H. Whiley. The average grades of 3 grams/ton of gold were found but the total production is unknown.

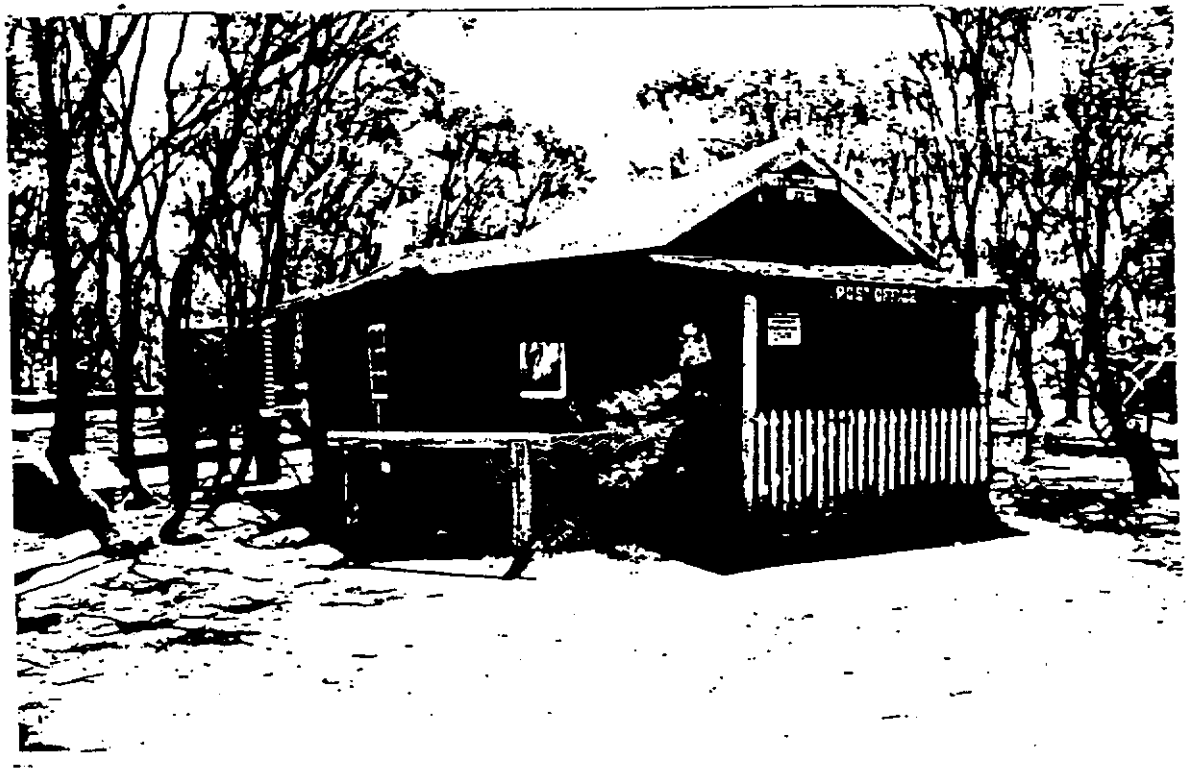
Another mine at County of Gipps, Parish of Bena, Portion 6, No 134 on map) was worked in about 1907 and again about 1970 but the amount produced is not recorded.

In 1927 a decision was made to build a railway line from Wyalong to Wamboyne. Rather than end the line at Wamboyne which was landlocked the Government pushed it on for a further four miles and named the terminus Euglo. Seven years later the name was changed to Burcher, possibly called after Charles Burcher one time owner of Euglo Station.



Mine shaft and windlass at Deadbitter's mine





Billy's Lookout Post Office - reconstructed at Wyalong by Mr and Mrs Beckett.

BILLYS LOOKOUT.

Billys Lookout was between Wamboyne and Lake Cowal, and it experienced a gold rush just after Wyalong goldfields were discovered, although gold had been mined there intermittently between 1873 and 1894.

The name Billys (Billies) Lookout is said to have originated from a tragedy that occurred in the area. A young man named Billie and an older man were droving cattle in the area for Samuel Wilson, when Billie's horse bolted, and he was struck by an overhanging limb of a tree. When they returned to the station to report the accident he was in a state of shock, and kept repeating, "I said 'Billie, lookout.' "

The Town and Country Journal, dated 2 June, 1894 states that: "The old mining camp at Billie's Lookout had lately quite a new lease of life and seems likely to become a permanent township. Two stores have been built and are in full swing and other business places are being erected.

There are about 300 men here and prospecting is being carried out very energetically. There are a few parties on gold but not to any great extent - simply tucker and a few shillings."

Neil White Snr and Ned Harris played a prominent part in the discovery of gold at Billys Lookout. At the beginning of April, 1895 a report stated that in addition to the initial claims, three more claims had bottomed on the run of gold. The whole valley was pegged out and other gullies were vigorously prospected and there were four or five reefs with fair gold. Neil White and party were working a promising reef 18 inches to 2 feet wide. One shaft was down 90 feet to water level and others were down 70 feet and 30 feet. The three shafts were being sunk to the same level when connecting drives were put in and the stopping of water commenced. About 50 tons of fair stone had been brought to the surface.

From the workings at County of Gipps, Parish of Coringle, No 132 on Map, $2240 worth of gold was found (value in 1967). At least 2.17 kg of gold was found at an average of 9 grams/ton. There were shafts drives and shallow pits for a length of 400 metres by 100 metres wide. The sedimentary soils were silt, clay, sand, granite sediment, quartz pebbles and boulders. The alluvial gold was derived from unworked veins in the surrounding hills.

In the mine known as the Billys Lookout Reef (County of Gipps, Parish of Corringle, Portion 53, No 130 on the Map), shafts and drives were driven for a length of 200 metres and width of 30 metres. In 1894 the major primary materials were reported to be gold and pyrite, and the minor primary

material was galena. Cowthorns and party were working this reef.

Other mines in the Parish of Coringle (Nos 127 and 128 on the Map) also produced some gold but the amounts are unknown.

Billys Lookout had a hall and business houses, and social life included concerts, dances and cricket matches with the neighbouring teams at Marsdens and Wamboyne. Messrs Wilson and Stewart of Lake Cowal Station were President and Vice-President of the Billys Lookout Cricket Club.

On 16 August, 1895, there was a concert at Billys Lookout to celebrate the erection of a hall for the Miners' Club. This was followed by a dance "with an excellent supper". Dancing continued until 8 a.m. Following the concert Mr Morris, President and an old identity, and Mr Neil White addressed a large crowd of members and residents in the hall, which had been decorated by "ladies and gentlemen of the township".

In November, 1895 the Department of Education made a grant of £5 to the Billys Lookout Progress Association for the erection of a bark school house and furniture. Edward Morrison was the first teacher to be appointed on 13 April, 1896.

Although approximately 1000 miners and gold seekers congregated at the Billys Lookout goldfields, the period of winning gold was shortlived. Numerous shallow shafts - or diggers holes - were sunk at various other sites within the locality. However no further signs of gold bearing stone were discovered.

Robert Brenner operated a battery on the field and also conducted the only licensed hotel - which was closed in 1903. There were possibly a number of shanties on the goldfield because it is recorded that on a Saturday night in September 1895 there was a raid by the Marsdens police. Some liquor was seized and one person was arrested. He appeared at the Marsdens Police Court and was fined £30 or six months in Forbes gaol.

Some of the timber from Robert Brenner's Hotel was later used to build a shed on Mr Harry Bodel's farm at nearby Clear Ridge. Mr Clarke, who was Mrs Neil White's father, moved his hotel from Marsden to Billys Lookout.

UNGARIE.

The township of Ungarie derives its name from the pastoral holding held in 1866 by one Roger Frehilly. Its native meaning means "thigh". The area of the pastoral station was 29440 acres with a grazing capability of 1000 head of cattle. A small settlement began to rise to the east of the present township and in 1892 it consisted of two general stores, a Post Office, a hotel, a blacksmith's shop, a shop and a boarding house. R.M. Mackrell ran the Post Office and one store. The other store was run by D.A. Colbert.

An application was made on 30 November, 1891 for the establishment of a village. Surveyor Maitland reported that a village should be surveyed on the south bank of the Humbug Creek. Nothing was done about it until Surveyor Roberts reported in December, 1892 that a suitable site could be found on the northern side of the Humbug Creek opposite the present town. Surveyor Maitland surveyed the village on this site in September, 1893 and this was gazetted as the village of Ungarie on 31 March, 1894.

When the Wyalong-Lake Cargellico Railway line was constructed the surveyors placed the railway station on the side of the creek opposite the village. A suggestion to extend the boundaries of the gazetted township were approved and duly gazetted on 27 July, 1917.

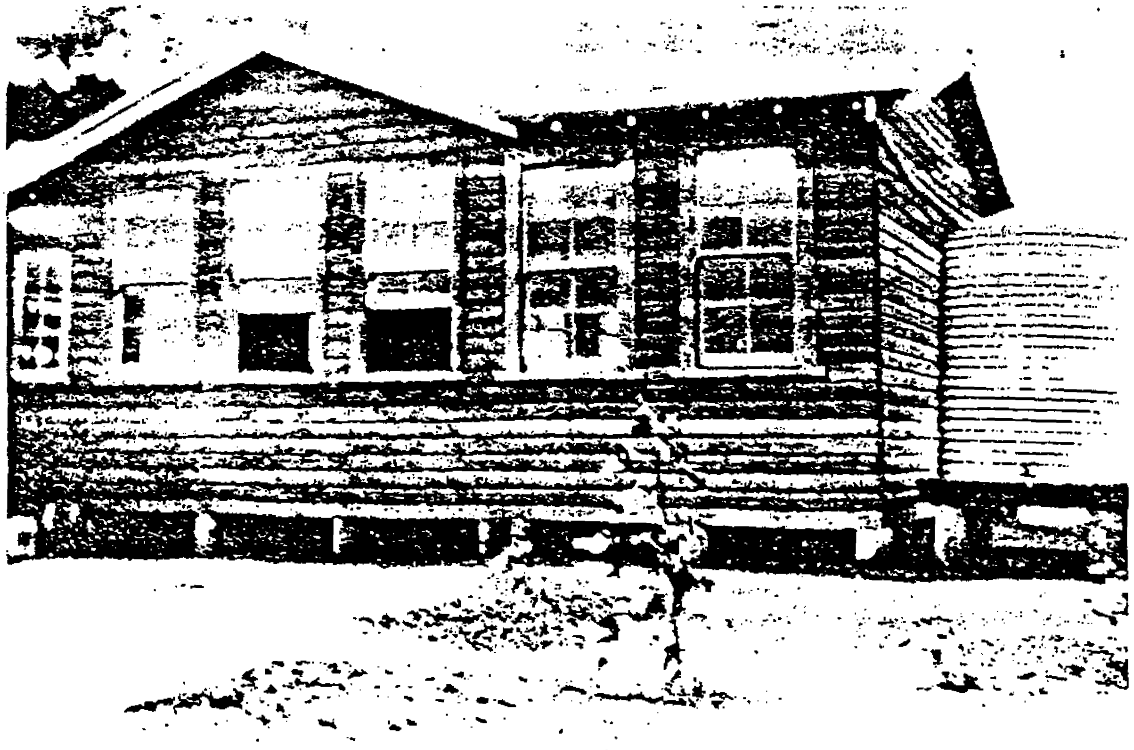
BLOW CLEAR.

The Wyalong Advocate dated 8 August 1903 stated that a discovery of gold bearing stone had taken place at Blow Clear some 20 miles north of Wyalong by scrub cutters. The stone was found on the surface and further investigations went to show that a quartz reef is running north and south about twelve inches wide. Samples have prospected so satisfactorily that Brian McNamara and others have bought two shares in the prospective Eldorado for the sum of £20. The stone is of sugary, white quartz quality and said to contain gold freely.

Further Mining Intelligence in the Wyalong Advocate dated 19 August, 1903 stated: The prospectors, Clarke and party are down 20 feet on a 12 inch reef of white sugary quartz, and have commenced to put a crushing together. Stewart and party, No 1 North, are on a reef about the same width, but distinct from the prospectors reef. It is composed of flesh coloured quartz, opalised, and containing ironstone, and is assayed at the rate of 1 oz 14 dwts gold to the ton. A good deal of prospecting is going on in the surrounding country, which is also Crown Land. There is no outcrop to guide the prospector and most of the work consists of trenching or costeening. Altogether there are about 40 men working at the new find and the adjacent country and there is plenty of water.

On 19 September we read that Clarke and party, Stewart and party, Leadbitter and party all have a tidy parcel of stone paddocked.

On 7 October it was reported that John Thompson had struck a reef at the depth of three feet about a mile south of the prospector's claim and gold was said to be showing freely in the reef.



LAKE COWAL.

The Geological Survey of New South Wales has very little data available relating to the geological history of Lake Cowal. Many speculative theories have been suggested as to what might have occurred during the centuries gone by. There has been no official theory as to how the large number of trees had grown to such proportions on the bed of the lake during some period of the past. The trees - mainly red gum - with well developed trunks and limbs, had been dead for a long period of time before white men first set foot in the area. The only logical conclusion that the Geological Survey can assume is that for a long time the waters held in the lake maintained a degree of purity, and later the water could have reached a level of salinity that the trees could not tolerate. This theory is only speculative, but most of the underground water in the catchment areas of the lake at a shallow level contains a high degree of salinity. The wet seasonal period of 1916-1917, when large volumes of water overflowed from the Lachlan River to Lake Cowal, provoked graziers concerned to bank off the low lying areas along the river to prevent flooding of their properties. Very little water has flowed to the lake from the river since that period. Major volumes of flood waters flow to the southern end of Lake Cowal from extensive catchment areas from which the principal flow is carried by Bland Creek. The upper reaches of the Bland Creek extend to the foothills of the Nimdooran Range, which is situated southwest of the town of Cootamundra.

Other creeks that empty into Lake Cowal are the Barmedman, Back and Duck Creeks. The upper reaches of the Barmedman Creek extend to southwest of the Barmedman township. The Duck Creek rises west of the town of Temora and continues along the eastern foothills of the Tungley ranges, joining the Barmedman and Back Creeks at a point four miles upstream from the Wyalong-Quandialla Road. From ther the creek becomes Back Creek which empties into the Bland Creek in the vicinity of the former village of Marsden.

The flood waters that flow from the localities on the southern and south western side of Wyalong-Barmedman Road all converge into Back Creek in the vicinity of the Wyalong-Quandialla Road. From the areas north of Wyalong and Mallee Plains the waters meet Back Creek near the crossing on the Back Creek Road. The waters from Clear Ridge, mainly by way of Clear Ridge (or Sandy) Creek, run directly to the southern end of Lake Cowal near the station homestead.

From the eastern areas, mainly from Piney Range near the west side of Weddin Mountain and the Caragabal district, flood waters run directly to the lake, principally through the Marsden area.. The run-off from theses extensive areas

Lake Cowal abounds in wildlife.

all move northwards towards their natural basin - which is Lake Cowal. The natural fall of the terrain still continues on down the Lachlan to the Murrumbidgee River. From there it continues to the Murray River and thences to the South Australian coast near Murray Bridge. The waters from the Bland can really flow a long, long way.

The main bed of Lake Cowal comprises an area of approximately 90 square miles. Lying north to south, the length of the bed is about 16 miles, with an average width from five to six miles.

During the period 1916-1917, large numbers of water birds and fowl flocked to the lake. Thousands of the various species of wild ducks and large numbers of black swans, pelicans, gulls - including sea gulls, cranes and numerous varieties of smaller birds. The dry trees in the waters of the lake provided excellent perches for the birds. It was during this period that Lake Cowal was declared a bird sanctuary. No open season for the shooting of birds was allowed. The declaration of the sanctuary became a controversial subject, especially when two years later, the waters of the lake were rapidly drying up again.

REPORT OF BRAMHOPE LAKE BLOCK - 3237 ACRES. 1946-1991.

1946 Dry. Useful grazing in summer and early autumn, but cut out badly in winter.

1947 Useful grazing, with small floods, about ⅓ country covered in December.

1948 Good grazing, summer and autumn, about 2/3 covered in June - receding at end of year with excellent grazing. Some fence repairs.

1949 Good grazing, about ½ full of water in spring.

1950 Country inundated to highest flood level in March.

1951 Only a little grazing along fringe of water.

1952 Flood level again in April.

1953 Still 2/3 covered at end of year.

1954 Small flood early in year, but only about ½ covered at end of year.

1955 Quite a few miles of fence renewed. Flood rains again in March, covering most of the country.

1956 Filled to record level again in April.

1957 Only fringe benefits, ¾ full at end of year.

1958 Useful grazing, water receding fast in summer, and country inclined to scald.

1959 About ¾ covered in March, water getting away quickly by end of the year.

1960 Completely dry and refenced by end of autumn. completely covered by water again in August.

1961 Not much use. Some grazing in summer.

1962 Filled again in January. No use through winter.

1963 Filled again in winter.

1964 Some flooding in spring, practically covering all the country.

1965 Useful grazing in spring with water getting away.

1966 All dry and fenced by end of autumn. Complete renewal of fencing. Splendid grazing.

1967 Good all year.

1968 About 500 to 600 acres flooded in June with further flooding in August - covering about ½ the country. Good grazing on flooded country in summer.

1969 Started to flood in March and continued till it filled completely in June.

1970 Had not receded much and filled again in June from Bland Creek.

1971 Not much use throughout the year.

1972 Water started to move back in dry spring, with cross fence dry and back to Channel near lignum by end of year.

1973 Lake useful in autumn and winter and a bit too good in spring with terrific growth of trefoil. Country about ⅓ covered but wet conditions in November covered most of it and forced us to shift sheep.

1974 Gradually filled right up and running out Manna Creek 2/8/74.

1975 Still flooded and more flood rains in October caused river water to overflow Lake and run Manna Creek early November.

1976 Manna Creek again a banker after flood rains in January. River water again reached lake in spring running Manna Creek with small flow - dry at end of year, but lake virtually full.

1977 Not much use, but back to cross fence in lignum by end of year with some restricted grazing.

1978 Lake promising but big winter rains again flooded big Lake with small overflow to little lake early October.

1979 Not much except fringe benefits, but back to cross fence at end of year and receding fast in dry conditions.

1980 Water getting away fast with disappointing results. European Carp? salting? or just dry weather and the result of continued flooding. Good results from Wimmera Rye sown by air and Bolte grew a splendid crop of wheat. Big stocking in lignum. Lake dry and fenced early December. Silting tanks.

1981 High stocking rates and dry conditions took toll and lake not carrying many stock through autumn. Approx. 600 acres grain sown Deepwater sump and nicely away when minor flood in July took water to Bolte's fence and ruined the crop. Wimmera Rye responded well, also barley grass, but large numbers again carried till end of year. Lignum paddock dry and Deepwater almost dry by end of year. Most of the country scalded except where cane grass growing thicker than ever.

1982 Lake running fair number of sheep early in year - mainly on dry Wimmera Rye grass. Flash local flooding after big rains in March caused water to reach Bolte's and presented problems and arduous work in getting out with minimal losses. Big numbers in Spring and lake completely dry by end of November.

1983 Local storm early January flooded approx. 800 acres Deepwater and Plain, with minor flooding in Lignum. Splendid response from couch grass, a great relief under extreme drought conditions with about 4000 sheep on Bramhope. With winter rains water into Bolte's by August and almost to Roy Woods' end October.

1984 Big summer rains early in year with local and Bland flooding caused the big lake to overflow about 1st February and running out Manna Creek by 11th February. Of no use for most of year. Little lake also full.

1985 Big Lake of very little use for year with a fresh towards end of year, virtually filling big Lake again. Little Lake quite useful, especially W.J.'s and drying fast.

1986 Water receded quickly in Little Lake, with good stocking rates. Also allowed opportunity crop to be sown with tremendous results. A fresh in Big Lake during the winter spoilt hopes of useful spring, but water getting away fast at end of year and becoming useful. For the record we lost about 70 of Mrs E.'s wethers in long paddock (Narara) due to poison attributed to algae in water.

1987 Bland Creek had run during year but minimal effect on Lake. Some light fringe grazing in late spring and water well back by end of the year.

1888 Lake dry by end of March but with lack of any showers no response of feed on deeper country. Fair amount of crop sown, but it did not survive a fresh in Lake which put the water into Bolte's. Good grazing.

1989 Lake dried out early in year and preparations made for sowing but water won the race. Turned very wet, with some flooding from River in early winter, with Lake about half full.

1990 Flood rains in autumn with the Lake overflowing from Bland and River waters and running out Manna Creek by about 1st May. Ceased running about end of the year.

1991 Little Lake almost dry by end of year, but big Lake had not receded much, except fringe benefits late spring and early summer.

ABORIGINAL DATA.

When the first settlers arrived at Lake Cowal there appeared to be ample evidence that the area had been inhabited by numbers of Aborigines of tribal proportions. The Bland had been referred to as a meeting place of the tribes of the Lachlan an Murrumbidgee Rivers.

Many of the old gum trees on the western banks of the lake showed extensive carvings on their trunks. The custom of carving a trunk of a tree near a burial plot could be proof that numbers of aborigines had been buried in the sandbanks surrounding the shores of the Lake.

In parts of the dense mallee areas of the district it was apparent that gunyahs had been erected. Practically all the hill areas bore signs of habitation by our first inhabitants. During the early days of Marsdens an aboriginal camp was situated along the eastern banks of Lake Cowal between the village and the Lake.

Samuel Wilson wrote in the RAHS Journal and Proceedings Volume III- 1923 p. 374 that aborigines had large camps on the site of the present Lake Cowal station homestead, and numerous middens were found there.

Mrs Sarah Musgrave, a pioneer of this district, wrote that the Bland was a famous battleground of the Lachlan and Murrumbidgee aborigines. She had remembered an occasion when two aborigines were killed by the same spear and another had his head knocked off by a boomerang. They had their sex initiation ground somewhere in the neighbourhood where they initiated their young men. John Regan discovered the area one day. This was on the site of the future Wyalong. The area was not used again because the aborigines said it was desecrated.

TOPOGRAPHY, GEOLOGY AND CLIMATE.

The eastern area of the Bland Shire, is included in the south-western slopes for rainfall reports and it is mostly flat, whilst the western part included in the Central western plains has many hills. The dividing line runs between the towns of Wyalong and West Wyalong.

East and north of West Wyalong the region is generally flat whilst the south and west are more undulating and have some sizable hills with high peaks.

An interesting physical feature is the line of hills which runs from North Yalgogrin across to Barmedman and these hills form a watershed. The streams rising on the northern side eventually flow into the Lachlan River and the various creeks have been listed elsewhere.

The topography of an area influences plant life in various ways. The types that grow on the hills are often quite different from those of the lower country. Foe example, Hill Red Gum (Eucalyptus dealbata) prefers hilly areas. Waterways, especially those subject to flooding and causing wet or damp conditions for considerable periods, are bordered by plants which can stand these conditions where others such as the River Red Gum (Eucalyptus camaldulensis) would perish.

Plants depend largely on the soil for their food. Soil is derived from broken down rocks. Rocks differ considerably in the amount of plant food which they contain. Thus a brief geological survey has some importance when studying the native flora of any given area.

In the Bland Shire there is a noticeable variation in the geology. It varies in age from the Upper Ordovician (the rocks of that period would have been formed hundreds of millions of years ago) to what is geologically known as Recent. Some of the rocks are Sedimentary and were made from the sediments of older rocks and laid down under water, mainly sandstone and shale. Then there are Igneous rocks. These have been formed from molten magna intruding into other rocks and cooling down, such as granite and dolerite. We also have Metamorphic rocks in the Bland Shire - the name means changed form. These rocks were either sedimentary or igneous to begin with and then, because of the great stresses and strains, accompanied by heat and chemical change, they become something different, as in slate and quartzite. Slate was originally shale and quartzite was sandstone.

The following igneous rocks occur in this shire: granite, granophyre, grano-diorite, rhyolite, porphyry, norite, and dolerite. Among the local sedimentary rocks are sandstone,

shale, conglomerate (pudding stone), and travertine (a limestone). The metamorphic group is represented by such rocks as slate, quartzite, schist and phyllite.

Very ancient rocks, probably belonging to the Silurian period, occur towards the eastern end of the shire. They are sheared conglomerates, sandstone, shale, schist and phyllite. The largest area includes Wambyne and the railway sidings of Corringle, Lake Cowal and Clear Ridge. The Bocberoi Hills which cross the Marsden Road about eight miles from Wyalong belong to this period. Evidence of tremendous pressure is seen here as the rock strata instead of being flat are just about vertical. Much of this rock is talc schist, a lightish grey colour.

Large areas of granite type rocks occur in the Bland Shire. It was from the quartz veins of these rocks that gold was obtained in the local mines. The rock from the mines is granodiorite, a black and white rock.

The granite belt stretches northward from West Wyalong and includes Wyrra, Calleen, Girral and areas north and south of Ungarie. There is a long strip going south east from Yalgogrin through Buddigower; another area includes Wargin, and another area lies between Thulloo and Kikoira, but does not include those places.

The only other area is very small, but very interesting. It is at Wyalong and about two miles north and south of it. Chinese market gardeners are excellent judges of soil and so for many years they produced excellent vegetables from the rich soil of Wyalong. The soil of Wyalong is more fertile than that of West Wyalong, much of which is covered by ironstone gravel over clay. There is an outcrop of conglomerate, sandstone, quartzite, siltstone and shale probably of Upper Devonian age on the north west edge of Lake Cowal.

Practically the whole of the Shire east of Wyalong is covered by Tertiary to Recent deposits. They include alluvial clay, silt, sand and sandstone. On the whole the resulting soil is fertile and provides good plant food.

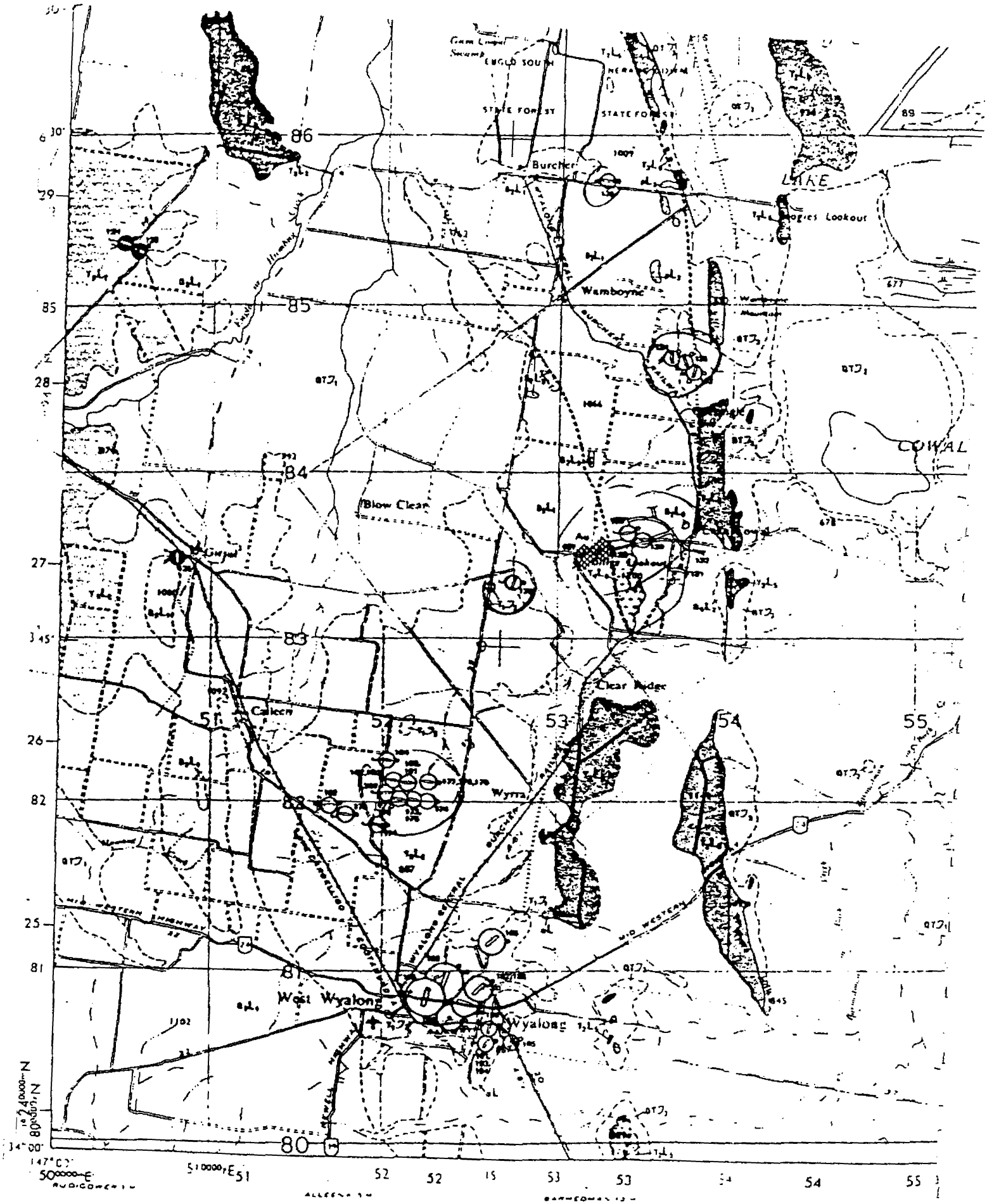
Bland Shire lies within a region of uncertain rainfall and its variability has a big influence on the vegetation. Plants have to adapt themselves to long dry periods and then cope with wet seasons as well. Taking the Shire as a whole, there is not much difference in the average annual rainfalls. It is the variability of the temperatures which influence plant life rather than the average. For example, between 1951 and 1956 Wyalong had an average maximum temperature of 18.18 degrees Celsius and a minimum average of 9.4 degrees Celsius, but this information does not reveal the heatwaves when the temperature reached over 43 degrees

Celsius in the shade and the cold frosty nights when the thermometer fell to zero or less.

Another important factor with regard to plant life is the absence of clouds on so many days of the year and the high rate of evaporation. The average annual evaporation for West Wyalong is about 57 inches compared with the average annual rainfall of about 19 inches.

The relative humidity for the area is low. There is a good deal of calm weather, particularly in the autumn and winter. Probably the most prevalent wind is that from the south west and when it is not moisture laden it is a particularly drying wind. The softer easterlies are not common. Those from other quarters make the temperatures soar in the summertime.

Pelicans and their young on a small island in the lake.



COMMODITY

COLOUR SYMBOL COMMODITY

Au Gold

FORM OF DEPOSIT

Vein

RELATIVE IMPORTANC

Minor commodities (if any) are shown in b

Where there is more than one major or min
sections are subdivided, e g 3 major, 2 mir

KEY TO MINES AS SHOWN ON EXTRACT OF THE FORBES METALLOGENIC MAP included in these notes.

MINE	NAME	COMMODITY	VALUE IN 1976 $'s
91	Weelah Manganese Prospect NW,SE	Man, Au	10 000
92		Man, Au	1 000 000-10 000
123	Ungarie Tin Prospect E, W	Sn	10 000
124	Carnells " " E, W	Sn	10 000
125	Girral " " N, S	Sn	10 000
126	Blow Clear Ridge Mine	Au	10 000
127	Billys Lookout (Placer)	Au	10 000
128	" " "	Au	10 000
129	Smiths Prospect	Au	10 000
130	Billys Lookout Reef	Au	10 000
131	" " " Deep leads	Au	
132	" " Alluvial Workings (Deep Leads)	Au	
133	Wambcyne Goldmine (Deep leads)N,S	Au	10 000
134	" "	Au	10 000
135	" "	Au	10 000
136	Kayser (Manna Mtn Prospect) E.W	Au	10 000
169	Rothacker's Prospect	Au	10 000
170	Keen's Prospect	Au	10 000
171		Au	10 000
172	Molloy's Mine	Au	10 000
173	Fletcher's Mine	Au	10 000
174	Dawson's Mine	Au	10 000
175	Crawley's Mine	Au	10 000
176		Au	10 000
177	Nelson's Mine	Au	10 000
178	Early Morn Mine	Au	10 000
179	Crampton's Mine	Au	10 000
180	Prospector's Mine	Au	10 000
181	Coronation Mine (The Blow Mine)	Au	10 000
182		Au	10 000
183		Au	10 000
184		Au	10 000
185	Western West Wyalong Grp of Lodes	Au	10 000 000-1 000 000
186	Mallee Bull Line of Lode	Au	10 000 000-1 000 000
187	Summergill's Line of Lode	Au	1 000 000-10 000
188	Klondyke Line of Lode	Au	as above
189	Pioneer Line of Lode	Au	as above
190	Santa Claus and Kinks Line of Lode	Au	as above
191		Au	10 000
192	Pine Ridge Line of Lode	Au	1 000 000-10 000
193		Au	10 000

194		Au	10 000
195	Pine Hill Lode	Au	10 000
196	Call Back Line of Reef	Au	1 000 000- 10 000
267		Au	10 000

Geological Reference:

Fault

Anticline

Syncline

Approximate

Concealed

General Reference:

Major Roads

Railways

THE FLORA

by Late Mrs Anne Mitchell B.Sc.
(as printed in "West of the Bland" - a History of the Wyalong District.

It is fortunate that our early explorers were also botanists or took botanists with them on their expeditions. After Blaxland, Lawson and Wentworth crossed the Blue Mountains in 1813 Governor Lachlan Macquarie sent various expeditions into the interior of New South Wales. The headwaters of the Macquarie and the Lachlan Rivers were discovered but no one knew where the streams went. It was thought that they might flow into a large inland sea, so, on 6th April, 1817, Surveyor John Oxley's exploration party, which included the botanist, Allan Cunningham, left Bathurst to trace the course of the Lachlan River.

About three weeks later they reached the Lachlan and followed it for some weeks. Then, to their surprise, although no rain had fallen in that area, the river began to rise and the water spread in all directions. Fearing they should be caught and drowned by the rising waters Oxley decided to leave the river at a point not far south of where Yarrabandai is to-day. Before doing so they planed a flat surface on the large stem of a Eucalypt and left the following marks:- J. Oxley, C. W. Evans, A.C. May 17th 1817. After leaving the river the explorers tourned south-west, hoping to reach the neighbourhood of Cape Northumberland. (This cape is situated in the extreme south-east corner of South Australia).

It was during this stage of the journey that the party traversed portion of what is now known as the Bland Shire. They probably passed east of the present Ungarie about 21st May and were also close to the sites of Yalgogrin and Weethalle before reaching Mt. Aiton (now known as The Peak) on 26th May—a distance of about 100 miles from the Lachlan. They continued south-west until they reached Mt. Brogden, (now called Mt. Binya). An inscribed monument at this point bears extracts from Oxley's journal. From there they travelled in a northerly direction on the western side of Cocoparra Range which they named Peel Range. No doubt in this part of their journey they went close to where Rankins Springs now stands.

The explorers reached the Lachlan River again on the 23rd June and followed it until not far from its junction with the Murrumbidgee (although they did not know this). They turned back and in early August crossed the river near the northern end of the Goobothery or Boloon Range. A monument marking the spot can be seen on the Lake Cargelligo-Condobolin Road.

From there they travelled overland to the Macquarie River and thence to Bathurst after an absence of four months.

Oxleys report of New South Wales stated that they went over country "of the most miserable description." He doubted that "these desolate plains would ever again be visited by civilized man." On 20th May Allan Cunningham noted in his journal: "Continued our course due S.W. over a most sterile, dry, scrubby flat country, notorious for the uniformity of its production being the same as passed yesterday" (Cypress Pine, Boree, Bulloak or Belah) "and penetrating three miles further we traced the same miserable arid country that we have had all day."

Oxley also gave an unfavourable report of the Lachlan River, saying that it was probably a flooded marsh in winter and a chain of ponds in summer. Cunningham's journal indicates that 1817 was a very dry year and this area was in the grip of a drought. The weather observation were very similar to those of the year 1967, exactly 150 years later (i.e. for May and early June). Oxley's party left the dangerous waters of the Lachlan only to endure the ravages of drought. No rain fell and much time was spent looking for water which was often stagnant and foul. Their horses suffered from the lack of feed and water and some of them died. The men's provisions were so low that they had to be rationed. If rain had fallen while they were near Binya they would have pushed on and found the Murrumbidgee about 30 miles farther south and thence to the Murray. However, that was not to be and to save his men Oxley turned towards the north again to get back to the Lachlan.

Neither Oxley nor Cunningham were impressed with what are now prized river flats in the vicinity of the Lachlan. Cunningham wrote on the 15th May: "The soil of these flats is of a tenacious cold stiff clay quality. The Cypressus glauca (White Cypress Pine) is frequent, forming small timber trees scarcely exceeding 25 feet, and the many dead stems scattered among the common Eucalypt are sufficient demonstration of the coldness and sterility of the soil." On 18th May when they left the River and turned south-west "the country became exceedingly brushy and assumed a greyish gloominess in consequence of the great numbers of Acacia pendula (Boree) and Rhagodia dilatata (a Salt bush) which were the two predominant shrubs. The soil is a loose red earth with a large proportion of sand." As they continued south-west, trees such as Eucalyptus micrantha (Snappy Gum) and Cypress pine were passed—also Kurrajongs and Yarran interspersed with Boree.

As they drew nearer to where Ungarie is now, Cunningham wrote "Continued on our course due S.W. over a most sterile, dry, scrubby flat country notorious for the uniformity of its productions, being of the same as passed yesterday." The taller timber was white Cypress pine and the smaller Bulloak or Belah and Boree. Farther on they saw Native Cherries and a "beautiful tree about 30 feet of very spreading habit, with branches very slender and pendulous." (This could have been a Wilga). Hop bushes were also in evidence. The next day they continued the S.W. journey and passed through "the melancholy Acacia pendula." Today we think the Boree a very attractive tree if not marred by an insect pest. On the rises they saw Ironbarks and Cypress pines and a number of shrubs such as Tea Tree, Green Mallee (?), White Mallee, Paper Bark and a tree the men called Snakewood, with rough and scaly bark. Mistletoe was common on the trees. The vegetation they encountered on 23rd. and 24th May was the same as that found today on the virgin areas from West Wyalong to the west and south-west. As well as the plants previously mentioned there were Mint-bushes (both red and white), Goodenias, Eriostemons, Melaleucas (one of which was probably our Broom-bush), Blue daisy bush, Clover bush and the twining Mallee Vine. The last evening they spent in our area they disturbed "a large emu and two young kangaroos who were feeding upon the trifling herbage, which the sterility of the country can only produce in small patches."

PLANTS SEEN BY ALLAN CUNNINGHAM WHILST EXPLORING THROUGH WHAT IS NOW THE BLAND SHIRE, FROM 18th TO 25th MAY, 1817

(A comprehensive but incomplete list).

Cyprossus glauca (White Cypress Pine) now called Callitris hugelii (C. glauca), Acacia pendula (Boree), Rhagodia dilatata (A Salt-bush), Eucalyptus microntha (Bastard Box) now called Eucalyptus racemosa (Snappy Gum), Pimelea Colorans (a rice flower), Arthrotriche gracilis, Arthrotriche augustiflora, Zieria pulchella (pulchella means pretty), Extoxia rugosa, Sida species (Paddys Lucerne), Aster decurrens now called Olearia decurrens (a Daisy-bush), Sterculia heterophylla, now called Brachiton populneum (Kurrajong), Asclepiadceae (Creeping shrub twining on small Cypresses), Acacia homalophylla (Yarran), Eucalyptus sideroxylon (Western Ironbark), Casuarina (could be Bullоak or Belah), Loranthus filiaformis, now called Amyema probably linifolia (Mistletoe), Zygophyllum (Twin-leaf), Daviesia (Pea-flower), Leptospermum sp. (Tea-tree), Eucalyptus acacioides, Eucalyptus dumosa (White Mallee), Melaleuca sp. (probably Broombush), Goodenia biflora (could be present G. Ovata), Eriosteman rhombifolium (a Wax-Flower) now E. difformis, Prostanthera nivea (White Mint-bush), Prostanthera coccinea, now called Prostanthera aspalathoides, (Scarlet Mint-bush), Myoporum gracile (belonging to the Boobialla group), Melaleuca sp. (a Paper-bark), Cassytha (Mallee Vine or Devil's Twine), Shrubby Aster (probably an Olearia), Goodia lotifolia (Clover-bush or Golden Tip), Erodium (Crowfoot), Aster oculatus, now called Alearia ramulosa (Twiggy Daisy-bush), Syngenesia (a Daisy of some kind), Westringia triphylla, now called Westringia eremicola (Australian Rosemary), Bignonia oxleiie, now called Pendorea pandoranoa sub species oxeleyi (Western Wonga Vine), Pentandria monogyria (Rutaceae). Extremely likely that this is now called Geijera parviflora (Wilga), Dodonea cuneata (Wedge-leaf Hop-bush), Exocarpus cupressiformis (Native Cherry), A "middling sized tree" from its description was very likely, Heterodendrum oleifolium (Rosewood).

It is impossible to decipher some of the plant names recorded in the journal. Also some of the names have been altered, partially or completely.

Cunningham does not mention grasses. No doubt they were included in the "trifling herbage." Perhaps it had been eaten down by animals or withered by drought, leaving no means of identification. Obviously the explorers did not come close to the site of West Wyalong for Cunningham would certainly have observed our Blue Mallee, (Eucalyptus fruticetorum). It is not possible to tell whether he observed Bullоaks or belahs, or both. He merely states "Casuarina." Bullоaks are Casuarina luehmanii and Belahs are Casuarina cristata, both of which grow in this area. He does not appear to be interested in the fauna of the region, except for kangaroos, emus and snakes, and that interest was not scientific. The Aborigines deserve special mention for their tolerance of the explorers. From time to time he writes of finding their recently vacated camps, of hearing them and members of the party seeing them. The natives would never have seen a white man before. With their consummate bushcraft they easily could have wiped out this expedition. It is sad to think that the white man's coming has meant degradation of various kinds for this peaceful tribe.

Our native flora looked after itself very well for thousands of years and even the advent of the Aborigines 20,000 years ago did not disturb it unduly, as they were neither pastoralists nor agriculturists. They did not dominate the plants, but lived with them using this and that, such as Nardoo (Marsilia drummondi) and Yam (Microseris scapigera).

Now the white man is here and much of the native-flora has disappeared, either by clearing; by pests such as rabbits, or being replaced by weeds, among them, Cape Weed (Cryptostemma calendula) and Skeleton Weed (Chondrilla juncea). The growing interest in our native plants in the last few years should lead to action to preserve our unique flora from extinction while there is yet time.

To get water and retain it has been the greatest need of our plants and they have developed many means of doing so. One striking example is the aromatic oils contained in the leaves of eucalypts. On a hot day the oil volatilises and the leaves have a protective layer between them and the sun, thus keeping down loss of water.

Some wattles (acacias) have finely divided leaves, such as the Wyalong Wattle (A. cardiophylla), but many of them, through untold years, have gone a step further and discarded their leaves. The leaf-stalks, or phyllodes, act as leaves. They are tougher and give off less moisture than a leaf. As seedlings, all wattles have pinnate leaves. If it is the phyllode type, such as the western Black Wattle (A. hakeoides), the transition stage can be seen as it gradually changes. When grown in the wetter climate of Melbourne the leaves of the Wyalong Wattle are much larger. In the Casuarinas, among them the Bull Oak and Belah, the leaves are reduced to scales and the wiry branchlets act as leaves.

There are numerous other examples of the adaptation of the plants to dry conditions. In the drier areas it does not seem to be the quality of the soil which is the governing factor in the distribution of plants, but rather its ability to retain water. Some plants are more adaptable than others and occur throughout the shire, while others are localised.

There are at least 18 different species of eucalyptus in the area. Mallees usually occur on solonized brown soils, but those around West Wyalong are on decomposed granite. The best-known is the Blue Mallee (eucalyptus fruticetorum). The Broad-leaved Mallee Box (E. behriana) is called Bull Mallee locally. It grows naturally only in the Wyalong district. Other mallees are Mallee Gum (E. gracilis), Green Mallee (E. viridis), White Mallee (E. dumosa) Red Mallee (E. oleosa) and Narrow-leaved Red Mallee (E. foecunda).

On stoney ridges with poor shallow soils Ironbark (E. sideroxylon), Hill Red Gum (E. dealbata) and Hill Gum (E. dwyeri) thrive where others would die. Currawong (Acacia doratonylon) and Black Pine (Callitris endlicheri) are often associated with them. At Narriah, Drooping She Oak (Casuarina stricta) also occurs.

Grey Box (Eucalyptus woolsiana) is well scattered through the shire on red soils, whereas the Western Grey Box (E. microcarpa) prefers good heavy soils. The Box with the roundish shining leaves, Bimble Box (E. populnea) is drought resistant and is found mostly on poor stiff clay soils. The presence of Yellow Box (E. melliodora) is considered an indication of good soil, usually heavy alluvial. It is our best honey tree.

River Red Gums (E. camaldulensis) thrive where there is an abundance of water and occur at Lake Cowal and along the creeks. Black or Flooded Box (E. largiflorens) lives on heavy alluvial soils subject to flooding and occurs in the Lake Cowal area. Fuzzy Box (E. conica) generally occurs on low land along streams. Narrow-leaf Ironbark (E. crebra) often grows in forests with cypress pines. It occurs in the Burcher area.

Other district trees are the Kurrajong (Brachychiton populneum). It is both handsome and useful. Where there is Belah (Casuarina cristata) the soil is heavy, and the same is true of Boree or Myall (Acacia pendula). Bull Oak (Casuarina luehmannii) is found on a variety of soils. White Cypress Pine (Callitris hugelii) is widespread in the district on good sandy loams which are well drained. It is a valuable timber tree and is white-ant resistant. Many of the forest areas have been cut out to fulfil the demands for its timber.

The Mallee Pine (Callitris preissii) occurs in the Weethalle area. Its common name is apt as it has several stems and is small. The Wilga (Geijera parviflora) is usually found on the heavier soils. It is a very attractive tree and can be used for fodder.

Other trees which grow in the shire are Rosewood or Berrigan (Heterodendrum oleifolium), Quondong (Eucarya acuminata).

Butter Bush or Western Pittosporum (Pittosporum phyllireoides) is also known as Berrigan. The hard fruit is yellow and opens to show sticky orange-red seeds.

Warrior Bush or Currant Bush (Apophyllum anomalum) is a small tree with almost leafless branches. It has an air of great antiquity about it. Budda (Eremophila mitchellii) is a small tree with graceful light green foliage and white or purplish bell-shaped flowers. It is sometimes called Sandalwood. Emu Bush (Eremophila longifolia) often only a shrub, occurs on a variety of soils. It has dull red tubular flowers about an inch long, and is sometimes called Berrigan. Sugarwood (Myoporum platycarpum) occurs chiefly on sandy loams in mallee country. It exudes a sweetish resin, and is also known as Dogwood and Sandalwood.

Yarran (Acacia homalophylla) is fairly widely distributed on a variety of soils. Native Cherry (Exocarpos cypressiformis) is an attractive small tree, looking rather like a pine. It seems as if the seed is outside its fruit. In reality the "fruit" is the enlarged berry-like, bright-red stalk and the "seed" is the real fruit, a small nut. The Jointed Cherry (Exocarpos aphyllus) has the same type of fruit, but is not attractive. It is leafless with criss-crossed hard, almost thorny, branchlets and is usually a large shrub. Moonah (Melaleuca pubescens) grows in sandy soil—a small spreading tree with two-inch white "bottlebrush" flowers. It is sometimes called Black Tea Tree.

Broom Brush (Melaleuca uncinata) is usually a shrub in this area. It contains oil which was sometimes extracted from it in the early days. Needlewood (Hakea tephrosperma) has a fairly wide range, and the needle-like leaves are about two inches long. The woody fruit opens and frees two dark, winged seeds.

Of hybrid Eucalyptus trees which have not been mentioned there are at least 40 different species within the shire. With the exception of the hybrids it is likely they would have all been here when Oxley and Cunningham passed this way in 1817.

So far 21 different wattle species have been identified in the area. No doubt there are more. The most famous is the Wyalong Wattle (Acacia cardiophylla). It occurs in the Boobaroi Forest, and a few miles west of West Wyalong. It favours the banks of dry watercourses. It is a beautiful free-flowering shrub, with rich yellow flowers and bi-pinnate leaves, the leaflets being very small. Nurserymen praise its beauty in their catalogues. It should not be confused with Deanes Wattle (A. deanei) which is much more common. In this species the leaflets are larger and not such an attractive green. The young leaves and branchlets are usually tinged with yellow and the flowers are paler than those of the Wyalong Wattle.

Western Black Wattle (A. hakeoides) is common in the district. Its "leaves" are up to five inches long and half an inch wide. The flowers are bright yellow. Other wattles are: Knife Wattle (A. cultriformis) Showy Wattle (A. decora), Needle Wattle (A. rigens), Kangaroo Thorn (A. armata), Grey Mulga (A. brachybotrya), Dagger-leafed Wattle (A. rhigiophylla), Streaked Wattle (A. lineata), Miljee (A. oswaldii), Bunny Bush (A. rotundifolia). Also A. Trimeura, A. aspera, A. scleraphylla, A. difformis and A. flexifolia. The last named flowers in July and brightens the landscape.

Among the most beautiful of our shrubs is the Purple Mint Bush (Prostanthera ovalifolia). Its colouring varies from lavender to purple. Some plants bear white or pink flowers. It seems to favour hillsides and occurs at such places as the Boobaroi Hills, Mt. Narriah and hillsides in the Alleena area. The Scarlet Mint Bush (Prostanthera aspalathoides) has a wide distribution. It grows about three feet has tiny bright green leaves and bright red flowers.

Austral Indigo (Indigofera Australis) is another beautiful shrub with bluey-green pinnate leaves and long sprays of rosy-mauve flowers. There are seven different species of Hop-Bushes (Dodonaeas) all of which are attractive when bearing their hops. The Wax Flowers (Eriostemons) are represented by the Long-leaved Wax Flower (E. myoporoides) in the south of the shire and by E. difformis, which has plump little aromatic leaves and is covered with white starry flowers. The Goblin Grevillea (G. floribunda) with its intriguing yellow and brown flowers grows in similar areas to the Purple Mint Bush. Grevillea anethifolia, a smallish shrub with highly perfumed white flowers occurs at Gubbata. Around Weethalle is another Grevillea with red flowers, as yet unnamed. Desert Cassia or Native Daphne (Cassia eremophila) is described as one of our most beautiful shrubs. It is widespread in the area. The local Tea Tree (Leptospermum trivalve) is a lovely sight in the spring when covered with small white flowers. Two hardy attractive shrubs are the Common Fringe Myrtle (Calytrix tetragona) and the Fringed Heath Myrtle (Micromyrtus ciliata).

Among the smaller plants there are many undershrubs, including daisy bushes, everlastings, pea plants, orchids, rushes, herbs and bulbs. The Rock Fern (Cheilanthes tenuifolia) is widespread. The Nardoo (Marsilia drummondi) which looks rather like a clover in the gilgais, is also a fern. Among the climbers are False Sarsparilla (Hardenbergia violacea), Western Wonga Vine (Pandorea pandorana oxleyi), clematis (C. microphylla), Parsonsia eucalyptophylla with highly perfumed mustard-coloured flowers, sweet apple-berry (Billardiera cymosa) a shrubby climber rare in N.S.W. and Glycine canescens, with sprays of small pea flowers.

Many overseas grasses have become naturalised here, but among the original native grasses are Corkscrew or Variable Spear Grass (Stipa veriabilis), Liverpool Plains Grass (S. aristiglumis), Soft Spear Grass (S. mollis), Feather Spear Grass (S. elegantissima), Warrego Grass (Paspaladium jubiflorum), Slender Panic (Panicum constrictum), Hairy Panic (P. effusum), Wallaby Grass (Danthonia richardsonii), White-top or Wallaby Grass (D. caespitosa), Brush Wire Grass (Aristida behriana), and the Wire Grasses or "Number 9," (Aristida ramosa, A. jerichoensis, and A Calycina), Umbrella Grass (Chloris truncata), Purple Love-grass (Eragrostis lacunaria), Clustered Love-Grass (E. elongata), Grey Beard Grass (Amphipogon caricinus), Button Grass (Dactylocyenium radulans) and Spinifex (Spinifex paradoxus).

The native trees were put to many uses by the early settlers, who proved themselves adept at improvising from what materials were available. They built and roofed houses, built fences and sliprails, made bullock yokes, and even cooked kurrajong leaves as vegetables.

The Grey Box proved to be a very useful tree. Box bark was used for roofing houses, huts, dairies and sheds by the early settlers and miners. Sometimes even the walls were of Box bark. The bark was attached to a frame of White Cypress Pine. The settler would choose a big tree with good, straight bark. The operation had to be carried out when the sap was rising, possibly after a good rain, as the bark then peeled off in large sheets, varying from half to an inch in thickness.

To remove the bark one scarf was cut low down on the tree and another higher up, according to the length of the sheet required. Cuts were made lengthways up the tree. A curved stick with a wedge-shaped point was used to pry the bark off the tree.

The curved sheets had to be flattened, and this was usually done by placing weights on the bark, but sometimes a small fire was lit underneath to straighten it out. The bark sheets were placed on the framework in the same way as galvanised iron is today, and were then kept in place by timber being laid across them and secured. These bark roofs shed the rain and were comparatively cool in summer. They lasted many years. The Grey Box was sometimes used as fencing posts and the timber was also used to some extent in brick kilns and bakers' ovens, but Cypress Pine was preferred.

Box and Ironbark were used extensively for making charcoal, which was used for forge work by blacksmiths and farmers. A pile of wood, arranged in layers, was covered over with soil with vents left at both ends. A fire was lit at one end and the draught carried it through to the other vent. When properly alight and the logs reduced to charcoal the pile was thoroughly sealed off and left for several days to cool down. This procedure prevented the coals from turning to ash. Box was the chief timber used for firing the boilers in the mines.

Ironbark fencing posts lasted a long time. They were fairly resistant to white ants and resistant to fire. The bark from Ironbark was used extensively for heating steel tyres, prior to fitting them on to waggon and sulky wheels. Once the tyres were in place on the wheels cold water was applied to make the metal shrink and fit tightly.

White Cypress Pine had, and still has, many uses. One of its great advantages is that it is white-ant resistant. Pine was used in the construction of houses and was also used for lining rooms. For sheds, sound sapling posts were used for rafters and battens. Fencing posts were sometimes made of pine. It was easy to split and saw and was straight, but it was not fire resistant. Young round pine rails, not less than four inches at the small end, were used extensively for underground mine props. Brick kiln owners used pine almost exclusively, as it provided a quick hot fire. It was also popular for bakers' ovens. Rabbit pits were lined with White Pine. Big pine trees were preferred to small ones for much of the building work. Some rafters in an old local shearing shed were over 30 feet long and without a knot in them.

Bull Oak was used for rails and firewood. It makes a very hot fire. Sometimes it was used to make bullock yokes, but they were not as good as those made of Kurrajong.

Kurrajong was splendid material for bullock yokes and one skilled man could make a yoke for two bullocks in two hours. There were four holes in the wood for the iron bows to pass through. Red hot rods were put through these to toughen the wood. Kurrajong leaves were valuable fodder in dry times.

Belah provided good fodder. Boree also yielded fodder and fencing posts. Posts from old Boree trees are hard, and last a long time. There are some very old ones on a property near Yalgogrin.

Other trees that provided fodder of some value were Wilga, Rosewood and Warrior Bush. Mallee Vine, also known as Devils Twine, was useful as cattle fodder. Locally this plant is semi-parasitic on Mallee trees.

The fruits of Quandong were used for jams, sauces and tart fillings. The wood of Needlewood provided material for home-made pipes and walking-sticks. The Currawong was said to be used for shoulder poles by the Chinese who lived in the district. At the turn of the century Blue Mallee was being treated for eucalyptus and other valuable products. Most of the trees mentioned and mallee roots were used for firewood in ovens and open fires.

Rabbit Pits were made of White Cypress Pine. The pits were sunk along the wire netting boundary fences, about one or two miles apart, depending on the nature of the country. Rabbits were always more plentiful in sandy country, because of the ease with which they could build their warrens. A hole about five feet deep and five feet square was sunk directly underneath the wire netting. Sawn rough timber slabs of pine were then placed

side by side in an upright position along one side of the hole. Then a 4 inch by 2 inch plank was placed horizontally to support the slabs and another one was pegged down at the bottom. The other three sides of the hole were treated the same way. The pit was then covered over with boards. Among them were four balanced pieces of board. An oncoming rabbit would tilt a board and drop into the pit. The board would then swing back into its original position. A wire-netting wing, one chain long, ran from each corner of the pit, making a sharp angle with the fence. This arrangement "herded" the rabbits towards the pit.

Every day or so a man would kill the rabbits and clear the pit. Other animals, too, would fall into the pits, especially ant-eaters, foxes, cats, and occasionally snakes also met their doom that way. When the rabbits were plentiful, as in 1907, there could be 300 rabbits a night in one pit. The average was 150 rabbits. Fourpence per pound was paid for rabbit skins in those days. In winter seven and in summer nine skins went to the pound.. They were bought by the local Chinese.

A Dog-Leg Fence was usually made of Cypress Pine. Two round posts were erected, and crossed rather like an open pair of scissors. They were supported by an 18 inch block of wood six to eight inches in diameter. This process was repeated and then a pine log ,with branches still attached, was placed in the V's of the crossed posts. By this means a fairly good sheep-proof fence could be constructed.

For a Chock and Log fence, any large available timber was used, Box, Ironbark and especially Cypress Pine. Green timber was easier to cut and work, and the longer poles were better for the purpose. A chock of wood two feet long and 9 to 12 inches was placed flat on the ground. A scarf was then cut out of the centre of the top side. A log was placed in the scarf. Then another chock was scarfed on both sides to fit over the first log and placed in position to receive another log on top. This process was continued until the desired height was reached. Logs along the top finished off the fence. Only the bottom chock needed to be two feet long. The others could be shorter and do a satisfactory job.

For a Post and Rail fence, Ironbark posts were used if possible. It is good straight splitting timber and lasts a long time. It is also easier to adze out than Box. Bulloak, Box and old Belah were used as rails. The timber was used green and both posts and rails were split lengthwise. A morticing axe was used to cut oblong holes in the upright posts. The rails were trimmed to fit snugly in the holes. As a rule three or four rails were used in each panel.

Slip Rails were used in place of gates. One method of making them was to place rails loosely in holes in the uprights so that they could be removed quickly to allow passage through. They were made of any available timber. Box rails were satisfactory, but Pine was too brittle and liable to break under pressure from stock. Another type of sliprail was made with slots cut in the posts to allow the poles to be dropped in. To remove one would require both a lifting and a pulling movement. This made the "gate" more secure where stock were concerned. Later on U-shaped round iron, or large used horseshoes, were driven into the posts and the rails were slipped into these. Wire twitches were also used.

Some landholders believed that timber growing on the spot and used as fencing material lasted longer than other timber. One local property had a paddock fenced with Box, another with Pine, and so on. Another had assorted fence posts with Pine, Mallee, Ironbark and others alternating. As one would expect, the Ironbark outlasted the other timber. Belah had to be old when used, as the young stuff rotted quickly. However, the timber had to be green when bored for fence posts otherwise the bits on the brace-and-bits would be broken. Yarran timber was used for fence posts and in the erection of stock and sheep yards. It lasted for years. Yarran wood makes a fire with great heat and burns to an ash. Its heat caused buckling and destruction in the fire-bars in stoves.

Black Pine was used to make bullock whip handles, and Quondong timber was used to make bullock yokes. Kurrajong leaves were sometimes cooked as vegetables, the most tender leaves coming from the top of the tree. The introduced plants, such as marshmallow and nettles, were also cooked as "greens."

The best meat blocks, both for homestead and butchers' use, were made from Kurrajong stumps. The wood was spongy, and slits made by cleavers closed up again. A few still in use are greatly valued by owners.

Sometimes settlers erected lofts in a corner of the stockyard, near a dam or waterhole. Men would hide in this until the kangaroos came for a drink, when they would shoot the unsuspecting animals.

FORESTRY DEPARTMENT

Of the 28 State Forests in the West Wyalong Sub-district the present Cypress Pine forests are by far the most important, not only because they produce the bulk of the sales of logs, poles and fencing timber, but because a considerable amount of grazing is available in them. The main Cypress Pine forest areas are in the Booberoi Hills, east of Wyalong, Yarranjerry, south of Ariah Park and along the Rankins Springs Road, south of Lake Cargelligo.

The Hardwood forests were of great consequence when they were dedicated, as they were the source of supply of such products as railway sleepers, fencing timber and firewood. Demand has since fallen off considerably and only a small amount of fencing timber and firewood is now sold. Twenty of the forests carry predominantly Cypress Pine timber and eight carry Hardwood (Iron Bark and Box). There are 25,000 acres in the pine forests and 14,000 acres in the hardwood forests. One forest carries a considerable amount of Blue Mallee, which is cut periodically for the distillation of eucalpytus oil.

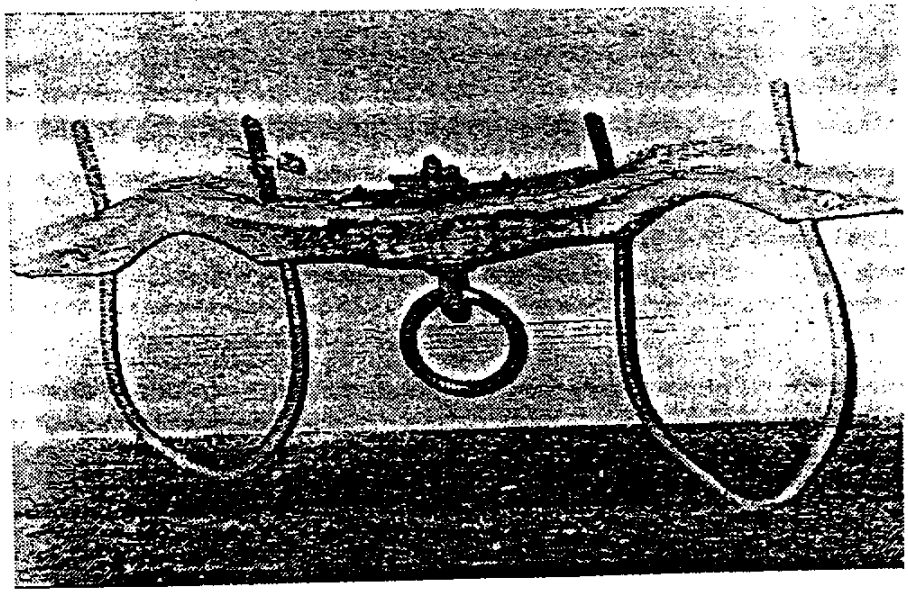
The West Wyalong Sub-district of the Forestry Commission extends about 110 miles in a N.W./S.E. direction and averages about 30 miles across. West Wyalong is the administrative centre of the sub-district, and with the sub-districts of Grenfell, Forbes and Condobolin, comprises the Forbes Forestry district. The sub-district boundary is roughly, Temora, Bland Creek, Lake Cowal, Burcher, Bena, Ungarie, Tullibigeal, Lake Cargelligo, Willandra Weir, Naradhan, Taleeban, Sandy Creek, Ardlethan, Wallaroobie, Mimosa and Temora.

Personnel in the sub-district are a forester and an office assistant engaged on administrative duties, and a forest foreman and another employee, who are engaged on field work. Work done by the commission consists mainly of the maintenance of assets, including roads, fences and water supplies, killing of useless Hardwood competing with Pine, supervision of timber operations and rabbit eradication. All these are done by local employees, with the exception of road maintenance, for which a grader unit comes from Forbes periodically, to grade the 216 miles of roads through local forests.

There are seven sawmillers in the sub-district, one of whom regularly buys logs from State Forests. A sawmiller from Grenfell also buys an annual quota of logs from this area. Sales from State Forests and other Crown areas are also periodically made to other millers. Most sawmillers are able to obtain the bulk of their log input from privately owned land. Miscellaneous sales of timber, poles, firewood, sand and gravel are made under licence and licences are issued to apiarists to allow them to place their hives in State Forests. Honey production is usually from those forests carrying Ironbank.

A considerable amount of grazing under permit is being done on local forests. Grazing was suspended on many forests about 1955, in order to encourage the germination and growth of Cypress Pine seedlings. These responded so well that grazing by cattle was introduced on many forests from 1964, and grazing by sheep, which eat small seedlings, is now being considered on some forests.

Grazing in the West Wyalong district forests has the desirable effect of removing much of the dry grass that creates a serious fire hazard each summer. Fires in the forests of the sub-district are rare. There have been only two in the last 12 years, burning a total of 13 acres.



BULLOCK YOKE MADE BY EARLY SETTLERS.

RAINFALL

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ttl.
1895	0	54	2	77	57	144	101	160	100	187	0	123	1005
1896	83	413	86	81	158	56	0	92	92	50	173	7	1291
1901	0	0	2	175	62	91	151	336	57	275	16	6	1171
1902	28	14	167	0	16	66	108	99	81	142	96	321	1138
1903	5	0	91	231	141	120	144	127	409	167	81	95	1611
1904	346	25	77	73	155	52	422	69	17	312	55	280	1883
1905	94	31	89	409	183	280	244	72	133	277	18	46	1876
1906	8	52	385	110	277	169	74	215	436	313	243	65	2347
1907	147	47	155	73	11	160	147	158	95	107	166	168	1434
1908	70	223	7	151	48	151	122	197	212	63	58	94	1396
1909	97	160	254	95	207	322	39	184	83	45	30	77	1593
1910	486	0	229	26	82	298	135	60	153	113	174	164	1920
1911	440	237	139	14	191	95	133	13	193	21	235	376	2087
1912	12	104	62	10	2	234	464	265	102	79	83	231	1648
1913	167	211	382	5	290	159	31	36	84	169	48	134	1716
1914	120	104	263	58	85	100	69	3	62	54	295	122	1355
1915	27	265	1	25	221	130	157	178	106	137	14	204	1465
1916	146	3	62	239	66	330	239	333	240	232	209	220	2319
1917	425	187	101	31	150	193	235	273	184	292	454	168	2693
1918	483	97	165	143	109	161	84	280	80	84	86	13	1785
1919	34	238	94	41	250	24	14	70	49	73	14	233	1134
1920	60	52	204	97	10	340	197	210	224	104	153	380	2031
1921	159	216	102	236	242	344	41	117	122	172	22	307	2080
1922	95	30	0	142	102	102	150	74	183	94	0	302	1274
1923	76	0	27	11	81	585	222	79	155	214	50	288	1788
1924	71	418	26	119	116	187	146	260	197	54	679	118	2391
1925	362	81	28	5	390	258	145	94	31	77	218	79	1768
1926	75	0	479	297	171	196	91	149	103	65	8	48	1680
1927	181	6	27	118	113	128	72	96	303	330	138	62	1574
1928	505	833	475	154	60	150	191	55	39	77	17	11	2567
1929	4	87	181	167	58	179	15	125	220	33	155	149	1373
1930	10	42	52	89	120	165	131	167	33	404	154	290	1657
1931	131	27	413	309	641	546	129	68	129	40	137	402	2972
1932	4	102	141	295	108	132	135	228	285	59	75	95	1659
1933	280	0	72	26	87	114	187	71	189	128	282	309	1745
1934	149	358	91	142	0	137	292	177	69	376	355	129	2275
1935	203	129	23	269	16	93	202	59	119	191	19	65	1388
1936	286	261	210	38	84	252	329	134	88	83	23	309	2097
1937	164	1	163	31	120	155	22	166	84	121	80	93	1200
1938	191	101	34	259	59	245	153	254	24	354	99	19	1792
1939	7	441	377	343	29	329	117	251	54	165	421	21	2555
1940	21	0	0	482	22	14	33	44	179	0	31	209	1035
1941	453	206	139	19	64	110	90	35	75	70	49	105	1415
1942	65	146	27	18	313	335	115	130	113	124	566	107	2059
1943	198	53	24	205	197	93	113	116	130	289	214	4	1636
1944	43	16	238	57	155	21	37	182	17	157	152	49	1124
1945	192	148	50	64	78	224	49	148	17	95	67	63	1195
1946	145	428	78	32	49	82	62	32	10	49	148	317	1432
1947	0	107	177	70	107	95	239	132	180	142	335	423	2007
1948	225	435	86	196	103	400	24	102	77	107	141	41	1937
1949	41	112	326	80	181	113	167	25	134	336	108	202	1825
1950	242	488	548	151	103	194	273	97	259	407	199	47	3008
1951	103	89	0	98	155	129	139	150	182	99	69	28	1241
1952	17	18	302	520	302	338	139	140	122	399	161	174	2632
1953	145	152	8	106	175	70	33	197	213	338	189	21	1647
1954	540	180	3	125	18	166	31	148	83	185	359	223	2061
1955	60	491	136	63	431	156	218	227	103	465	112	98	2560
1956	363	271	777	502	294	322	374	173	100	327	63	71	3637
1957	32	162	46	64	13	93	251	148	20	67	54	184	1134
1958	81	62	224	111	219	102	219	229	163	231	73	70	1784
1959	8	236	423	234	51	74	195	35	104	228	50	51	1675
1960	215	58	35	77	271	30	243	246	292	73	216	160	1916
1961	105	17	62	382	23	160	282	244	60	289	373	336	2333
1962	936	97	47	26	250	73	145	239	63	159	85	217	2337
1963	241	152	212	89	344	225	174	87	146	137	119	366	2292
1964	42	21	22	433	117	126	108	117	242	241	28	61	1558
1965	0	1	0	199	98	104	62	174	55	262	236	452	1643
1966	12	49	227	38	173	62	146	257	181	195	190	344	1874
1967	39	8	122	2	74	197	4	170	49	155	0	0	820
1968	60	0	37	221	469	65	186	87	47	129	102	250	1653

ON FAUNA

Early settlers in the Bland Shire have told of a small animal that lived in mallee trees, which they knew as a native bear. This gives credence to the listing of koalas by the National Parks and Wild Life Service as being in the district, although rare.

A marsupial about half the size of a kangaroo, grey in colour with splashes of white, was a common sight. It was kown as the paddymelon. The burrowing of another marsupial, the bilbie, caused a crater-like warren: Rabbits took over the warrens and the bilbies disappeared. Clearing of the land for wheatgrowing and grazing has led to the extinction of dingoes and native cats that were common in the closing years of the nineteenth century.

The keen observer will find many species still living in the bushlands of the shire. Listed as uncommon in the monotremes is the platypus, but the spiny ant-eater is still fairly common.

Common marsupials are the yellow-footed marsupial mouse, the fat-tailed ... rsupial mouse, brush-tailed possum and the grey kangaroo. Uncommon marsupials are the feather-tail glider, the squirrel glider, the ring-tailed possum, bushy tailed possum, pigmy possum and the red kangaroo. Mammals extinct in the district are rabbit-eared bandicoot, brush tailed rat kangaroo, brown hare-wallaby and the bridle nail-tailed wallaby. Tiger cats have been seen on rare occasions in the Weethalle district.

Of native rats and mice the Eastern water rat is still common. The allied rat and the long-haired rat are uncommon and the extinct species are the Eastern pseudo-rat, the white-footed rabbit-rat, and Mitchell's hopping mouse. Bats are uncommon to rare, but the district has been at times inhabited by the Eastern horseshoe-bat, the greater long-eared bat, the little brown bat, Gould's wattled bat, the bent-winged bat, yellow-bellied free tail bat, white striped mastiff-bat and the little mastiff bat. Flying foxes are rare visitors.

Introduced mammals are the European rabbit, the European hare, the dingo, red fox, Feral pig, Feral cat, goat, rat and mouse.

Of the snakes the carpet snake, common brown snake, tiger snake, mulga snake, red-bellied black snake, myall snake and the bandy-bandy are the most common. Seldom seen now are the red-naped snake, yellow faced whip snake and death adder. A snake expert who visited the district in recent years is said to have been of the opinion that taipans could be here, but no sightings have been reported. Copper-heads are also said to be present. The bush is inhabited by a number of lizards and skinks. These include the common ctella, legless lizard, jacky lizard, bearded dragon, goanna, striated skink, Cunningham's skink, shingle-back shink, blue tongue, copper-tailed skink, water skink and grass skink. Seldom seen are the thick-tailed Gecko, scaly-foot, and Gould's goanna.

In the years of good rainfall, when the waters of Lake Cowal spread over the north eastern countryside of the shire, black swans and numerous other water birds are seen. Seagulls have found their way to the lake, and on rare occasions have been seen over West Wyalong.

Flocks of galahs and colourful parrots are more plentiful in the wheat season than at any other time, but, unless steps are taken to conserve larger areas of the suitable habitat of the more rare types their chances of survival are slight.

Among the birds seen in the shire are the emu, brown goshawk, wedge-tailed eagle, peregrind falcon, brown hawk, mallee fowl, peaceful dove, common bronzewing, crested pigeon, Major Mitchell's cockatoo, galah, cockatiel, ringnecked parrot, red-rumped parrot, blueboanet, mulga parrot, pallid cockatoo, tawny frogmouth, owlet nighijar, laughing kookaburra, rainbow bird, black-faced cuckoo-shrike, southern scrub robin, chestnut quail-thrush, white-browed babbler, brown songlark, black-backed wren, purple-backed wren, western warbler, little thornbill, chestnut-tailed thornbill, yellow-tailed thornbill, brown weebill, mallee heath wren, red-capped robin, hooded robin, southern yellow robin, grey fantail, willie wagtail, restless flycatcher, golden whistler, rufus whistler, red-lored whistler, Gilbert's whistler, grey shrike-thrush, crested bellbird, striated pardalote, yellow-tailed pardalote, striped honeyeater, white-eared honeyeater, yellow-plumed honeyeater, brown-headed honeyeater, white-fronted honeyeater, spiny-cheeked honeyeater, peewee, white-winged chough, apostle bird, pied butcher-bird, grey butcher-bird, black-backed magpie, Australian raven, little raven, pelican, spoonbill, blue crane, white ibis, bab chick, wood duck, teal, black duck, black swan, green leak parrot, finches, seagulls, swallows, eastern stone curlew, spur-winger plover, quail, diver, shell parrot (budgerigar), little crow, eastern rosella, brolga, mistletoe bird, turquoise parrot, noisy miner, little wattle bird, masked wood swallow (blue martin), dusky wood swallow, pied currawong, collared sparrow hawk, branded plover, kingfisher (several species), eastern shrike-tit, diamond dove.

THE KELPIE

The Wyalong district has played its part in the development of the Kelpie sheep dog which has been so invaluable to the pastoral industry in this country.

The early 1800's, were an era when transport and handling of stock, other than by droving was virtually unknown. The hundreds of counties through England and Scotland all had stock of one sort or another, and with the stock went the shepherds and their dogs. When stock was first brought to Australia, so were shepherds and their dogs to care for them. This was necessary for the stock had to be "folded" or yarded every night to protect them from the dingoes and Aborigines and to stop them from straying.

With the rapid increase in stock numbers there was an increasing demand for a "mustering" or "gathering" type worker to replace the "shepherding" type dog. There is little doubt that by the mid 1800's a great number of different strains and types of workers had been imported. One of the first to successfully make a name for themselves was the Rutherford strain of North County Collies which immediately proved ideally suitable to Australian conditions. Several younger members of the Rutherford family had migrated to Australia, and once settled were supplied with dogs by their Scottish relatives. Mr. J. Rutherford purchased Yarrawonga from the Hume family, where he bred the black dog, Moss, which later became the property of Mr. Jack Gleeson.

Mr. Robert Tully, a well known breeder in the Murray and Darling River areas, was also a strong supporter of the Rutherford strain collie and all his stock were claimed to have carried this blood.

The dog which gave the Kelpie breed its name was Gleeson's Kelpie which was bred, as far as we know, on Worrock station in Victoria. Mr. John D. (Jack) Gleeson came into possession by swapping a horse for the pup, which had been bred by Mr. G. Robertson from imported collie parents. Gleeson's Kelpie is described as a black and tan with semi-erect ears and who had a reddish tinge to her coat when seen in the sun.

Mr. Gleeson left the district shortly after acquiring Kelpie and stayed for a short time at Albury, where he met and married Miss Mary Ryan, a daughter of Mr. Lancelot Ryan of Wallandool station. Two other daughters, Kate and Grace, married Harry King and Pat Cox, sons of the owners of Yalgogrin and Wollongough stations respectively. In crossing the Murrumbidgee, on his way to take up a position on Bolero (North Belaira) he met an old friend, Mr. Mark Tully, brother to Mr. Robert Tully, who gave him the black dog, Moss, who had been bred at Yarrawonga from dogs imported from the Rutherford kennels in North Scotland.

Kelpie was mated twice to Moss; the first litter she whelped was shortly after arriving at Bolero and a pup was given to Mr. T. Keogh. The second litter by Moss was born on North Yalgogrin and a pup from this litter was given to Mr. Steve Apps, who was on Merringreen.

About this time, 1870, Mr. Arthur Robinson brought out from Scotland a pair of black and tans, Brutus and Jenny for Mr. Elliott of the firm of Elliott and Allen of Geraldra station. They had been mated together on the way out and the bitch, Jenny, whelped shortly after arrival. Both Brutus and Jenny are described a smooth-coated black and tans with semi-erect ears. One of the pups from the first litter, Caesar, was given to Mr. John Rich who was on Narriah at the time. Caesar was mated to Gleeson's Kelpie and the most famous of all kelpies was the result. When the litter arrived a black and tan female pup named Young Kelpie later Kelpie the Second then King's Kelpie was given to Mr. C. T. W. King and she became famous in the early 1870's when she won the first sheep dog trial ever held in Australia. Her performance at Forbes on this occasion was so outstanding it resulted in the naming of the breed.

For a short time the name, Kelpie, applied to the progeny of King's Kelpie only, although more properly it should have been applied to Gleeson's Kelpie for without her there would never have been a breed so named today. From the mass of records to hand it appears that it was not long before all dogs of similar appearance were being described as Kelpies. In the entry of 35 dogs at the Sydney Sheep Dog Trials in 1898 only two dogs were entered as collies.

Gleeson took up a selection on Bolero, being portion 10 Parish of Yalgogering, 40 acres, in March 1878. When leaving North Yalgogrin to take up a position at Lake Cowal West, he left Kelpie with his friend Mr. T. J. Garry, and Moss with Mr. P. J. Cox of Merringreen, but as Kelpie shortly afterward developed a cancerous growth she had to be destroyed, ending her days at Wollongough, Ungarie. Old Moss, which Mr. Cox had lent to Mr. C. T. W. King for stud purposes, was found dead on the chain one morning at Gainhill, Lake Cargelligo, which property Mr. King was managing at the time. While living at Lake Cowal West, Gleeson had an accident with a horse and died at Wagga Wagga.

THE MOUSE PLAGUE

Almost incredible stories have been told of the mice plague of 1916. Early in the winter hordes of mice appeared from nowhere, to invade the fields, the homes and business places. They destroyed haystacks and grain, ate the produce and foodstuffs in stores, and in the homes they even got into bed mattresses. Many of the houses were lined with hessian, which was covered with wallpaper. The mice ate the paper and hessian, and the nights were disturbed by their scampering up and down the walls. The stench was everywhere.

Mr. Jack King was working at Mr. Charles O'Donnell's farm at Buddigower and he recalls that the men walked around the haystacks at night, carrying a tin tub containing water. With a stick they knocked the mice into the tub. The mice ate stacked bagged wheat until the heaps collapsed, and, as 1916 was a wet year the damage was considerable. In 1917 Mr. N. Conn, of Quandialla, was pulling down a shed, when he noticed there were no lead washers on the screws. Close examination showed that the mice had eaten away all the lead, but could not bite into the iron in the screws. In 1917 there was another plague, but it was on a smaller scale.

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This supplies the list of Runs and Names of owners in the Wyalong area of the Lachlan District.

SQUATTING ON CROWN LANDS IN N.S.W. by J.F. Campbell. - Royal Australian Historical Journal Vols XV, XVII.
Mr J.F. Campbell has given us a list of Runs extant in 1849. The author makes quite clear the reasons for the attitude adopted by Governors Bourke and Gipps against the rapacity of the Squatters.

LACHLAN PASTORAL RUNS - First Annual Report upon occupation of Crown Lands, year 1879.
This book gives details of Name of Run, Holder, Size etc of the Pastoral Runs. It gives a detailed description of the area under discussion.

PASTORAL POSSESSION OF N.S.W. William Hanson, 1889.
Gives vital information about the Pastoral Holdings which usually consisted of an agglomeration of runs. The document supplies the important information of the area, annual rental and holder of Leasehold Area and Resumed Area.

NATIVE NAMES OF SOME OF THE RUNS IN THE LACHLAN DISTRICT. - F.W. Woolrych L.S. Paper read before the Royal Sosiety of N.S.W. 4 June, 1890.
Information is given regarding the origin of names of early Runs in the Wyalong area. It also supplies an early map of the district.

MANUSCRIPTS held by the Lands Department contain information about names of Runs and Holders in the Bland about 1847.

REPORTS OF DEPARTMENT OF MINES - 1894. - W.H.S. Slee F.G.S. Chief Inspector of Mines.

WYALONG - A thesis written by BROTHER THOMAS M.A. - UNPUBLISHED. COPY HELD BY BLAND HISTORICAL SOCIETY.

This gives the condition of the field - the amount treated and the yield.
These reports continued until the goldfield ceased as a gold supplier in 1920.

RECORDS OF GEOLOGICAL SURVEY - Vol Iv Part 2, 1894.
This document gave the Geological origin of the field.

GEOLOGICAL STRUCTURE OF THE WYALONG GOLDFIELD Vol IV, Part II, 1894. E.F. Pittman A.R.S.M.
The author points out that the easy nature of the working of the goldfield was due to the decomposition of the granite. He pays a great tribute to the Neeld family in opening up the field.

REPORT ON THE WYALONG GOLDFIELD - J.A. Watt M.A, B.Sc. 1899.
This document gave details of the geological formations on the Wyalong Goldfield and an accurate description with diagrams of each important mine.

WYALONG ARGUS. - 1898
This newspaper gives accurate information regarding the needs of the mining population - namely water and a railway.

OUTBACK IN AUSTRALIA.- by Walter K. Harris F.R.G.S., F.R.C.I. 1913.
The author visited Wyalong just as the mining era was closing and the population was turning to wheat cultivation.

EARLY DAYS IN WEST WYALONG. - by R.P. Bell. Commonwealth Bank Notes, September, 1934.
The author pays tribute to the pioneers who strove against the prophesies of the explorers. He points out how the population was attracted by the gold but remained when the district settled down as a flourishing wheat area.

MARSDEN TOWNSHIP 1866-1970. Document prepared by W.J. Waugh, President and Research Secretary, Grenfell Historical Society. 1970.

BEYOND THE EARLY MAPS - by Veronica G. McNamara. 1974.

TOWN AND COUNTRY JOURNAL 2 June, 1894 and 16 Jun3, 1894.

WEST OF THE BLAND. - A History of the Wyalong District. Published by the Bland District Historical Society, in association with the Wyalong 75th Anniversary Committee, 1969.

AROUND THE COWAL - by William J. English.
Information about Marsden, Lake Cowal, Billy's Lookout and Clear Ridge districts.

WHERE THE LINE ENDS. by Mark Fitzgerald.
Published for Burcher's Golden Jubilee Celebrations 1929-1979.

Lake Cowal Gold Project

Appendix I

LAKE COWAL HISTORICAL RESEARCH

by

Bland Historical Society

for

North Mining Limited
1 Macquarie Place, Sydney NSW 2000
Australia

1993

IN MEMORY OF

MISS UNA WILSON

A TRUE PIONEER.

"No eye has seen,
No ear has heard,
nor has it ever entered
into the human mind
to conceive what things God
has prepared for those
who love Him."

1 Cor. 2,9

CONTENTS.

EARLY HISTORY OF THE DISTRICT.

In 1817 Surveyor General John Oxley was sent by Governor Lachlan Macquarie to discover what happened the Lachlan and Fish Rivers. These rivers caused geographers a problem because they both flowed inland in different directions.
In 1817 Oxley established his depot on the Lachlan and in April with Allan Cunningham and ten companions, started down the river.

This journey brought him into the area under discussion and we read in his diary the first recorded description of this area. His description was very unfavourable, which is surprising, because this land eventually became one of the best wheat producing areas in New South Wales.

Whilst in the vicinity of Mt Amyot Oxley said: "It is impossible to fancy a worse country than the one we are now travelling over, intersected by swamps and small lagoons in every direction; the soil a poor clay and covered with stunted useless timber." OXLEY: P 20-21. The timber referred to was the mallee scrub and this district would be north of Lake Cowal.

In the Mt Melville district which on this occasion was more than usually flooded, he said:" I am forced to conclude that in common seasons this whole tract is badly watered. The soil of the country we passed over was poor and cold clay but there were many rich levels which, could they be drained and defended from the inundations of the river, would amply repay cultivation." Oxley concluded that these flats were entirely unsuited for cattle, the grass being too swampy and the good portions mentioned above being overcrowded with bushes, swamps and lagoons. He did not consider it a safe or desirable grazing country.

In the neighbourhoods of Mts Maude, Edwards and Campbell he described the country as "poor and as barren as can well be imagined; the soil a light red sand, acacia scrubs, small box trees and a few miserable cypresses." OXLEY: p.43.

He said from the want of timber, grass and water it would never be inhabited by civilised man. His prophesy was not true for this district, now called Ungarie, north west of the township of West Wyalong, is the centre of one of the greatest wheat producing districts in the State.

The Surveyor General was struck by the physiography of the region. The few hills which the region possessed usually terminated on their westward side in a perpendicular bluff to a height of two or three hundred feet.

It was in this district the Oxley first noticed what was surely gold country! He observed that the hills to the south

were "curiously composed of pudding stone in very large masses - (granite), the lower stratum being a coarse granite intermingled with pieces of quartz. OXLEY: p52.

Fortunately Oxley's gloomy opinion of this region did not deter the squatters in their westward drive. These squatters "concentrated for a time on the south, and, in a few years, dotted settlements all over the country from the old cedar huts of Illawarra to Lake George and the Lachlan." Roberts: "Squatting Age in Australia" p.3. The Lachlan formed the boundary of the Nineteen Counties. By 1835, the thick black line of the Nineteen Counties remained as solid as ever on the map as the legal limit of settlement, but, actually it had been crossed in all directions." Roberts p5.

Oxley had first explored the Bland in 1817 when he camped for a considerable time near the Weddin Mountains. He tried to explore the Bland Creek but was only able to go as far as Euroka where he was blocked by water. There was so much water about that he considered he had discovered an inland sea and marked his name on a tree at the edge of the water. This tree stood for many years until an unimaginative Free Settler chopped it down and burned it. What Oxley considered as an inland sea was merely the backed up waters of the Lachlan River and Lake Cowal which had filled up the Bland Creek and spread across the plains.

Major Thomas Mitchell (later Sir Thomas) the next Surveyor General of New South Wales set out in 1826 to further explore the Bland country which he called "The Levels". He got as far as where the Bland Road joins Curraburrama and Bland Stations. He camped in a belt of timber halfway between these two stations at a place called Major's Point. He was forced back, as Oxley had been, because of a Lachlan flood which he thought was an inland sea.

The first settlers in the neighbourhood of Wyalong seem to have been a family of Gibson Brothers who took up a run near the Bland in 1833 and Mr Glass who settled on the Bland in 1834. Some of the early settlers were Mr Oakes (Back Creek) - 1835; Mr Myles at Morangorell in 1836 and who sold to Donald McGregor in 1843. John Bray from Crookwell opened Narraburrah in 1836 and Horatio Roberts and Wade also from Crookwell opened Carrumbee in 1836. They sold to John Shourd and John Mason in 1840. Abel Burke opened Bland Creek in 1838 and in the same year John Levitt took up a station near Grogan. He sold to Thomas Burrett of Wentworth Falls in 1839. Moses Beard opened up a run on the Bland Creek opposite Abel Burke in 1840. John Trott opened the Billabong in 1842 and sold it to James Marsden in 1852.

Following the squatting and occupational period of the first settlers who took up pastoral runs about 1842, there came a secondary wave of pioneers, bringing with them their wives

and families. Apart from the pastoral stations very little settlement had taken place within the Wyalong district prior to 1885.

John Rodd had taken up Billabong Pastoral Run in 1842. The Billabong Run extended through Mallee Plains to the area where the twin towns of Wyalong and West Wyalong were later established. Rodd later sold to James Marsden in 1852. The Government Gazette of New South Wales, 1842, included the following lessees in the Lachlan Distict No 6:

No 3	Lessee	William Atkins	Run Cowal	16000 acres
No 129	Lessee	John Rodd	Run Caragabal	26880 acres
No 130	Lessee	John Rodd	Run Billabong	40000 acres
No 149	Lessee	Levi Stonestreet	Run Tregalona	25600 acres

In 1849, two years after the Waste Lands Act was passed allowing squatters to take up Runs we find the following names:

Cartwright	John	Barmedman Run	36000 acres
Burke	Abel	Back Creek	28400 acres
Gibson	Alice	Bland	44800 acres
Rodd	John	Billabong	40000 acres
Stonestreet	Levi	Tregalana	25600 acres
Walton	John	Bland	100 square miles
Atkins	William	Cowal	16000 acres

In 1852 John Regan, brother of Denis Regan who had married Sarah Musgrave commenced exploring back country for station property. In a few years he had caused much of the country to be opened up and shifted the location of the outback from Young to what is now Wyalong. On one occasion John Regan set off with a Mr Wood and after passing the Billabong came to another creek. Their tethered horses wandered off and after finding them had difficulty in finding their camp again. They called the creek 'Humbug' and this simple expression showed the feeling of the two men towards the creek that had so long deluded them.

Mr Wood was impressed with the land and sent Mr Walsh as overseer to take possession of the run until he (Wood) was able to occupy it. Walsh entered into partnership with Wood and called the station Merrengreen and stocked it with cattle and horses. This was the farthest outback station in south west New South Wales. In 1859 Thomas and James White explored Humbug Creek, taking up land which they called Ballangama. Mr Woodhouse took up Hiawatha and Thomas and Abraham Wood set up on the Humbug Creek calling their station Wallandry.

The next land explored by John Regan was the Merool now known as Wyalong. The first man on the Merool was an American negro named Sims and known as Black Sims. He took up Coonaparra run in 1859 and was in possession two years before another settler came to the district. His run

reverted to the Crown when he was arrested for cattle stealing and sentenced to ten years imprisonment.

In 1861 William Marshall acquired a large area on The Merool and called it Buddigower and in the same year George Harman took up Quondarry. Moses Beard late of the Bland took up land on the Merool calling the station Merool Creek. Samuel Pawsey of Mandamah was followed by Hamilton Hume, nephew of the explorer at Mandamah West.

By the Land Act 1884 called the Subdivision of Runs Act, the old Runs were converted into Pastoral Holdings. Thus we find that Lake Cowal No 701 includes the Clear Ridges, Lower Billabong, Billabong Back and Wombine Runs.

The first major area to be alienated from the original Lake Cowal Run was proclaimed in 1885 as Lake Cowal No 162. The secondary Lake Cowal Station was acquired by John Bloyd Donkin and was situated on the eastern side of Bland Creek, downstream from Marsdens. The homestead was near Fishermans Bend where the Bland Creek turns north-west to empty into Lake Cowal. A number of smaller holdings were taken up in the Lake Cowal area, along the perimeter extending from Wamboyne through Billys Lookout to Clear Ridge. In the Marsdens district the smaller holdings were mainly situated between the village and the Booberoi Hills fronting the road to Wyalong.

The land upon which the town of Wyalong now stands was formerly part of Camping Reserve 6387, Parish of Mugga, County of Bland, within the leasehold area of Billabong Holding No 61 held in 1889 by Henry Ricketson and also part of Wyolong (Wyalong) Resumed area No 410. Prior to this the Leasehold area was part of Mugga Swamp Run held in 1866 by McIntosh and Oakes and by H. Ricketson in 1879. The Resumed area part of Upper Wyolong (Wyalong) No 1 Run was held in the same year by E.A. Phillips and P. Besnard and 1879 by J. Cox and M. Callaghan. The present location of West Wyalong lies wholly in the latter run only. HANSON: 1889

There was hardly any other settlement in this locality until 1889. In this year we find the names of holders of Conditional Leases or Conditional Purchases taken up a few miles north and north west of the present township of West Wyalong. The holders were as follows: William, Robert and Elizabeth Gagie, Wilfred Wells Jnr, and William Lange. Then followed in the early nineties a little to the south, John and Phillip Bolte, Donald Rankin and Phillip Ryan. G.W. Neeld came in 1893 and became an important figure in the history of the district.

The gradual falling off of the goldfield did not mean the doom of the two townships as witnessed in other townships for it was found as far back as 1898 that the district was

most suitable for agricultural pursuits and particularly wheat growing. It was evident that wheat growing had become established by 1900 because the estimated area under wheat in the Wyalong district in that year was 11900 acres with an expected yield of 12 bushels to the acre.

At the turn of the century the principal properties in the Lake Cowal area were:

LAUREL PARK: taken up in 1885 by Patrick and Thomas Frost, comprised an area of 4960 acres and was situated on the southern side of Wamboyne Hill. Frost Brothers sold to Henry Buttenshaw in March, 1898 for 17/6 per acre including 3000 well bred sheep.

LAKE COWAL WEST: adjoined the southern side of Laurel Park and was acqired by Frank Allen. It comprised of 8000 acres. Allen sold to Beaufroy Green. After a series of misfortunes, including the homestead being gutted by fire, Green sold to Key Perry. Perry did not reside on the property, but placed it under the management of William McNair, who had come to Billys Lookout in 1885. Lake Cowal West was sold in the 1920's to William J. Hammond who took up residence with his only son Roy and three younger daughters. The property was subdivided in the late 1920's following the death of William Hammond.

LAKESIDE: Taken up by James H. Palmer, comprised of 4000 acres. Palmer sold to William S. English in 1907 for 10/- an acre. English renamed the property "Weelona".

LAKE VIEW: selected by Charles West in 1888.

PINE GROVE: 2400 acres, selected by Henry Thomas Broadribb in 1887.

HILLSIDE: 800 acres, situated on the eastern side of Billys Lookout was taken up by Moses (Harry) Fleming who was employed on Lake Cowal.

CORRAN: selected by Samuel Stewart and situated opposite Fellmans and Weelona and fronting the Billys Lookout Road.

ELLERSLIE: joined Flemings block and a forest lease on the northern boundary, on the west by Girdlers Tank lease and fronting the road leading to the Marsdens-Wyalong Road.

MILLY MILLY: selected by Roderick Charles McDonell and comprised 3000 acres. It was proclaimed as a settlement lease area on 23 January 1904.

CALOOLA: taken up by Mr Rawsthorne, followed by James Hay, and Steve Vinecombe. In 1922 it was acquired by Charles Wilson (second son of Samuel Wilson). It was purchased by

Thomas J. Wilson (no relation to Charles) in 1926. Caloola was proclaimed as a settlement lease area on 27 July, 1895 for an annual rental of £40.

Later the forest area between Harry Flemings and Ellerslie was taken up by Samuel Pellow.

Two small blocks were taken up at Billys Lookout by Victor Beazley and Mervyn Whiley. Portion of Beazley's block was situated where Billys Lookout village had been.

GOLD MINING.

Gold occurs in many types of rock in the form of lodes, veins and impregnations, the breaking up of which form surface and alluvial deposits. Pure gold is seldom found in nature; silver, copper, iron, platinum and other metals are found with it.

The geology of Wyalong is difficult to describe, because with the exception of a few widely separated low elevations such as the old hospital hill, standing at the N.E. of Wyalong and Pine Hill and Pine Ridge, the underlying rocks are nowhere visible at the surface.

The underlying beds are concealed by an overcovering of Post Tertiary accumulations of several feet of red soil, so that the geologist must make his observations by an examination of the surface soil or by the use of shafts made by miners in prospecting. The difficulty was increased in the case of Wyalong because of the lack of knowledge of geology of the surrounding districts.

In 1899. the Government Geologist, Mr E.F. Pittman reported that the Wyalong goldfield had been developed so vigorously that it was then the most productive in the Colony. He went on to say: " The altitude of Wyalong is almost 800 feet above sea level, and I think that there must have been during the Tertiary period, well-defined channels through which the drainage of this elevated district found its way to the sea, or to the Tertiary basin, or lake (at least 900 feet thick), which exists near the junction of the Murray and Darling Rivers. In these drainage channels the gold derived from the denudation of the auriferous reefs must have been concentrated."

In the frenzied search for gold in the first years of the goldfield at Wyalong, reports came in of discoveries in the surrounding areas. These included Yalgogrin, Buddigower, Billys Lookout, Hiawatha and Blow Clear and areas in closer proximity to the diggings. Gold was discovered at Hiawatha on Portions 10 and 12 on Good Friday, 1898 by Conway and Ryan and it was traced to the adjoining crown lands. All the

reef at Hiawatha were in granite, which seemed to occupy a large portion of the surrounding country and seemed to be continuous with the Wyalong mass. The reefs struck east and west and dipped to the north in contrast to the Wyalong reefs, which had a general north south trend.

In the neighbourhood of Wyalong, there are roughly two main geological areas which can be readily be distinguished and their boundary line approximately known. The larger of these is occupied solely by granite and it is in this area which possibly contains rocks of much greater age than the granite, is occupied by highly altered sedimentary strata and igneous rocks of intrusive character. J.WATT: "Report on Wyalong Goldfield" p10. The granite extends for miles in a northerly and probably continues without break to Hiawatha - a distance of 8 miles north west from Wyalong. Auriferous reefs have been discovered at Hiawatha. The granite also extends south as well as west to Yalgogrin.

Almost the whole area of the goldfields is occupied by loosely aggregated sandy and clayey materials which are largely the result of the decomposition and disintegration in situ of the underlying granites and diorites. The red colour of the deposits is probably due to the presence of oxide of iron. The iron oxide itself is derived from the biotite and hornblende present in the granite. The decomposition of these minerals sets free the oxide of iron.

The red colour of the surface soils in dry regions such as Wyalong is more characteristic than in most regions for in this latter region "the decaying organic matter has a bleaching effect due to the reduction of the ferric oxide and its partial removal in a soluble form. Part of the oxide of iron has separated out in the form of small ironstone concretions which present rounded pseudo-water-worn appearance due to their mode of origin." J. WATT p. 12

"In the absence of well marked outcrops it was the presence of these fragments that led to the discovery of gold at Wyalong." J. WATT p1. Small rounded particles of quartz were noticeable on the small Mallee flat which extends between the township of Wyalong and Pine Ridge. Although during heavy rain, water evidently flows over this flat, there does not seem to be any depth of deposit there or any accumulation of gravel but the loose rounded stones are weathered irregularly over the surface and through the red soil.

The gold present in the Wyalong goldfield was so fine that it was not readily detected except by aid of a lens.

Mr Neeld Snr had joined his sons, who had come to Wyalong previously. He selected a piece of land and was preparing to use it in the normal way. The ironstone nodules had

naturally attracted his attention because he had experience in the Ballarat and Bendigo goldfields and also in Fiji. The first gold was found in quartz on the Pioneer Claim reef. While Mr Neeld Snr was prospecting the first claim one of his sons located gold-bearing stones just outside the selection and about 10 chains to the east of the former site. The reef from which these stones came was soon located and was afterwards known as the Dead Rabbit Claim and later still as the Easter Gift. Work was considerably impeded by the thick mallee scrub.

The third discovery was made by Harry Neeld on Klink's line of reef and was known as Harry's Find. It remained in the Neeld family and paid large dividends. Discoveries were made on sites known afterwards as Red Flag and the Currajong Mine, but no prospecting was done there. The most important discovery was made towards the end of October when some of the sons discovered gold-bearing rocks in the vicinity of what was known as the Prospecting Claim.

The family decided to peg out claims on 16 December, 1893; firstly the Prospecting Claim, then Harry's Find and thirdly the Pioneer Claim, fourthly the Christmas Gift and lastly The Dead Rabbit. J. WATT: p6.

Men began to arrive from the day the gold was reported and by the end of January 1894 there were about 500 men on the goldfield. It was not until the following March, when the first parcels of ore were crushed at Barmedman and good results shown, that the big rush took place and by the end of that month 10000 had arrived on the goldfield.

The fact that the field was worked so successfully was in no small measure due to the character of the ground, which over all parts of the goldfield could be worked with pick and shovel alone down to at least 150 feet. This made the sinking of shafts very inexpensive. As J. Watt observed (p 7): "As a consequence of this many of the reefs have been profitably worked which, had the ground been hard, would certainly have been abandoned."

By the end of 1894 there were six crushing machines at Wyalong, but these were reduced to four and two chlorination works erected when it was recognised that chlorination was the most suitable process for the treatment of rich ore.

In 1894 the following crushings took place at Barmedman and show varying rich ore:

	Tons	yielded	oz.	dwt	grs.
Neeld	13	"	6	4	.
Cassin	12½	"	9	3	.
Neeld No 2	17	"	72	16	.
Perry & Party	17	"	42	18	.
Conway " "	22	"	103	5	.

Keeth	"	"	28¼	"	67 . .
Fraser	"	"	10½	"	39 6 .
Gorman	"	"	37	"	77 12 .
Smith	"	"	6	"	8 14 .
McMahon	"	"	4	"	10 . .
Lawry	"	"	14¼	"	14 18 .

The greatest drawback to the development of the Wyalong goldfield was the scarcity of water and as there were no large watercourses in the vicinity, the warden had to set aside tanks and have races excavated.

One of the outstanding differences of this goldfield from others in Australia was the almost complete absence of alluvial gold. "The existence of so many rich veins at the surface makes it extremely probable that these veins have suffered denudation to some extent. Had the other circumstances been favourable alluvial deposits would have been formed. In the absence of these deposits we must therefore conclude they have not been so." J. WATT p. 14.
The unfavourable circumstances are:
a. the absence of hills and gullies in this flat country, where natural sluicing operations could take place.
b. The small of rain is another big factor.
c. The extremely fine state of the gold set free would mean that it would be scattered by the action of the wind and rain storms so prevalent in these regions.

As to the question why was this goldfield so long undiscovered, it may be pointed out that this was due to:
i. The absence of alluvial deposits, already explained above.
ii. The level nature of the ground with its almost universal covering of red soil.
iii. The absence of fresh water.
iv. The sparsely settled condition of the surrounding country, and
v. The very fine condition of the gold.

During 1895 the claims were steadily developed although there was some falling off of population, due to the discovery of gold elsewhere in Australia. The scarcity of water retarded an even greater development because water was very necessary in crushing operations. Coupled with this was the refractory nature of the ore from below water level. These factors tended to keep down returns. However it was established that the reefs were payable below water level.

The following is a list of mine depths in 1895:

Hildebrands	245 ft	White Reef	185 ft
Hidden Treasure	225	Barrier	180
Pressers	210	Bantam	170
Bolte's	193	Currajong	160
Snowden & Party	185	Welcome Stranger	150.

White Reef, Currajong, and Welcome Stranger gave splendid returns.

During 1895 the new large battery of Nicholas and Raymond commenced work and was in constant use. Climo and Co also erected large works at a cost of £8000 for the treatment of tailings. The number of miners engaged was 8600, 500 less than the year before but the Report of the Department of Mines, 1895, hastens to add that the figures would rise again as several mines intended putting on more men.

The record year was reached in 1897 when 34750 oz were obtained. In that year "Wyalong produced more gold than any other mining division in the Colony." J.WATT: p7.

The Wyalong "Argus", dated January 5, 1898 in its editorial was justly proud that "no outside capital had yet come into the Wyalong field....."

In 1900 there was drop in the yield on the Wyalong goldfield because the mines were treating low grade ores which had been accumulating. The number of miners which had been 1600 in 1899 dropped to 1200 in 1900. In 1907 the number of miners fell to 462 and by 1910 only 150 men were employed on the goldfield.

The gold yields for each of the years of production were as follows:

1895	15634 tons of stone yielded	24497 ounces of gold
1896		
1897	30750	33900
1898	30940	34582
1899	15116	44675
1900	22387	32425
1905	10555	24708
1910		9000
1915		3800

1920 - The yield had practically ceased.

In 1920 the Department of Mines Report stated that "Gold mining has almost ceased in this division." Thus a most important period in the history of Wyalong came to an end. Anyone interested in the progress of Wyalong during the first quarter century must have rejoiced that Wyalong had indeed found its staple, not the golden metal, but the golden grain.

Gold had been found in the Wyalong district long before it was found in Wyalong itself, in such places as Temora (or Bakers) 1879, Barmedman 1882, and later Reefton in 1895.

Before finishing the history of the Wyalong Goldfield we pause to remember the tragedy of the Barrier Mine disaster which took place on Saturday, 13 January, 1912, when five

miner lost their lives, through an inrush of carbon dioxide gas. Those who died were Frank McGuire, Jack Mulhall, Bert Navin, Jack Navin, and Rupert Nicholson.

Because of the conditions at the "Main Camp" (White Tank) the establishment of a township was considered to be an urgent necessity. Surveyor J. Richmond was given instructions in February, only two months after the discovery of gold to lay out a township for the new goldfield. He selected a site about one and three quarter miles east of the Main Camp. His reasons for selecting this site so far from the mining field were that: "It was necessary to keep off the area of the gold deposits; its suitability from a sanitary viewpoint; its proximity to the main Barmedman Road and its generally healthy location." Richmond completed the survey of the first four sections by 6 March, but this was considered insufficient it was extended to fourteen sections.

The whole of the township of Wyalong proper is mainly situated on a farm selected by the Neeld family, while the town of West Wyalong is built on farms owned by George Bolte and John Ryan. The whole of the township of West Wyalong is built on the farm of John Ryan, while the northern boundary of George Bolte's property extended from about Paul Meagher's residence to Central Railway Station and south to include Pig Tank. The farms of Neeld, Bolte and Ryan were resumed by the Government for mining purposes.

Joining Bolte's property on the west, south and south-east were the farms of Con Ryan, Philip Bolte, John Bolte and Donald Rankin. On the northern side of the goldfield were Robert Gagie and Sons, William Lange, Jacob Haub, Christopher Haub, Niel Nielsen, Conrad Hildebrand, E.T. Clark, Jacob Rootes and Sons, Wilfred Wells and Donald Fraser.

Wyalong, the original name of the old run and Parish, was decided upon as the name of the new township after consultation with the Mining Wardens, who also approved the street names. Most of the streets bear the names of the pioneers of the field or officials connected with its early history.

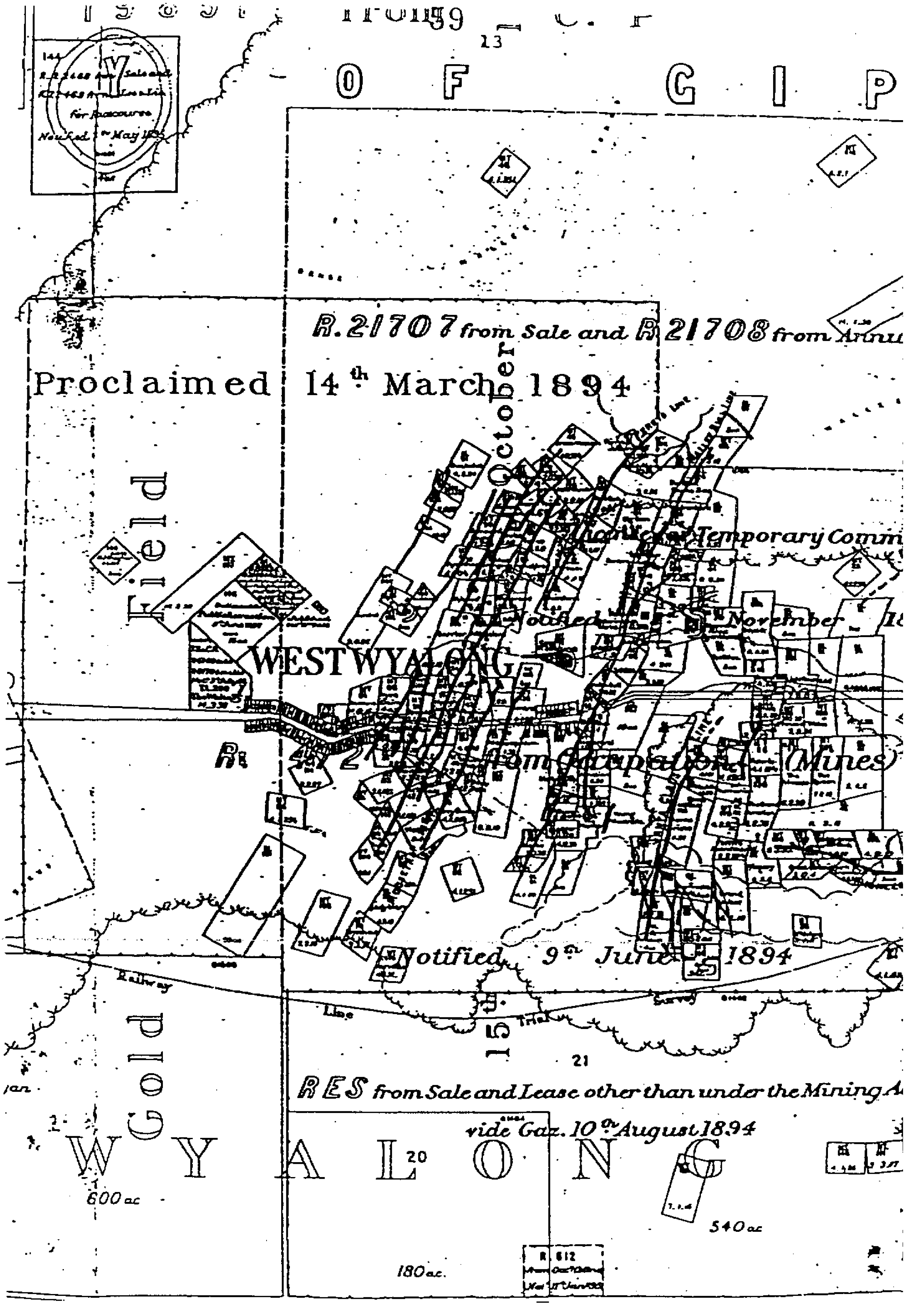
Early in March, 1894 there were no buildings whatever on the ground, but by 3 May, 120 to the value of £20 each had been erected. By the police returns the total population within 5 miles of Wyalong Courthouse, including both townships was, at the end of 1894, 4215 of which 3825 were males and 930 females, exclusive of children. Dept of MINES RECORD, 1894 p25. Wyalong was proclaimed a Village on 23 June, 1894 having obtained the necessary approval from Governor Duff on 19 June 1894.

The demand for alotments at West Wyalong continued, and the expected transfer of residential population or business activities from Main Camp to the Government Township did not occur. A huge population soon gathered round the White Tank "and notwithstanding my warning and advice an irregular narrow street was formed on the very quartz claims whereby the Main Camp or Wyalong West became an established fact". DEPT OF MINES REPORTS, 1894. p25. The warden was unable to lay a street 99 feet wide with cross streets of the same width in a position not likely to be auriferous, in accordance with allotments in the already surveyed town 2½ miles distant.

Finally, after much agitation Surveyor Richmond was instructed on 6 April, 1895 to survey the occupied area at West Wyalong (late Main Camp) and to prepare a design plan with the Main Street 66 feet wide.

The final survey of Main Street was carried out by Surveyor V.F. Tozer on 28 December, 1895 and the many irregularities and encroachments were at last straightened out.

The White Tank, an outpost of Wyalong No I Station and water supply for the goldfields in 1894.



OF GIP
R.21707 from Sale and R 21708 from Annu
Proclaimed 14th March 1894
October
Field
Temporary Comm
Notified
November
WESTWYALONG
R
from Occupation (Mines)
Notified 9th June 1894
Railway
Line
Trial
Survey
15
21
RES from Sale and Lease other than under the Mining A
vide Gaz. 10th August 1894
Gold
WYALONG
20
600 ac
540 ac
180 ac.
R 612

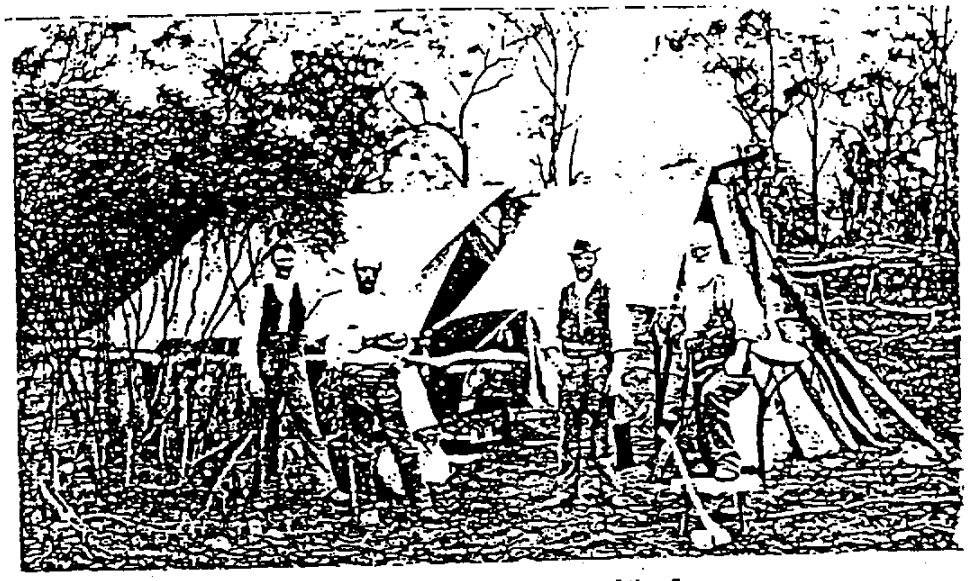
14.

RAINFALL

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot.
1895	0	54	2	77	57	144	101	160	100	187	8	123	1005
1896	83	413	86	81	158	56	0	92	92	50	173	7	1291
1901	0	0	2	175	62	91	151	336	57	275	16	6	1171
1902	28	14	167	0	16	66	108	99	81	142	96	321	1138
1903	5	0	91	231	141	120	144	127	409	167	81	95	1611
1904	346	25	77	73	155	52	422	69	17	312	55	280	1883
1905	94	31	89	409	183	280	244	72	133	277	18	46	1876
1906	8	52	385	110	277	169	74	215	436	313	243	65	2347
1907	147	47	155	73	11	160	147	158	95	107	166	168	1434
1908	70	223	7	151	48	151	122	197	212	63	58	94	1396
1909	97	160	254	95	207	322	39	184	83	45	30	77	1593
1910	486	0	229	26	82	298	135	60	153	113	174	164	1920
1911	440	237	139	14	191	95	133	13	193	21	235	376	2087
1912	12	104	62	10	2	234	464	265	102	79	83	231	1648
1913	167	211	382	5	290	159	31	36	84	169	48	134	1716
1914	120	104	263	58	85	100	69	3	62	54	295	122	1335
1915	27	265	1	25	221	139	157	178	106	137	14	204	1465
1916	146	3	62	239	66	330	239	333	240	232	209	220	2319
1917	425	187	101	31	150	193	235	273	184	292	454	166	2691
1918	483	97	165	143	109	161	84	280	80	84	86	13	1785
1919	34	238	94	41	258	24	14	70	49	73	14	233	1134
1920	60	32	204	97	10	340	197	210	224	104	153	380	2031
1921	159	216	102	226	242	344	41	117	122	172	22	307	2080
1922	95	30	0	142	102	102	150	74	183	94	0	302	1274
1923	76	0	27	11	81	585	222	79	155	214	58	288	1786
1924	71	418	26	119	116	187	146	268	197	54	679	118	2391
1925	362	81	28	5	390	256	145	94	31	77	218	79	1768
1926	75	0	479	297	171	196	91	149	101	65	8	48	1680
1927	181	6	27	118	113	128	72	96	303	330	136	62	1574
1928	505	833	475	154	60	150	191	55	39	77	17	11	2567
1929	4	87	181	167	58	179	15	125	220	33	155	149	1373
1930	18	42	52	89	120	165	131	167	33	404	154	290	1657
1931	131	27	413	309	641	546	129	68	129	40	137	402	2972
1932	4	102	141	295	106	132	135	228	285	59	75	95	1659
1933	280	8	72	26	87	114	187	71	189	128	282	309	1745
1934	149	358	91	142	8	137	292	177	69	376	355	129	2275
1935	203	129	23	269	16	93	202	59	119	191	19	65	1388
1936	286	261	210	38	84	252	329	134	88	83	23	309	2097
1937	164	1	163	31	120	155	22	166	84	121	88	93	1200
1938	191	101	34	259	59	245	153	254	24	354	99	19	1792
1939	7	441	377	343	29	329	117	251	54	165	421	21	2555
1940	21	0	8	482	22	14	33	44	179	0	31	209	1035
1941	453	206	139	19	64	110	90	35	75	70	49	105	1415
1942	65	146	27	18	313	335	115	130	113	124	566	107	2059
1943	198	53	24	205	197	93	113	116	130	289	214	4	1636
1944	43	16	238	57	155	21	37	182	17	152	152	49	1124
1945	192	148	50	64	78	224	49	148	17	95	67	63	1195
1946	145	428	78	32	49	82	62	32	10	49	148	317	1432
1947	0	107	177	70	107	95	239	132	180	142	335	423	2007
1948	225	435	86	196	103	400	24	102	77	107	141	41	1937
1949	41	112	326	80	181	113	167	25	134	336	108	202	1825
1950	242	488	548	151	103	194	273	97	259	407	199	47	3008
1951	103	89	0	98	155	129	139	150	182	99	69	28	1241
1952	17	18	302	520	302	338	139	140	122	399	161	174	2632
1953	145	152	8	106	175	70	33	197	213	338	189	21	1647
1954	540	180	3	125	18	166	31	148	83	185	359	223	2061
1955	60	491	136	63	431	156	218	227	103	465	112	98	2560
1956	363	271	777	502	294	322	374	173	100	327	63	71	3637
1957	32	162	46	64	13	93	251	148	20	67	54	184	1134
1958	81	62	224	111	219	102	219	229	163	231	73	70	1784
1959	8	236	423	234	51	74	195	35	104	228	50	51	1675
1960	215	58	35	77	271	30	243	246	292	73	216	160	1916
1961	105	17	62	382	23	160	282	244	60	289	373	336	2333
1962	936	97	47	26	250	73	145	239	63	159	85	217	2337
1963	241	152	212	89	344	225	174	87	146	137	119	366	2292
1964	42	21	22	433	117	126	108	117	242	241	28	61	1558
1965	0	1	0	199	98	104	62	174	55	262	236	452	1643
1966	12	49	227	38	173	62	146	257	181	195	190	344	1874
1967	39	8	122	2	74	197	4	170	49	155	0	0	820
1968	60	0	37	221	469	65	186	87	47	129	102	250	1653

WEST OF THE BLAND

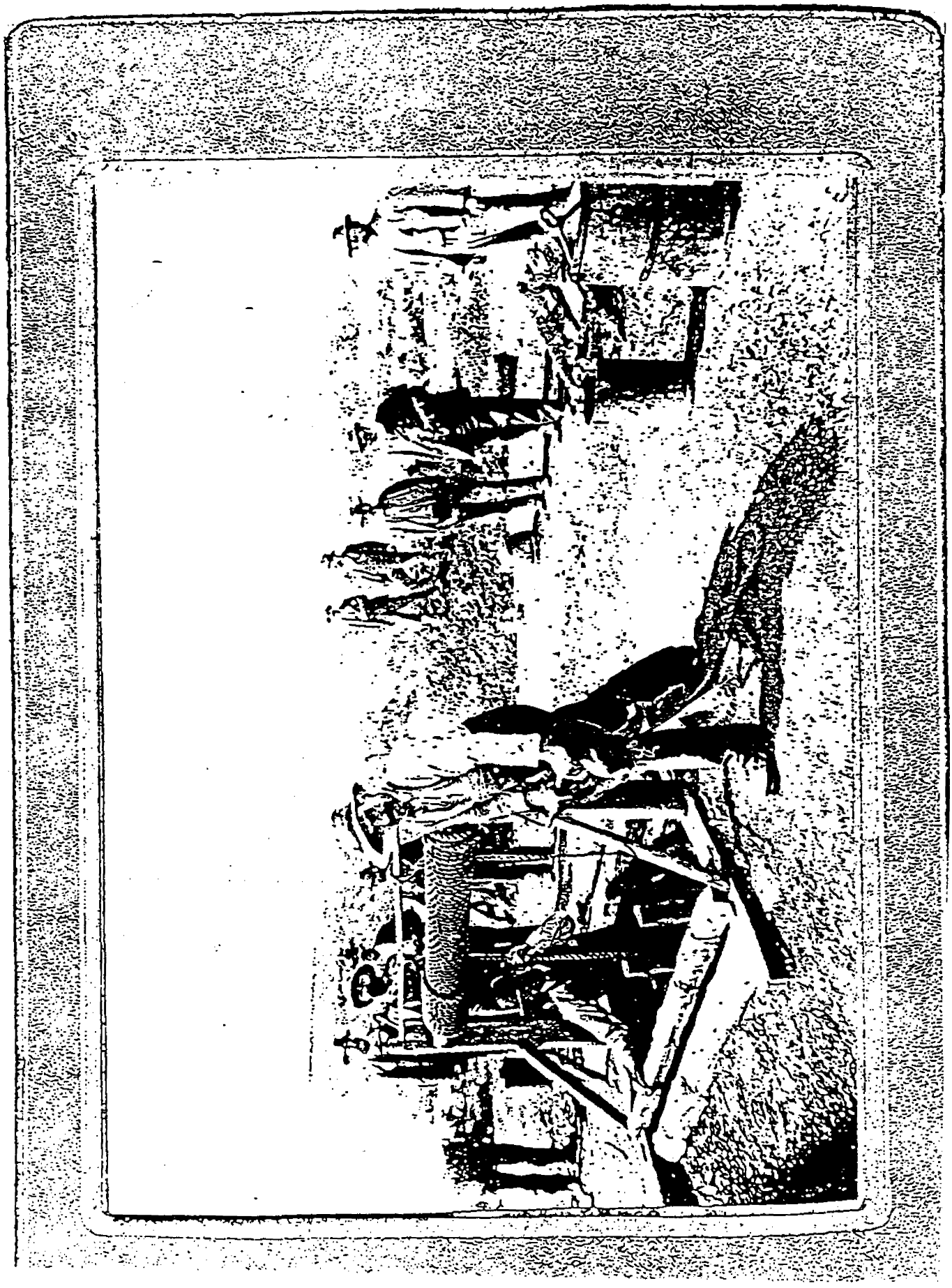
15.



Early Days of Wyalong "A Prospectors' Camp"

"A Peep into a Gold Mine."—In the 300-ft. Level, Neilly's Mine. A reef 13-ft. wide.

16.



17.

DEPARTMENT OF PUBLIC HEALTH, STATE OF NEW SOUTH WALES. Form No. 31a.

TYPHOID FEVER

TYPHOID FEVER is a preventable disease, the infection of which is always derived from a previous case of the same nature, though possibly a long interval of time may elapse between the occurrence of the first and of subsequent cases. The type of the disease may be mild or severe, but all cases are capable of imparting infection to others.

The infection is conveyed in the excreta of the typhoid patient (bowel discharges and urine), and any article contaminated by such excreta may serve as a vehicle of infection.

It is not known precisely how long the infectious material may retain its vitality and its power of doing harm, but there is reason to believe that under favourable circumstances, *e.g.*, in a cesspit or in some soils, this time may be many months, and possibly years.

The infection is most commonly distributed by food or drink, and may obtain access to these in a variety of ways. As examples, the following may be mentioned:—

Water in wells may be infected from adjacent leaky cesspits.

Milk and other foods may be infected through being handled by patients, or those in attendance on patients, or through the use of cans or vessels that have been washed in infected water.

Articles of food may be infected by dust or flies carrying minute particles of excreta that have been improperly disposed of.

PREVENTION.

TYPHOID FEVER is most prevalent, as a rule, in Summer and Autumn, and at these seasons especially every person should take precautions against infection.

Clean up all premises, and keep them clean and free from accumulations of dirt and rubbish which may shelter and foster the Typhoid microbes. Clean up closets and cesspits. If there is any suspicion that any closet or yard is already infected, disinfect it freely with Chloride of Lime solution.

Be careful that food and drink are not exposed to risk of infection. Boil all milk and all water before drinking. Guard food and drink as well as possible from dust and flies.

Every case of TYPHOID FEVER should be regarded as a possible source of danger, and special precautions should be taken to render harmless all excreta, and all articles in the least degree soiled with excreta, by DISINFECTION.

DISINFECTION may be accomplished either by heat or by chemicals.

I. Heat—Boiling is the most reliable domestic method of applying heat. Excreta and infected slop waters may be boiled in the open air with little or no nuisance if burning or charring of the substances be avoided. These matters are thus rendered non-infectious—a most important matter. Clothes also are readily disinfected by boiling.

II. CHEMICALS—(1.) For excreta (bowel discharges and urine) the following may be used:—

Chloride of Lime... ... 5 per cent. solution, made by mixing 1 lb. of fresh chloride of lime with 1 gallon of water.

Carbolic Acid ... ... 5 per cent. solution.

The chemical disinfectant must be in bulk equal to or greater than the amount of excreta to be disinfected, and must be intimately mixed with the excreta and remain in contact for at least one hour. The common practice of sprinkling on antiseptic so as merely to produce an odour of the chemical is of no value.

(2.) For clothing—Carbolic Acid in the above strength, the clothes to remain in soak for an hour.

ISOLATION.—Unless complete isolation and skilled nursing is obtainable at home every endeavour should be made to transfer the case to Hospital. This is advisable in the interests not only of the patient but also of other members of the household who run serious risk of becoming infected.

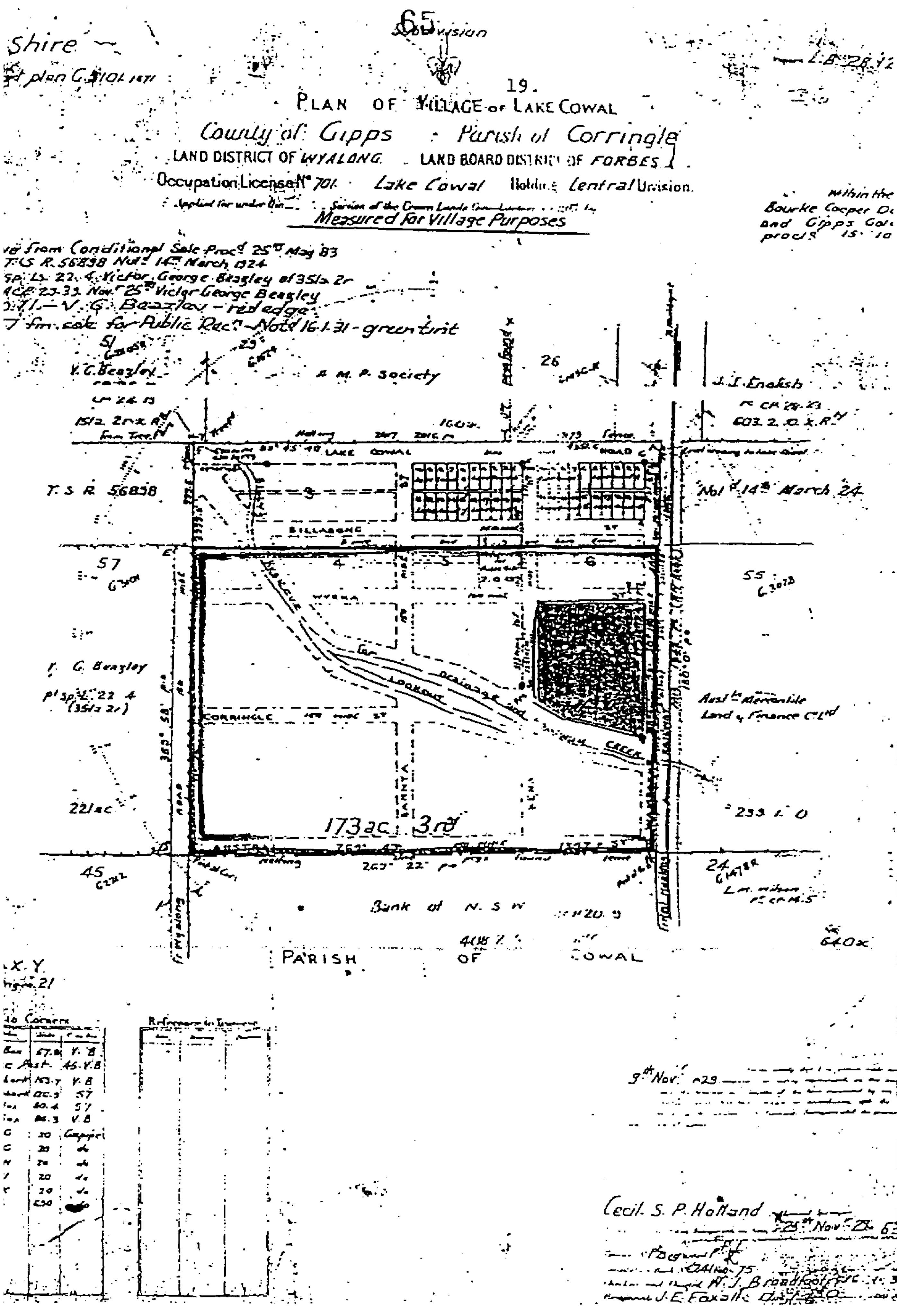
DISPOSAL OF EXCRETA.—Where a special pail is provided the excreta should be placed in this after disinfection by boiling or chemicals, and removed to the appointed depôt.

Where such a service is not available extreme care should be taken to thoroughly disinfect by boiling all excreta before disposing of them by burial.

On no account should infectious excreta be buried or cast out on any premises. This practice has frequently led to infection of other persons living on the same or even on neighbouring premises, and tends moreover to perpetuate the disease and cause a yearly recurrence in the Typhoid season.

Sydney, Sept. 7, 1903. (By Order) G. H. KING, Secretary.

77715



65
Subdivision
Shire
19.
PLAN OF VILLAGE OF LAKE COWAL
County of Gipps · Parish of Corringle
LAND DISTRICT OF WYALONG LAND BOARD DISTRICT OF FORBES
Occupation License No 701 Lake Cowal Holding Central Division.
Measured for Village Purposes
Within the Bourke Cooper ... and Gipps ... procs 15 10
T.S.R. 56838 Notd 14th March 1924
Victor George Beazley
Victor George Beazley
V.G. Beazley - red edge
for Public Rec. - Notd 16.1.31 - green tint
A. M. P. Society
J. J. English
T.S.R. 56838
Notd 14th March 24
LAKE COWAL ROAD
BILLABONG ST
WYRRA
LOOKOUT
DRAINAGE
CORRINGLE ST
CREEK
AUSTRAL ST
Austn Mercantile Land & Finance Co Ltd
V. G. Beazley
173ac 3rd
57
55
26
45
24
221ac
Bank of N.S.W
PARISH OF COWAL
640ac
9th Nov 29
Cecil S. P. Holland
25th Nov 29

A 271

20.

LAND BOARD OFFICE,

FORBES 25th March, 1953

TELEPHONE No. 17 P.O. Box 129

IN REPLY, ADDRESS: THE DISTRICT SURVEYOR AND GIVE THIS NUMBER

... REG. BNF.

L.B. 50-572.

T.J. Wilson Esq.,
"Caroola",
Clear Ridge,
via WYALONG.

Dear Sir,

Special Lease application 50-11 Wyalong has been lodged by V.G. Beazley over the red edged area on accompanying diagram which includes R. 62447 from sale for Public Recreation Notified 16th January, 1931- green tint on diagram.

It has been reported that together with yourself the following have been appointed trustees of such reserve on the dates indicated:-

Charles West, appointed 28-10-32.
Clive West " "
William Arthur Buttenshew "
Patrick Hetherington, 18- 9-36.

It is asked that you please advise the trustees' attitude to the proposed Special Lease application. A field officer of this Department has reported that the area has never been used for the notified purpose.

If possible any statement supplied should be signed by all of the trustees.

Yours faithfully,
C.E. ELPHINSTONE,
District Surveyor.
Per:

21.

LAKE COWAL.

The Geological Survey of New South Wales has very little data available relating to the geological history of Lake Cowal. Many speculative theories have been suggested as to what might have occurred during the centuries gone by. There has been no official theory as to how the large number of trees had grown to such proportions on the bed of the lake during some period of the past. The trees - mainly red gum - with well developed trunks and limbs, had been dead for a long period of time before white men first set foot in the area. The only logical conclusion that the Geological Survey can assume is that for a long time the waters held in the lake maintained a degree of purity, and later the water could have reached a level of salinity that the trees could not tolerate. This theory is only speculative, but most of the underground water in the catchment areas of the lake at a shallow level contains a high degree of salinity. The wet seasonal period of 1916-1917, when large volumes of water overflowed from the Lachlan River to Lake Cowal, provoked graziers concerned to bank off the low lying areas along the river to prevent flooding of their properties. Very little water has flowed to the lake from the river since that period. Major volumes of flood waters flow to the southern end of Lake Cowal from extensive catchment areas from which the principal flow is carried by Bland Creek. The upper reaches of the Bland Creek extend to the foothills of the Nimdooran Range, which is situated southwest of the town of Cootamundra.

Other creeks that empty into Lake Cowal are the Barmedman, Back and Duck Creeks. The upper reaches of the Barmedman Creek extend to southwest of the Barmedman township. The Duck Creek rises west of the town of Temora and continues along the eastern foothills of the Tungley ranges, joining the Barmedman and Back Creeks at a point four miles upstream from the Wyalong-Quandialla Road. From ther the creek becomes Back Creek which empties into the Bland Creek in the vicinity of the former village of Marsden.

The flood waters that flow from the localities on the southern and south western side of Wyalong-Barmedman Road all converge into Back Creek in the vicinity of the Wyalong-Quandialla Road. From the areas north of Wyalong and Mallee Plains the waters meet Back Creek near the crossing on the Back Creek Road. The waters from Clear Ridge, mainly by way of Clear Ridge (or Sandy) Creek, run directly to the southern end of Lake Cowal near the station homestead.

From the eastern areas, mainly from Piney Range near the west side of Weddin Mountain and the Caragabal district, flood waters run directly to the lake, principally through the Marsden area.. The run-off from theses extensive areas

all move northwards towards their natural basin - which is Lake Cowal. The natural fall of the terrain still continues on down the Lachlan to the Murrumbidgee River. From there it continues to the Murray River and thences to the South Australian coast near Murray Bridge. The waters from the Bland can really flow a long, long way.

The main bed of Lake Cowal comprises an area of approximately 90 square miles. Lying north to south, the length of the bed is about 16 miles, with an average width from five to six miles.

During the period 1916-1917, large numbers of water birds and fowl flocked to the lake. Thousands of the various species of wild ducks and large numbers of black swans, pelicans, gulls - including sea gulls, cranes and numerous varieties of smaller birds. The dry trees in the waters of the lake provided excellent perches for the birds. It was during this period that Lake Cowal was declared a bird sanctuary. No open season for the shooting of birds was allowed. The declaration of the sanctuary became a controversial subject, especially when two years later, the waters of the lake were rapidly drying up again.

REPORT OF BRAMHOPE LAKE BLOCK - 3237 ACRES.
1946-1991.

1946 Dry. Useful grazing in summer and early autumn, but cut out badly in winter.

1947 Useful grazing, with small floods, about ½ country covered in December.

1948 Good grazing, summer and autumn, about 2/3 covered in June - receding at end of year with excellent grazing. Some fence repairs.

1949 Good grazing, about ½ full of water in spring.

1950 Country inundated to highest flood level in March.

1951 Only a little grazing along fringe of water.

1952 Flood level again in April.

1953 Still 2/3 covered at end of year.

1954 Small flood early in year, but only about ½ covered at end of year.

1955 Quite a few miles of fence renewed. Flood rains again in March, covering most of the country.

1956 Filled to record level again in April.

1957 Only fringe benefits, ¼ full at end of year.

1958 Useful grazing, water receding fast in summer, and country inclined to scald.

1959 About ¼ covered in March, water getting away quickly by end of the year.

1960 Completely dry and refenced by end of autumn. completely covered by water again in August.

1961 Not much use. Some grazing in summer.

1962 Filled again in January. No use through winter.

1963 Filled again in winter.

1964 Some flooding in spring, practically covering all the country.

1965 Useful grazing in spring with water getting away.

1966 All dry and fenced by end of autumn. Complete renewal of fencing. Splendid grazing.

1967 Good all year.

1968 About 500 to 600 acres flooded in June with further flooding in August - covering about ½ the country. Good grazing on flooded country in summer.

1969 Started to flood in March and continued till it filled completely in June.

1970 Had not receded much and filled again in June from Bland Creek.

1971 Not much use throughout the year.

1972 Water started to move back in dry spring, with cross fence dry and back to Channel near lignum by end of year.

1973 Lake useful in autumn and winter and a bit too good in spring with terrific growth of trefoil. Country about ½ covered but wet conditions in November covered most of it and forced us to shift sheep.

1974 Gradually filled right up and running out Manna Creek 2/8/74.

1975 Still flooded and more flood rains in October caused river water to overflow Lake and run Manna Creek early November.

1976 Manna Creek again a banker after flood rains in January. River water again reached lake in spring running Manna Creek with small flow - dry at end of year, but lake virtually full.

1977 Not much use, but back to cross fence in lignum by end of year with some restricted grazing.

1978 Lake promising but big winter rains again flooded big Lake with small overflow to little lake early October.

1979 Not much except fringe benefits, but back to cross fence at end of year and receding fast in dry conditions.

1980 Water getting away fast with disappointing results. European Carp? salting? or just dry weather and the result of continued flooding. Good results from Wimmera Rye sown by air and Bolte grew a splendid crop of wheat. Big stocking in lignum. Lake dry and fenced early December. Silting tanks.

1981 High stocking rates and dry conditions took toll and lake not carrying many stock through autumn. Approx. 600 acres grain sown Deepwater sump and nicely away when minor flood in July took water to Bolte's fence and ruined the crop. Wimmera Rye responded well, also barley grass, but large numbers again carried till end of year. Lignum paddock dry and Deepwater almost dry by end of year. Most of the country scalded except where cane grass growing thicker than ever.

1982 Lake running fair number of sheep early in year - mainly on dry Wimmera Rye grass. Flash local flooding after big rains in March caused water to reach Bolte's and presented problems and arduous work in getting out with minimal losses. Big numbers in Spring and lake completely dry by end of November.

1983 Local storm early January flooded approx. 800 acres Deepwater and Plain, with minor flooding in Lignum. Splendid response from couch grass, a great relief under extreme drought conditions with about 4000 sheep on Bramhope. With winter rains water into Bolte's by August and almost to Roy Woods' end October.

1984 Big summer rains early in year with local and Bland flooding caused the big lake to overflow about 1st February and running out Manna Creek by 11th February. Of no use for most of year. Little lake also full.

1985 Big Lake of very little use for year with a fresh towards end of year, virtually filling big Lake again. Little Lake quite useful, especially W.J.'s and drying fast.

1986 Water receded quickly in Little Lake, with good stocking rates. Also allowed opportunity crop to be sown with tremendous results. A fresh in Big Lake during the winter spoilt hopes of useful spring, but water getting away fast at end of year and becoming useful. For the record we lost about 70 of Mrs B.'s wethers in long paddock (Narara) due to poison attributed to algae in water.

1987 Bland Creek had run during year but minimal effect on Lake. Some light fringe grazing in late spring and water well back by end of the year.

1888 Lake dry by end of March but with lack of any showers no response of feed on deeper country. Fair amount of crop sown, but it did not survive a fresh in Lake which put the water into Bolte's. Good grazing.

1989 Lake dried out early in year and preparations made for sowing but water won the race. Turned very wet, with some flooding from River in early winter, with Lake about half full.

1990 Flood rains in autumn with the Lake overflowing from Bland and River waters and running out Manna Creek by about 1st May. Ceased running about end of the year.

1991 Little Lake almost dry by end of year, but big Lake had not receded much, except fringe benefits late spring and early summer.

LAKE COWAL - AN EPHEMERAL LAKE.

Lake Cowal is a natural depression approximately 14,600 ha in area. It is approximately 26 kms in length and averages 6 to 7 kms in breadth. The Lake is formed of two portions separated by a low saddle and a hill known as Bogeys Island. The northern and smaller portion is known as Nerang Cowal (or the Little Lake) and the larger and deeper southern section is called Lake Cowal.

Inflows to Lake Cowal occur due to flood waters which escape from the Lachlan River downstream of Jemalong Gap and Wyldes Plains Irrigation District. These inflows enter Lake Cowal immediately south of Bogeys Island. Additionally inflows occur from Bland Creek, which enters the Lake at its southern extremity.

Overflows from the Lake system discharge over a bar located at the northern end of Nerang Cowal and flow down Manna Creek and thence via Bogandillon Swamp, Wallamundry and Wallaroi Creeks to the Lachlan River.

When filled to capacity up to the level of the northern outlet bar, the total volume of water stored in both Lakes is about 194,000 ML of which 162,000 ML is retained in Lake Cowal at a maximum water depth of 4.2 metres. The remaining 32,000 ML is stored in Nerang Cowal at a depth of about 1.5 metres. At capacity storage, the surface area of Lake Cowal and Nerang Cowal is 10,800 ha and 3,800 respectively.

The Lake area is owned by private landholders under freehold tenure. The Shires of Jemalong, Weddin and Bland meet in the centre of the Lake. The area is fenced, including lands that become submerged and it is used for cropping and grazing as flood waters recede.

Once filled to capacity the Lake takes from 2 to 3 years to empty by evaporation and seepage, provided that no further inflows occur. During this period, wind driven waves often cause temporary inundation of land recently exposed by evaporation thus creating a natural irrigation, watering and improving the abundant growth of valued pasture for grazing.

Records of flooding from the Lachlan River and Bland Creek commence in 1870. However most of this data is scanty and open to differences of opinion, consequently the flooding history of Lake Cowal is not altogether clear. Studies show that the Lake was dry between 1904 and 1931. A series of floods in the Lachlan brought water into Lake Cowal for periods between 1950 and 1960 and a substantial portion of the Lake was dry between 1967 - 68 and 1984 - 1988. More recently Lake Cowal has filled in 1990 and 1993.

Whilst Bland Creek floods can occur independently of , or in conjunction with, flooding in the Lachlan, Lake Cowal is most commonly filled by inflows from floods in the Lachlan. Flood events in Bland Creek alone are rarely of sufficient significance to fill Lake Cowal or Nerang Cowal and carry

The aoove data would indicate that over the years mans intervention has altered the character of the Lake, clearing the land for farming, building dams - irrigation, levies to protect some areas from flood with little consideration being given to the resulting effect on neighbouring properties resulting in many landholders feeling that they have been disadvantaged due to the flood protection being received by others. Now however an awareness of damage to self and others is making people look to their farming practices and accept that any action which either diverts water to neighbouring land, or increases the volume of water in neighbouring locations is unacceptable.

With few exceptions the land around the Lake has been owned continuously and successfully managed by the same families for three and four generations creating , within those groups a valuable knowledge of successful farming and grazing practise and a deep attachment to the very unique area in which they live. While, in this dry continent water is a valued asset to the farmer it also provides an aesthetic value to those who are fortunate to live in the area. It is interesting to note that early settlers, where possible, built their homes near water and many farmers dwelling near Lake Cowal, the Creeks and surrounding area benefit from this. What could be more beautiful than the moon making a silver path across the water or an early morning sunrise and in dry times the view of an abundant crop or fattening stock.

Flora and Fauna too numerous to mention abound in the area and create a constant fascination to all who are interested in observing nature. It is one of the most significant waterbird concentration areas in NSW. It is an important site for migratory birds and contains a diverse breeding waterfowl population of 79 species, numerous other birds are found there and several rare and endangered species are known to inhabit and breed in the Lake.

It is important to note that it is essential that the Lake has its dry periods, for when the Lake dries up, vegetation grows-the land is used for farming and grazing -native animals appear, then the Lake floods and a rich biological explosion occurs -food is plentiful - aquatic life is generated and birds appear. It can also be noted by those familiar with the area that bird numbers are greater when the bed of the Lake is only partly submerged, they enjoy" - pottering about" the shallow water.

Lake Cowal supports commercial fishing based mainly on golden perch, redfin, and yabbies. The wetlands are a popular site for duck hunting (though not all landowners are sympathetic to this activity). A reserve on the western side administered by the National Parks and Wildlife Service allows public access to the Lake.

The major enterprises on the dryland area are sheep and cattle grazing and cropping of winter cereals such as wheat, oats and barley. The wetland areas are grazed and cropped opportunistically as moisture and market conditions permit.

productive than the surrounding dry lands for several years after flood recession. High crop yields can often be obtained from recently flooded land and an abundance of stock feed can provide ideal conditions for grazing stock. It can be noted that farmers cropping the wetland areas run the risk of inundation by flood before harvest - this has been particularly noted since 1950 - however the excellent return can make the gamble worth the risk. Grazing is of course more reliable and of value to landholders particularly in times of drought when an abundance of feed grows as water recedes, the necessity of storing large quantities of fodder for dry times is not so great when the bed of the Lake is available for grazing. Lake Cowal is known as some of the most productive agricultural land in the state.

In 1992 Lake Cowal was listed on the Register of the National Estate.

Comment about Lake Cowal would not be complete without some reference to snakes.

Snakes are reptiles and are numerous in Australia. There are 110 species of land snakes in Australia, they can be grouped into four families. They are the Elapidae, which are front fanged; the Pythons, which are constrictors; the Colubridae, which are harmless rear fanged snakes; and the burrowing blind snakes (family Typhlopidae).

Most of the Australian species and all the dangerous ones, are ELAPID or front fanged. The danger presented by a particular snake's bite depends on both the potency of its venom and the quantity it is capable of injecting. If both of these factors are considered, the most dangerous land snakes are , in order: the Taipan, the Death Adder, the Tiger Snake, the Eastern Brown Snake, the Western Brown Snake, the Copperhead, the Mulga Snake, the Red-bellied Black Snake and the Rough Scaled Snake.

Some snakes to be found at Lake Cowal are. Yellow-faced whip snake, White-lipped snake, Red-naped Snake, Eastern Tiger Snake, King Brown Snake, Spotted Black Snake, Eastern Brown Snake, Curl Snake, Black-headed Snake and Bandy-bandy. So it can be seen that while interest may centre on the Tiger Snake there are other snakes worthy of mention.

The Eastern Tiger Snake is common at Lake Cowal and active each year between spring and autumn. This reptile is found on the ground and in trees, some of which may be standing in water up to two kilometres from the shore. They live on a variety of chicks, eggs, mice, frogs, spiders, grasshoppers, beetles and ants. A study has shown that Tiger Snakes have a preference for young birds although frogs generally constitute a substantial part of their diet. It is interesting to note however that Tiger Snake remains have been found in food of several remains of birds in the Lake Cowal area including Sacred Ibis, Whistling Kite, Brown Goshawk, Swamp Harrier, Kookaburra and Pied Butcher-bird. So while the snake is hunting it too is being hunted.

Snakes only pose a threat if disturbed, basic common sense must be observed in the Lake area. Naturally if the Lake is partly dry and a reasonable distance from dwellings and daily activity there will be less likelihood of coming across a snake though snakes can be found a considerable distance from water. If the Lake has a reasonable quantity of water bringing it in closer then extra care needs to be taken. Protective clothing such as boots or shoes and long trousers should be worn, avoid walking through long grass and disturbing logs etc., Snakes will shelter on a hot day, the ground is too hot for them to move about but they will come out at night. People learn to live with nature all over the world, they are not constantly confronting dangerous animals nor perishing from extremes in climate.

Lake Cowal has been, over the years, a place of interest to many naturalists among them Eric Worrell , who during his lifetime did much to extend public knowledge of Australian

Reptile Park near Gosford NSW and was awarded the MBE in 1970 for his contribution to the development of anti-venenes.

George Cann was a regular visitor to Lake Cowal, he was known as a Master Snake Man who feared not the bite of the Tiger Snake or Death Adder. He and his wife Essie settled at La Perouse and established what became known as possibly Australia's longest running snake show. Their sons George Jnr and John still visit Lake Cowal and continue on with the show at the newly landscaped and aptly named Cann Park at La Perouse.

John Edwards was another man who developed an interest in reptiles at a young age and became a regular visitor to the area - at one time he had an educational exhibition of snakes and spiders on tour around the schools.

One purpose in catching snakes is to milk their venom which is supplied to the Commonwealth Serum Laboratories where antivenenes are made for the treatment of snake bite.
In most Australian States snakes are protected by law, including the venomous species. A dangerous snake may only be killed if it is near a house , or is an immediate threat.

Flora and Fauna abound at Lake Cowal, it would be impossible to make a complete list.

Two keen, world travelled, bird enthusiasts camped for two days on the shores of the Lake during September 1989. They were delighted with their sightings and also commented that in all their travels they had not seen anything more beautiful than the sunrise over the Lake.

Their list:

Great crested grebe
Hairy headed grebe
Pelicans
Large pied cormorant
Little pied cormorant
Little black cormorant
White necked heron
Straw necked ibis
Yellow billed spoonbill
Black swan
Australian shelduck
Black duck
Grey teal
Wood duck
Whistling Kite
Little eagle
Masked yapwing
Silver gull
Crested pigeon
Galah
Eastern rosella
Red rumped parrot
Pallid cookoo
Bookbook owl
Kookaburra
Welcome swallow
Tree martin
Black faced cookoo shrike
Grey shrike thrush
Willy wag tail
Grey crowned babbler
Rufous songlark
Noisy friarbird
Noisy miner
White plumed honeyeater
Striated pardalote
House sparrow
Common starling
White winged chough
Apostle bird
Magpie lark
Pied butcher bird
Australian magpie
Australian raven

Bird song provides constant music, especially in the spring when so many birds enjoy the blossom of the trees.

Some trees to be found are the Selah. Wilga, River red-gum, Bimble box, Yellow box, Black box, Grey box, Rosewood. Weeping myall,River cooba, Pine, Kurrajong.

Flowers are a delight, especially in the spring and if there has been rain it is a joy to discover numerous small, but very beautiful flowers; Bulbine lily, nodding blue lily,Grasland lily,plain sun orchid, mistletoe, native lilac, pink bindweed,bugle flower,tall bluebell, rock isotome, mulla-mulla, numerous daisy flowers, yellow, mauve, pink, blue and white and billy-buttons.

THE WEST WYA

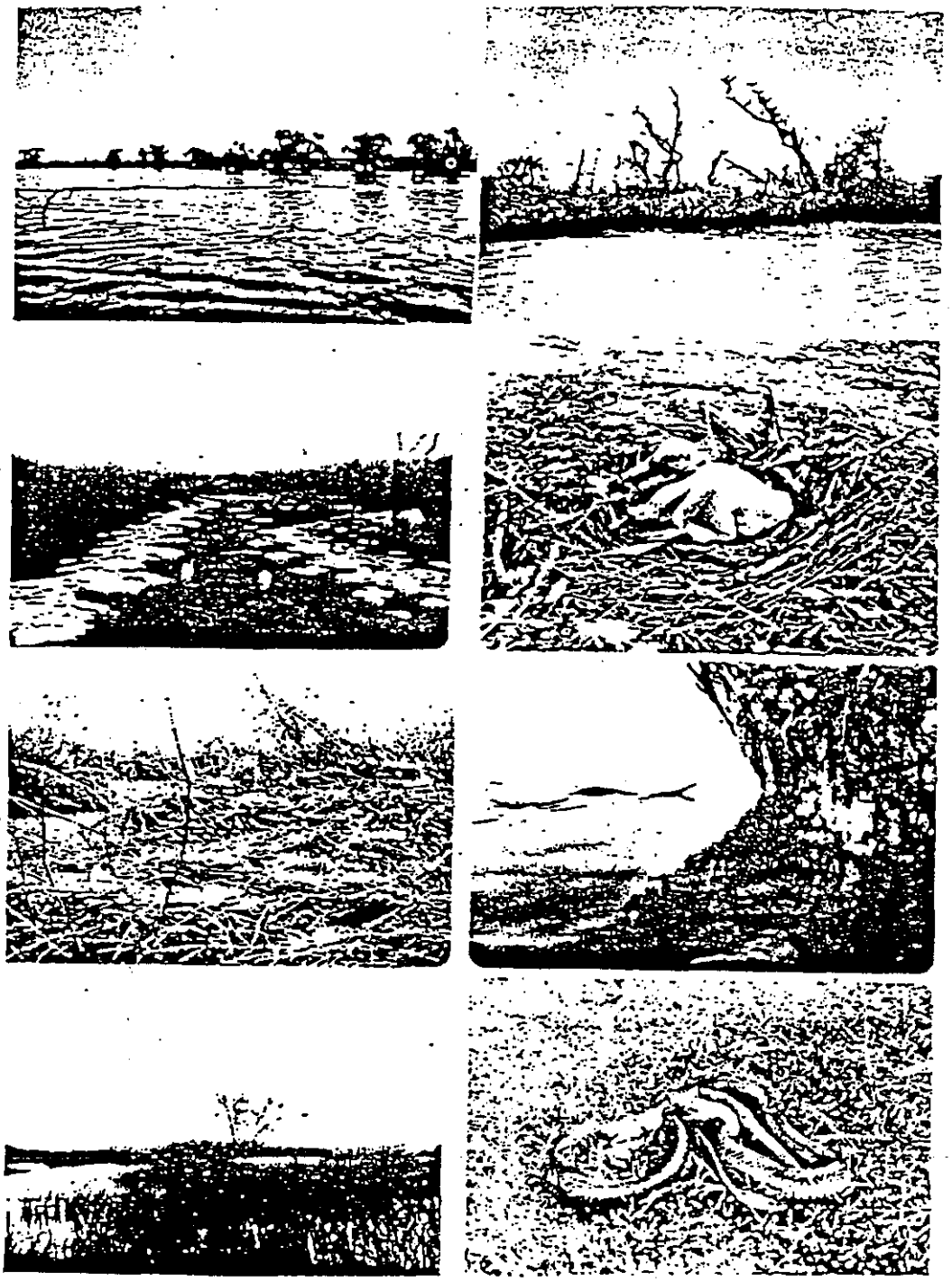
53 YEARS' RAINFALL.

Lake Cowal Records

Mr. S. Wilson, of Lake Cowal Station, Marsden, writes:—

"I enclose herewith our registered rainfalls for the first six months of each year, from 1st January 1880, also the total rainfall for each year. It will be seen that the first six months of this year is only the eighth driest, but as the major part of the rain fell in January, viz. 1.72 inches and the next good fall of 1.01 inch only came on 2nd June, which is too late for much germination on clay soil, it has resulted, up to date, in a very bad season."—Yours etc., S. WILSON.

Year	6 mon.	12 mon.
1880	7.12	11.72
1881	7.96	14.33
1882	4.40	15.71
1883	4.72	14.08
1884	7.52	13.44
1885	14.82	20.77
1886	8.60	21.78
1887	16.00	28.00
1888	5.04	9.08
1889	12.02	21.40
1890	20.53	30.62
1891	15.84	25.96
1892	6.28	18.00
1893	11.01	18.98
1894	16.54	27.10
1895	7.22	14.12
1896	10.76	25.78
1897	6.56	15.05
1898	7.13	14.58
1899	6.43	12.78
1900	11.03	17.15
1901	6.71	13.59
1902	2.62	10.41
1903	6.98	16.20
1904	5.81	18.03
1905	12.36	18.62
1906	9.90	22.98
1907	5.53	14.34
1908	5.43	14.43
1909	11.97	17.66
1910	12.21	21.62
1911	12.36	21.17
1912	4.36	15.07
1913	11.12	14.28
1914	5.42	12.41
1915	4.39	12.55
1916	14.04	27.98
1917	10.27	26.49
1918	7.41	13.00
1919	6.95	12.88
1920	7.29	18.42
1921	11.58	21.66
1922	[illegible]	13.86



Lake Cowal abounds in wildlife.

35. 1965

ON THE LA

Lake Cowal Better Drained Than Held For Storage

By Alan Buttenshaw, Coniston, West Wyalong

An inexpensive drainage system on Lake Cowal that would work would be a better proposition than a much more costly buffer storage scheme almost certainly doomed to failure.

The use of Lake Cowal as a buffer storage for the Lachlan River, as outlined by Mr J. Ridley, of Pine Hills, Forbes, in the "Herald" of May 7 caused both interest and surprise.

Interest because I am a landholder in that area; surprise because Mr Ridley is a member of the Lake Cowal Flood Mitigation and Drainage Association and is fully aware of the association's strong objections to its use for buffer storage.

Storage Plan Rejected

In 1952, after floods which began in 1950, Mr Coventry, district engineer for Water Conservation and Irrigation Commission, Forbes, in answer to requests for some feasible flood mitigation scheme for that town investigated the possibilities of Lake Cowal as a water dumping ground and/or possible storage for water.

A thorough investigation by the commission revealed it was entirely unsuitable for storage. Consequently, the plan was rejected.

Lake Cowal ranges from approximately 3ft to 12ft only when completely full.

In the main, it would require a lot of walking to get into 3ft of water. Being a shallow pan, evaporation occurs at a high level and in view of the size, winds use much of the water.

Mr Ridley's mention that Mr Reg Ratley, V.C., was settled on lake country would indicate it was considered of reasonable value.

This implies that a suitable drainage system would be a worthy solution to difficulties. Buffer storage could not possibly help him.

Meetings were held in regard to lake drainage as far back as 1950 and have gained in impetus as each new affliction has been thrust on lake landholders.

However, up to the present, survey work and other investigations carried out have been done at landholders' expense and no assistance has been forthcoming from governmental sources.

In all cases, irrespective of what proposed usage outside bodies have envisaged for Lake Cowal, not once have lake landholders been shown the common courtesy of being asked their opinion as to the possibilities of such a scheme. They have not been informed of any possible recompense should their lands be taken from them.

In spite of continued flooding and with much of our country unproductive, the following reveals the potentiality of the land in full production.

Wool grown on Lake Cowal has on a number of occasions since 1949 topped the catalogue, of wool firm representing the vendor for that day.

Prices obtained for surplus sheep have been at least on a par and, in most cases, ahead of many other sales in the surrounding districts.

Some landholders who run cattle in the lake area are renowned for the quality prime stock they produce.

Wheat crops yielding over 13 bags an acre have been grown.

"LAKESIDE"

My association with Lake Cowal began in 1922, when my father Harold Bolt won this block in a civil ballot. 3,000 acres on the NorthWestern edge of the 35,000 known as the "Big" Lake. The only improvments on the block were one fence and one dam. My father lived alone in a tin hut for 7 years. He cut carted and hand bore many fence posts before putting up miles of new fences. He and his brothers built the woolshed and all the other farm buildings.

He married and had the farmhouse built. My wife and I still live in that house. Our family is the only one of the original owners who drew blocks, still holding our portion. Owning a farm in a lake has it's ups and downs. But the good times have outweighed the bad. Probably the most difficult thing being the fencing.

In 1988 we gained first prize in the local then zone, then the regional crop competition with some Vulcan wheat grown in the lake bed. It went 26 bags to the acre. We used no fertilizer and only worked it up once.

We have at one time grazed 6,000 sheep and 100 cattle - some belonging to neighbours - at the one time the feed was so lush.

Many duckshooters from near and far have camped and become friends over the 'wet' years. We have had up to 1200 camped on our place alone one year. And despite the loss of our grazing land when the lake is full, the magnificent water birds nesting in their thousands almost makes up for it. The National Geographic Magazine have featured the rare Royal Spoonbills nesting here.

Lake Cowal is famous for it's tiger snakes and we have had them in the house and even at this moment have 2 frozen in the deep freeze to show interested visitors. Our two sons made quite a hit on separate occasions with frozen 'tigers' at school.

One unique feature of this property is the family graveyard. The ashes of my Grandfather and Father are buried on a quiet hill overlooking the lake bed.

This is just a brief picture of life on a lake farm. The years of 'wet' droughts and good years when everyone else is experiencing a dry drought have certainly been worth the different farming practises needed to own "Lakeside".

T. K. Bolte.

Trevor King Bolte.

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RUNS AND STATIONS - LAKE COWAL.

NEW SOUTH WALES GAZETTER. 1866.

CROSBIE'S CREEK: (Co. King). is an eastern tributary of the Boorowa River, rising in the Yass Plains, and flowing west about 10 miles.

COWAL LAKE: (Co. Gipps) is a large swampy lagoon, formed by the waters of the Yeo-Yeo and Manna Creeks. It is about 18 miles in length and 6 miles in width, and in wet weather expands into a large shallow lake. The hollow or valleys in which it lies is about 40 miles S.E. of Condobolin, on the Lachlan River, and is well grassed and abounds in salsolaceous plants. Pliocene tertiary.

COWAL STATION: (LACHLAN DISTRICT), occupier T.J. Atkins, area 16000 acres; grazing capability, 600 head of cattle. The nearest post town is Forbes.The old charges were Thirteen pound; the recently appraised rental is Seventyfive pounds.

COWAL NO.2 STATION: (Lachlan district), occupier, T.J.Atkins, area 16,000 acres; grazing capability 640 head of cattle. Charges, Thirtyeight pound two shillings and six pence.

HAIWATHA STATION: (Lachlan district), occupier, M.R. Bernard, area 58000 acres, grazing capability 4,000 head of cattle. Charges, Thirty pound.

CLEAR RIDGES STATION: (Lachlan district), occupier, Thomas Lees, area 45,000 acres, grazing capability 640 head of cattle. Charges Thirty pound.

BLOW CLEAR STAATION NO.2: (Lachlan district), occupier, Sweeney Brothers, are 16,000 acres, grazing capbility 960 head of cattle. Charges, Thirty pound.

BLAND: is a county in the pastoral district of Lachlan, containing 300 acres of alienated land, and 1,359,700 acres of unalienated. Its boundaries are, however, open to modifacation.

BLAND STATION: (Lachlan district), occupier, Thomas Atkins, area, 17,000 acres, grazing capability 640 head of cattle. Rental Two hundred and sixteen pound.

BLAND STATION NO 2: (Lachland district), occupier, John Chisholm.

BLAND EAST STATION: occupier, Mrs Alice Gibson.

BILLABONG STATION: occupier, Thomas Lee, 19,000 acres.

BILLABONG LOWER STATION: occupier, Thomas Lee, 16,000 acres

BILLABONG BACK RUN: occupier, Thomas Lee, 16,000 acres.

BILLABONG NO 2 STATION: occupier, James Marsden, 16,000 acres.

LAKE COWAL SUBDIVISION

NAME	CLEARED ACRES	CROP ACRES	AREA ACRES
ANDERSON			1930
BASSETT	300	100	6500
BACKHAUS	700		3185
BAILEY. P		400	1396
BUTTENSHAW. W	3045		5200
BAILEY. C		400	1137
BUTTENSHAW. E		1000	2560
COONEY			803
COX			916
CAMERON			2946
CROFT		100	2556
CADOW. EST	200		22567
DAWSON BROS	1112	100	27000
DAWSON. J		200	3580
DAWSON. A			5262
DUNN. A		200	3183
DUNN. T.M.		200	3719
DILL		300	3201
DEAN. T		300	4560
DEAN. J		400	2560
DEAN. T.E.	500		1500
DONKIN			28771
ENGLISH		300	4002
EDGERTON			1158
ELLARD			1112
FACEY			4406
FIRTH			2767
FITZGERALD R		300	2240
FOWLER			5244
FITZGERALD A	300		2560
FITZGERALD. E		200	2682
FLEMING	400	300	1240
GAVEL J			20447
GANNON			3885
GOLDING		600	8268
GALLOWAY			1862
HOPE C			3837
HOPE. A.S.	100		19340
HAMMON	100		8000
HAMMOND	100		8000
JONES. W.T.			2560
JONES A.S.		300	1447
KENNEDY A			2993
KENNEDY L			2949
LOW	300		13801
LUDLOW	1000	250	6887
LEWINGTON			2278
LEVERSHA	400	300	1525
LEONARD		300	1280
LEAHY			30000
LUNT			1280
LUDLOW J	100		2000

NAME	CLEARED ACRES	CROP ACRES	AREA ACRES
MATCHETT			59000
MOONEY. P.J.			14200
MOONEY. P,M,			4000
MARSH. W			6000
MOONEY. O .M. Bede			5143
MAY			2489
MOONEY. P.J.S.			4591
McCORMACK			2649
McCORMACK J	300		6228
MASLIN		100	19000
McDONELL	1500	1200	3785
McPHILLAMY			12642
NASH			1647
NEIDECK		800	2560
NEIDECK W		400	2560
PORTER. C	400		1351
PORTER		400	8456
PURSEHOUSE			770
QUILTY		400	2989
RIDLEY. G.H.		500	11768
REYNOLDS. O			740
REYNOLDS. H			853
REARDON			3548
RAND			10121
RECKMAN	100		1937
RIDLEY & WOOD	100		2815
RIDLEY S	150	1300	5120
RIDLEY. J	200		2588
RICKETSON EST	700		25000
RENKE			1708
SHEPHARD. W			804
SHEPHARD A	400	150	2746
SHARPE			770
SMITH E.E.		1500	1950
SMITH. C		300	1650
SMITH. C.		500	2189
STEWART	400		2448
WEST	5000	2000	13965
WILSON & CO	2000	1000	42500
WILSON. L	800		3016
WILSON. C	600	300	2560
WILSON. G			2051
WESTON			2560
WARROO EST			42313
YERBURY. E			1843
YERBURY. A			1889
WAITE M			6510
WOODS. G		400	2584
WOODS. H.R.	1000	500	2560
WAITE J			3405

THE LONE HAND. AUGUST 2, 1920.

LAKE COWAL.

Boolambayte:- The great rains in N.S.W. last month swelled the Lachlan River until it burst the confines of its banks and spread the water over the plains to fill Lake Cowal. This inland sea is a spasmodic affair, and exists in name more often than in actuality, like all western lakes, save Lake Cudgellico. When the rains of 1915 and 1916 flooded the inland rivers, Lake Cowal filled for the first time for some 12 or 13 years, but the long dry spell during 1918-19 saw its waters vanish completely. This lake is merely a shallow depression, some 69000 acres in area, and when the basin is filled, the greatest depth is only about 4 feet. In early days and ordinary flood in the Lachlan would send a strong stream through Gatenby's Jemalong station into the lake, and, so a consequence, it was very often full. When the Forbes-Condobolin road was formed and N.A. Gatenby went in for irrigation, the embankments and barriers so created obstructed the flow until it required a heavy flood to divert any considerable volume of water along the Bland to the Lake. The area indendated by these floods soon dries up in the fierce heat of the western summers, leaving excellent pasturage in the huge basin. This land is held by Samuel Wilson, a typical western squatter of the old school, and his enormous run, probably the largest in the Central-west, is called Lake Cowal Station. It lies near the overflow3 between the Bland and the Mirrool and save for the lake and a few isolated hills, is genuine plain country. The recent flow from the Lachlan has inundated about 25000 acres of the lake bed, and for 12 months there will be a fine, but shallow sheet of water there.
Then, unless heavy rains come next winter it will be dry pasture land. But during its days of fullness, Lake Cowal is a paradise for the naturalist.
Every variety of water birds that the back country knows finds a temporary habitat along its grassy fringe, and on its reed strewn basin. In 1916 I saw 3 million of teal, mallard, black and wood duck black swans in clouds, pelicans, cranes, shags and those wonders of the water, the wingless musk-duck. Shooters slaughtered ducks in thousands for food and sport, but the numbers never decreased.
Whence the birds came so suddenly, or whither departed when the lake dried ups is one of the mysteries of the inexplicable western bush.

LAKE COWAL.

by S.WILSON.

The date of the earliest settler at Lake Cowal is unknown, but would be probably be prior to 1830.

James Marsden 'took up' this station, also Billabong Station, joining the village of Marsden, called after him, and which for over forty years was called Marsden's. Lake Cowal Station was sold by Marsden to Clarence and Kennedy, and they sold it to Ricketson and Shinn about 1876, and the latter sold it to Samuel Wilson, of Lima Station, Benalla, in 1880, since which it had been held by our family.

Caragabel Station, surrounding Marsden, was taken up by Gibson about 70 years ago, and Fred Faithful Gibson held it till his death, and his beneficiaries still hold it. Morangorell Station on the Bland, was taken up by Donald McGregor prior to 1850. He sent a load of hay to Forbes gold rush, getting up to three shillings per pound for it.

The name, Cowal means "lake" in Aboriginal language. Youngee means the "mallee hen". Wamboyne means "kangaroo". Nerang means "small". Morangerell means "white cockatoo". Borongerell means "bird".

The pioneers of the Bland were: Cartwright, Marsden, Gibsons, McGregor, McNamaras, Caldwell, Jamiesons, Chisholms. Willliam Jamieson still lives at Back Creek, Wyalong and could give interesting early history. Steve Caldwell bought Moonbucca in 1894. James white took up Burrangong, where the town of Young now is, in 1819.

Mrs Sarah Musgrave is said to be the first white child born at Young, and she is still alive.

Rabbits were first seen in 1886, and within ten years there were hundreds of thousands of them.

The Aborigines had large camps on the site of the present Lake Cowal Station Homestead, which is on an elevation of about twenty feet above the Lake, and was evidently once a volcano. Numerous middens were about here. Lake Cowal, containing four hundred thousand acres, and eight feet six inches deep when full, was at one time much deeper than it now is, as at a depth of twenty four feet below the ground surface one finds the identical coarse sand that abounds on the huge sand bank,

There is a rock island in the Lake about 76 feet above high water level. The rock is mostly slate, but old Devonian rock appears at the northern end, and on the north littoral there is "plum pudding" stone.

Wamboyne Hill, lying two miles west of the Lake, is sandstone granite. Manna Mountain, four miles north of the

Lake, is granite, with some quartz and sandstone. Billy's Lookout Hill is granite and quartz, and a considerable amount of alluvial gold had been obtained on the Eastern slopes of it.

West Wyalong, 24 miles west of Lake Cowal, had rich veins of gold, and the mining lasted 26 years, but is now worked out.

Grey kangaroos were exceedingly numerous in 1880-84, and over 15,000 were yarded and killed here. There are probably not 20 alive now. There were no red or blue kangaroos on this western side of the Lake, though on the eastern side they were numerous, and still are. There were a few wallabies here once, and probably some scrub wallaby. Paddymelons were plentiful, but now extinct. Bulbys were once numerous. Emus were numerous and still are plentiful. There were a lot of dingoes, but they are now extinct.

copy taken from R.A.H.S. Journal and Proceedings-
Volume VIII - 1923. Page 373 & ff.

WRITTEN BY LESLIE WILSON

Corran was taken up by my father, Samuel Wilson as a Settlement Lease of 2560 acres (26/9/1895 Cowal & Gipps)The capital value was £1.0.0 per acre.

Chas was born at Corran 1897

He had the homestead and stables built and the timber was cut and milled at Lake Cowal and the cost was 5/- per hundred super feet, dressed.

Father sold Corran to his nephew Samuel Stewart for £1300 on a walk in walk out basis. Sam Stewart took over a mortgage on Corran amounting to £800 and agreed to pay Father the balance of £500 spread over five years free of interest.

At a later date Sam Stewart took up an additional area of 1500 aacres adjoining the southern boundary of Corran.

About 1908 Sam sold Corran and the additional 1500 acres to S.J. Stanford from South Australia for about 17/6 per acre present title.

In 1913 Stanford sold the additional area of 1500 acres to Dean for around £2.0.0 per acre and at the end of the same year my Father bought the original area of 2560 acres on my behalf at £2.0.0 per acre present title

In 1914 I made application to convert the 2560 acres of settlement lease to conditional purchase at a capital value of 20/- per acre and after a delay of about two years my application came before the Land Court and was granted.

In 1920 I bought 420 acres known as "Clearys" from the late Chas West at £2.0.0 per acre present title and in 1926 I sold Corran and Clearys to T Skinnick for £5.0.0 per acre present title at that time there was 8/- per acre owing to the Crown on 2560 acres and I have no record of the amount owing on the 42o acres known as "Clearys"

I left there in June 1926 and did not see the place again till October 1958.

I took delivery of the property known as "Malboona" 915 miles west of Mudgee) in March 1927 and had a number of unpacked cases stored in a shed there. This shed was burnt down one night and all my diaries dating from 1914 and a lot of my records were destroyed which accounts for a certain amount of vagueness in this record.

Corran was named after a farm on the Isle of Bute which is owned by my Mother's family. I understand that all the balance of the island is owned by the Marquis of Bute.
The Corran homestead is built on ground which was originally covered with a dense growth of small pine trees. The plan of the house is the same as a homestead owned by my grandfather near Benalla in Victoria.

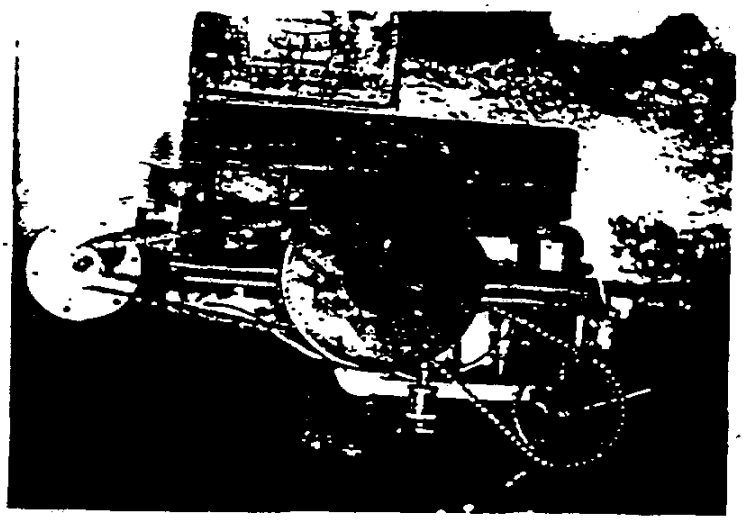
WILSON
LESLIE: GEORGE: CHARLES:BASIL
LAKE COWAL 10th JANUARY 1911

SAMAUEL WILSON SNR

NEWSPAPER CUTTING.
9.2.1925
U.S.A. - LAKE COWAL
KDHA HEARD PLAINLY
WEST WYALONG, MONDAY

Exceptional results in the reception of long distance wireless signals were received on Friday night between 8 and 9 o'clock when Leslie M. Wilson at Lake Cowal Station received music and speech broadcast from KDHA, Pittsburgh, Pennsylvania, without using aerial or earth. Owing to very bad atmospherical conditions little of the speech was understandable, but many melodies were easily recognisable, including "Killarney".
A low-loss two value set, with coils designed and constructed by the owner was used. With the aerial and earth connected the music was heard 15 feet from the loud speaker. Lake Cowal is 250 miles from Sydney.

LESLIE WILSON
WIRELESS ROOM LAKE COWAL STATION



LESLIE WILSON
MOTOR FOR WIRELESS AT "CORRAN"

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WATER FROM LAKE COWAL TO WYALONG.

During May, 1895, a project was afoot to bring water to Wyalong from Lake Cowal. Mr. R.O.Ffrench made preliminary investigations as to the best route, etc., and Mr Campbell, a licensed surveyor, was to ascertain the difference in elevation between the two places. When this was done a more definite report was to be submitted on the scheme. Mr Ffrench stated that no difficulty would be encountered to raise the required capital.

In the report of the Sectional Committee, June 1895, regarding Temora to Wyalong railway, Mr Gough, in his evidence said he thought that if water from Lake Cowal was lain on to the Wyalong field, a pipe might be laid to the range where Billy's Lookout was situated and gravitation would carry it from there to Wyalong. Mr R.J.Campbell, surveyor, said he had made a survey of the line of water supply from the neighbourhood of Lake Cowal to Wyalong West. The plan showed a route via the Wyrra Mountains, near Mr Carter's house on the Billabong, but he had no knowledge of the cost of the work of putting down pipes etc. He said he knew the country between Lake Cowal and Wyalong. About half of it, that next to Lake Cowal, was good agricultural land, but the part between Wyalong and that named is inferior except odd places suitable for agriculture.

Sergeant of Police and Mining Registrar, Sgt. McHardy, said that claims were being taken up in various localities, such as Sandy Creek and Billy's Lookout. Those places did their business with Wyalong. There was also a large area of country close to Wyalong which has not been prospected. Sgt. McHardy thought a permanent supply of water would do more to develop the field than a railway would.

The synopsis of the report regarding the feasibility of obtaining a water supply from Lake Cowal, prepared by Mr. Campbell under instructions of Mr Ffrench stated:" The nearest point to the southwestern shore of the lake from Wyalong West is N33 degrees E and 21 miles distant. A line in this direction would pass over country with out any elevation of sufficient height to admit the gravitation and supply of water into Wyalong and is, therefore, though short, no practicable as part of the proposed scheme.

"A line passing from the centre of the lake to Billy's Lookout which is distant 10 and a half miles form deep water if carried to Wyalong West 15 and three quarter miles, would

require a total of 26 and one quarter miles of pipe. Billy's Lookout is an abrupt elevation of decomposed granite rising to a height of about 400 feet above the level of the lake and a considerably higher elevation the Wyalong. The route is objectionable, partly on account of the great distance to be covered, also owing to the non-permanent character of the supply from the lake itself. A shorter route, and a more desirable one in many respects, would commence on the Bland Creek above where the waters of the lake spread out during flood periods. This route passes over level country and the ascent is gradual from the spur on the Wyrra range, where the elevation would probably be about 300 feet above the starting point , a distance of 10 and a half miles form there. From there to Wyalong West would be twelve and a half miles, or twenty three and a half miles in all. This line seems to be the best, for several reasons. The source of supply is permanent, the creek at this point not being dry for over twenty years. The water there is always pure and sweet, which is not the case with the waters of the lake. The distance is shorter than by Billy's Lookout and the elevation on the Wyrra range is sufficient for the purposes required with the line passing almost entirely through Crown Lands.

"The country passed over is open box and pine forest to the foot of the Wyrra range, the soil being moderately stiff clayey loam. Within the slopes of the range the line would pass through ironbark, pine, oak, box and over dense scrub and loose conglomerate soil. From there to Wyalong the timber is box, mallee and scrub, the soil being a stiff, clayey loam. Timber of good quality is obtainable in the vicinity of the forest on the Wyrra range, the line passing for a considerable distance through a Government forest reserve. The starting point on Bland Creek is on a Government water reserve and the banks of the creek are sufficiently above flood mark to permit of buildings and machinery being safely placed there. Lake Cowal, although presenting a very fine appearance as an expanse of water, is not to be relied on as a permanent source of water supply. Its greatest depth when quite full is 14 feet. After that it overflows at the north west end into Manna Creek, it was quite dry for nearly two years between 1883 and 1885, and in consequence of its shallowness, the water is rendered impure by the constant disturbance by the waves of the sedimentary beds of vegetable matter. Wild fowl excrement, weeds etc. would probably choke the pipe which would be laid in the lake.

"I, therefore, think that the most practicable route is one form Bland Creek via Wyrra Range and thence to Wyalong West. Of course, my estimate regarding the height of Billy's Lookout and the Wyrra Range is liable to rectification when the levels are properly taken. This work should be carried out at once in order that this data shall be obtained before the scheme is finally decided upon".

Mr J.B. Reymond, Member for the Electorate of Ashburnham, was in Wyalong for some days during December, 1895. Members of the Progress Committee of West Wyalong conferred with him on the proposed water supply from Lake Cowal to Wyalong. Members of the committee submitted that the scheme was the only one likely to give permanent results. He said the Government was fooling away money in unproductive works while, if it could be shown that this scheme would give anything like payable results, it must receive favourable consideration. He read a letter from Mr. C.McPhillamy of Warroo with regard to bringing water form the Lachlan to Lake Cowal, in which it was shown the natural flow of the water from the river could be used to fill Lake Cowal much more than was being done.

Mr Reymond said he felt sure any proposal to bring water from Lake Cowal to Wyalong would have to be part of a comprehensive water conservation scheme and such a scheme was being formulated.

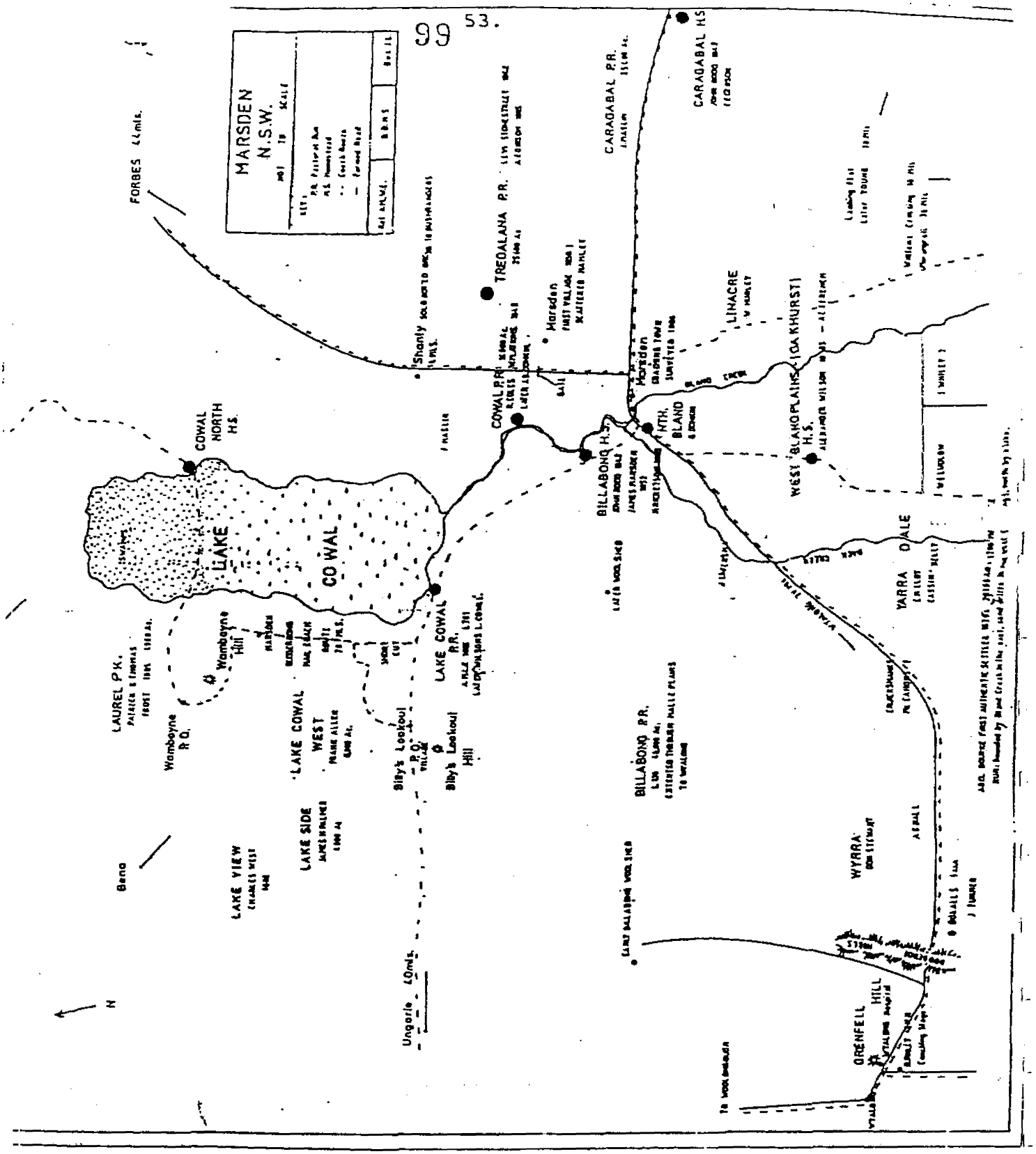
A TRIP TO LAKE COWAL

A correspondent in the Wyalong Star, August 15, 1895, under the name of "The Vag", wrote the following report on a trip he had made to Lake Cowal: "Lake Cowal is a local Tom Tiddlers ground, the natural point for a picnicker, the sportsman, the budding artist, the adventure seeker, the blase and the impressionist. This it had achieved and it merits well the distinction. Argiculturally it is as yet an undeveloped bonanza. Industrially also it has unlimited water supply and great possibilities in the far future. As a repository of valuable minerals rapidly making its way to the front, let us further see how it is rapidly fulfilling its inevitable destiny.

"About 30 miles by five or six miles, it is best reached from Wyalong by a sandy creek and Billy's Lookout. Taking a northerly track from Billy's Lookout, some five miles through fairly open country, carrying very likely looking soil for cereals, but quite bare of feed at present, brings us in sight of the lake, which forms a large portion of Messrs Wilson and Stewart's Lake Cowal Station. Its argicultural aspect is quite fair, arable soil everywhere, quite rich in places. On the lake bank, half a mile to a mile in width of rich alluvial, which with reef clay, capable of growing anything in creation with this climate and judicious irrigation, it is especially suitable for vine and fruit culture.

"To what extent is it now utilised? It supports about a quarter of a sheep and five thousand rabbits to the acre. Both are museum specimens, for opposite reasons. The sheep rattle like castanets and the rabbits ar aldermanic quadrupeds - too fat for sport and only useful for boomerang practice.

"All around the lake and the Bland district feed is as bare as your hand, and most of the stations are travelling their sheep southwards to the Tumbarumba plains or north to the Lachlan country, where some of the river flats around Condobolin and Forbes still have a little herbage left and more is springing from the last rains..... Even as I write alluvial discoveries are reported from Billly's Lookout ....Soil, gold and water unlimited -- what bright destiny might not be promised for the lake district?"



From the memories of Mr.W.J.English and Mr.A.L.Martin.

PERSONALITIES

Coupled with Marsden, the Lake Cowal district has a background of distinction for the numbers of its citizens who have held important positions in public life. The district can boast of two Members of Parliament. (George Wilson was holding the State seat of Dubbo at the time of his death); shire presidents; eight or nine show society present, number of show committeemen and many others who have held office in public affairs.

SAMUEL WILSON

Samuel Wilson was associated with the ownership of Lake Cowal station for half a century, and he resided there for practically the whole of period. During the later years, Leslie, George, Charles and Basil Wilson were associated with their father on the station. Leslie, George and Charles had also acquired separate properties. Samuel Wilson was the chairman of the temporary shire council, pending the official incorporation of the Shire of Bland. He was also the foundation president of the West Wyalong P.A.H. and I. Association. A further term of office was served by him as a councillor on the Bland Shire Council. He took and active interest in the public affairs of the district and gave much valued support to all the patriotic movement during World War I. A keen supporter of the Billy's Lookout school, he always attended the annual break-ups for the Christmas vacations. Besides giving the school prizes, Mr Wilson would give a lecture on some interesting subject.

ERNEST ALBERT BUTTENSHAW.

Ernest Albert Buttenshaw was the owner of Ellerslie for a period of years. He entered public affairs when a young man. Ernie Buttenshaw, as he was familiarly known throughout the district, contested and won the former State Parliament seat of Lachlan about 1917, as a Progressive Party candidate. A breakaway occurred within the ranks of the Progressives during the early period of the 1920's. Buttenshaw was one of the seven party members who remained loyal to the party. They were known as the seven "true blues". From this breakaway a new party emerged and from

then on was known as the Country Party. The new party was lead by Colonel Michael Bruxner. It was during the tern of the Deputy Premiership of Colonel Bruxner that Mr Buttenshaw attained cabinet rank as Minister for Works and Railways. When Colonel Bruxner retired from active politics, Mr Buttenshaw was elevated to the position of Leader of the Country Party. During the absence of the Premier, Sir Thomas Bavin, on a mission overseas Mr Buttenshaw was the Acting Premier. At a later period he became Minister for Lands. During his youth, Ernie Buttenshaw was a keen follower of cricket and tennis and he participated in these sports at most of the surrounding centres where clubs existed.

CHARLES WEST.

A typical rugged pioneer, Charles West was a man of stamina and endurance. He came to Lake View before the turn of the century, with his young wife, who was 20 years of age. Charles West was a strong supporter of the West Wyalong Show Society. He was a member of the general committee for a period of years. In his young days, Charles was a "gun" blade shearer and had the reputation of being a "200 a day" man. Besides sheep, he took a keen interest in wheatgrowing and was the biggest grower in the Lake Cowal area. West never drank, nor did he smoke. He always attributed his good health and physical condition to his abstention from the common habits.

WILLIAM BUTTENSHAW

William A. Buttenshaw was known throughout the district as one of the most honest of gentlemen. He vied with Samuel Wilson for the longest terms of presidency of the show society, topping the list with nine terms of office. Wilson had eight terms. The three sons of William Buttenshaw are past presidents of the show society.

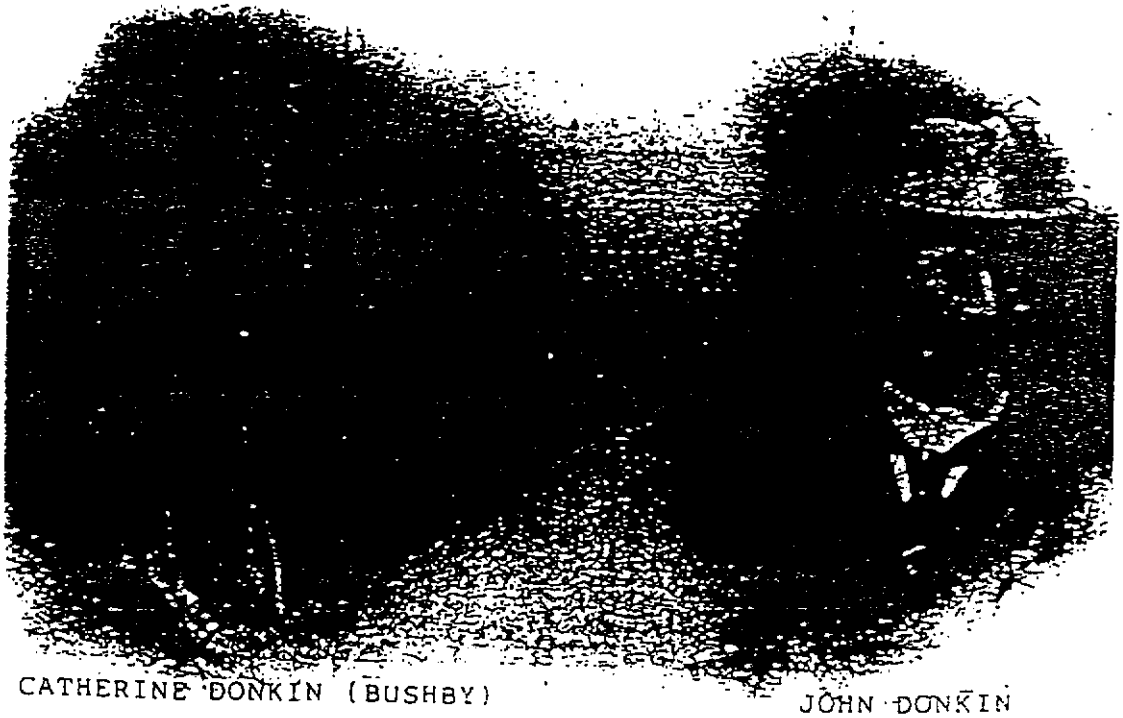
JAMES PATON.

Born in Glasgow Scotland in 1885, James Paton, who had been a law clerk on the Caledonia Railway Company, came to Australia in 1908 to Lake Cowal Station. With a true pioneering spirit he adapted himself to life on the land, with a love of horses and growing crops. he had a strong mechanical bent, was a prolific reader, with a special interest in parliamentary law. He was a Justice of the Peace, a member of the Local Land Board, a trustee of the Clear Ridge hall and the instigator of the Clear Ridge

School. A railway league which was successful in persuading the government to build the Euglo (Burcher) line, was founded by him. He was the sponsor and campaign director for four local men who entered politics. They were Messrs George Wilson, E.A. Buttenshaw, Hugh Roberton and G.P. Evans. On the executive of the Country Party, he also worked for the Wheat Stabilisation Scheme and served for some years on the West Wyalong P.A.H. and I.Association committee. He was a member of Masonic Lodges, a trustee of Billy's Lookout hall and school. During World War II he was a member of the Volunteer Defence Corps mounted Regiment. Mr Paton, who died at the age of 57 years, entered in possession of his "Beulah" property Clear Ridge in 1928.

SAMUEL WILSON

BUTTENSHAW
JAMES: ROSALIE JASPRIZZA: ERNEST
MARY LLOYD: WILLIAM
MARY (WEST) HENRY NURSING IRENE SIMPK:
VICTOR



CATHERINE DONKIN (BUSHBY)

JOHN DONKIN

MARSDEN.

The name Marsden was taken from Mr. James Marsden, who took up a run of country (Bland Billabong) here in 1852. When the village was first established about 1866, it took the name Marsdens, from the fact that the country was known as Marsden's country. This persisted until changed to Marsden in 1912.
It has no connection with the Rev. Samuel Marsden, who arrived in Australia in 1794 and died at Windsor in May 1838.

A Post Office was connected by Telegraph to Morangorell and Young in 1875, the poles for this line being carted by Mr. William Hughes (1830-1916) of Thuddungra. (A relative of the 1970 Cowra road Hughes family).

By this time the Police Station was erected, but it was not until 21st July 1879 that the first Court of Petty Sessions was established at Marsden. Mr.S.Robinson being the Stipendary Magistrate at the time.

It appears that the first Hotel was erected before 1866, probably the first building at Marsden.

A public meeting was held in January 1882 to erect a school, as there were enough children to secure a school from the Department. The meeting collected Thirty Pounds towards building their own school at the time.
This was erected in 1883 and shops and houses were being added and the 'Royal' Hotel was being rebuilt after a fire in March 1882. This hotel was owned by Mr. Curry, who later had the Criterion at Grenfell.

The Police Magistrate was holding a monthly court at Marsden in 1883 and Miss Hill was the teacher at Marsden School in 1883.

At that time the nearest hospital and doctor was at Grenfell, which was really going ahead in 1883.

It is not known who had the hotel at Marsden in 1884, but Mr. Maurice Paice had the Bimbi Hotel at Sandy Creek crossing at the junction of roads from Young, Morangorell, Young and Bland.

The Welcome Home hotel on Grenfell Road, Wheeogo, was ran by Mr. J.D:Brenner. (later Bristow's).

The railway line from Murrumburrah to Young was not completed until 1885, the next nearest rail head was a Blayney.

Young and Cowra were connected in 1886 and on to Blayney by 1888 which gave those from Marsden a train to Sydney for produce after they had travelled either to Young or Cowra.

The discovery of gold at Wyalong in 1893 and the beginning of a town there, detracted from the importance of Marsden as a centre.

They were hoping that the line coming to Grenfell from Koorawatha in 1899 would continue on through the Bland to Wyalong, via Marsden but the Government of the day decided that a line from Temora to Wyalong would be best and this was constructed in 1903-04.

The Grenfell- Koorawatha line was opened in 1901. Coach fare Grenfell to Marsden in 1898 was fifteen shillings each.

In 1903 Marsden had two stores, Post and Telegraph Office, Police Station, Court House and gaol and the Royal Hotel kept by Mrs. Cleary and daughter. The Bimbi Hotel in 1903 was kept by Mr.John Norton and the school there had 60 pupils. One of the first mailmen on the Grenfell-Marsden run was Mr. Alex Fraser, sometime before 1882 and Mr. Thomas Maguire ran the Marsden-Morangorell mail for many years up to about 1934. Weddin Shire Council was formed in 1906 and the town of Marsden was right on the western edge of the Shire boundary, between Weddin and Bland Shires.

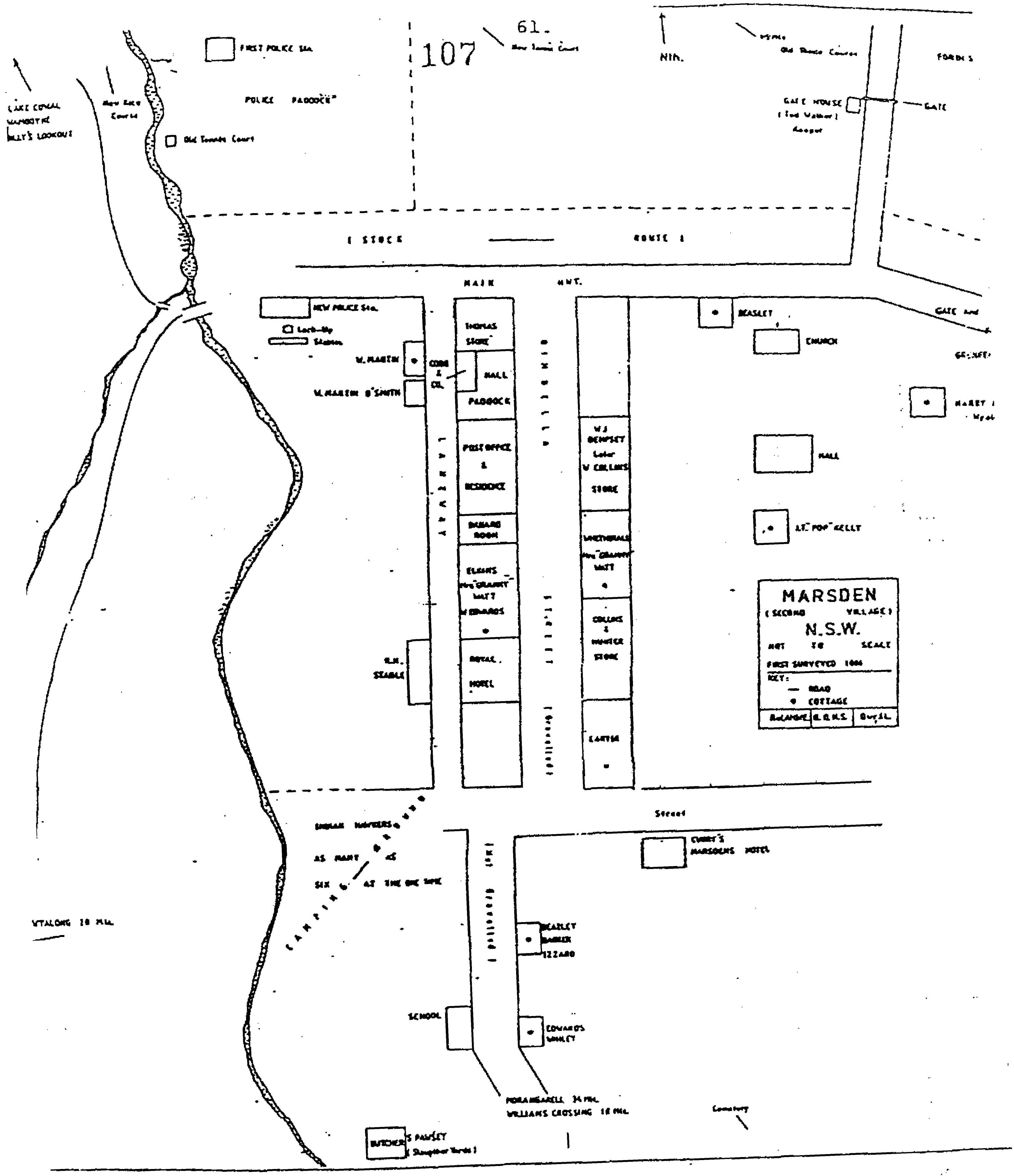
Agitation commenced for the Forbes-Stockinbingal railway line in 1907 and many were the arguments in favor of a Grenfell-Wyalong line instead, through Piney Range or Bimbi. These arguments continued until February 1912, when a start was made on the Forbes-Stockinbingal line at Stockinbingal.

This was the beginning of the end of Marsden township, with motor cars being introduced into the district in about 1909 and roads getting better, more and more people were shopping in the bigger centres. At the same time the township of Bimbi was growing and taking more and more business from Marsden, by 1912. By 1916 the line had been constructed from Stockinbingal to Caragabal where a new township sprang up and a license granted for a proposed new hotel there. This again took away from Marsden, and more so when it was completed right through to Forbes by 1917. The route of the line affected Bimbi as well as Marsden and Quandialla and Caragabal took over as the leading town in the area.

The Police Station closed 20.4.1931.

In 1970 Mrs. J. Martin lives in the old Court House-Police Station and gaol at Marsden, but little else remains of the one time thriving township of the 1880s.

taken from: "Marsden Township" 1866-1970.
Grenfell Historical Society.


FIRST POLICE Stn.
POLICE PADDOCK
Old Tennis Court
New Race Course
New Tennis Court
Nth.
Old Race Course
FORBES
GATE HOUSE
GATE
STOCK ROUTE
MAIN ST.
NEW POLICE Stn.
Lock-Up
Stables
W. MARTIN
W. MARTIN B'SMITH
THOMAS STORE
HALL
PADDOCK
POST OFFICE & RESIDENCE
BOARD ROOM
ROYAL HOTEL
W.J. DEMPSEY Later W. COLLINS STORE
COLLINS & HUNTER STORE
CARTER
BEASLEY
CHURCH
HALL
Street
MARSDENS HOTEL
SCHOOL
BUTCHER
MARSDEN
(SECOND VILLAGE)
N.S.W.
NOT TO SCALE
KEY:
ROAD
COTTAGE

MARSDENS POST OFFICE AND MAIL RUNS.

Early postal records show that in a letter written on 30th April, 1866, Mr. Henry H. Cooke of Bland Billabong, requested that he be appointed as Postmaster in that locality (later known as Marsdens). Mr Cooke's letter read, in part as follows; *"Sir - Having seen that Tenders are invited for the carrying of a weekly mail, from Morangarell to Mr. Marsden's Station on the Billabong Creek, I beg most respectively (when such mail is established) to solicit the designation of Postmaster at this place. It may be well to state, that within a quarter of a mile of Mr Marsden's, I have a building in the course of erection, which is to be completed by the 20th or 21st of May when I intend opening a general store, on the newly surveyed reserve for a Government Township."* This letter of application was supported by two testimonials *"from Gentlemen to whom I am personally known"*. One was from Mr. W.Farrand, Postmaster at Forbes and the other from Johnson C. King, also of Forbes. Both persons regarding Mr Cooke as *"Steady, trustworthy, respectable, and in every way eligible for the appointment"*.

Marsden's Post Office was opened on 1st June, 1866 and Mr Cooke was appointed as Postmaster at a salary of Twelve Pound per year. On 26th September, 1867, Mr Cooke resigned and Robert Butler, who purchased Mr Cooke's business, was appointed Postmaster.

In a report, dated 21st July, 1868, submitted by Postal Inspector Moyse, it was stated that the Post Office at Marsdens was destroyed by fire on 4th January, 1868, and *"nothing saved but seal, date stamps and type; the handles of which are burnt"*. Following the resignation of Robert Butler, John Young was appointed as Postmaster on 1st September, 1875.

A petition, dated 3rd December, 1877, and signed by 15 persons, requested that the Marsdens Post Office be moved to a more convenient place. (The Post Office was carried on at a hotel following the fire.) This petition was forwarded to the Postmaster-General on 14th January 1878. The petition read as follows:- *"We the undersigned, receiving our letters and papers through the Marsdens Post Office, beg leave respectfully to state, that the present Marsdens Post Office is inconveniently situated and is one and a half miles distant from the township, and in our opinion, injudiciously kept at a public house, thereby tempting the station men and other servants sent with and for our*

letters, to indulge in drink, and otherways delay in returning home."

Reporting on this petition Postal Inspector Buchanan stated:- *"At present I see no reason for removing the Office. The petition is, it appears, in the handwriting of Kelly, the applicant for the office, and I can find but two of the names as residents of Marsdens."*
A telegraph line had been constructed from Young to Morangarell during 1877; and the line between Morangarell and Marsdens was reported as being under construction in 1878. The date on which the telegraph office was opened at Marsdens is not known. The Telegraph Station Master, John M. Shannon, was appointed to Marsden on 17th January, 1879. However, the Station Masters were often appointed some weeks prior to the opening of the telegraph stations. Although a policy of amalgamation of post and telegraph offices was being implemented at the time, it was not unusual for the telegraph offices to be opened in separate premises.
When Postal Inspector Buchanan recommended on 30th January, 1879, that the Telegraph Station Master also undertake the duties of Postmaster, it is possible that John M. Shannon had not taken duty as Telegraph Station Master. The Inspector said:- *"As a Station Master has been appointed to the Telegraph Office at Marsdens, it would be well that he should undertake the duties of Postmaster also. There is a feeling of jealousy respecting the present holder of the office which would be done away with. If my proposition is approved, it would give satisfaction to the general body of the people in this locality."* This recommendation was accepted and Mr. J.M. Shannon was appointed Post and Telegraph Master on 1st April, 1879. As Telegraph Master he was paid one hundred and fifty pound per annum by the Telegraph Department. Usually the Post and Telegraph Masters' salaries were paid jointly by the Postal and Telegraph Departments. However, in the case of Mr Shannon the one hundred and fifty pound paid by the Telegraph Department was considered adequate and he did not receive a postal salary.
The Postmaster in a letter addressed to the Secretary requested that Mr. J. Chief's offer to rent or purchase of premises to be used as a Post and Telegraph Office as accepted as the present building was unsuitable. The Postmaster's letter res; *" I respectfully beg to submit for your consideration, enclosed proposal from Mr Kelly. The present building used as post and telegraph office is in very insecure. It is built of split rails many of which have shrunk so much as to leave apertures large enough to admit a*

man's body. The rent of the present building in Twenty six pound per annum and of that offered by Mr Kelly Thirty pound per annum. The number of registered letters passing through this office require greater protection than the insecurity of the present office affords." And Mr. Kelly's offer was:- *"I beg to offer for sale or to rent my premises on allotment 4, section 10, Bimbella Street which consist of a four roomed cottage sawn timber iron roof 21x21 feet with detached kitchen 12x8 and necessary for the sum if total sale, One hundred and thirty pound - including allotment or at a rental of Thirty pounds per annum.*

PERSONALITIES

THOMAS WILLIAMS: Mine host of the Pig and Whistle at the "Two Mile" which fronted the Forbes Road at the original villiage. Tom and Mrs Williams were maternal grandparents of the well Known Bodel family at Mallee Plains. Mrs Bodel snr was Kitty Williams and was born at Marsdens, as were also he sister Mary and brother George. Young George was tragically killed when a water tank slipped from a dray. The Williams family came to Marsdens about 1866 and during 1873, Mr Williams moved his hotel to a site 18 miles farther upstream on the Bland Creek from Marsdens. The site became known as Williams's Crossing, which was situated at the intersection of the Morangarell and Bimbi Roads. The hotel was named The Travellers Rest.

WILLIAM MARTIN Snr: Listed in an early Directory of N.S.W. as a blacksmith and photographer, he was a well known identity during the early days of Marsden. Horses for shoeing, and vehicles for repairs, were brought to his smithy at Marsdens from distant areas - even west of Ungarie. Bill and Mrs Martin reared a family of ten, five sons and five daughters, at Marsdens. As a Justice f Peace, William Martin presided at the Marsdens Court of Petty Sessions. A family reunion was held at the Marsden home of Jack and Mrs Martin in 1955.
The average age of the family at that date was 64 years. Some of the early family history was revealed at the function. The late parents had come to Marsden about 75 years previously, and reared their large family at the village. When a brass band was organised at Marsden, the father made a drum from a goat skin for the band When William and Mrs Martin died, they were buried in the Wyalong cemetery. One date was 1918.

J.B. DONKIN: Mr J.B. Donkin was the owner of the station known as Donkin's Lake Cowal. J.B. and Mrs Donkin were well known personalities throughout the Marsden and surrounding districts. They were always generous supporters of any charitable or worthy cause. The station homestead was situated on the eastern banks of the Bland Creek, downstream Marsden near the bend called Fisherman's Bend. The vicinity of the homestead, for many years, was the scene of an annual picnic for all the Marsden children. Every child attending the picnic was presented with a prize. Periodic visits to the Donkin homestead wee made by some of the Governors of N.S.W. The Governors were always provided with a police

escort to and from the station. The last Governor to visit the station was Sir Harry Rawson. Mr Donkin was the first resident of Marsden to own a motor car. The car was delivered to Wyalong by rail, and at various periods, was trucked back to Sydney for use during visits to the city.

JOHN THOMAS KELLY: Familiarly known as "Pop" Kelly. He was the father of Mrs Curry and her twin sister, Mrs Sutcliffe, Senr. of Wyalong. "Pop" Kelly was a hawker by trade when he first arrived at Marsdens. Apparently he was a man with some education as he had been the Marsdens correspondent to one of the Wyalong newspapers for a number of years. Kelly died in 1905, at Cottingly, in the Mallee Plains district, where Mrs Sutcliffe was resident at that period. He was buried in the Wyalong cemetery.

JACK MARTIN: one of the sons of William Martin Snr., was a well known personality at all the local dance halls in the role of M.C. Jack's masterpiece was his ability in putting the dancers through the sets of the old-time square dances. The most popular square dance was the Lancers, followed by the Alberts and Quadrilles.
During his later life, Jack Martin acquired some of the smaller blocks of land that were situated adjacent to Marsden, and carried on farming and grazing pursuits until his death.

SYDNEY BUDGE SNR: Was a station hand on Caragabal Station for 45 years, during the ownership period of F.F.Gibson. As a token of esteem for his long period of service on the) station the late F.Gibson bequeathed to him a small block of land adjacent to the villiage of Marsden, where Syd built a cottage. During the years of his retirement Syd was a well known barracker of the local sporting fixtures, especially cricket and tennis matches. Just a s the Sydney Cricket Ground had its "Yabber", so did Marsden have its Syd Budge. Three member of the family still live in the Marsden district.Frank Jack and Ethel live at Caragabal, Zeta (Mrs George Boneham) at Billabong (1972).

MRS. "GRANNY" WATT: Remembered as one of the grandest of women in the pioneering days. Mrs Watt was affectionately endeared to all - young and old- as "Granny". During her life Mrs Watt was married three times, two of her husbands (Powell and Walker) having predeceased her. Before moving to the villiage. It is not known whether she ran the shanty or not. Granny Watt was midwife to most of the children born

there. She was always at the bedside of the sick, and ready to help those in distress. Mrs Watt was a grandmother of the Budge family. She died about 1912, and was buried in the Marsden cemetery.

SUSAN TATE: Was a wandering nomad. Periodically Susan would walk from Young to Marsden, a distance of 70 miles. On arrival, she would quench her thirst with a few beers, have a rest, then start on the return walk to Young.

8 7 6 5 4 3 2 1

The Travellers' Rest Hotel, Williams's Crossing, near Wyalong, erected by the late Thomas Williams in 1898. [illegible] 7.3

Sent by Mrs. H. Bodel, Forest View, Wyalong.

This photo was taken about 1895 and taken from the Land Annual of 1938. The hotel was ½ mile down the creek from where the new bridge is and now is just on Sinclair's property.

Mrs. Catherine Margaret Bodel (nee Williams) was born on 23rd December 1872 at the Pig & Whistle hotel on the Forbes road at the 2 mile opposite to Haslins.

1. Jim Fearce
2. Johannah Williams (Mrs. A. Rhall)
3. Winnie Williams (Mrs. Marsden)
4. Tom Williams the second
5. Mrs. Tom Williams (nee Bridget McNamara)
6. Mrs. Jack Williams (nee Molly McGrath)
7. Mary Williams (Mrs. Andy Worner)
8. Andy Worner

BILLYS LOOKOUT.

Billys Lookout was between Wamboyne and Lake Cowal, and it experienced a gold rush just after Wyalong goldfields were discovered, although gold had been mined there intermittently between 1873 and 1894.

The name Billys (Billies) Lookout is said to have originated from a tragedy that occurred in the area. A young man named Billie and an older man were droving cattle in the area for Samuel Wilson, when Billie's horse bolted, and he was struck by an overhanging limb of a tree. When they returned to the station to report the accident he was in a state of shock, and kept repeating, "I said 'Billie, lookout.' "

The Town and Country Journal, dated 2 June, 1894 states that: "The old mining camp at Billie's Lookout had lately quite a new lease of life and seems likely to become a permanent township. Two stores have been built and are in full swing and other business places are being erected.

There are about 300 men here and prospecting is being carried out very energetically. There are a few parties on gold but not to any great extent - simply tucker and a few shillings."

Neil White Snr and Ned Harris played a prominent part in the discovery of gold at Billys Lookout. At the beginning of April, 1895 a report stated that in addition to the initial claims, three more claims had bottomed on the run of gold. The whole valley was pegged out and other gullies were vigorously prospected and there were four or five reefs with fair gold. Neil White and party were working a promising reef 18 inches to 2 feet wide. One shaft was down 90 feet to water level and others were down 70 feet and 30 feet. The three shafts were being sunk to the same level when connecting drives were put in and the stopping of water commenced. About 50 tons of fair stone had been brought to the surface.

From the workings at County of Gipps, Parish of Coringle, No 132 on Map, $2240 worth of gold was found (value in 1967). At least 2.17 kg of gold was found at an average of 9 grams/ton. There were shafts drives and shallow pits for a length of 400 metres by 100 metres wide. The sedimentary soils were silt, clay, sand, granite sediment, quartz pebbles and boulders. The alluvial gold was derived from unworked veins in the surrounding hills.

In the mine known as the Billys Lookout Reef (County of Gipps, Parish of Corringle, Portion 53, No 130 on the Map), shafts and drives were driven for a length of 200 metres and width of 30 metres. In 1894 the major primary materials were reported to be gold and pyrite, and the minor primary

material was galena. Cowthorns and party were working this reef.

Other mines in the Parish of Coringle (Nos 127 and 128 on the Map) also produced some gold but the amounts are unknown.

Billys Lookout had a hall and business houses, and social life included concerts, dances and cricket matches with the neighbouring teams at Marsdens and Wamboyne. Messrs Wilson and Stewart of Lake Cowal Station were President and Vice-President of the Billys Lookout Cricket Club.

On 16 August, 1895, there was a concert at Billys Lookout to celebrate the erection of a hall for the Miners' Club. This was followed by a dance "with an excellent supper". Dancing continued until 8 a.m. Following the concert Mr Morris, President and an old identity, and Mr Neil White addressed a large crowd of members and residents in the hall, which had been decorated by "ladies and gentlemen of the township".

In November, 1895 the Department of Education made a grant of £5 to the Billys Lookout Progress Association for the erection of a bark school house and furniture. Edward Morrison was the first teacher to be appointed on 13 April, 1896.

Although approximately 1000 miners and gold seekers congregated at the Billys Lookout goldfields, the period of winning gold was shortlived. Numerous shallow shafts - or diggers holes - were sunk at various other sites within the locality. However no further signs of gold bearing stone were discovered.

Robert Brenner operated a battery on the field and also conducted the only licensed hotel - which was closed in 1903. There were possibly a number of shanties on the goldfield because it is recorded that on a Saturday night in September 1895 there was a raid by the Marsdens police. Some liquor was seized and one person was arrested. He appeared at the Marsdens Police Court and was fined £30 or six months in Forbes gaol.

Some of the timber from Robert Brenner's Hotel was later used to build a shed on Mr Harry Bodel's farm at nearby Clear Ridge. Mr Clarke, who was Mrs Neil White's father, moved his hotel from Marsden to Billys Lookout.

From Miss Wilson and
The Town & Country Journal, dated 2 June, 1894.

WYALONG ADVOCATE. TUESDAY JUNE 26, 1928.

"BILLY'S LOOKOUT.

History Recalled. by NEIL WHITE.

This is my first venture in print, but I should like to say something of my people, who have passed away, and of Mr. Wilson and his family, who were good friends of my mother while she was alive.

I consider that some of the members of the Chamber of Commerce have gone to far. The Lookout is mentioned in a reading called the History of the Lachlan (written by my mother's father) which goes back over a hundred years. The region known as the Lookout meant the country from the Fish River to the Old Man Plain and the Bland.

My grandfather came from England at the age of 22, and his first residence was at Gralton's station in the Forbes district. Later he lived at Speck's Gap. He was a horse and cattle vet and in the early days he travelled all that district.

The Lookout is first mentioned in the above history in the year '63 when my father laid the foundation of his fortunes by discovering alluvial gold there. In '6[illegible] he selected a holding known as Pine Hill in the Forbes district.. Ned Harris discovered reef gold at the Lookout before my father made his find of alluvial gold. The first battery in the district was erected at the Lookout.

The old Billybung Station is also mentioned in the readings. It was owned by James Atkins, who died 2[illegible] years ago, at the age of 93. The Lookout later became the back station of Billybung and was given the name of Billy's Lookout. Some of the oldest survivors of those districts spoke of the Lookout as being one of the Rignols, those being J.B. Donkin, and Maitland, of Moonbi.

As regards the remark made about a Johnny-come-lately, that could apply to Mr.E.A.Buttenshaw, the man who had done all in his power to make the place a busy centre with the spirit of a good citizen had done what he can for the children and young people re a little recreation, which otherwise they might never have got. It was here that Mr.Buttenshaw got his first start on the land. He also got the right for the railway to that part. I am of the opinion that a little honor is due to such a man. As a fair deal to all concerned, if the place be called any other name but the Lookout, it should be called Ernie's Lookout."

TOWN AND COUNTRY JOURNAL 2. 6. 1894.

BILLIE'S LOOKOUT TUESDAY.
This old mining camp had lately quite a new lease of life and seems likely to become a permanent township. Two stores have been built and are in full swing and other business places are being erected.
There are about 300 men here and prospecting being carried out very energitically.
There are a few parties on gold but not to any great extent simply tucker gold and a few shilllings.
A numerously signed petition had been forwarded to the Postmaster General asking that a post office may be established, great inconvenience being felt, there being no post office nearer than Marsden, 15 miles distant.

BILLIE'S LOOKOUT REEFS.
A correspondent at Billie's Lookout writes:-
White and party struck a reef about three miles in a westerly direction on May 31. The stone, a small specimen of which had since been crushed, gives good results, some say equal to an at Wyalong. Another reef is in McNair's selection and Fitzgerald and party are waiting for permits when they will start working. Prospecting for reefs is being vigorously carried out and any one with capital coming here will no doubt be amply repaid for the outlay.
The petition for a post office has been answered and the postmaster from Marsden is here now making enquiries.
The weather is cold and rainy and there is plenty of water and grass.
Aid was granted for a provisional school at Billie's Lookout on 9.5.1895. First teacher was appointed 13.4.1896, Edward Morrison.
Public School 16.5.1905. Department of Education letter undated.

WYALONG STAR June 19 1894.

From Billy's Lookout we learn that mining affairs have an improving tendency. Hatward and son cleared up about six loads on Friday for nearly an ounce to the load. The sinking is 35 ft and the depth of wash over a foot.
A few others are getting gold, but in most cases the gold bearing reef 14 inches thick at four feet from the surface has also been found about three miles south and several claims have been registered.
Two bakers, two butchers and two storekeepers should be able to provide well for a population of 200 people. Taken altogether the place has now an air of permanency which it never before possessed.

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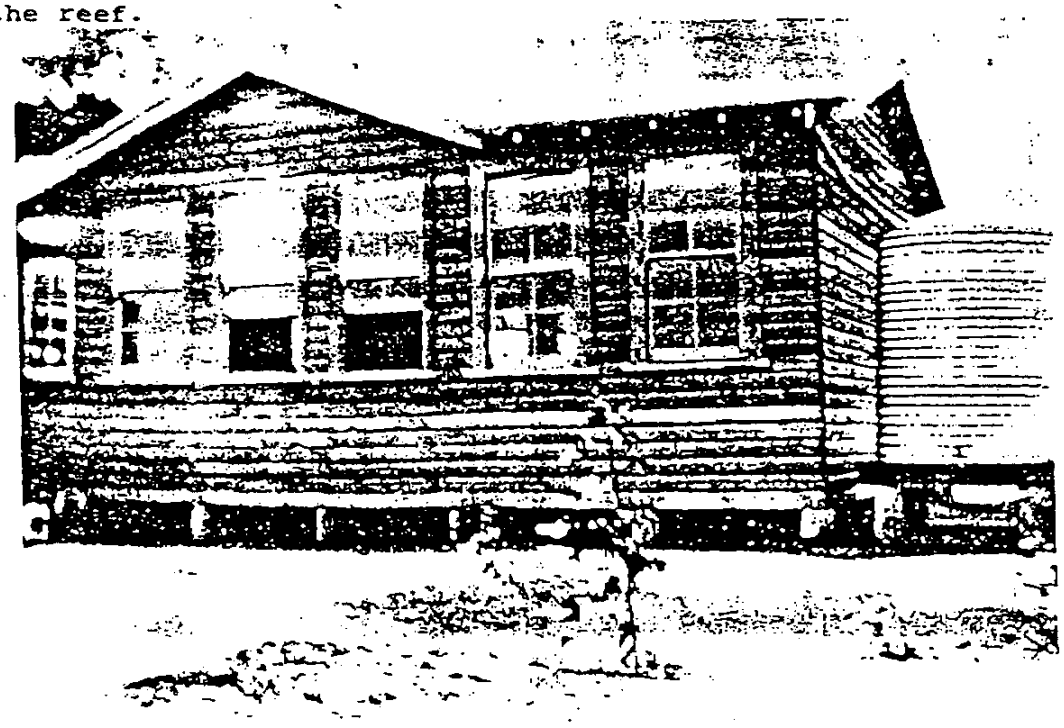
BLOW CLEAR.

The Wyalong Advocate dated 8 August 1903 stated that a discovery of gold bearing stone had taken place at Blow Clear some 20 miles north of Wyalong by scrub cutters. The stone was found on the surface and further investigations went to show that a quartz reef is running north and south about twelve inches wide. Samples have prospected so satisfactorily that Brian McNamara and others have bought two shares in the prospective Eldorado for the sum of £20. The stone is of sugary, white quartz quality and said to contain gold freely.

Further Mining Intelligence in the Wyalong Advocate dated 19 August, 1903 stated: The prospectors, Clarke and party are down 20 feet on a 12 inch reef of white sugary quartz, and have commenced to put a crushing together. Stewart and party, No 1 North, are on a reef about the same width, but distinct from the prospectors reef. It is composed of flesh coloured quartz, opalised, and containing ironstone, and is assayed at the rate of 1 oz 14 dwts gold to the ton. A good deal of prospecting is going on in the surrounding country, which is also Crown Land. There is no outcrop to guide the prospector and most of the work consists of trenching or costeening. Altogether there are about 40 men working at the new find and the adjacent country and there is plenty of water.

On 19 September we read that Clarke and party, Stewart and party, Leadbitter and party all have a tidy parcel of stone paddocked.

On 7 October it was reported that John Thompson had struck a reef at the depth of three feet about a mile south of the prospector's claim and gold was said to be showing freely in the reef.

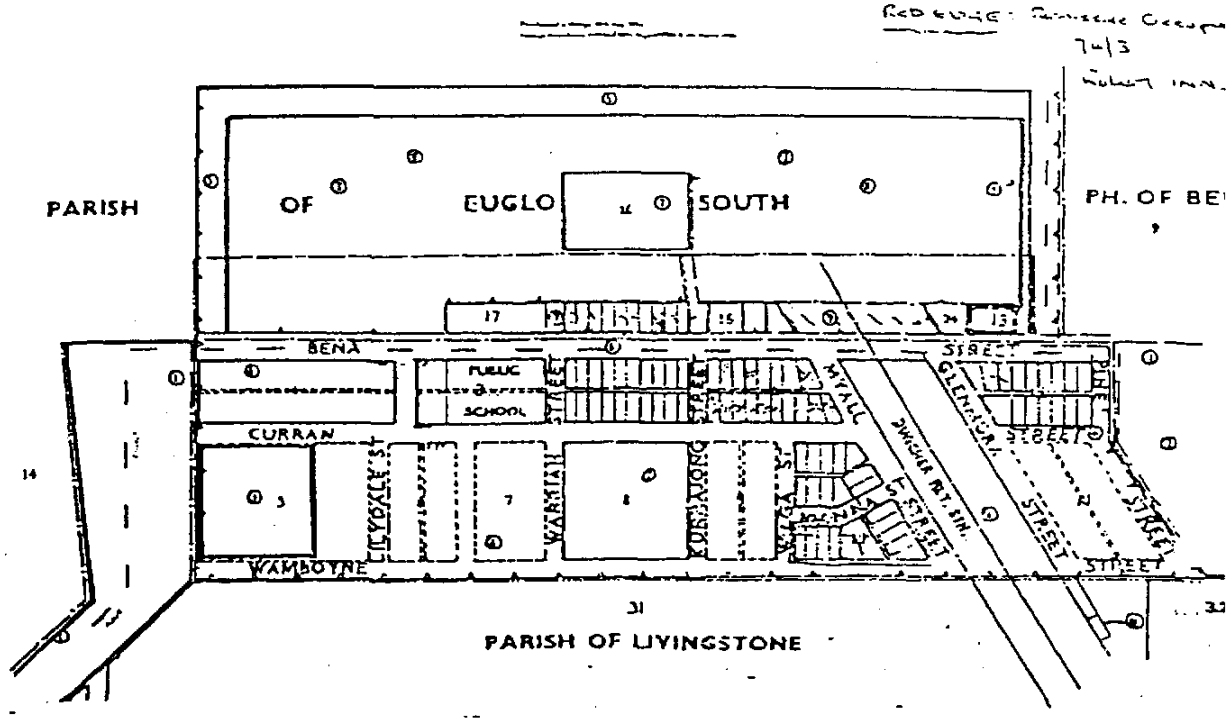


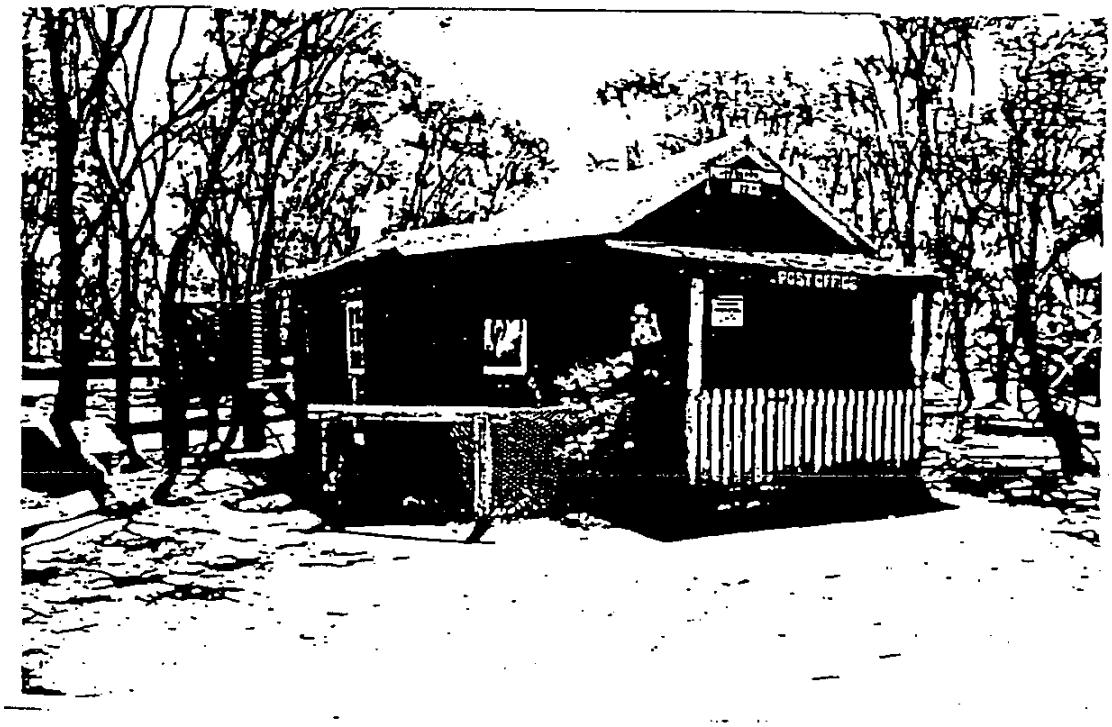
Blow Clear School, 1927

BLOW CLEAR

Some excellent stone from this locality has been shown about town since Sunday and as a result there is a revival of interest in the place. In view of this fact we have made enquiries as to the progress being made, with the result that we are enabled to make the following report:- Clarke and party on the western reef are driving south on the 50 ft level on a fair body of stone. The same party on the weastern reef are down about 50 feet in the new shaft on about a foot of stone. No. 1 north of Clarke and party are crosscutting for the western reef at 60 ft and expect to cut the reef any day. On the eastern reef the same party are down about 50 ft on stone from six to twelve inches carrying fair gold. No. 2 north are crosscutting for the reef. McNeill's prospecting claim about half a mile east of Clarke and party struck nice gold on Saturdady last. Your representative has seen some of the stone and can vouch for its appearance. Armstrong and party are sinking on the reef and samples dollied show at least an ounce prospects. Grass and water are both plentiful at this find, and considering the moderate number of men on the field really good work is being done. As depth is attained it will be possible to speak with more authority on the prospects sof the place..

VILLAGE OF BURCHER AND ADJOINING LANDS





Billy's Lookout Post Office - reconstructed at Wyalong by Mr and Mrs Beckett.

UNGARIE.

The township of Ungarie derives its name from the pastoral holding held in 1866 by one Roger Frehilly. Its native meaning means "thigh". The area of the pastoral station was 29440 acres with a grazing capability of 1000 head of cattle. A small settlement began to rise to the east of the present township and in 1892 it consisted of two general stores, a Post Office, a hotel, a blacksmith's shop, a shop and a boarding house. R.M. Mackrell ran the Post Office and one store. The other store was run by D.A. Colbert.

An application was made on 30 November, 1891 for the establishment of a village. Surveyor Maitland reported that a village should be surveyed on the south bank of the Humbug Creek. Nothing was done about it until Surveyor Roberts reported in December, 1892 that a suitable site could be found on the northern side of the Humbug Creek opposite the present town. Surveyor Maitland surveyed the village on this site in September, 1893 and this was gazetted as the village of Ungarie on 31 March, 1894.

When the Wyalong-Lake Cargellico Railway line was constructed the surveyors placed the railway station on the side of the creek opposite the village. A suggestion to extend the boundaries of the gazetted township were approved and duly gazetted on 27 July, 1917.

WAMBOYNE.

The first mine put down in the district was in 1902 on the Trig Hill in Quinlan's "Nerang Cowal State Forest". The Mines Department paid £1 per foot to have the shaft sunk by the Ellis Brothers but there was no gold.

Gold was found in 1905 by Harry Kaiser in what is now the Burcher district, formerly Wamboyne (County of Gipps, Parish of Bena, Portion 4, No on Map 136). The workings went to a depth of eight metres long and three metres wide. H.F. Fitzgerald and party worked the mine in 1941. Up to 1967, 270 grams of gold worth $288 was produced.

There was quite a rush for a while and Kaiser's Hill was a hive of activity. Harry and Alf Nelson put down a shaft on "Wilga Vale" (No 177 on Map) and Harry Leadbitter Snr sank a shaft on top of the hill, but there was no gold in either. Leadbitter went to a big gully on Mark Fitzgerald's "Uplands". He struck a little gold at fifty feet, but went down to ninety feet and all he found was pipe clay. This came in handy for people for the whitening of their fireplaces - they came for miles around in order to obtain some.

Kaiser was on a good reef, but it was never a bonanza. The ore was carted to West Wyalong by Bullock teams to be crushed. The carriers were Jim Hughes and Herb Beazley. This mine petered out about 1909. The Wyalong Advocate, 18 May 1906 reported that Keyser (sic) was down 30 feet on a new reef with 10 tons at grass which was to be treated at the Billys Lookout Battery. It was also reported that Nelson, Leonard, Easdale and a couple of others had not discovered anything.

The Wamboyne Gold Mine (County of Gipps, Parish of Coringle, Portion 12, No 133 on the Map) was first worked in 1907. Later in 1935 G.W.J. Murray and party and in 1939 this was worked by H. Whiley. The average grades of 3 grams/ton of gold were found but the total production is unknown.

Another mine at County of Gipps, Parish of Bena, Portion 6, No 134 on map) was worked in about 1907 and again about 1970 but the amount produced is not recorded.

In 1927 a decision was made to build a railway line from Wyalong to Wamboyne. Rather than end the line at Wamboyne which was landlocked the Government pushed it on for a further four miles and named the terminus Euglo. Seven years later the name was changed to Burcher, possibly called after Charles Burcher one time owner of Euglo Station.

ABORIGINAL DATA.

When the first settlers arrived at Lake Cowal there appeared to be ample evidence that the area had been inhabited by numbers of Aborigines of tribal proportions. The Eland had been referred to as a meeting place of the tribes of the Lachlan an Murrumbidgee Rivers.

Many of the old gum trees on the western banks of the lake showed extensive carvings on their trunks. The custom of carving a trunk of a tree near a burial plot could be proof that numbers of aborigines had been buried in the sandbanks surrounding the shores of the Lake.

In parts of the dense mallee areas of the district it was apparent that gunyahs had been erected. Practically all the hill areas bore signs of habitation by our first inhabitants. During the early days of Marsdens an aboriginal camp was situated along the eastern banks of Lake Cowal between the village and the Lake.

Samuel Wilson wrote in the RAHS Journal and Proceedings Volume III- 1923 p. 374 that aborigines had large camps on the site of the present Lake Cowal station homestead, and numerous middens were found there.

Mrs Sarah Musgrave, a pioneer of this district, wrote that the Eland was a famous battleground of the Lachlan and Murrumbidgee aborigines. She had remembered an occasion when two aborigines were killed by the same spear and another had his head knocked off by a boomerang. They had their sex initiation ground somewhere in the neighbourhood where they initiated their young men. John Regan discovered the area one day. This was on the site of the future Wyalong. The area was not used again because the aborigines said it was desecrated.

From extracts The Way Back.

TOPOGRAPHY, GEOLOGY AND CLIMATE.

The eastern area of the Bland Shire, is included in the south-western slopes for rainfall reports and it is mostly flat, whilst the western part included in the Central western plains has many hills. The dividing line runs between the towns of Wyalong and West Wyalong.

East and north of West Wyalong the region is generally flat whilst the south and west are more undulating and have some sizable hills with high peaks.

An interesting physical feature is the line of hills which runs from North Yalgogrin across to Barmedman and these hills form a watershed. The streams rising on the northern side eventually flow into the Lachlan River and the various creeks have been listed elsewhere.

The topography of an area influences plant life in various ways. The types that grow on the hills are often quite different from those of the lower country. Foe example, Hill Red Gum (Eucalyptus dealbata) prefers hilly areas. Waterways, especially those subject to flooding and causing wet or damp conditions for considerable periods, are bordered by plants which can stand these conditions where others such as the River Red Gum (Eucalyptus camaldulensis) would perish.

Plants depend largely on the soil for their food. Soil is derived from broken down rocks. Rocks differ considerably in the amount of plant food which they contain. Thus a brief geological survey has some importance when studying the native flora of any given area.

In the Bland Shire there is a noticeable variation in the geology. It varies in age from the Upper Ordovician (the rocks of that period would have been formed hundreds of millions of years ago) to what is geologically known as Recent. Some of the rocks are Sedimentary and were made from the sediments of older rocks and laid down under water, mainly sandstone and shale. Then there are Igneous rocks. These have been formed from molten magna intruding into other rocks and cooling down, such as granite and dolerite. We also have Metamorphic rocks in the Bland Shire - the name means changed form. These rocks were either sedimentary or igneous to begin with and then, because of the great stresses and strains, accompanied by heat and chemical change, they become something different, as in slate and quartzite. Slate was originally shale and quartzite was sandstone.

The following igneous rocks occur in this shire: granite, granophyre, grano-diorite, rhyolite, porphyry, norite, and dolerite. Among the local sedimentary rocks are sandstone,

shale, conglomerate (pudding stone), and travertine (a limestone). The metamorphic group is represented by such rocks as slate, quartzite, schist and phyllite.

Very ancient rocks, probably belonging to the Silurian period, occur towards the eastern end of the shire. They are sheared conglomerates, sandstone, shale, schist and phyllite. The largest area includes Wamboyne and the railway sidings of Corringle, Lake Cowal and Clear Ridge. The Bocberoi Hills which cross the Marsden Road about eight miles from Wyalong belong to this period. Evidence of tremendous pressure is seen here as the rock strata instead of being flat are just about vertical. Much of this rock is talc schist, a lightish grey colour.

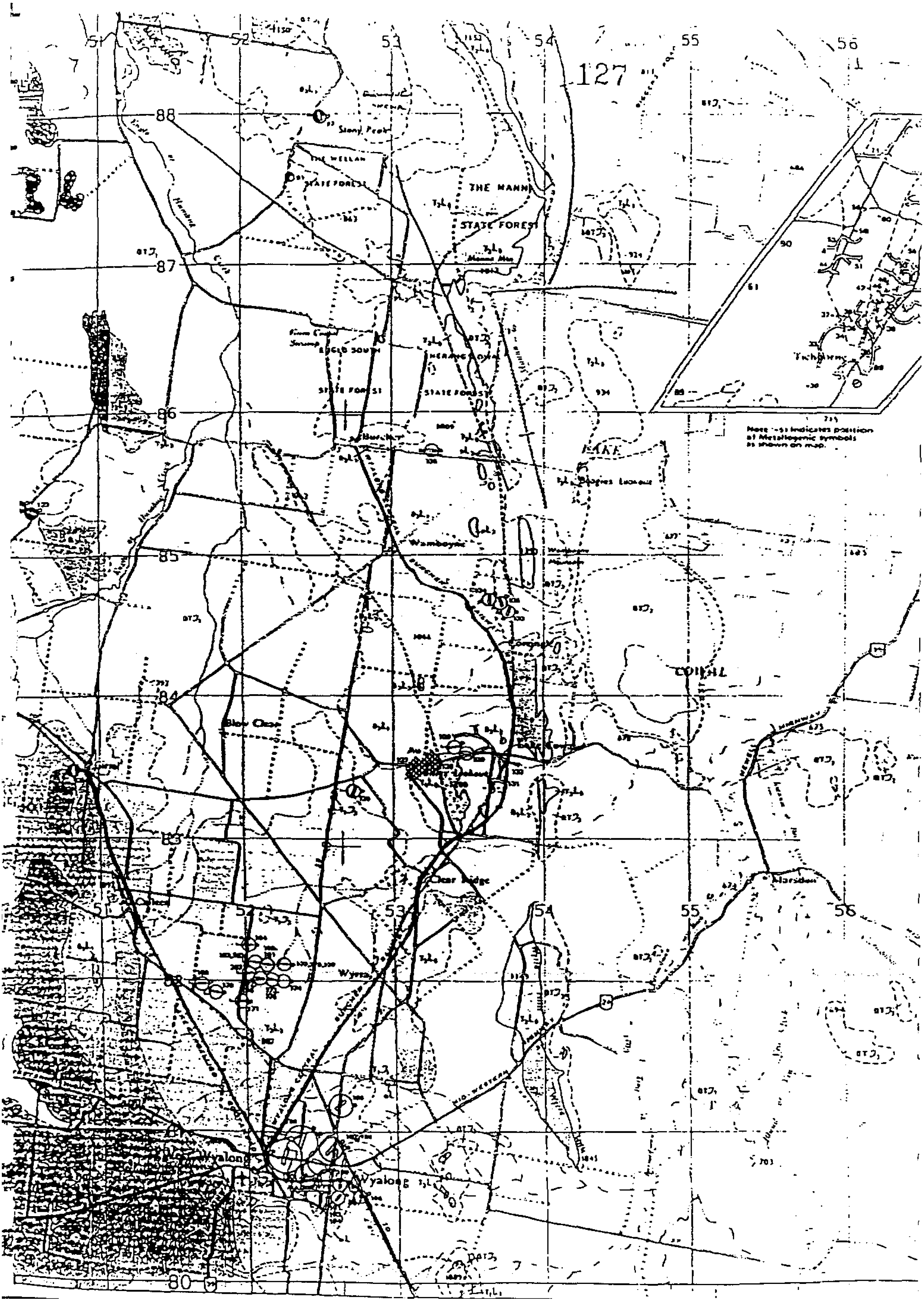
Large areas of granite type rocks occur in the Bland Shire. It was from the quartz veins of these rocks that gold was obtained in the local mines. The rock from the mines is granodiorite, a black and white rock.

The granite belt stretches northward from West Wyalong and includes Wyrra, Calleen, Girral and areas north and south of Ungarie. There is a long strip going south east from Yalgogrin through Buddigower; another area includes Wargin, and another area lies between Thulloo and Kikoira, but does not include those places.

The only other area is very small, but very interesting. It is at Wyalong and about two miles north and south of it. Chinese market gardeners are excellent judges of soil and so for many years they produced excellent vegetables from the rich soil of Wyalong. The soil of Wyalong is more fertile than that of West Wyalong, much of which is covered by ironstone gravel over clay. There is an outcrop of conglomerate, sandstone, quartzite, siltstone and shale probably of Upper Devonian age on the north west edge of Lake Cowal.

Practically the whole of the Shire east of Wyalong is covered by Tertiary to Recent deposits. They include alluvial clay, silt, sand and sandstone. On the whole the resulting soil is fertile and provides good plant food.

Bland Shire lies within a region of uncertain rainfall and its variability has a big influence on the vegetation. Plants have to adapt themselves to long dry periods and then cope with wet seasons as well. Taking the Shire as a whole, there is not much difference in the average annual rainfalls. It is the variability of the temperatures which influence plant life rather than the average. For example, between 1951 and 1956 Wyalong had an average maximum temperature of 18.18 degrees Celsius and a minimum average of 9.4 degrees Celsius, but this information does not reveal the heatwaves when the temperature reached over 43 degrees



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Stony Peak
THE WELLAN
STATE FOREST
THE MANNA
STATE FOREST
STATE FOREST
STATE FOREST
Wamboyne
Blow Clear
Clear Ridge
Wyalong
Wyalong
Marsden
Tichborne
Note: indicates position of Metallogenic symbols as shown on map.

Celsius in the shade and the cold frosty nights when the thermometer fell to zero or less.

Another important factor with regard to plant life is the absence of clouds on so many days of the year and the high rate of evaporation. The average annual evaporation for West Wyalong is about 57 inches compared with the average annual rainfall of about 19 inches.

The relative humidity for the area is low. There is a good deal of calm weather, particularly in the autumn and winter. Probably the most prevalent wind is that from the south west and when it is not moisture laden it is a particularly drying wind. The softer easterlies are not common. Those from other quarters make the temperatures soar in the summertime.

Pelicans and their young on a small island in the lake.

KEY TO MINES AS SHOWN ON EXTRACT OF THE FORBES METALLOGENIC MAP included in these notes.

MINE	NAME	COMMODITY	VALUE IN 1976 $'s
91	Weelah Manganese Prospect NW,SE	Man, Au	10 000
92		Man, Au	1 000 000-10 000
123	Ungarie Tin Prospect E, W	Sn	10 000
124	Carnells " " E, W	Sn	10 000
125	Girral " " N, S	Sn	10 000
126	Blow Clear Ridge Mine	Au	10 000
127	Billys Lookout (Placer)	Au	10 000
128	" " "	Au	10 000
129	Smiths Prospect	Au	10 000
130	Billys Lookout Reef	Au	10 000
131	" " " Deep leads	Au	
132	" " Alluvial Workings (Deep Leads)	Au	
133	Wambcyne Goldmine (Deep leads)N,S	Au	10 000
134	" "	Au	10 000
135	" "	Au	10 000
136	Kayser (Manna Mtn Prospect) E.W	Au	10 000
169	Rothacker's Prospect	Au	10 000
170	Keen's Prospect	Au	10 000
171		Au	10 000
172	Molloy's Mine	Au	10 000
173	Fletcher's Mine	Au	10 000
174	Dawson's Mine	Au	10 000
175	Crawley's Mine	Au	10 000
176		Au	10 000
177	Nelson's Mine	Au	10 000
178	Early Morn Mine	Au	10 000
179	Crampton's Mine	Au	10 000
180	Prospector's Mine	Au	10 000
181	Coronation Mine (The Blow Mine)	Au	10 000
182		Au	10 000
183		Au	10 000
184		Au	10 000
185	Western West Wyalong Grp of Lodes	Au	10 000 000-1 000 000
186	Mallee Bull Line of Lode	Au	10 000 000-1 000 000
187	Summergill's Line of Lode	Au	1 000 000-10 000
188	Klondyke Line of Lode	Au	as above
189	Pioneer Line of Lode	Au	as above
190	Santa Claus and Kinks Line of Lode	Au	as above
191		Au	10 000
192	Pine Ridge Line of Lode	Au	1 000 000-10 000
193		Au	10 000

194		Au	10 000
195	Pine Hill Lode	Au	10 000
196	Call Back Line of Reef	Au	1 000 000
			10 000
267		Au	10 000

Geological Reference:

Fault

Anticline

Syncline

Approximate

Concealed

General Reference:

Major Roads

Railways

by Late Mrs Anne Mitchell B.Sc.

— (as printed in "West of the Bland" - a History of the Wyalong District.

It is fortunate that our early explorers were also botanists or took botanists with them on their expeditions. After Blaxland, Lawson and Wentworth crossed the Blue Mountains in 1813 Governor Lachlan Macquarie sent various expeditions into the interior of New South Wales. The headwaters of the Macquarie and the Lachlan Rivers were discovered but no one knew where the streams went. It was thought that they might flow into a large inland sea, so, on 6th April, 1817, Surveyor John Oxley's exploration party, which included the botanist, Allan Cunningham, left Bathurst to trace the course of the Lachlan River.

About three weeks later they reached the Lachlan and followed it for some weeks. Then, to their surprise, although no rain had fallen in that area, the river began to rise and the water spread in all directions. Fearing they should be caught and drowned by the rising waters Oxley decided to leave the river at a point not far south of where Yarrabandai is today. Before doing so they planted a flat surface on the large stem of a Eucalypt and left the following marks:- J. Oxley, G. W. Evans, A.C. May 17th 1817. After leaving the river the explorers journed south-west, hoping to reach the neighbourhood of Cape Northumberland. (This cape is situated in the extreme south-east corner of South Australia).

It was during this stage of the journey that the party traversed portion of what is now known as the Bland Shire. They probably passed east of the present Ungarie about 21st May and were also close to the sites of Yalgogrin and Weethalle before reaching Mt. Aiton (now known as The Peak) on 26th May—a distance of about 100 miles from the Lachlan. They continued south-west until they reached Mt. Brogden, (now called Mt. Binya). An inscribed monument at this point bears extracts from Oxley's journal. From there they travelled in a northerly direction on the western side of Cocoparra Range which they named Peel Range. No doubt in this part of their journey they went close to where Rankins Springs now stands.

The explorers reached the Lachlan River again on the 23rd June and followed it until not far from its junction with the Murrumbidgee (although they did not know this). They turned back and in early August crossed the river near the northern end of the Goobothery or Boloon Range. A monument marking the spot can be seen on the Lake Cargelligo-Condobolin Road.

From there they travelled overland to the Macquarie River and thence to Bathurst after an absence of four months.

Oxleys report of New South Wales stated that they went over country "of the most miserable description." He doubted that "these desolate plains would ever again be visited by civilized man." On 20th May Allan Cunningham noted in his journal: "Continued our course due S.W. over a most sterile, dry, scrubby flat country, notorious for the uniformity of its production being the same as passed yesterday" (Cypress Pine, Boree, Bulloak or Belah) "and penetrating three miles further we traced the same miserable arid country that we have had all day."

Oxley also gave an unfavourable report of the Lachlan River, saying that it was probably a flooded marsh in winter and a chain of ponds in summer. Cunningham's journal indicates that 1817 was a very dry year and this area was in the grip of a drought. The weather observation were very similar to those of the year 1967, exactly 150 years later (i.e. for May and early June). Oxley's party left the dangerous waters of the Lachlan only to endure the ravages of drought. No rain fell and much time was spent looking for water which was often stagnant and foul. Their horses suffered from the lack of feed and water and some of them died. The men's provisions were so low that they had to be rationed. If rain had fallen while they were near Binya they would have pushed on and found the Murrumbidgee about 30 miles farther south and thence to the Murray. However, that was not to be and to save his men Oxley turned towards the north again to get back to the Lachlan.

Neither Oxley nor Cunningham were impressed with what are now prized river flats in the vicinity of the Lachlan. Cunningham wrote on the 15th May: "The soil of these flats is of a tenacious cold stiff clay quality. The Cypressus glauca (White Cypress Pine) is frequent, forming small timber trees scarcely exceeding 25 feet, and the many dead stems scattered among the common Eucalypt are sufficient demonstration of the coldness and sterility of the soil." On 18th May when they left the River and turned south-west "the country became exceedingly brushy and assumed a greyish gloominess in consequence of the great numbers of Acacia pendula (Boree) and Rhagodia dilatata (a Salt bush) which were the two predominant shrubs. The soil is a loose red earth with a large proportion of sand." As they continued south-west, trees such as Eucalyptus micrantha (Snappy Gum) and Cypress pine were passed—also Kurrajongs and Yarran interspersed with Boree.

As they drew nearer to where Ungarie is now, Cunningham wrote "Continued on our course due S.W. over a most sterile, dry, scrubby flat country notorious for the uniformity of its productions, being of the same as passed yesterday." The taller timber was white Cypress pine and the smaller Bulloak or Belah and Boree. Farther on they saw Native Cherries and a "beautiful tree about 30 feet of very spreading habit, with branches very slender and pendulous." (This could have been a Wilga). Hop bushes were also in evidence. The next day they continued the S.W. journey and passed through "the melancholy Acacia pendula." Today we think the Boree a very attractive tree if not marred by an insect pest. On the rises they saw Ironbarks and Cypress pines and a number of shrubs such as Tea Tree, Green Mallee (?), White Mallee, Paper Bark and a tree the men called Snakewood, with rough and scaly bark. Mistletoe was common on the trees. The vegetation they encountered on 23rd. and 24th May was the same as that found today on the virgin areas from West Wyalong to the west and south-west. As well as the plants previously mentioned there were Mint-bushes (both red and white), Goodenias, Eriostemons, Melaleucas (one of which was probably our Broom-bush), Blue daisy bush, Clover bush and the twining Mallee Vine. The last evening they spent in our area they disturbed "a large emu and two young kangaroos who were feeding upon the trifling herbage, which the sterility of the country can only produce in small patches."

River Red Gums (E. camaldulensis) thrive where there is an abundance of water and occur at Lake Cowal and along the creeks. Black or Flooded Box (E. largiflorens) lives on heavy alluvial soils subject to flooding and occurs in the Lake Cowal area. Fuzzy Box (E. conica) generally occurs on low land along streams. Narrow-leaf Ironbark (E. crebra) often grows in forests with cypress pines. It occurs in the Burcher area.

Other district trees are the Kurrajong (Brachychiton populneum). It is both handsome and useful. Where there is Belah (Casuarina cristata) the soil is heavy, and the same is true of Boree or Myall (Acacia pendula). Bull Oak (Casuarina luehmannii) is found on a variety of soils. White Cypress Pine (Callitris hugelii) is widespread in the district on good sandy loams which are well drained. It is a valuable timber tree and is white-ant resistant. Many of the forest areas have been cut out to fulfil the demands for its timber.

The Mallee Pine (Callitris preissii) occurs in the Weethalle area. Its common name is apt as it has several stems and is small. The Wilga (Geijera parviflora) is usually found on the heavier soils. It is a very attractive tree and can be used for fodder.

Other trees which grow in the shire are Rosewood or Berrigan (Heterodendrum oleifolium), Quondong (Eucarya acuminata).

Butter Bush or Western Pittosporum (Pittosporum phyllireoides) is also known as Berrigan. The hard fruit is yellow and opens to show sticky orange-red seeds.

Warrior Bush or Currant Bush (Apophyllum anomalum) is a small tree with almost leafless branches. It has an air of great antiquity about it. Budda (Eremophila mitchellii) is a small tree with graceful light green foliage and white or purplish bell-shaped flowers. It is sometimes called Sandalwood. Emu Bush (Eremophila longifolia) often only a shrub, occurs on a variety of soils. It has dull red tubular flowers about an inch long, and is sometimes called Berrigan. Sugarwood (Myoporum platycarpum) occurs chiefly on sandy loams in mallee country. It exudes a sweetish resin, and is also known as Dogwood and Sandalwood.

Yarran (Acacia homalophylla) is fairly widely distributed on a variety of soils. Native Cherry (Exocarpos cypress iformis) is an attractive small tree, looking rather like a pine. It seems as if the seed is outside its fruit. In reality the "fruit" is the enlarged, berry-like, bright-red stalk and the "seed" is the real fruit, a small nut. The Jointed Cherry (Exocarpos aphyllus) has the same type of fruit, but is not attractive. It is leafless with criss-crossed hard, almost thorny, branchlets and is usually a large shrub. Moonah (Melaleuca pubescens) grows in sandy soil—a small spreading tree with two-inch white "bottlebrush" flowers. It is sometimes called Black Tea Tree.

Broom Brush (Melaleuca uncinata) is usually a shrub in this area. It contains oil which was sometimes extracted from it in the early days. Needlewood (Hakea tephrosperma) has a fairly wide range, and the needle-like leaves are about two inches long. The woody fruit opens and frees two dark, winged seeds.

Of hybrid Eucalyptus trees which have not been mentioned there are at least 40 different species within the shire. With the exception of the hybrids it is likely they would have all been here when Oxley and Cunningham passed this way in 1817.

So far 21 different wattle species have been identified in the area. No doubt there are more. The most famous is the Wyalong Wattle (Acacia cardiophylla). It occurs in the Boobaroi Forest, and a few miles west of West Wyalong. It favours the banks of dry watercourses. It is a beautiful free-flowering shrub, with rich yellow flowers and bi-pinnate leaves, the leaflets being very small. Nurserymen praise its beauty in their catalogues. It should not be confused with Deanei Wattle (A. deanei) which is much more common. In this species the leaflets are larger and not such an attractive green. The young leaves and branchlets are usually tinged with yellow and the flowers are paler than those of the Wyalong Wattle.

Western Black Wattle (A. hakeoides) is common in the district. Its "leaves" are up to five inches long and half an inch wide. The flowers are bright yellow. Other wattles are: Knife Wattle (A. cultriformis) Showy Wattle (A. decora), Needle Wattle (A. rigens), Kangaroo Thorn (A. armata), Grey Mulga (A. brachybotrya), Dagger-leafed Wattle (A. rhigiophylla), Streaked Wattle (A. lineata), Miljee (A. oswaldii), Bunny Bush (A. rotundifolia). Also A. Trinervata, A. aspera, A. sclerophylla, A. difformis and A. flexifolia. The last named flowers in July and brightens the landscape.

Among the most beautiful of our shrubs is the Purple Mint Bush (Prostanthera ovalifolia). Its colouring varies from lavender to purple. Some plants bear white or pink flowers. It seems to favour hillsides and occurs at such places as the Boobaroi Hills, Mt. Narriah and hillsides in the Alleena area. The Scarlet Mint Bush (Prostanthera aspalathoides) has a wide distribution. It grows about three feet has tiny bright green leaves and bright red flowers.

Austral Indigo (Indigofera Australis) is another beautiful shrub with bluey-green pinnate leaves and long sprays of rosy-mauve flowers. There are seven different species of Hop-Bushes (Dodonaeas) all of which are attractive when bearing their hops. The Wax Flowers (Eriostemons) are represented by the Long-leaved Wax Flower (E. myoporoides) in the south of the shire and by E. difformis, which has plump little aromatic leaves and is covered with white starry flowers. The Goblin Grevillea (G. floribunda) with its intriguing yellow and brown flowers grows in similar areas to the Purple Mint Bush. Grevillea anethifolia, a smallish shrub with highly perfumed white flowers occurs at Gubbata. Around Weethalle is another Grevillea with red flowers, as yet unnamed. Desert Cassia or Native Daphne (Cassia eremophila) is described as one of our most beautiful shrubs. It is widespread in the area. The local Tea Tree (Leptospermum trivalve) is a lovely sight in the spring when covered with small white flowers. Two hardy attractive shrubs are the Common Fringe Myrtle (Calytrix tetragona) and the Fringed Heath Myrtle (Micromyrtus ciliata).

PLANTS SEEN BY ALLAN CUNNINGHAM WHILST EXPLORING THROUGH WHAT IS NOW THE BLAND SHIRE, FROM 18th TO 25th MAY, 1817

(A comprehensive but incomplete list).

Cypressus glauca (White Cypress Pine) now called Callitris hugelii (C. glauca), Acacia pendula (Boree), Rhagodia dilatata (A Salt-bush), Eucalyptus microntha (Bastard Box) now called Eucalyptus racemosa (Snappy Gum), Pimelea Colorans (a rice flower), Arthrotriche gracilis, Arthrotriche augustiflora, Zieria pulchella (pulchella means pretty) Extoxia rugosa, Sida species (Paddys Lucerne), Aster decurrens now called Olearia decurrens (a Daisy-bush), Sterculia heterophylla, now called Brachiton populneum (Kurrajong), Asclepiadeeae (Creeping shrub twining on small Cypresses), Acacia homalophylla (Yarran), Eucalyptus sideroxylon (Western Ironbark), Casuarina (could be Bulloak or Belah), Loranthus filiaformis, now called Amyema probably linifolia (Mistletoe), Zygophyllum (Twin-leaf), Daviesia (Pea-flower), Leptospermum sp. (Tea-tree), Eucalyptus acacioides, Eucalyptus dumosa (White Mallee), Melaleuca sp. (probably Broombush), Goodenia biflora (could be present G. Ovata), Eriosteman rhombifolium (a Wax-Flower) now E. difformis, Prostanthera nivea (White Mint-bush), Prostanthera coccinea, now called Prostanthera aspalathoides, (Scarlet Mint-bush), Myoporum gracile (belonging to the Boobialla group), Melaleuca sp. (a Paper-bark), Cassytha (Mallee Vine or Devil's Twine), Shrubby Aster (probably an Olearia), Goodia lotifolia (Clover-bush or Golden Tip), Erodium (Crowfoot), Aster ecalatus, now called Alearia ramulosa (Twiggy Daisy-bush), Syngenesia (a Daisy of some kind), Westringia triphylla, now called Westringia eremicola (Australian Rosemary), Bignonia exleiie, now called Pendorea pandoranoa sub species oxeleyi (Western Wonga Vine), Pentandria monogyria (Rutaceae). Extremely likely that this is now called Geijera parviflora (Wilga), Dodonea cuneata (Wedge-leaf Hop-bush), Exocarpus cupressiformis (Native Cherry), A "middling sized tree" from its description was very likely, Heterodendrum oleifolium (Rosewood).

It is impossible to decipher some of the plant names recorded in the journal. Also some of the names have been altered, partially or completely.

Cunningham does not mention grasses. No doubt they were included in the "trifling herbage." Perhaps it had been eaten down by animals or withered by drought, leaving no means of identification. Obviously the explorers did not come close to the site of West Wyalong for Cunningham would certainly have observed our Blue Mallee. (Eucalyptus fruticetorum). It is not possible to tell whether he observed Bulloaks or belahs, or both. He merely states "Casuarina." Bulloaks are Casuarina luehmanii and Belahs are Casuarina cristata, both of which grow in this area. He does not appear to be interested in the fauna of the region, except for kangaroos, emus and snakes, and that interest was not scientific. The Aborigines deserve special mention for their tolerance of the explorers. From time to time he writes of finding their recently vacated camps, of hearing them and members of the party seeing them. The natives would never have seen a white man before. With their consummate bushcraft they easily could have wiped out this expedition. It is sad to think that the white man's coming has meant degradation of various kinds for this peaceful tribe.

Our native flora looked after itself very well for thousands of years and even the advent of the Aborigines 20,000 years ago did not disturb it unduly, as they were neither pastoralists nor agriculturists. They did not dominate the plants, but lived with them using this and that, such as Nardoo (Marsilia drummondi) and Yam (Microseris scapigera).

Now the white man is here and much of the native-flora has disappeared, either by clearing; by pests such as rabbits, or being replaced by weeds, among them, Cape Weed (Cryptostemma calendula) and Skeleton Weed (Chondrilla juncea). The growing interest in our native plants in the last few years should lead to action to preserve our unique flora from extinction while there is yet time.

To get water and retain it has been the greatest need of our plants and they have developed many means of doing so. One striking example is the aromatic oils contained in the leaves of eucalypts. On a hot day the oil volatilises and the leaves have a protective layer between them and the sun, thus keeping down loss of water.

Some wattles (acacias) have finely divided leaves, such as the Wyalong Wattle (A. cardiophylla), but many of them, through untold years, have gone a step further and discarded their leaves. The leaf-stalks, or phyllodes, act as leaves. They are tougher and give off less moisture than a leaf. As seedlings, all wattles have pinnate leaves. If it is the phyllode type, such as the western Black Wattle (A. hakeoides), the transition stage can be seen as it gradually changes. When grown in the wetter climate of Melbourne the leaves of the Wyalong Wattle are much larger. In the Casuarinas, among them the Bull Oak and Belah, the leaves are reduced to scales and the wiry branchlets act as leaves.

There are numerous other examples of the adaptation of the plants to dry conditions. In the drier areas it does not seem to be the quality of the soil which is the governing factor in the distribution of plants, but rather its ability to retain water. Some plants are more adaptable than others and occur throughout the shire, while others are localised.

There are at least 18 different species of eucalyptus in the area. Mallees usually occur on solonized brown soils, but those around West Wyalong are on decomposed granite. The best-known is the Blue Mallee (Eucalyptus fruticetorum). The Broad-leaved Mallee Box (E. behriana) is called Bull Mallee locally. It grows naturally only in the Wyalong district. Other mallees are Mallee Gum (E. gracilis), Green Mallee (E. viridis), White Mallee (E. dumosa) Red Mallee (E. oleosa) and Narrow-leaved Red Mallee (E. foecunda).

On stoney ridges with poor shallow soils Ironbark (E. sideroxylon), Hill Red Gum (E. dealbata) and Hill Gum (E. dwyeri) thrive where others would die. Currawong (Acacia doratoxylon) and Black Pine (Callitris endlicheri) are often associated with them. At Narriah, Drooping She Oak (Casuarina stricta) also occurs.

Grey Box (Eucalyptus woolsiana) is well scattered through the shire on red soils, whereas the Western Grey Box (E. microcarpa) prefers good heavy soils. The Box with the roundish shining leaves, Bimble Box (E. populnea) is drought resistant and is found mostly on poor stiff clay soils. The presence of Yellow Box (E. melliodora) is considered an indication of good soil, usually heavy alluvial. It is our best honey tree.

Among the smaller plants there are many undershrubs, including daisy bushes, everlastings, pea plants, orchids, rushes, herbs and bulbs. The Rock Fern (Cheilanthes tenuifolia) is widespread. The Nardoo (Marsilia drummondi) which looks rather like a clover in the gilgais, is also a fern. Among the climbers are False Sarsparilla (Hardenbergia violacea), Western Wonga Vine (Pandorea pandorana oxleyi), clematis (C. microphylla), Parsonsia eucalyptophylla with highly perfumed mustard-coloured flowers, sweet apple-berry (Billardiera cymosa) a shrubby climber rare in N.S.W. and Glycine canescens with sprays of small pea flowers.

Many overseas grasses have become naturalised here, but among the original native grasses are Corkscrew or Variable Spear Grass (Stipa veriabilis), Liverpool Plains Grass (S. aristiglumis), Soft Spear Grass (S. mollis), Feather Spear Grass (S. elegantissima), Warrego Grass (Paspaladium jubiflorum), Slender Panic (Panicum constrictum), Hairy Panic (P. effusum), Wallaby Grass (Danthonia richardsonii), White-top or Wallaby Grass (D. caespitosa), Brush Wire Grass (Aristida behriana), and the Wire Grasses or "Number 9," (Aristida ramosa, A. jerichoensis, and A Calycina), Umbrella Grass (Chloris truncata), Purple Love-grass (Eragrostis lacunaria), Clustered Love-Grass (E. elongata), Grey Beard Grass (Amphipogon caricinus), Button Grass (Dactylocyenium radulans) and Spinifex (Spinifex paradoxus).

The native trees were put to many uses by the early settlers, who proved themselves adept at improvising from what materials were available. They built and roofed houses, built fences and slip-rails, made bullock yokes, and even cooked kurrajong leaves as vegetables.

The Grey Box proved to be a very useful tree. Box bark was used for roofing houses, huts, dairies and sheds by the early settlers and miners. Sometimes even the walls were of Box bark. The bark was attached to a frame of White Cypress Pine. The settler would choose a big tree with good, straight bark. The operation had to be carried out when the sap was rising, possibly after a good rain, as the bark then peeled off in large sheets, varying from half to an inch in thickness.

To remove the bark one scarf was cut low down on the tree and another higher up, according to the length of the sheet required. Cuts were made lengthways up the tree. A curved stick with a wedge-shaped point was used to pry the bark off the tree.

The curved sheets had to be flattened, and this was usually done by placing weights on the bark, but sometimes a small fire was lit underneath to straighten it out. The bark sheets were placed on the framework in the same way as galvanised iron is today, and were then kept in place by timber being laid across them and secured. These bark roofs shed the rain and were comparatively cool in summer. They lasted many years. The Grey Box was sometimes used as fencing posts and the timber was also used to some extent in brick kilns and bakers' ovens, but Cypress Pine was preferred.

Box and Ironbark were used extensively for making charcoal, which was used for forge work by blacksmiths and farmers. A pile of wood, arranged in layers, was covered over with soil with vents left at both ends. A fire was lit at one end and the draught carried it through to the other vent. When properly alight and the logs reduced to charcoal the pile was thoroughly sealed off and left for several days to cool down. This procedure prevented the coals from turning to ash. Box was the chief timber used for firing the boilers in the mines.

Ironbark fencing posts lasted a long time. They were fairly resistant to white ants and resistant to fire. The bark from Ironbark was used extensively for heating steel tyres, prior to fitting them on to waggon and sulky wheels. Once the tyres were in place on the wheels cold water was applied to make the metal shrink and fit tightly.

White Cypress Pine had, and still has, many uses. One of its great advantages is that it is white-ant resistant. Pine was used in the construction of houses and was also used for lining rooms. For sheds, round sapling posts were used for rafters and battens. Fencing posts were sometimes made of pine. It was easy to split and saw and was straight, but it was not fire resistant. Young round pine rails, not less than four inches at the small end, were used extensively for underground mine props. Brick kiln owners used pine almost exclusively, as it provided a quick hot fire. It was also popular for bakers' ovens. Rabbit pits were lined with White Pine. Big pine trees were preferred to small ones for much of the building work. Some rafters in an old local shearing shed were over 30 feet long and without a knot in them.

Bull Oak was used for rails and firewood. It makes a very hot fire. Sometimes it was used to make bullock yokes, but they were not as good as those made of Kurrajong.

Kurrajong was splendid material for bullock yokes and one skilled man could make a yoke for two bullocks in two hours. There were four holes in the wood for the iron bows to pass through. Red hot rods were put through these to toughen the wood. Kurrajong leaves were valuable fodder in dry times.

Belah provided good fodder. Boree also yielded fodder and fencing posts. Posts from old Boree trees are hard, and last a long time. There are some very old ones on a property near Yalgogrin.

Other trees that provided fodder of some value were Wilga, Rosewood and Warrior Bush. Mallee Vine, also known as Devils Twine, was useful as cattle fodder. Locally this plant is semi-parasitic on Mallee trees.

The fruits of Quandong were used for jams, sauces and tart fillings. The wood of Needlewood provided material for home-made pipes and walking-sticks. The Currawong was said to be used for shoulder poles by the Chinese who lived in the district. At the turn of the century Blue Mallee was being treated for eucalyptus and other valuable products. Most of the trees mentioned and mallee roots were used for firewood in ovens and open fires.

Rabbit Pits were made of White Cypress Pine. The pits were sunk along the wire netting boundary fences, about one or two miles apart, depending on the nature of the country. Rabbits were always more plentiful in sandy country, because of the ease with which they could build their warrens. A hole about five feet deep and five feet square was sunk directly underneath the wire netting. Sawn rough timber slabs of pine were then placed

side by side in an upright position along one side of the hole. Then a 4 inch by 2 inch plank was placed horizontally to support the slabs and another one was pegged down at the bottom. The other three sides of the hole were treated the same way. The pit was then covered over with boards. Among them were four balanced pieces of board. An oncoming rabbit would tilt a board and drop into the pit. The board would then swing back into its original position. A wire-netting wing, one chain long, ran from each corner of the pit, making a sharp angle with the fence. This arrangement "herded" the rabbits towards the pit.

Every day or so a man would kill the rabbits and clear the pit. Other animals, too, would fall into the pits, especially ant-eaters, foxes, cats, and occasionally snakes also met their doom that way. When the rabbits were plentiful, as in 1907, there could be 300 rabbits a night in one pit. The average was 150 rabbits. Fourpence per pound was paid for rabbit skins in those days. In winter seven and in summer nine skins went to the pound. They were bought by the local Chinese.

A Dog-Leg Fence was usually made of Cypress Pine. Two round posts were erected, and crossed rather like an open pair of scissors. They were supported by an 18 inch block of wood six to eight inches in diameter. This process was repeated and then a pine log, with branches still attached, was placed in the V's of the crossed posts. By this means a fairly good sheep-proof fence could be constructed.

For a Chock and Log fence, any large available timber was used, Box, Ironbark and especially Cypress Pine. Green timber was easier to cut and work, and the longer poles were better for the purpose. A chock of wood two feet long and 9 to 12 inches was placed flat on the ground. A scarf was then cut out of the centre of the top side. A log was placed in the scarf. Then another chock was scarfed on both sides to fit over the first log and placed in position to receive another log on top. This process was continued until the desired height was reached. Logs along the top finished off the fence. Only the bottom chock needed to be two feet long. The others could be shorter and do a satisfactory job.

For a Post and Rail fence, Ironbark posts were used if possible. It is good straight splitting timber and lasts a long time. It is also easier to adze out than Box. Bullock, Box and old Belah were used as rails. The timber was used green and both posts and rails were split lengthwise. A morticing axe was used to cut oblong holes in the upright posts. The rails were trimmed to fit snugly in the holes. As a rule three or four rails were used in each panel.

Slip Rails were used in place of gates. One method of making them was to place rails loosely in holes in the uprights so that they could be removed quickly to allow passage through. They were made of any available timber. Box rails were satisfactory, but Pine was too brittle and liable to break under pressure from stock. Another type of sliprail was made with slots cut in the posts to allow the poles to be dropped in. To remove one would require both a lifting and a pulling movement. This made the "gate" more secure where stock were concerned. Later on U-shaped round iron, or large used horseshoes, were driven into the posts and the rails were slipped into these. Wire twitches were also used.

Some landholders believed that timber growing on the spot and used as fencing material lasted longer than other timber. One local property had a paddock fenced with Box, another with Pine, and so on. Another had assorted fence posts with Pine, Mallee, Ironbark and others alternating. As one would expect, the Ironbark outlasted the other timber. Belah had to be old when used, as the young stuff rotted quickly. However, the timber had to be green when bored for fence posts otherwise the bits on the brace-and-bits would be broken. Yarran timber was used for fence posts and in the erection of stock and sheep yards. It lasted for years. Yarran wood makes a fire with great heat and burns to an ash. Its heat caused buckling and destruction in the fire-bars in stoves.

Black Pine was used to make bullock whip handles, and Quandong timber was used to make bullock yokes. Kurrajong leaves were sometimes cooked as vegetables, the most tender leaves coming from the top of the tree. The introduced plants, such as marshmallow and nettles, were also cooked as "greens."

The best meat blocks, both for homestead and butchers' use, were made from Kurrajong stumps. The wood was spongy, and slits made by cleavers closed up again. A few still in use are greatly valued by owners.

Sometimes settlers erected lofts in a corner of the stockyard, near a dam or waterhole. Men would hide in this until the kangaroos came for a drink, when they would shoot the unsuspecting animals.

FORESTRY DEPARTMENT

Of the 28 State Forests in the West Wyalong Sub-district the present Cypress Pine forests are by far the most important, not only because they produce the bulk of the sales of logs, poles and fencing timber, but because a considerable amount of grazing is available in them. The main Cypress Pine forest areas are in the Booberoi Hills, east of Wyalong, Yarranjerry, south of Ariah Park and along the Rankins Springs Road, south of Lake Cargelligo.

The Hardwood forests were of great consequence when they were dedicated, as they were the source of supply of such products as railway sleepers, fencing timber and firewood. Demand has since fallen off considerably and only a small amount of fencing timber and firewood is now sold. Twenty of the forests carry predominantly Cypress Pine timber and eight carry Hardwood (Iron Bark and Box). There are 25,000 acres in the pine forests and 14,000 acres in the hardwood forests. One forest carries a considerable amount of Blue Mallee, which is cut periodically for the distillation of eucalpytus oil.

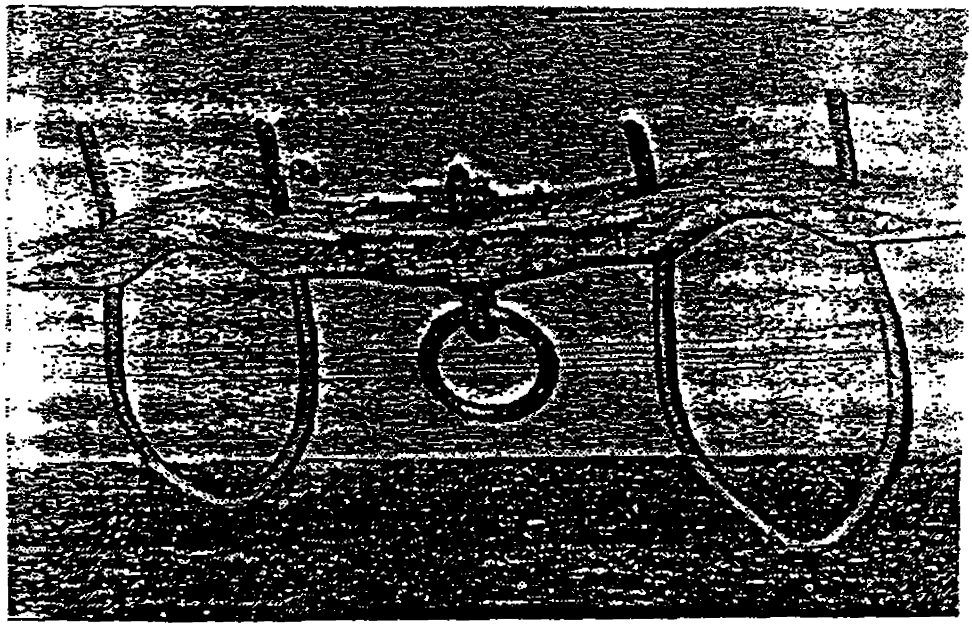
The West Wyalong Sub-district of the Forestry Commission extends about 110 miles in a N.W./S.E. direction and averages about 30 miles across. West Wyalong is the administrative centre of the sub-district, and with the sub-districts of Grenfell, Forbes and Condobolin, comprises the Forbes Forestry district. The sub-district boundary is roughly, Temora, Bland Creek, Lake Cowal, Bureber, Bena, Ungarie, Tullibigeal, Lake Cargelligo, Willandra Weir, Naradhan, Taleehan, Sandy Creek, Ardlethan, Wallaroobie, Mimosa and Temora.

Personnel in the sub-district are a forester and an office assistant engaged on administrative duties, and a forest foreman and another employee, who are engaged on field work. Work done by the commission consists mainly of the maintenance of assets, including roads, fences and water supplies, killing of useless Hardwood competing with Pine, supervision of timber operations and rabbit eradication. All these are done by local employees, with the exception of road maintenance, for which a grader unit comes from Forbes periodically, to grade the 216 miles of roads through local forests.

There are seven sawmillers in the sub-district, one of whom regularly buys logs from State Forests. A sawmiller from Grenfell also buys an annual quota of logs from this area. Sales from State Forests and other Crown areas are also periodically made to other millers. Most sawmillers are able to obtain the bulk of their log input from privately owned land. Miscellaneous sales of timber, poles, firewood, sand and gravel are made under licence and licences are issued to apiarists to allow them to place their hives in State Forests. Honey production is usually from those forests carrying Ironbank.

A considerable amount of grazing under permit is being done on local forests. Grazing was suspended on many forests about 1955, in order to encourage the germination and growth of Cypress Pine seedlings. These responded so well that grazing by cattle was introduced on many forests from 1964, and grazing by sheep, which eat small seedlings, is now being considered on some forests.

Grazing in the West Wyalong district forests has the desirable effect of removing much of the dry grass that creates a serious fire hazard each summer. Fires in the forests of the sub-district are rare. There have been only two in the last 12 years, burning a total of 13 acres.



BULLOCK YOKE MADE BY EARLY SETTLERS.

Early settlers in the Bland Shire have told of a small animal that lived in mallee trees, which they knew as a native bear. This gives credence to the listing of koalas by the National Parks and Wild Life Service as being in the district, although rare.

A marsupial about half the size of a kangaroo, grey in colour with splashes of white, was a common sight. It was kown as the paddymelon. The burrowing of another marsupial, the bilbie, caused a crater-like warren: Rabbits took over the warrens and the bilbies disappeared. Clearing of the land for wheatgrowing and grazing has led to the extinction of dingoes and native cats that were common in the closing years of the nineteenth century.

The keen observer will find many species still living in the bushlands of the shire. Listed as uncommon in the monotremes is the platypus, but the spiny ant-eater is still fairly common.

Common marsupials are the yellow-footed marsupial mouse, the fat-tailed [illegible]rsupial mouse, brush-tailed possum and the grey kangaroo. Uncommon marsupials are the feather-tail glider, the squirrel glider, the ring-tailed possum, bushy tailed possum, pigmy possum and the red kangaroo. Mammals extinct in the district are rabbit-eared bandicoot, brush tailed rat kangaroo, brown hare-wallaby and the bridle nail-tailed wallaby. Tiger cats have been seen on rare occasions in the Weethalle district.

Of native rats and mice the Eastern water rat is still common. The allied rat and the long-haired rat are uncommon, and the extinct species are the Eastern pseudo-rat, the white-footed rabbit-rat, and Mitchell's hopping mouse. Bats are uncommon to rare, but the district has been at times inhabited by the Eastern horseshoe-bat, the greater long-eared bat, the little brown bat, Gould's wattled bat, the bent-winged bat, yellow-bellied free tail bat, white striped mastiff-bat and the little mastiff bat. Flying foxes are rare visitors.

Introduced mammals are the European rabbit, the European hare, the dingo, red fox, Feral pig, Feral cat, goat, rat and mouse.

Of the snakes the carpet snake, common brown snake, tiger snake, mulga snake, red-bellied black snake, myall snake and the bandy-bandy are the most common. Seldom seen now are the red-naped snake, yellow faced whip snake and death adder. A snake expert who visited the district in recent years is said to have been of the opinion that taipans could be here, but no sightings have been reported. Copper-heads are also said to be present. The bush is inhabited by a number of lizards and skinks. These include the common diella, legless lizard, jacky lizard, bearded dragon, goanna, striated skink, Cunningham's skink, shingle-back skink, blue tongue, copper-tailed skink, water skink and grass skink. Seldom seen are the thick-tailed Gecko, scaly-foot, and Gould's goanna.

In the years of good rainfall when the waters of Lake Cowal spread over the north eastern countryside of the shire, black swans and numerous other water birds are seen. Seagulls have found their way to the lake, and on rare occasions have been seen over West Wyalong.

Flocks of galahs and colourful parrots are more plentiful in the wheat season than at any other time, but, unless steps are taken to conserve larger areas of the suitable habitat of the more rare types their chances of survival are slight.

Among the birds seen in the shire are the emu, brown goshawk, wedge-tailed eagle, peregrind falcon, brown hawk, mallee fowl, peaceful dove, common bronzewing, crested pigeon, Major Mitchell's cockatoo, galah, cockatiel, ringnecked parrot, red-rumped parrot, bluebonnet, mulga parrot, pallid cockatoo, tawny frogmouth, owlet nightjar, laughing kookaburra, rainbow bird, black-faced cuckoo-shrike, southern scrub robin, chestnut quail-thrush, white-browed babbler, brown songlark, black-backed wren, purple-backed wren, western warbler, little thornbill, chestnut-tailed thornbill, yellow-tailed thornbill, brown weebill, mallee heath wren, red-capped robin, hooded robin, southern yellow robin, grey fantail, willie wagtail, restless flycatcher, golden whistler, rufus whistler, red-lored whistler, Gilbert's whistler, grey shrike-thrush, crested bellbird, striated pardalote, yellow-tailed pardalote, striped honeyeater, white-eared honeyeater, yellow-plumed honeyeater, brown-headed honeyeater, white-fronted honeyeater, spiny-cheeked honeyeater, peewee, white-winged chough, apostle bird, pied butcher-bird, grey butcher-bird, black-backed magpie, Australian raven, little raven, pelican, spoonbill, blue crane, white ibis, bab chick, wood duck, teal, black duck, black swan, green leak parrot, finches, seagulls, swallows, eastern stone curlew, spur-winger plover, quail, diver, shell parrot (budgerigar), little crow, eastern rosella, brolga, mistletoe bird, turquoise parrot, noisy miner, little wattle bird, masked wood swallow (blue martin), dusky wood swallow, pied currawong, collared sparrow hawk, branded plover, kingfisher (several species), eastern shrike-tit, diamond dove.

THE KELPIE

The Wyalong district has played its part in the development of the Kelpie sheep dog which has been so invaluable to the pastoral industry in this country.

The early 1800's, were an era when transport and handling of stock, other than by droving was virtually unknown. The hundreds of counties through England and Scotland all had stock of one sort or another, and with the stock went the shepherds and their dogs. When stock was first brought to Australia, so were shepherds and their dogs to care for them. This was necessary for the stock had to be "folded" or yarded every night to protect them from the dingoes and Aborigines and to stop them from straying.

With the rapid increase in stock numbers there was an increasing demand for a "mustering" or "gathering" type worker to replace the "shepherding" type dog. There is little doubt that by the mid 1800's a great number of different strains and types of workers had been imported. One of the first to successfully make a name for themselves was the Rutherford strain of North County Collies which immediately proved ideally suitable to Australian conditions. Several younger members of the Rutherford family had migrated to Australia, and once settled were supplied with dogs by their Scottish relatives. Mr. J. Rutherford purchased Yarrawonga from the Hume family, where he bred the black dog, Moss, which later became the property of Mr. Jack Gleeson.

Mr. Robert Tully, a well known breeder in the Murray and Darling River areas, was also a strong supporter of the Rutherford strain collie and all his stock were claimed to have carried this blood.

The dog which gave the Kelpie breed its name was Gleeson's Kelpie which was bred, as far as we know, on Worrock station in Victoria. Mr. John D. (Jack) Gleeson came into possession by swapping a horse for the pup, which had been bred by Mr. G. Robertson from imported collie parents. Gleeson's Kelpie is described as a black and tan with semi-erect ears and who had a reddish tinge to her coat when seen in the sun.

Mr. Gleeson left the district shortly after acquiring Kelpie and stayed for a short time at Albury, where he met and married Miss Mary Ryan, a daughter of Mr. Lancelot Ryan of Wallandool station. Two other daughters, Kate and Grace, married Harry King and Pat Cox, sons of the owners of Yalgogrin and Wollongough stations respectively. In crossing the Murrumbidgee, on his way to take up a position on Bolero (North Belaira) he met an old friend, Mr. Mark Tully, brother to Mr. Robert Tully, who gave him the black dog, Moss, who had been bred at Yarrawonga from dogs imported from the Rutherford kennels in North Scotland.

Kelpie was mated twice to Moss; the first litter she whelped was shortly after arriving at Bolero and a pup was given to Mr. T. Keogh. The second litter by Moss was born on North Yalgogrin and a pup from this litter was given to Mr. Steve Apps, who was on Merringreen.

About this time, 1870, Mr. Arthur Robinson brought out from Scotland a pair of black and tans, Brutus and Jenny for Mr. Elliott of the firm of Elliott and Allen of Geraldra station. They had been mated together on the way out and the bitch, Jenny, whelped shortly after arrival. Both Brutus and Jenny are described a smooth-coated black and tans with semi-erect ears. One of the pups from the first litter, Caesar, was given to Mr. John Rich who was on Narriah at the time. Caesar was mated to Gleeson's Kelpie and the most famous of all kelpies was the result. When the litter arrived a black and tan female pup named Young Kelpie later Kelpie the Second then King's Kelpie was given to Mr. C. T. W. King and she became famous in the early 1870's when she won the first sheep dog trial ever held in Australia. Her performance at Forbes on this occasion was so outstanding it resulted in the naming of the breed.

For a short time the name, Kelpie, applied to the progeny of King's Kelpie only, although more properly it should have been applied to Gleeson's Kelpie for without her there would never have been a breed so named today. From the mass of records to hand it appears that it was not long before all dogs of similar appearance were being described as Kelpies. In the entry of 35 dogs at the Sydney Sheep Dog Trials in 1898 only two dogs were entered as collies.

Gleeson took up a selection on Bolero, being portion 10 Parish of Yalgogering, 40 acres, in March 1878. When leaving North Yalgogrin to take up a position at Lake Cow I West, he left Kelpie with his friend Mr. T. J. Garry, and Moss with Mr. P. J. Cox of Merringreen, but as Kelpie shortly afterward developed a cancerous growth she had to be destroyed, ending her days at Wollongough, Ungarie. Old Moss, which Mr. Cox had lent to Mr. C. T. W. King for stud purposes, was found dead on the chain one morning at Gainhill, Lake Cargelligo, which property Mr. King was managing at the time. While living at Lake Cowal West, Gleeson had an accident with a horse and died at Wagga Wagga.

THE MOUSE PLAGUE

Almost incredible stories have been told of the mice plague of 1916. Early in the winter hordes of mice appeared from nowhere, to invade the fields, the homes and business places. They destroyed haystacks and grain, ate the produce and foodstuffs in stores, and in the homes they even got into bed mattresses. Many of the houses were lined with hessian, which was covered with wallpaper. The mice ate the paper and hessian, and the nights were disturbed by their scampering up and down the walls. The stench was everywhere.

Mr. Jack King was working at Mr. Charles O'Donnell's farm at Buddigower and he recalls that the men walked around the haystacks at night, carrying a tin tub containing water. With a stick they knocked the mice into the tub. The mice ate stacked bagged wheat until the heaps collapsed, and, as 1916 was a wet year the damage was considerable. In 1917 Mr. N. Conn, of Quandialla, was pulling down a shed, when he noticed there were no lead washers on the screws. Close examination showed that the mice had eaten away all the lead, but could not bite into the iron in the screws. In 1917 there was another plague, but it was on a smaller scale.

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THE WAYBACK. by Sarah Musgrave. Cumberland Argus.
This book written by the first white girl born in the Young district, gives an interesting but unchecked account of the early history of Wyalong.

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SQUATTING ON CROWN LANDS IN N.S.W. by J.F. Campbell. - Royal Australian Historical Journal Vols XV, XVII.
Mr J.F. Campbell has given us a list of Runs extant in 1849. The author makes quite clear the reasons for the attitude adopted by Governors Bourke and Gipps against the rapacity of the Squatters.

LACHLAN PASTORAL RUNS - First Annual Report upon occupation of Crown Lands, year 1879.
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PASTORAL POSSESSION OF N.S.W. William Hanson, 1889.
Gives vital information about the Pastoral Holdings which usually consisted of an agglomeration of runs. The document supplies the important information of the area, annual rental and holder of Leasehold Area and Resumed Area.

NATIVE NAMES OF SOME OF THE RUNS IN THE LACHLAN DISTRICT. - F.W. Woolrych L.S. Paper read before the Royal Sosiety of N.S.W. 4 June, 1890.
Information is given regarding the origin of names of early Runs in the Wyalong area. It also supplies an early map of the district.

MANUSCRIPTS held by the Lands Department contain information about names of Runs and Holders in the Bland about 1847.

REPORTS OF DEPARTMENT OF MINES - 1894. - W.H.S. Slee F.G.S. Chief Inspector of Mines.

This gives the condition of the field - the amount treated and the yield.
These reports continued until the goldfield ceased as a gold supplier in 1920.

RECORDS OF GEOLOGICAL SURVEY - Vol Iv Part 2, 1894.
This document gave the Geological origin of the field..

GEOLOGICAL STRUCTURE OF THE WYALONG GOLDFIELD Vol IV, Part II, 1894. E.F. Pittman A.R.S.M.
The author points out that the easy nature of the working of the goldfield was due to the decomposition of the granite. He pays a great tribute to the Neeld family in opening up the field.

REPORT ON THE WYALONG GOLDFIELD - J.A. Watt M.A, B.Sc. 1899.
This document gave details of the geological formations on the Wyalong Goldfield and an accurate description with diagrams of each important mine.

WYALONG ARGUS. - 1898
This newspaper gives accurate information regarding the needs of the mining population - namely water and a railway.

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Information about Marsden, Lake Cowal, Billy's Lookout and Clear Ridge districts.

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Published for Burcher's Golden Jubilee Celebrations 1929-1979.

MISS UNA WILSON. Personal research and Files.

APPENDIX B

COWAL GOLD PROJECT
EUROPEAN HERITAGE AND ASSESSMENT
AND RECORDING OF HOMESTEAD COMPLEX

DRAFT

COWAL GOLD PROJECT
EUROPEAN HERITAGE AND ASSESSMENT AND RECORDING OF HOMESTEAD COMPLEX

By

Dr Michael Pearson
Heritage Management Consultants

For

Barrick Gold Australia Pty Ltd

4 June 2003

HERITAGE MANAGEMENT CONSULTANTS Pty Ltd
Research - Planning - Management Advice

CONTENTS

1. INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Heritage Management Consultants has been engaged to provide advice as to the heritage assessment of building at the Cowal West homestead area, identified by the Bland Shire Council for their Local Environment Plan, and to undertake recording of these items. Preliminary advice on the potential heritage and recording issues relating to other buildings on the Barrick area was also sought. The site was inspected and recording undertaken on 27-28 May 2003. Photography of the Cowal West Buildings was separately contracted by Barrick and undertaken by Neil Crook, in consultation with Michael Pearson.

1.2 ACKNOWLEDGMENTS

The kind assistance of Col, Nyelva and Jenelle Carnegie, former owners of Cowal West, and Bill Shallvey of Cowal Gold Project are gratefully acknowledged.

1.3 AUTHORSHIP

The report was researched and written by Dr Michael Pearson, Heritage Management Consultants Pty Ltd, 84 Ballarat Street, FISHER, ACT.

2. UNDERSTANDING THE PLACE

2.1 HISTORY OF THE LAKE COWAL AND COWAL WEST PROPERTIES

Exploration

The explorer John Oxley was sent to investigate the Lachlan River in 1817, and was the first recorded European to pass through the area. Oxley's route took him from the vicinity of Condobolin south-west to Griffith, passing well to the north-west of the Lake Cowal district. Major Thomas Mitchell passed well to the south of the Lake Cowal area in 1826.[1] The non-indigenous exploration of the Cowal area was undertaken, as it was over most of inland Australia, by the pastoralists themselves. The earliest recorded pastoralists in the general Wyalong district were the Gibson brothers, who took up a run near Bland, about 40km south-east of Lake Cowal, in 1833.

Pastoral settlement

Lake Cowal was beyond the Limits of Location, that is outside the Nineteen Counties, established in 1829, within which settlement was sanctioned. However, the promise for better grazing land 'further out' enticed pastoralists to send their stock beyond the 'Limits', and the squatting boom followed. As the government slowly came to grips with the reality of the spread of settlement, it created in 1839 eight pastoral districts ('squatting districts'), one of which, the Lachlan District, included Lake Cowal.[2]

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1 Feeken, E.H.J. & Feeken, G.E.E. 1970. *The discovery and exploration of Australia*, Nelson, Melbourne.

2 Roberts, S.H. 1935. *The Squatting Age in Australia 1835-1847*, Melbourne University Press, Carlton: 139.

By 1840 there were 98 stations established in the Lachlan squatting district. In subsequent years several pastoral runs were established surrounding Lake Cowal, and the configuration of the local properties changed over time as runs were amalgamated or subdivided. The picture of the early runs is also confusing because of the use of the same run name for a number of different grazing holdings (eg 'Billabong' and 'Lake Cowal' in various forms).

Cowal Station, occupying the eastern side of Lake Cowal, was leased by Thomas J. Atkins in 1842, and was described in 1866 as comprising 16,000 acres with a carrying capacity of 600 head of cattle. The newly assessed annual rental in 1866 was £75. Atkins also held Cowal No. 2 Station of 16,000 acres (640 cattle and £38 2s 6d rental). John Rodd took up Billabong Station (south of Lake Cowal, not to be confused with the later station overlapping the Lake) and Caragabal Station (to the east), also in 1842. [3]

By 1866 Thomas Lee occupied a number of runs that covered the western side of Lake Cowal and what is now the Cowal Gold Mining Leases and Barrick land holdings, these being[4]:

Run	Acres	Capacity	Rental
Wombine Station	20,000	4,000 head cattle	£30
Billabong Station	19,000	7,000 head cattle	£75
Billabong Back Station (immediately west of Cowal Mining Lease area)	16,000	640 head cattle	£30
Billabong Lower Station (north west of Cowal Mining Lease area)	16,000	640 head cattle	£30

The area now occupied by the Cowal Gold Mining Leases was originally part of the pastoral runs of Wombine and Billabong (See accompanying maps). The four Lee stations were combined in the 1880s with the Clear Ranges Run to the south west, to form Lake Cowal Pastoral Holding No. 701.

Lake Cowal Pastoral Holding No. 701 was divided in 1886 into a Leasehold Area[5] of 78,879 acres (annual rental £591 11s 10d), and a Resumed Area of 70,735 acres (annual licence £294 14s 7d). Holding No. 701 was held in 1889 by the Australian Mortgage, Land and Finance Company, probably indicating that Lee had been unable to withstand the growing rural economic crisis.[6]

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3 Bland Historical Society, 1993. 'Lake Cowal historical research', a report for North Mining Limited; McNaught, J. 1997. *Index and register of Land Grants-Leases and Purchases 1820-1856*, Richmond-Tweed Regional Library, Goonalabah, NSW; *Bailliere's New South Wales Gazetteer and Road Guide*, 1866. F.F. Bailliere, Sydney: 156.

4 *Bailliere's New South Wales Gazetteer and Road Guide*: 43.

5 A new Lands Act (1884 'The Subdivision of Runs Act') limited free selection in NSW. Each squatter's run was to be divided into two portions, a 'Leasehold Area' retained by the lessee and a 'Resumed Area' to be opened to settlement by small farmers. However, the 1880s and 90s were periods of decline in the central and western regions, and increasingly the runs were in the hands of banks (623 runs and 577 occupation leases in resumed areas by 1889). By 1893 8 million acres of settled land had been abandoned. In 1894 the Carruthers Act returned the remaining balance of the Resumed Areas back to the leaseholder, to be resumed by government only when needed. See Roberts, S.H. 1968. *History of Australian Land Settlement 1788-1920*. Macmillan of Australia, Melbourne. pp 309-311.

6 Hanson, W. 1889. *Pastoral Possessions of New South Wales*, Gibbs, Shallard & Co, Sydney 280. The map of Lake Cowal Pastoral Run 701 gives different figure: 85,600 Leasehold and 81,600 Resumed Areas.

Lake Cowal Station

Lake Cowal Station, incorporating the southern blocks currently held by Barrick, and extending south up Bland Creek towards Marsdens, was taken up by James Marsden in the 1850s. The station was later sold to Clarence and Kennedy, who in turn sold to F.W. Ricketson and H. Ghinn in about 1876.[7] The 1886 map of the Holding 701 subdivision shows a homestead in the current Lake Cowal homestead location, a woolshed where the current woolshed ruins are located, and adjacent huts, presumably for shearers accommodation, on portions 1 (a lot within portion 74) and 10 held by Ricketson and Ghinn. This is confusing, as the land area involved was within Lee's Lake Cowal Pastoral Holding 701, yet would appear to be an independent pastoral property of some size well before the 1886 subdivision of 701. Subsequent ownership of Lake Cowal Station is a bit confusing, different version saying it was acquired by John Boyd Donkin in the 1880s, or by Sir Samuel Wilson in 1880.[8] The latter seems correct, Donkin's station appearing to be further south near Marsdens, probably a part of the original and larger Lake Cowal run.

The Lake Cowal woolshed, which appears from the map information quoted above to have been built before 1886, may have been one of the first sheds in Australia to install mechanical machinery in 1888.[9] While another source suggests the machines were installed in Donkin's Lake Cowal shed[10], it is possible Wilson's Lake Cowal might have been the shed involved, as Sir Samuel Wilson also owner Dunlop Station on the Darling, the first shed to have mechanical shears installed in 1887. This deserves further research.

Wilson's Lake Cowal woolshed was the scene of a record-breaking clip in September 1935, when shearers William Ellis and his sons Patrick and William Jnr. established a record for family shearing of 656 sheep in one day.[11]

The sequence of ownership of portions within the Cowal Gold Mining Lease area, as tracked from the copies of parish maps annotated by the Lands Department Office is shown in the following table.[12]

7 Bland Historical Society 'Lake Cowal historical research': 88.

8 Bland Historical Society 'Lake Cowal historical research': 50, 88.

9 Walsh, G. 1993. *Pioneering days: people and innovations in Australia's rural past*, Alen and Unwin, Sydney: 86.

10 *West of the Bland*: 44.

11 *West of the Bland*: 45.

12 From maps for Parish Corringle, County Gipps, Ed. 1 1895, Ed. 2 1895, Ed. 3 1909, Ed. 4 1921, Ed. 5 1929, Ed. 6 1948, Parish Lake, County Gipps, Ed. 2 1902, Ed. 3 1938, Ed. 4 1939, Parish Cowal, County Gipps, Ed. 1 1880, Ed. 2 1895, and Pastoral Run maps for "Lake Cowal 701', Department of Land and Property Information NSW web site http://www.lpi.nsw.gov.au/maps (2003).

	Holder and Details	Date (purchase confirmed)	Notes
Parish Corringle			
2	F.W. Ricketson & Henry Ghinn	1895 map	Ricketson held the reduced Billabong Station to the south east in 1904
3	James Stewart CP81.169	4 Aug 1881	Map of Cowal Pastoral Holding 701. Hut worth £30, dam and tank worth £100. Forfeited 18.8.85, hut, tank, ring barking, fencing and stacked wood worth £159 5s. (1909 ed.)
3	Frank Allen CP85.47	12 Feb 1886	
3	J.H. Palmer Pt ASL04-5	April 1904	Settlement Lease
3	Commercial Banking Company of Sydney	1909 map	
4	Australian Mortgage, Land & Finance Company	1895 map	
7	Annie Isabel Allen CP85.46	11 Feb 1886	Block on which Cowal West homestead complex sits
7	Commercial Banking Company of Sydney	1909 map	
9	Annie Isabel Allen CL4656	11 Feb 1886	
9	W.J. Hammond CP28.40	9 Dec 1910	subdivision
10	Frank Allen CL4657	12 Feb 1886	
44 (ex 10)	Frank Allen CL4657	12 Feb 1886	
44 (ex 10)	J.H. Palmer Pt ASL 04.5	April 1904	
44 (ex 10)	R.H. Thompson pt CL28.24	15 Feb 1929	
11	Originally part of WR 579 (watering reserve)	22 Feb 1878	
11	F.C.H. Allen CP86.19	6 May 1887	
45 (ex 11)	Beaufoy A. Greene Sp L	5 Feb 1908	
45 (ex 11)	Reserve for Flood Refuge	31 Aug 1928	
45 (ex 11)	R.C. Hammond	17/8/1995	
12	Originally part of WR 579 (watering reserve)	22 Feb 1878	
12	F.C.H. Allen CL6.51	6 May 1887	
12	Bank of NSW	1909 map	
12	R.C.J. Hammond CP28.41	29 Dec 1910	Subdivision
21	J.H. Palmer	1900	
21	P. Hetherington	23 Nov 1928	
22	J.H. Palmer	1904	
22	R.H. Thompson pt CP28.24	15 Feb 1929	

Portion Number	Holder and Details	Date (purchase confirmed)	Notes
Parish Lake			The floor of Lake Cowal was subdivided as Home Farm Grants in the 1920s
22	W.C. Rathmell CP28.20	1928	
23	Tom Croft Home Farm Grant 36.2	1936	
24	R.G. Buttenshaw HFG		
24	M.W. Whiley SpL 31.58	1931	
25	Frank Plackett Additional Home Farm Grant AHF32.1	1931	
Parish Cowal			
1 (part of 74)	F.W. Ricketson & H. Ghinn	1880 map	1886 map for Lake Cowal Pastoral Holding 701 shows homestead in position of present homestead, valued at £880.
1 (part of 74)	Clarence Hann & Co, I.P 73.3298	1873	Shown on 1880 map, crossed out and replaced by Ricketson and Ghinn.
1 (part of 74)	F.W. Ricketson & H. Ghinn	1880 map	
10	Frederick William Ricketson C.P.78.100	March 28 1878.	1886 map for Lake Cowal Pastoral Holding 701 shows woolshed at position of present woolshed ruin, valued at £940, and adjacent huts valued at £100.
10	Australian Mortgage, Land & Finance Company	1892 map	

Stock owners in the Lake Cowal area in 1904 are listed as[13]:

Frank Allen	Lake Cowal West	2,092 sheep
J.B. Donkin	Lake Cowal, Marsdens	11,808 sheep, 28 cattle, 18 horses
Low Brothers	Lake Cowal	6,340 sheep, 19 cattle, 8 horses
Wilson & Co.	Lake Cowal Station	18,808 sheep

The exact boundaries between these stations have not been researched.

Cowal West

The portions making up the western section of the Cowal Mining Lease area were taken up by Frank and Annie Isabel Allen between 1885 and 1887, and named 'Cowal West'. This acquisition would have been more understandable if the land had been in the resumed section of Pastoral Holding 701, but it was in fact mainly in the leasehold section. This suggests that Lee had already lost control of the property and the finance company was trying to sell-off its asset.

13 Bland District Historical Society, 1978. *West of the Bland: A history of the Wyalong District*, Bland District Historical Society, West Wyalong: 36-38.

It appears from the history of the portions making up Cowal West that Frank Allen disposed of the property in the early 1900s. Allen sold to Beaufoy Greene, who, after misfortunes including the burning of the homestead, sold to Key Perry. Perry's resident manager was William McNair. Perry in turn sold to William J. Hammond in the 1920s, Hammond living on the station with his son and three daughters. The property was subdivided on Hammond's death in the late 1920s.[14] Further subdivision of blocks in the Cowal West holdings occurred when the railway between West Wyalong and Burcher was opened in 1930, the rail line reserve effectively cutting some portions in half.

The remaining section of Cowal West was bought from Hammond's son by Col Carnegie and his family in 1954, who occupied the property until acquired by Barrick.[15]

Lake Cowal farmstead blocks

Samuel Wilson at Lake Cowal Station carried out experiments in wheat growing and predicted a good future for the crop in the district. In 1911 the leasehold land comprising the major part of Wilson's Lake Cowal Station was subdivided for wheat production. This included large areas in the districts of Billy's Lookout, Clear Ridge, Wyrra, Blow Clear and Wamboyne.[16] These areas are south and west of the Lake Cowal Gold area.[17]

The Lake Cowal leases (parishes Blow Clear and Clear Ridge) were made available for closer settlement from 21 April 1913. 35 blocks in Parish of Blow Clear and 21 in parish of Clear Ridge were gazetted as Homestead Farms (an area capable of supporting a settler, his home and family under reasonable conditions).[18]

Large tracts of Crown Land in the district were taken up for closer settlement following the First World War and into the 1920s. Many were taken up by wheat farmers with little grazing experience, and the blocks proved too small for self sufficient wheat production. Much of the floor of Lake Cowal was taken up as small blocks in the 1920s.

'Lakeside', the farm formerly occupied by the Bolte family in the north of the Barrick holdings, is an example of the Home Farm Grants, occupying the lake floor. Harold Bolte won the block in a ballot in 1922, built a home for his family, and grew prize-winning wheat, as well as grazing sheep and cattle. The homestead still stands.[19]

The combination of depression and drought in the late 1920s and early 30s caused major distress in the Wyalong/Cowal district, with the government becoming involved in a major relief scheme. In 1940 the Commonwealth and State governments reached agreement on a scheme to introduce a Rural Reconstruction Board to assess and rationalise farm size to produce viable farm holdings. This work was substantially completed by 1950. The original 1,970 farms in a 3.5 million acres area, were reduced to 1,103 farms, and a better balance between wheat and grazing was struck.[20]

14 Bland Historical Society 'Lake Cowal historical research': 5.
15 Personal communication, Col Carnegie, 27/5/03.
16 *West of the Bland*: 48-49.
17 *West of the Bland*: 40
18 *West of the Bland*: 40.
19 Bland Historical Society 'Lake Cowal historical research': 82.
20 *West of the Bland*: 41-42.

One of the lake blocks was a 2,400 acres special lease given to Reg Rattey V.C. in recognition of his Victoria Cross winning exploits in New Guinea in 1945. Rattey had grown up in Barmedman, south of West Wyalong, and named his new Lake Cowal lease 'Weeloona'. Rattey built the homestead that stands in the block today.[21] (see attached description of Rattey's life and V.C. award.)

2.2 DESCRIPTION OF THE PLACE

Cowal West

The Cowal West Homestead Complex consists of the following items:

Homestead building
The original Cowal West homestead, probably built by the Allens, burnt down about the turn of the 20th century. A new homestead was built, probably in the first decade of the 20th century. A date on one of the fireplaces indicated 1916, but this might have post-dated the main construction.[22]

The homestead as rebuilt consisted of a five-roomed cottage with a detached kitchen block of two rooms (see fold-out plans attached).[23] The main cottage had a large room with 3320mm high ceiling, plaster-lined walls with picture rails and a polished floor, with a fireplace on the northern wall. This room was separated by a timber-lined corridor from two timber-lined rooms, also with 3320 high ceilings. These rooms were subsequently combined into one. This main group of rooms had a hipped roof. At the rear were two rooms, possibly early additions, with a gable roof and the same ceiling height as the main rooms, and being plaster lined with picture rails.

The original gable-roofed kitchen block had two timber lined rooms with 3340mm high ceilings, one room having a stove setting within a chimney, the other possibly being the original dining room. Two rooms were subsequently added to the rear of the kitchen block, which had fibro-lined walls and a skillion roof.

To the south of the main rooms was a three-roomed free-standing addition with a gable roof with a gablet (gambrel) form on the eastern end, which was probably built soon after completion of the main building. It has timber-lined rooms with 3260mm high ceilings. This suit of sleeping rooms is separated from the main building by a wide corridor, roofed by the verandah surrounding the main building. A verandah extends across the eastern front of the main building and sleeping addition, and part way along the northern wall of the main building and along the southern wall of the sleeping addition. The corners of the roof were decorated with decorative metal fins (acroteria). All buildings were clad externally with weatherboards.

21 Website www.chapter-one.com/vc/award.asp?vc=1022
22 Personal communication, Col and Jenelle Carnegie, 27/5/03.
23 Described from plans drawn up in 1976 by architect George Guest, provided by Nyelva Carnegie..

The homestead had this configuration until 1976, when extensive alterations and additions were made, designed by the architect George Guest. At that date the corridor between the main building and sleeping addition and the verandah south of the sleeping addition were enclosed, new rooms formed, the merged large room in the main building was subdivided into two bedrooms, and the sleeping addition extended west to create a bathroom. A roof was extended over the northern side of the building to create a shaded area, but a proposed new room for that location was not built. The kitchen was enlarged and redesigned, with a corridor inserted separating it from the adjacent room. New entries were created into the living room and the newly created bedroom.[24]

The homestead is in good condition.

Woolshed and yards

The woolshed has six discernible stages of construction.

Stage 1 consists of an aisled gable-roofed set of sweating pens and catching pens, and the shearing board. It is constructed with heavy round timber posts supporting the outside walls and aisle walls, and clad externally in a combination of weatherboard, iron formed from flattened drums, and horizontal planks. The top 300mm of the eastern wall adjacent to the sweating pens is open and protected with chicken wire and fly wire. A light roof framing without trusses or collar ties but simply pitched from the level of the top of the aisle posts, supports the corrugated galvanised iron (CGI) roof. Several glass skylights have been inserted above the board. The floor of the sweating and catching pens are timber gratings, formed either from sawn timber slats or round timbers in some sections. The shearing board has a timber boarded floor.

The sweating pens and catching pens are divided by rails made of whole bush poles, morticed into the upright posts. Gates in the central race are hurdles made of boughs morticed into a frame, and raised vertically between posts, the ends of the hurdles contained within simple pairs of battens attached to the posts. The hurdles are held up by a wire hook looped over a peg in a beam above.

Gates into the sweating and catching pens are made of boughs morticed into a frame, and swung on posts. The support posts either run up to the beam above, where they are morticed into the beam which acts as a pivot, or are gate-height and supported at the top by a wrought iron hoop, or later by a twisted wire loop. The bases of the support posts sit in a circular depression cut into a timber plate set into the floor of the shed. The gates were originally (and some still are) held closed by a wooden peg chained to the gate and fitting into a circular hole in the jamb-post. The gates giving onto the board are boarded over a bough and plank ledged and braced frame.

Above the sweating and catching pens are doubled round timber beams acting as ties between the posts supporting the aisles, and providing top-supports for the posts within the pens. The sections above the northern and southern pen sections are boarded over to form an upper level, used for storage.

[24] described from plans

The western aisle roof over the board has been raised by attaching new rafters higher-up the main roof frame, held about 400mm above the level of the top of the aisle posts by timber spacers, and extending to posts along the western wall about 300mm taller than those along the eastern wall. The roof appears to have been raised by a total of about 700mm to allow for the installation of mechanical sheering machinery, suggesting that the shed was originally built to accommodate hand shearing (see implications in the Analysis of Evidence section).

The board has four stands for mechanical shears, with a line shaft above driven by an electric motor. He chutes to the counting out pens are located between round timber posts along the western wall.

Stage 2 consists of a two-bayed gable-roofed extension to the south, which forms a press room. The roof has a ridge at the same height as the Stage 1 roof, but the roof slope is continuous to the side posts, leaving a gap where it adjoins the double-slope of the Stage 1 roof above the Stage 1 aisle posts. This gaps has been partially infilled with iron sheet. The floor level is 300mm lower than the level of the board and pens in Stage 1, the board level being extended into the western side of Stage 2 to house the wool sorting tables. A series of partitions in the south-west corner form wool bins, and double opening doors give access in the southern wall. The northern wall of Stage 2 is weatherboard to about 2m height, separating it from the sweating and catching pens in Stage 1.

The roof frames of Stage 2 have timber brackets to support a roller or pulley, probably associated with the original wool press that would have been located here. The present wool press is an electric Sunbeam press.

Stage 3 is a weatherboard and iron-clad skillion extension to the east of the southern bay of Stage 2.

Stage 4 and 5 are a gable-roofed extension to the west of the shearing board. Stage 4 may be contemporary with Stage 1, acting as the experts room, or it may have been added when the first machine shears were introduced, as the engine room. The floor is timber boarded and at the level of the board. It currently has a shelf with shearing components and related materials on it, a coat rack, and a free-standing set of disc grinders.

Stage 5 is an extension about 250 mm wider than Stage 4, and has a dirt floor at a lower level, with a large concrete pad extending into a skillion extension on the northern wall. This probably housed a later engine for mechanical shears. Double opening doors give access to the west. Stages 4 and 5 are clad in vertical boards, with no internal lining.

Stage 6 is an extension of the sweating pens on the northern wall of Stage 1. It has a slatted floor and is clad in Flattened iron drums. Two doors give access from the pens to the north to the central race and the eastern sweating pens. This addition was built in 1952.[25]

Artefacts within the woolshed include old lamb-bats (for gathering up lambs wool), slatted sorting tables, bale stencils, two cane wool baskets, and the more recent modern disc grinder, wool press and mechanical shears set.

[25] Personal communication, Col Carnegie, 27/5/03.

The yards extend about 65 metres north and 35 metres west of the woolshed. The yards are roughly made and poorly maintained, consisting of sections of post and rail fencing, old iron fencing, old gates, iron sheet and weldmesh panels. Only the southern section retains a formal linear shape, the rest being without a straight section. A galvanised iron clad drop dunny is located west of the yards.

Shearing Quarters

The shearing quarters, located 80 metres west of the woolshed, which were erected before Col Carnegie arrived in 1954, are made up of four buildings.

Sleeping Quarters: Consisting of a gabled corrugated galvanised iron roof, timber-framed and fibro-clad building with five rooms, supported on timber and concrete stumps. Each room is approximately 3500mm by 2880mm in floor size, with a small shelf built onto the rear wall as the only built-in furniture. Each room has a louvred window and single door, timber boarded floor, and is fibro clad internally.

Kitchen and dining room: A gabled CGI roofed building, timber-framed and externally clad in CGI and internally clad in fibro. The fibro-clad ceiling is 2740mm high. The building sits of timber and concrete stumps, and has a suspended timber boarded floor. The building is divided internally into two rooms by a partition with a central opening. Doors provide access into the east and west sides of each room. The kitchen room has a 'Younger' iron stove set in a brick fireplace with an external brick chimney on the southern wall. A bench top with sink occupies most of the western wall. A large fly-wire covered food safe sits in the room, but has been moved from its original location.

The dining room has a fireplace at the northern end with external brick chimney, and a fly-wire walled food cupboard is built into the south-west corner of the room.

Shower block: A CGI clad skillion-roofed shed with concrete slab floor and housing three shower stalls, a room for a water heater, and an externally accessed flush septic toilet.

Laundry: A CGI clad gable-roofed shed with concrete slab floor. A brick fireplace setting with a pipe chimney for a laundry copper is located in the south-west corner, and bench on the eastern wall. The interior has been clad in recent years in black plastic for use as a photographic dark room by Jenelle Carnegie.

A 2750mm diameter CGI water tank sits in a space adjacent to all buildings.

Stables

The stables is a pole-framed drop-slab building. The main building is a two-storey gable-roofed construction 8.88m long by 4.5m wide, having four bays on the ground floor separated by full-height round posts on the perimeter and down the centre-line. The side-wall posts are 3.24m high and the ridge is 4.8m high. The upper floor is a single-roomed loft, accessed by a door in the eastern gable-end. The walls between the posts on the lower floor and on the upper side-walls are infilled with horizontal drop-slabs of cypress pine in the form of thick split planks up to 70mm thick, 360mm wide and 2.5m long. Many of the slabs have fallen from the building. The gable-ends above the log joists supporting the upper floor are clad in roughly made weatherboards.

The ground floor has four bays, separated by three round pole rails spanning between the support posts to a height of 1340mm. Between the bottom rail and the floor, a height of approx 550mm, is infilled with slabs held between battens attached to each post. The floor of the western three bays is made of slabs laid directly on the ground.

The western-most bay is a tack room, the round-timber joists supporting the upper floor having wooden pegs inset into them on which to hang harness. The two central bays are stable stalls. The western stall has a feed crib in the form of a hurdle attached at an angle to the upper rear wall of the stall, and fed with hay through a slot in the floor above. The other stall has a wooden trough, 340mm wide, supported between the bottom two side rails at each end. This is also fed from the floor above, hay being fed into a cavity created by lining the adjacent posts on both sides, the hay then being forked out of a gap left in this cavity above the trough. The posts at the entry end of each stall has a broad curved peg attached, to support saddles, as well as subsidiary pegs for harness.

The floor of the eastern-most bay is covered in coke, presumably to supply the blacksmith's forge which was originally located in a shed nearby. The walls of this bay are clad with flat iron sheets, made from flatted drums.

In the southern walls of each bay were doors, either double or single hung.

A 4.5m wide skillion addition to the northern side of the main building has flat iron (flattened drums) and weatherboard walls and a floor made of half-logs laid on the ground. The skillion originally housed horse-drawn vehicles.

The stables building has a severe lean, up to 15° from the vertical on the eastern wall, due to the rotting of the bases of key posts and the absence of cross-bracing. Many slabs and supporting frames have fallen from the building, and the structure is at risk of imminent collapse.

Workers cottage

Two buildings form the worker's cottage and bathroom. The cottage itself has several stages of development. The original building was a two-roomed timber-framed weatherboard-clad structure with gable roof. The two rooms were clad in tongue and groove boards, as was the ceiling, and were separated by a 1970mm high tongue and groove boarded partition. A brick fireplace and chimney was attached to the northern wall. Each room has a separate door off the skillion-roofed verandah extending part way across the front of the building. The floor is timber boarded, supported on low stumps.

An addition to the rear of the original building has side walls clad in weatherboards of a different profile to the original, and is internally clad in fibro. The western wall is stud-framed and clad only on the interior with fibro, suggesting the shed structure west of it were designed at the same time to protect that wall from the weather.

West of the addition is the ruined remains of a pole-framed shed, not accessed from within the cottage. Hinges on the remaining posts on the eastern wall suggest double-opening doors on that side.

The gable roof of the original cottage was extended over the addition and the rear shed. A CGI water tank sits partly under the front verandah, which has a concrete slab floor.

A separate gable-roofed timber-framed weatherboard clad building is located immediately to the north-east of the cottage, and is identified by Col Carnegie as a bathroom. The single door faces east, and the floor is timber over short stumps. The gable-ends are clad in fibro. No fittings for its supposed use survive.

The rear shed has substantially collapsed, and the addition is roofless. The southern wall of the original cottage has separated from the rest of the building and has pulled away at the base. The roof has several CGI sheets missing or detached, and the chimney and fireplace have collapsed. The cottage is in poor condition. The bathroom is in fair condition.

Other buildings

Fibro cottage: A workman's cottage is located to the north-east of the complex. It is a timber-framed fibro cottage, in fair condition. Col Carnegie states that it was built in 1951. The cottage was not recorded in detail.

Machinery Shed: A 22m x 9m steel-framed ribbed corrugated iron clad open-fronted machinery shed was built by Col Carnegie in the 1970s.

Hay shed/Vehicle shelter: A tall pole-framed structure with a CGI roof supported on steel trusses and with no wall cladding, 11m square, is a 1970s construction.

Hay shed ruin: A totally collapsed pole-framed shed, possibly contemporaneous with the stables, is located north of that building. Timber posts, slabs and iron are scattered over the 9m x 10m site, and part of the northern gable-end wall lies partly intact on the ground.

Feed shed: a modern CGI clad feed shed located adjacent to a small set of yards about 80m south of the woolshed.

Vehicle/work shed: Located adjacent to the homestead, this steel-framed CGI clad open-fronted shed is probably of 1970s vintage.

Garage: A weatherboard clad, fibro-lined garage is adjacent to the homestead.

Lake Cowal and adjacent blocks

Rattey's house

Reg Rattey V.C.'s house on Lot 38, later acquired by the Buttenshaws, is a four-roomed timber-framed CGI clad cottage with a two-roomed skillion extension at the rear. Internal cladding is tongue and groove boards. An enclosed verandah ran around three sides of the house, and has substantially collapsed in several sections. Most of the roofing iron has blown off, the verandahs are in a state of collapse, and the main building is in poor condition. The front entry path is lined with up-turned beer bottles. The building was not recorded in detail.

Survey markers
Two survey markers were inspected. The first is a tree with a blaze within which is cut a broad arrow and the numbers 38, 31 and 37 one above the other. Two adjacent trees have blazes cut in them but no lettering. The marker is at the junctions of lots 38, 31 and 37 (formerly lots 3 and 4 of Portion 74).

The second marker is a tree with a blaze in which is carved 'BM' above the number 10 and the letters 'PT'. It is at the corner of Lot 10, Portion 4 (formerly lots 1 and 2 of portion 74). The survey bench mark is a peg and nail located immediately below the blaze and encircled by the roots.

Lake Cowal homestead complex
The Homestead Complex consists of:

- a substantial homestead building
- stables
- two workers cottages
- garage /shed
- meat house
- machinery shed
- dump

No recording was undertaken.

Lake Cowal Woolshed
A very large timber woolshed in very poor condition, largely collapsing located about 1.4km south of the homestead.

Lake Cowal Shearer's Quarters
Located on Sandy Creek (formerly Back Creek) between the homestead and the woolshed, the quarters consist of weatherboard sleeping quarters with eight rooms, a kitchen/dining block, generator shed and showers block. The quarters are not those shown in the 1886 plan of the area (which were adjacent to the woolshed), but appear to be of a substantial age. The quarters buildings are in a poor condition, but still standing.

2.3 ANALYSIS OF EVIDENCE

Thematic context

The NSW Heritage Office uses the NSW Historical Themes as a framework within which to consider the possible aspects of significance of heritage places. There are also National Themes, which can be related to the NSW themes.

The Cowal West and Lake Cowal sites have a connection with the following NSW Historical Themes:

NSW Historical Theme	Australian Theme	Relevance to Cowal Sites
Agriculture	Developing local, regional and national economies	Settlement of the lake floor by Home Farm Grant areas for wheat growing
Pastoralism	Developing local, regional and national economies	Early runs, later station development, such as Cowal West and Lake Cowal. Associated woolsheds, yards, homestead, quarters.
Technology	Developing local, regional and national economies	Transition from hand shears to mechanical shearing exhibited in Cowal West and Lake Cowal woolsheds.
Land tenure	Building settlements, towns and cities	Changes in run, station and farm configuration, survey trees, fencing.
Accommodation	Building settlements, towns and cities	Homesteads, shearers quarters, workers accommodation.
Labour	Working	Shearers quarters, workers accommodation, woolsheds, stables, machinery sheds. Changing shearers conditions.
Domestic life	Developing Australia's cultural life	Homestead, shearers quarters, workers accommodation, kitchens, shower blocks.
Persons	Marking the phases of life	Associations with early squatters, station holders, small settlers: Sir Samuel Wilson, Frank Allen, Bolte family, Buttenshaws, Ricketson, Reg Rattey V.C.

Recorded places in context—Cowal West

The pastoralism theme is one of the strongest reflected at Cowal West. The themes of technology, accommodation, labour and domestic life are closely associated with the pastoralism theme. Cowal West has historical associations with the early squatter runs and later stations, and with the late 19th century subdivision of the runs. The woolshed and stables, in particular, relate to late 19th century origins.

The **homestead** is typical of self-sufficient homesteads of the early 20th century. It demonstrates the domestic living conditions of pastoral families through the 20th century, without exhibiting the characteristics of its type in an outstanding way. Very many homesteads in rural NSW demonstrate the same level of evidence. It is associated with a number of pastoral families of local note.

The **woolshed** demonstrates, in the lifting of the roof over the board, clear and uncommon evidence of the technological change from hand shearing to mechanical shearing. No evidence was located to provide the date of this change, but the very early conversion of the Lake Cowal shed (either Wilson's or Donkin's) in 1888 illustrates that the technology was known at an early date to the Allens at Cowal West. It can be assumed that the shed was converted to mechanical shearing before the turn of the century. The mechanical handpiece was well established by 1900, and only one shed surveyed in the Riverina was still using hand-blades by 1923.[26]

The best study of woolsheds with which to compare the Cowal West shed is Peter Freeman's work. This study looked at 25 woolsheds in the broadly defined Riverina region. The nearest sheds to Lake Cowal covered in the study are 'Bygoo' near Ardlethan, 'Wallendbeen', 'Kingsvale' and 'Memagong' near Young, and 'Wooyeo', 'Uabba' and 'Naradhan', near Lake Cargellico.[27] This study was done over 20 years ago, and Peter Freeman estimates that about one third of the sheds he surveyed no longer exist today.[28] The sheds date from the 1860s through to the 1890s, so are directly comparable in age to the Cowal West shed.

Many of the sheds surveyed by Freeman were larger than Cowal West, but it is reasonably typical in layout and detail for a small to medium-scale shed. The double-aisled design is more or less the standard form for woolsheds of the period. The use of cypress pine for wall cladding (only partly used at Cowal West) and internal rails was also common. Only two of the surveyed sheds demonstrated the raising of the roof over the board to accommodate mechanical shears—these being 'Bundyulumblah' (1880) near Moulamein, and 'Roto' (1889) near Hillston. Other sheds converted to mechanical shears had sufficient head-room to accommodate the equipment without major alteration, and hence have less physical evidence of the technological change. The evidence at Cowal West is therefore uncommon.

While many of the sheds had gates and fences made of framed boughs, these were often replaced with sawn timber or iron gates as the larger sheds were upgraded. While not rare, these features at Cowal West are of note and are increasingly uncommon. Only one of the surveyed sheds had its vertically-lifting race gates highlighted, were at 'Bygoo' (1867) near Ardlethan, where the slatted gates are counter-balanced with pine log weights suspended from pulleys. While some other sheds in NSW are known to have lifting gates (such as 'Merriville', Murrumbateman), the vertical lifting gates at Cowal West would appear to be rare.

The **yards** adjacent to the woolshed have been poorly maintained in their original configuration and have an *ad hoc* feel to their arrangement. The yards give little evidence of the arrangement of stock handling at the height of the shed's activities. They are not typical, nor are they a significant rarity.

The **Shearer's Quarters** are typical of 1930s-1940s era quarters—fibro and CGI cladding, conforming to the Shearers Accommodation legislation. They contribute to completeness of the overall complex, but are not of particular significance in their own right.

26 Freeman, P. 1980. *The woolshed: a Riverina anthology*, Oxford University Press, Melbourne: 39.
27 Freeman, *The woolshed: a Riverina anthology.*
28 Personal communication, Peter Freeman, 2/6/03.

The **Stables** are uncommon in their age and retained details of drop-slab construction, use of pole rail partitions, log floor and surviving chaff rack/crib, feed trough, and saddle pegs. Little comparative evidence is available. Cypress pine drop log construction using round logs or split half-logs is more common than split pine slabs as used here, but this construction is found in a number of the Riverina woolsheds of a similar vintage.[29] The size of the slabs (up to 370mm wide) puts them at or beyond the maximum size (12") allowed to be cut without special permit under the 1884 *Crown Lands Act*[30], and is an interesting interpretative devise to show the environmental changes in the local district. Similar chaff racks are found at 'Fernhill' (1858) near Bowenfels, and 'Cliefden' (1842) near Carcoar,[31] and probably at other 19th century stables. Saddle racks and pegs are common, though a standard inverted 'V' form seems more common than the carved curved form found at Cowal West. While a good comparative analysis is not possible, the Cowal West stables are assessed as being at least uncommon if not rare. The condition of the stables, however, is very poor, and unless stabilised they are likely to collapse in the near future. The stables have a strong visual appeal due to their rustic timber form and obvious handcrafted construction.

The **weatherboard workers cottage** is of historical interest in illustrating the layout of the working homestead complex, and demonstrating the conditions of worker accommodation in the early 20th century. However, due to changes made to it over time, its poor condition, and the incomplete nature of the evidence shown in the surviving structure, it is not a particularly good example of its type.

The 1951 **fibro-clad workers cottage** is of a form and construction common throughout rural NSW, and is not considered to be of significance.

The **remaining buildings**, constructed in the 1970s and later, are considered to be part of the contemporary use of the property, and, other than as evidence of the historical development of the complex over time, not considered to be of heritage significance.

Recorded places in context—Lake Cowal Station

The identified places on Lake Cowal Station, outside the Development Approval area for the Cowal Gold project, were not recorded or assessed. The following analysis is based on a brief inspection only, and would require additional work to confirm a final assessment.

The **Lake Cowal Homestead complex** is directly related to the second generation of pastoral runs in the Lake Cowal region, and together with its woolshed and shearing quarters appears to have historical associations and physical remains of potential heritage significance.

Lake Cowal Woolshed is a large shed that would benefit from an analysis in the context of Freeman's wider survey of the Riverina sheds. It is possibly one of the earliest sheds to be converted to mechanical shearing. The shed is in ruin, and is beyond effective conservation, but its recording would salvage potentially important historical and technological evidence of local and regional significance. The original shearers quarters were adjacent to the shed (as shown on 1885 subdivision map), and may have left archaeological evidence.

29 Freeman, *The woolshed: a Riverina anthology*
30 Freeman, *The woolshed: a Riverina anthology*: 26.
31 Roxbough, R. and Baglin, D. 1978. *Colonial farm buildings of New South Wales*, Rigby, Sydney: 131-133.

The **Lake Cowal Shearer's Quarters** are of as yet unknown age, but appear to be early 20th century in date. They are potentially of greater significance than the Cowal West quarters.

Rattey's house is closely associated with a prominent Australian, due to his war record, who also typified the small-scale settlement of the lake area.

The **survey marker trees** appear to be related to subdivision of the lake bed blocks in the 1920s, and are interesting evidence of the survey of the local area.

3. STATEMENT OF SIGNIFICANCE

The following statement of significance is based on the criteria used for assessments for the NSW Heritage Register. The assessment is for the Cowal West complex only.

Statement of Significance

Cowal West homestead complex is of local significance in reflecting the late-19th century creation of pastoral properties out of the earlier large runs, typifying the pattern of land settlement in central NSW established at that time.

The woolshed has significant evidence of the change from hand shearing to mechanical shearing, a technological advance that had a major influence on the consolidation of pastoralism as the dominant landuse of the region. The woolshed contains construction elements and fittings that are uncommon or rare in the region, and under substantial risk throughout the state. It is an important example of its type in the region. It has some potential to reveal new information about 19th century woolshed construction, given its relatively unaltered internal details. The interior of the woolshed has some aesthetic appeal due to its rustic character and demonstrated craftsmanship.

The stables contain construction elements and fittings that are uncommon or rare, and under substantial risk. The stables have some aesthetic appeal due to their rustic character and demonstrated craftsmanship. Initial assessment (without good comparative evidence) suggests the building is an important example of its type in the region.

The pastoral families associated with the development of Cowal West, including the Allen, Greene, Hammond and Carnegie families, are closely associated with the history of the local Lake Cowal area.

Breakdown of significance by criterion

Criterion A: an item is important in the course, or pattern, of NSW's cultural or natural history;

> Cowal West homestead complex is of local significance in reflecting the late-19th century creation of pastoral properties out of the earlier large runs, typifying the pattern of land settlement in central NSW established at that time.

The woolshed has significant evidence of the change from hand shearing to mechanical shearing, a technological advance that had a major influence on the consolidation of pastoralism as the dominant landuse of the region.

Criterion B: an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history;

The pastoral families associated with the development of Cowal West, including the Allen, Greene, Hammond and Carnegie families, are closely associated with the history of the local Lake Cowal area.

Criterion C: an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW;

The complex as a whole is typical of the layout, design and visual character of medium-scale pastoral holdings in the region, but does not have outstanding aesthetic values or evidence of creative or technical achievement originating on the property. The Stables have some aesthetic appeal due to their rustic character and demonstrated craftsmanship. The interior of the woolshed shares this aesthetic appeal.

Criterion D: an item has strong or special associations with a particular community or cultural group in NSW for social, cultural or spiritual reasons;

Does not apply

Criterion E: an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history;

The woolshed has some potential to reveal new information about 19th century woolshed construction, given its relatively unaltered internal details. The rubbish dumps appear to have been both cleaned up and scavenged for bottles, and little archaeological potential remains.

Criterion F: an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history;

The woolshed and the stables contain construction elements and fittings that are uncommon or rare in the region, and under substantial risk throughout the state.

Criterion G: an item is important in demonstrating the principal characteristics of a class of NSW's

- cultural or natural places; or
- cultural or natural environments.

The homestead complex as a whole is typical of its kind, but is not assessed as an important example. The woolshed and stables are important examples of their type, retaining construction elements and fittings now uncommon or rare in other examples.

4. CONCLUSIONS

The Cowal West Homestead Complex has local significance. The key elements of the place that underpin that significance are the woolshed and to a lesser degree the stables. The woolshed is certainly of local significance, and potentially of regional significance. The stables are of local significance, the assessment of their wider importance requiring further comparative research.

The woolshed is capable of being conserved. The building is in good condition, and superficial examination suggests conservation would not be a major undertaking. If conservation *in situ* is not feasible, the option of moving the shed to a new location should be critically assessed before being adopted. The shed is of pole construction, so it cannot be moved intact or in sections, but would have to be taken apart and totally reconstructed in its new location. The significance of the building in its original place and context would be irretrievably lost, and the risk of loss of physical evidence and aesthetic character in the process of demolition and reconstruction would be great. The cost benefit and heritage benefit of such a move has to be questioned. The Burra Charter stresses that the moving of a building 'should not be to the detriment of any place of cultural significance.

If demolition cannot be avoided, **it is recommended** that representative components of the gates, hurdles and movable artefacts be salvaged from the building and donated to a collecting institution (local museum, state museum, Shearer's Hall of Fame etc) with appropriate financial assistance to allow their proper display interpretation and conservation.

The stables are capable of conservation, if action is taken immediately. Similar concerns to those expressed about the woolshed arise about moving the building if conservation *in situ* is not feasible. While the stables are more likely to be easier to disassemble and re-erect, it is high-risk proposition from the point of view of retention of cultural significance. A critical consideration is whether there is a potential recipient of the moved building who would be able to guarantee ongoing conservation and public access and interpretation. Without such a recipient, removal of the building may be a costly step that simply postpones the building's eventual destruction.

The places on Lake Cowal Station, outside the development application area but owned by Barrick, are of considerable historical interest and potentially of local or regional heritage significance. Their further research and recording **is recommended**, to assist Barrick make appropriate decisions about their future use and possible conservation.

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APPENDIX C

APPENDIX J – GROUND VIBRATION AND AIRBLAST, AUSTRALIAN STANDARD AS 2187.2-1993 *EXPLOSIVES – STORAGE, TRANSPORT AND USE PART 2: USE OF EXPLOSIVES*

APPENDIX J

GROUND VIBRATION AND AIRBLAST OVERPRESSURE

(Informative)

J1 INTRODUCTION

The contents of this Appendix are designed to be informative and are not intended to override existing statutory requirements, particularly with respect to human comfort limits set by various authorities. This Appendix should be read in conjunction with any such statutory requirements and with regard to their respective jurisdictions. The intention of the present recommendations for both human comfort limits and damage limits is to provide information that reflects current best practice globally.

This Appendix addresses two common environmental effects of blasting: ground vibration and airblast. It provides background information, guidelines for measurement and criteria for peak levels.

It is recognized that ground vibration and airblast produced by blasting falls into two categories—

(a) those causing human discomfort; and

(b) those with the potential for causing damage to structures, architectural elements and services.

Generally, human discomfort levels set by authorities are less than the levels that are likely to cause damage to structures, architectural elements and services. Ground vibration and airblast levels are influenced by a number of factors, some of which are not under the control of the shotfirer.

Complaints may arise following a blast and it is recommended that accurate records be maintained. Such records should describe the location of the blast and all the blastholes, the design of the blast in terms of explosives and initiating system usage and ground vibration and airblast measurement data. It is recommended that the records be kept for at least seven (7) years. A longer period of retention of the records may be warranted if a region of the mine, quarry or construction project is blasted over an extended or disrupted period. Standardized criteria for ground vibration and airblast are used to evaluate a blast. There are various jurisdictions and sources for these criteria and this Appendix presents pertinent information and references to it.

The correct measurement of ground vibration and airblast requires systems with adequate sensitivity, dynamic range and frequency response. People may easily confuse the sources of their discomfort. Not only may they assess incorrectly the true level of ground vibration and airblast but they misconstrue the actual source. For example, secondary noise is often attributed to ground vibration but this noise, such as windows and crockery rattling, may have been caused either by the ground vibration or airblast. Persons responsible for, or involved with the blast, should have a good understanding of such issues and be able to communicate that understanding to affected people. Monitoring records may support the communication.

Blasts should be designed according to the prevailing regulatory controls from both a human comfort and damage perspective. All efforts should be made to minimise environmental disturbances.

Information in this Appendix is presented as follows:

(i) Paragraph J1 provides a general introduction.

(ii) Paragraph J2 provides a broad description of the phenomena of ground vibration and airblast.

(iii) Paragraph J3 describes typical measurement system requirements and procedures.

(iv) Paragraph J4 gives examples of maximum levels of ground vibration for human comfort that some authorities have chosen. It also gives levels for the prevention of damage to structures, architectural elements and services from ground vibration.

(v) Paragraph J5 gives examples of maximum levels of airblast for human comfort that some authorities have chosen. It also gives levels for the prevention of damage to structures, architectural elements and services from airblast.

(vi) Paragraph J6 provides guidance for operating practice where ground vibration and airblast are of concern and suggests a protocol for communication in the event of complaints arising from ground vibration and airblast produced by blasting.

(vii) Paragraph J7 provides methods for the preliminary estimation of ground vibration and airblast magnitudes

(viii) Paragraph J8 provides a bibliography of work relevant to this Appendix.

J2 DESCRIPTION OF THE PHENOMENA

J2.1 Ground vibration

Ground vibration from blasting is the radiation of mechanical energy within a rock mass or soil. It comprises various vibration phases travelling at different velocities. These phases are reflected, refracted, attenuated and scattered within the rock mass or soil, so that the resulting ground vibration at any particular location will have a complex character with various peaks and frequency content. Typically, higher frequencies are attenuated rapidly so that at close distances to the source such frequencies will be present in greater proportion than at far distances from the source.

The magnitude of the ground vibration together with ground vibration frequency are commonly used to define damage criteria. The choice of the appropriate damage criterion may require consideration of the frequencies arising from the blast.

Studies and experience show that well designed and controlled blasts are unlikely to create ground vibrations of a magnitude that causes damage. Particular structures such as tall buildings, or abnormal ground conditions such as water-logged ground, should be carefully considered in a specialist study.

Cracks in buildings may be attributable to causes other than ground vibration, including ground or foundation movements (settlement and swell) associated with reactive clay soils during periods of prolonged dry or wet weather.

J2.2 Airblast

Airblast is the pressure wave (sound) produced by the blast and transmitted through the air. Unlike ground vibration there is only one airblast phase but it too is a complex wave-train consisting of various peaks and with a range of frequencies. The sources of airblast include a usually small air pressure pulse generated by the ground vibration, a direct air pressure pulse generated by the rock movement during blasting and an air pressure pulse caused by direct venting of gases from the region of the blast. It is important to recognise that airblast may be reflected by layers within the atmosphere and that the airblast may be refocused at distances remote from the blast.

Airblast may be heard by people if it contains energy in the audible frequency range, typically between 20 Hz and 20 kHz. However, some of the energy is sub-audible and lies in the frequency range between 2 Hz and 20 Hz. Such low frequency airblast is often experienced indoors as secondary audible effects, such as rattling of windows and of sliding doors. A blast perceived as loud may have a low airblast level and a blast that is barely noticeable outdoors may have a high airblast level.

At distances where both effects are above perceptible levels, airblast is usually felt after any ground vibration. Ground-transmitted vibration waves from a blast normally travel faster than the air-transmitted airblast overpressure.

Airblast is generally the cause of more complaints than ground vibration.

Airblast levels that are barely noticeable are much lower than those that will cause damage. Because of a large dynamic range, airblast levels are measured typically on a logarithmic decibel scale (dB). On this scale, an increase of 6 decibels represents a doubling of the sound pressure levels.

Airblast levels may also be reported as an A-weighted (dBA) or C-weighted (dBC) value. These scales adjust the frequency content of the measured airblast time history. Linear-weighting (dBL) implies no adjustment of the frequency content in the measured records. The A-weighting is commonly associated with the hearing response of humans and is most often used for assessing general noise levels associated with machinery and vehicular traffic. The C-weighting, which attenuates the frequencies more than does A-weighting, is often used for impulsive sounds such as the sonic booms of aircraft.

As an example, if a sound level meter measures an airblast level of 115 dBL, the same meter would measure approximately 90 dBA for the same event. The frequency content of the particular airblast time history will determine the relative levels between the dBL and dBA readings.

All airblasts should be reported on the dBL scale, particularly when considering structural and architectural effects, and the other weighting scales should be used as required.

J3 MEASUREMENT

J3.1 General

J3.1.1 *Management*

The proper management of blasting operations demands that records be kept for each blast. As a minimum, this includes the blast location, the blast geometry, the explosives loaded, the initiation design and the location of any man-made or natural structures that may be affected by the blast. Such information is invaluable for continuous improvement of the desirable outcomes from the blast, but also provides information for analyses concerning ground vibration and airblast exceedences.

Measurements of ground vibration and airblast are made in a variety of ways and for different reasons. While a standard approach is recommended, it must be remembered that blasting will have a different end effect on each and every structure. The standard approach is useful for routine monitoring of relatively standard blasts under relatively uniform conditions.

Special monitoring techniques may be required for other conditions, but these are not addressed in this Appendix.

It is emphasized that measurement equipment used should comply with Paragraphs J3.2.1 and J3.3.1 of this Standard. It should be noted that regulatory authorities may require or approve the use of equipment with specifications different from those given in Paragraphs J3.2.1 and J3.3.1 to meet specific situations.

J3.1.2 *Typical blast monitoring guidelines*

The following are intended only as general guidelines, and cannot describe methods for all types of field conditions:

(a) *Read the instrument instruction manual* An operator should be familiar with the instrument and competent in its use. Emphasis must be placed on awareness of maintenance issues.

(b) *Instrument calibration* Instrument calibration must be maintained, be traceable and documented. As a guideline, instrument calibration should be carried out at intervals not exceeding 12 months.

(c) *Pre-blast preparation* The operator must be informed of the monitoring conditions before setting out, particularly the size of blast, the designed effective charge mass per delay, the designed blast duration and distance to all monitoring locations. Other pertinent data that should be noted include user's name, date, time, location, instrument trigger levels and instrument identification number.

(d) *Record the full waveform* The instrument must have sufficient memory capacity available and be configured to save waveforms long enough for the blast design and distance. As a rule of thumb, 3 seconds per kilometre should be allowed plus the blast duration. Under certain circumstances, particularly for airblast recording using a sound level meter with acceptable frequency response, it may be appropriate to use a calibrated instrument that records only peak levels with and without weighting factors.

(e) *Record the blast* The effort of deploying the instrument justifies sufficient care to ensure a successful recording. Once installed on site, the system must be tested, and trigger levels must be as low as possible yet sufficiently above local background to avoid spurious events. Having saved the measurement, the data must be secured and available for any subsequent analysis.

(f) *Ground vibration transducer placement* The ground vibration transducer should be effectively coupled as described in Paragraph J3.2.2.

(g) *Microphone* The microphone should be mounted at a height of not less than one metre with the windshield attached as described in Paragraph J3.3.2.

J3.2 Ground vibration

J3.2.1 *Measuring equipment*

Typically, the measurement of ground vibrations uses transducers for particle velocity (geophone) or particle acceleration (accelerometer). Accelerometers tend to be used in specialist applications due to their (generally) superior specifications. The data from accelerometers may be converted readily to particle velocity by integration, either in hardware or software. The discussion in this clause is restricted to measurements of particle velocity.

Particle velocity is normally expressed in millimetres per second (mm/s). A vibration transducer should produce signals for three mutually orthogonal axes and preferably with one sensor measuring the vertical direction and the other two in horizontal directions. This arrangement enables a rapid assessment of vibrations in a coordinate system applicable to most man-made structures. Data records in three orthogonal directions may be transformed into any other curvilinear coordinate system that is relevant to the structure of concern.

The measurement equipment should record, and be able to play back these signals for the full duration of the blast event. The measurement equipment, or associated software, should indicate the absolute maximum signal value for each of the three components over this duration, referred to as the Peak Component Particle Velocity (PCPV). Also the measurement equipment should indicate the maximum of a root sum of squares calculation for the three components performed over the whole signal duration, referred to as the Vector Peak Particle Velocity (VPPV). Instrumentation noise (including electrical disturbances) measured as a peak value should be less than 10% of VPPV. The frequency range of the measurement equipment must be at least 2 Hz to 250 Hz (–3 dB roll off), with a tolerance of 10% over this frequency range (see Figure J3.2.1). The use of equipment with a frequency response range of 5 to 250 Hz, which was specified in AS 2187.2—1993, should be permitted in the vast majority of situations where this frequency range is adequate. For a digital system, the recommended minimum sampling frequency is 500 Hz.

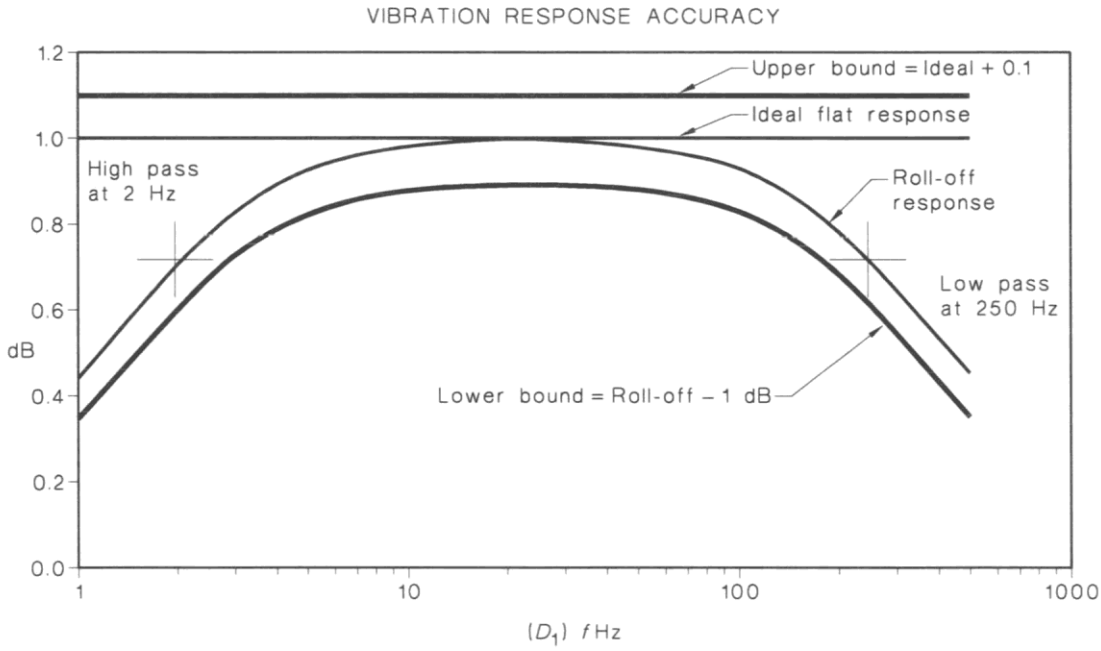

FIGURE J3.2.1 TYPICAL PARTICLE VELOCITY VIBRATION RESPONSE ACCURACY

J3.2.2 *Measuring technique*

The purpose of the measurement is to measure the magnitude of ground vibration that is transmitted to the structure at ground level.

Ground vibrations should normally be measured on the ground near the point of concern. The measurement location(s) should be away from structures that may produce reflections and cause spurious readings. Poor ground conditions for instrument coupling or lack of access should not preclude taking measurements on the foundation of the structure at ground level; however, it should be noted that measurements taken on the structure above ground level can be misleading as they are often exaggerated by structural or modal response. The choice of locations and the process of undertaking ground vibration measurement should be restricted to competent persons.

When setting up the instrument, the operator should estimate the likely range of ground vibration in order to set appropriate scales and trigger levels.

The basis for coupling the transducer is to ensure that it faithfully records the motion of the ground. The preferred coupling method depends on site conditions. Where there is a rigid surface (e.g., concrete or rock) adhesive or mechanical bonding can be used. Where the surface is soil, the transducer can be embedded or fixed to an embedded mount (for example, 200 mm concrete cube or similarly sized cylinder). If measurements are repeated at the same location, an embedded mount is particularly justified for consistency of results. Coupling with soil spikes in soft conditions may lead to exaggerated measurements and is not recommended.

The orientation of all transducers with respect to the blast location should be documented by the operator. The information needs to be sufficient so that each and every component vibration can be placed in the same global coordinate system used for the blastholes within a blast. Such orientation information is also required for triaxial transducers housed in an integrated container.

J3.3 Airblast

J3.3.1 *Measuring equipment*

The measurement of airblast overpressure uses a microphone and the airblast is usually expressed in Pascals (Pa) or decibels Linear (dBL). The measurement equipment should record the absolute maximum pressure level. In general, it is recommended that the measurement equipment record, and be able to reproduce this signal for the full duration of the blast event. The measurement equipment should indicate the absolute maximum signal value in dBL, a logarithmic (decibel) scale with linear weighting referred to a pressure of 20 mPa. This scale does not modify the frequency content of the airblast and may be used for assessing the likelihood of airblast-induced damage. Instrumentation noise (including electrical disturbances) measured as a peak value should be at least 20 dBL less than the measured peak. The frequency range of the measurement equipment must be at least 2 Hz to 250 Hz (–3 dB roll off), with a tolerance of ±1 dBL over this frequency range (see Figure J3.3.1). For a digital system, the recommended minimum sampling frequency is 500 Hz.

Where the airblast measurement is triggered by the ground vibration, the recording duration has to be sufficient for the monitoring distance. As a rule of thumb, 3 s per kilometre is allowed, plus the blast duration.

It is useful for the recording equipment and/or the associated software to have provision for analysing the airblast levels using an A-weighting, C-weighting and the associated sound exposure levels in order to provide extra information relating to human comfort levels.

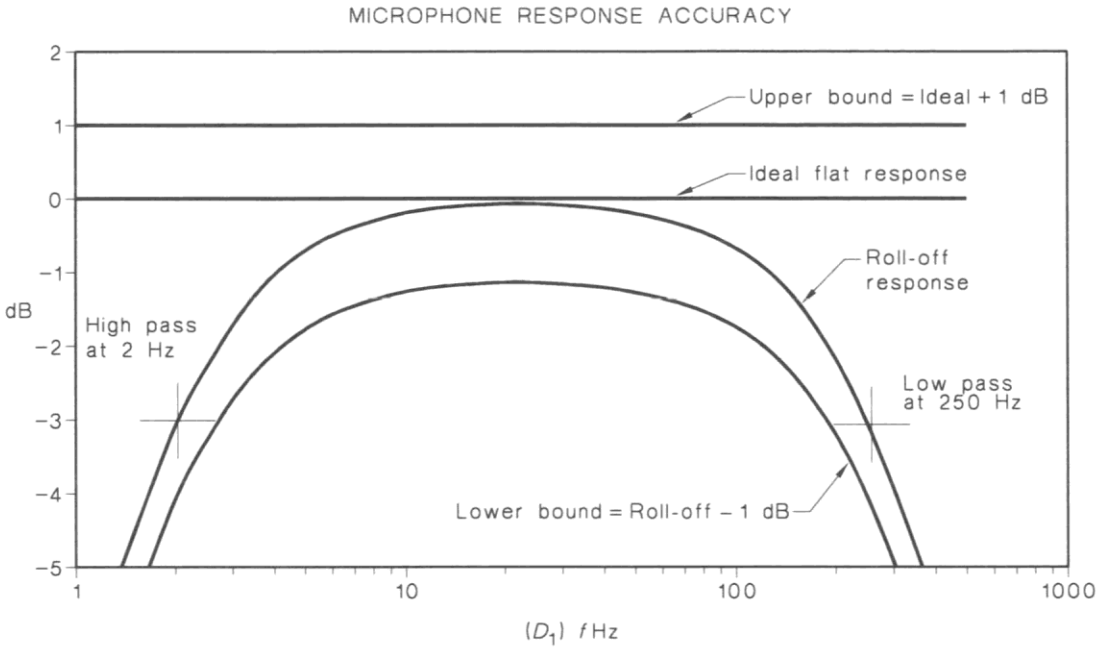

FIGURE J3.3.1 MICROPHONE RESPONSE ACCURACY

J3.3.2 *Measuring technique*

The microphone should be oriented in a direction of maximum sensitivity to the incident sound. A windshield should be fitted in accordance with the manufacturer's recommendations.

The microphone should be mounted on a tripod or similar stable stand and located at least 1 m from ground level unless a specific investigation shows that measurements taken at a lower height are valid. It should be located away from structures that may produce reflections and cause spurious readings.

J3.4 Blast monitoring records

Blast monitoring records provide the data for determining any improvements in blast outcomes, including the management and control of ground vibration and airblast. As a minimum, blast monitoring records should include the following:

(a) The size of the blast in terms of the number of blastholes and the quantity of explosives in each blasthole.

(b) The method of initiation and the timing sequence to be used in the blast.

(c) The date and time of the blast.

(d) The location of the measurement transducers (geophones, accelerometers, microphones).

(e) Instrument trigger levels.

(f) Measurement equipment and operator details.

(g) The location of the blast in relation to the mine, quarry or construction site lease.

(h) The location of any structures and/or persons who may be affected by the blast.

(j) The measured ground vibration and airblast values including the peak particle velocity values for each of the triaxial components, a derived vector peak particle value and the peak airblast levels.

Blast monitoring records should, wherever possible, include the following:

(i) The location of each blasthole collar.

(ii) Face survey information indicating the proximity of the nearest blastholes to any free faces within the blast.

(iii) Full time histories of the ground vibration and airblast responses.

(iv) Weather conditions, especially wind speed, cloud cover and direction and any other notable conditions such as rain.

(v) Information derived from a video of the blast.

(vi) Any subjective information from the shotfirer and any persons who may be affected by the blast.

A copy of these records should be included in the site blast records.

J4 GROUND VIBRATION LEVELS

J4.1 General

The maximum levels for ground vibration for human comfort that some authorities have chosen are set out in Paragraphs J4.2 to J4.5.

NOTE: The maximum levels advised in this Appendix are designed to be informative and are not intended to override existing statutory requirements, particularly with respect to human comfort limits set by various authorities.

The methods of data analysis for these limits are also presented. In part, such analyses are a departure from that described in earlier and other Standards and the intention is to provide sufficient detail so that expert persons may implement these in hardware and/or software.

J4.2 Ground vibration

Vibration transmitted through the ground may cause damage to structures and architectural elements or discomfort to their occupants. The vibration levels at which people become annoyed are well below vibration levels at which damage occurs. The likelihood of such damage or discomfort may be ascertained by measuring the vibration from a blast close to the location of concern such as a building or other structure.

For all limits it is necessary to measure in three orthogonal directions, one in the vertical direction and the other two in perpendicular horizontal directions. Such measurements align with most structural members in man-made structures. From such measurements it is possible to derive the Vector Peak Particle Velocity (VPPV) and the Peak Component Particle Velocity for each direction (PCPV). The magnitude of the vector particle velocity (v_p) is the amplitude of the vector sum of three time-synchronised velocity components directly measured by an instrument. When not measured directly it may be determined by the following Equation:

$$v_p = \sqrt{v_x^2 + v_y^2 + v_z^2} \qquad \ldots \text{J4.2}$$

where v_x, v_y and v_z are the synchronized instantaneous velocity components of the x, y and z axes, respectively. The VPPV is the maximum of v_p.

J4.3 Human comfort limits

NOTE: Statutory requirements for human comfort limits for ground vibration may apply in respective jurisdictions.

General guidance on human response to building vibrations is given in AS 2670.2, ISO 2631-2 and BS 6472.

J4.4 Damage limits

J4.4.1 *General*

Frequency independent and frequency dependent guide levels are described in both British Standard BS 7385-2 and the United States Bureau of Mines (USBM) RI 8507. The levels specified are peak component particle velocities, and the methodologies used for assessing the frequencies are similar in both documents.

Frequency-dependent criteria are important for assessing the blast-induced vibration effects on buildings and other structures and are the recommended approach.

J4.4.2 *Frequency-independent levels*

Frequency-dependent criteria may not be readily implemented for all parties concerned with this Standard.

For explosives users who do not have the facilities to use frequency-dependent assessment methods, the levels specified in Table J4.5(B), which are more conservative for most blasting applications, will reduce the potential for damage. The Table should be used in conjunction with the notes that follow it.

Wherever possible, the ground vibration levels from all blasting operations must be limited to the damage limit criteria shown below in Figures J4.4.2.1 or J4.4.2.2 at all sites not in the ownership or control of the organisation commissioning the blasting.

J4.4.3 *Frequency dependent levels*

Frequency-dependent guide levels described in British Standard BS 7385-2 and the United States Bureau of Mines (USBM) RI 8507 are given below. The levels specified are peak component particle velocities, and the methodologies used for assessing the frequencies, are similar in both documents.

The frequency-dependent guide values from BS 7385-2 for the prevention of minor or cosmetic damage occurring in structures from ground vibration are shown in Table J4.4.2.1 and Figure J4.4.2.1 below:

TABLE J4.4.2.1

TRANSIENT VIBRATION GUIDE VALUES FOR COSMETIC DAMAGE (BS 7385-2)

Line	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structure. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

NOTES:

1 Values referred to are at the base of the building.

2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.

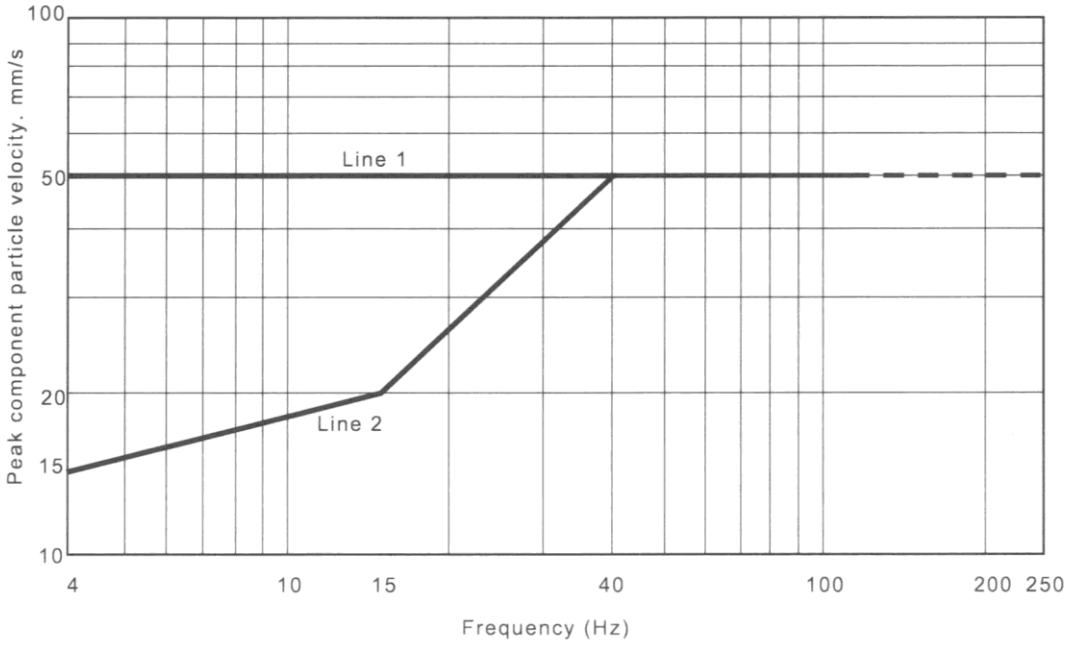

FIGURE J4.4.2.1 TRANSIENT VIBRATION GUIDE VALUES FOR COSMETIC DAMAGE (BS 7385-2)

British Standard 7385-1 damage classification is shown in Table J4.4.2.2.

TABLE J4.4.2.2

BS 7385-1:1990—DAMAGE CLASSIFICATION

Damage classification	Description
Cosmetic	The formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in the mortar joints of brick/concrete block construction
Minor	The formation of cracks or loosening and falling of plaster or drywall surfaces, or cracks through bricks/concrete blocks
Major	Damage to structural elements of the building, cracks in support columns, loosening of joints, splaying of masonry cracks etc.

The frequency dependent alternative blasting criteria for low-rise residential buildings given in (USBM) RI 8507 are shown in Figure J4.4.2.2 and Table J4.4.2.3.

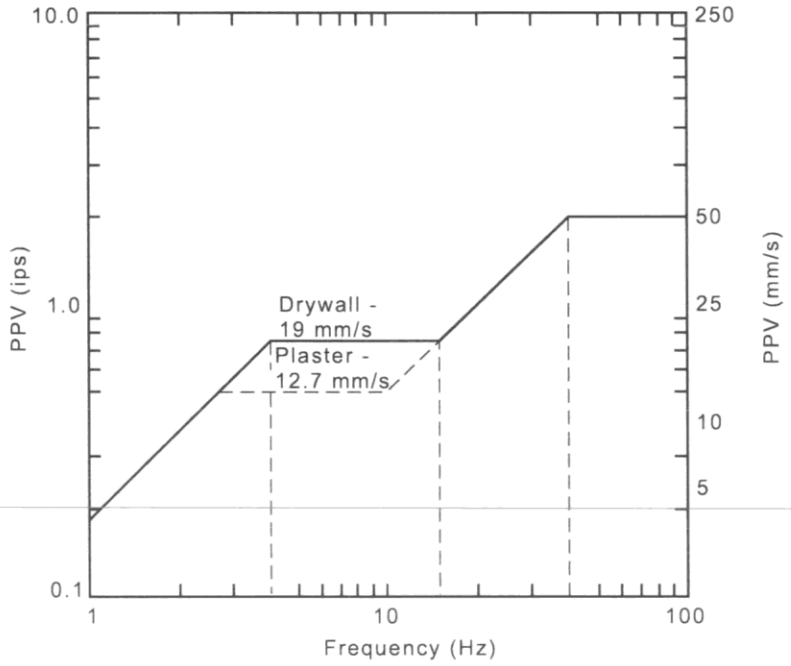

FIGURE J4.4.2.2 USBM 'SAFE' BLASTING VIBRATION LEVEL CRITERIA

USBM damage classifications are shown in Table J4.4.2.3.

TABLE J4.4.2.3

USBM DAMAGE CLASSIFICATION

Uniform classification	Description of damage
Threshold	Loosening of paint; small plaster crack at joints between construction elements; lengthening of old cracks
Minor	Loosening and falling of plaster; cracks in masonry around openings near partitions; hairline to 3 mm cracks (0 to 1/8 in); fall of loose mortar
Major	Cracks of several mm in walls; rupture of opening vaults; structural weakening; fall of masonry, e.g., chimneys; load support ability effected

Authoritative investigations (see Paragraph J8, Item 1) suggest that the guide values and assessment methods given in BS 7385-2 and (USBM) RI 8507 are applicable to Australian conditions, and are recommended for explosives users with the facilities to make use of these methods.

The estimation of the frequency of each vibration component to be used in structural damage assessment is complex. Simple approaches suggested within the BS 7385-2 and (USBM) RI 8507 includes—

(a) frequency of the maximum PPV amplitude peak;

(b) dominant frequency of the component vibration time history; and

(c) zero crossing frequency of the PPV amplitude peak.

The (USBM) RI 8507 and BS 7385-2 methodologies for assessing frequencies have been widely used for many years, and were suitable for use with desktop and laptop computers with the power that was commonly available in the 1980s and early 1990s. It appears that the motion frequencies determined by simple methods, such as zero crossing, are conservative for assessing damage potential.

NOTE: A method under development, which may give greater accuracy, uses the (USBM) RI 8507 frequency-dependent limits (which are similar to the limits specified in BS 7385-2) but with a more accurate methodology for assessing frequencies.

The method has been tested and published [see Fragblast 7–Beijing (1992) which may be found at http://www.isee.org and search their publications]. At the time of writing this Standard, software systems for the practical use of this method by explosives users were being developed, but were not in general use.

J4.5 Recommended ground vibration limits

NOTE: Statutory requirements for human comfort limits for ground vibration may apply in respective jurisdictions.

The maximum levels for ground vibration for human comfort, which some authorities have chosen, are provided in Table J4.5(A). Recommended limits for ground vibration for control of damage to structures are provided in Table J4.5(B).

Frequency-dependent limits have the capacity to precisely deal with the hazards presented by ground vibration and are seen as the basis for best practice blasting. The particular frequency-dependent criteria should be reported with the measurements. All the limits given in Tables J4.5(A) and J4.5(B) are peak component particle velocities, as used in overseas Standards and guidelines. The classification of type of structure may be difficult and when in doubt, a more conservative limit from the nearest description in Table J4.5(B) should be applied.

TABLE J4.5(A)

GROUND VIBRATION LIMITS FOR HUMAN COMFORT CHOSEN BY SOME REGULATORY AUTHORITIES (see Note to Table J4.5(B))

Category	Type of blasting operations	Peak component particle velocity (mm/s)
Sensitive site*	Operations lasting longer than 12 months or more than 20 blasts	5 mm/s for 95% blasts per year 10 mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Sensitive site*	Operations lasting for less than 12 months or less than 20 blasts	10 mm/s maximum unless agreement is reached with occupier that a higher limit may apply
Occupied non-sensitive sites, such as factories and commercial premises	All blasting	25 mm/s maximum unless agreement is reached with occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that can be shown to adversely effect the equipment operation

*A sensitive site includes houses and low rise residential buildings, theatres, schools, and other similar buildings occupied by people.

NOTE: The recommendations in Table J4.5(A) are intended to be informative and do not override statutory requirements with respect to human comfort limits set by various authorities. They should be read in conjunction with any such statutory requirements and with regard to their respective jurisdictions.

TABLE J4.5(B)

RECOMMENDED GROUND VIBRATION LIMITS FOR CONTROL OF DAMAGE TO STRUCTURES (see Note)

Category	Type of blasting operations	Peak component particle velocity (mm/s)
Other structures or architectural elements that include masonry, plaster and plasterboard in their construction	All blasting	Frequency-dependent damage limit criteria Tables J4.4.2.1 and J4.4.4.1
Unoccupied structures of reinforced concrete or steel construction	All blasting	100 mm/s maximum unless agreement is reached with the owner that a higher limit may apply
Service structures, such as pipelines, powerlines and cables	All blasting	Limit to be determined by structural design methodology

NOTE: Tables J4.5(A) and J4.5(B) do not cover high-rise buildings, buildings with long-span floors, specialist structures such as reservoirs, dams and hospitals, or buildings housing scientific equipment sensitive to vibration. These require special considerations, which may necessitate taking additional measurements on the structure itself, to detect any magnification of ground vibrations that might occur within the structure. Particular attention should be given to the response of suspended floors.

J5 AIRBLAST LEVELS

J5.1 General

Airblast can cause discomfort to persons and, at high levels, damage to structures and architectural elements, and at very high levels, injury to persons.

The airblast levels at which people become annoyed are well below levels at which damage has been proven to occur. The evaluation of the effects of blasting should separate human response and structural/architectural damage effects of airblast. Of particular importance in this regard is the frequency content of the airblast. For example, an airblast that is inaudible to humans may still be responsible for structural/architectural damage effects. Conversely, an airblast level that causes human discomfort may have negligible structural/architectural damage effects. The limits set out in Paragraphs J5.2, J5.3 and J5.4 below offer a robust means for differentiating such effects and are based upon studies conducted by various workers in blasting.

The sound pressure level [*SPL* (*dBL*)] is defined as follows:

$$SPL = 10 \log_{10} \left(\frac{P}{P_0} \right)^2 \qquad \ldots \text{J5.1}$$

where P is the pressure level (Pa) and P_0 is the reference pressure of 20 mPa. It is generally accepted that aural pain will occur in humans for *SPL* greater than 140 dBA for frequencies in the range 20 Hz to 20 kHz and for *SPL* between 160 dBL and 170 dBL for frequencies below 20 Hz.

General control limits currently used in Australia are not frequency dependent. It is probable that continuing research and development will result in the development of frequency-dependent limits and these should be adopted when available.

J5.2 Human comfort limits

NOTE: Statutory requirements for human comfort limits for airblast may apply in respective jurisdictions.

Human comfort limits for airblast are linked to the annoyance produced. Several factors contribute to annoyance by impulsive sounds such as airblast. These include the loudness, duration and number of events plus the time of day and the nature of the disturbance.

J5.3 Damage limits

From Australian and overseas research, damage (even of a cosmetic nature) has not been found to occur at airblast levels below 133 dBL. The probability of damage increases as the airblast levels increase above this level. Windows are the building element currently regarded as most sensitive to airblast, and damage to windows is considered as improbable below 140 dBL.

A limit of 133 dBL is recommended as a safe level that will prevent structural/architectural damage from airblast. Reference to Tables J4.4.2.2 and J4.4.2.3 should be made when classifying damage.

J5.4 Recommended airblast limits

Airblast limits for human comfort chosen by some regulatory authorities are provided in Table J5.4(A). Recommended damage control limits are given in Table 5.4(B). All the limits are expressed as peak linear sound pressure levels. The classification of type of structure may be difficult and, when in doubt, a more conservative limit from the nearest description in Table J5.4(B) should be applied.

TABLE J5.4(A)

AIRBLAST LIMITS FOR HUMAN COMFORT CHOSEN BY SOME REGULATORY AUTHORITIES (see Note to Table J5.4(B))

Category	Type of blasting operations	Peak sound pressure level (dBL)
Human comfort limits		
Sensitive site*	Operations lasting longer than 12 months or more than 20 blasts	115 dBL for 95% blasts per year. 120 dBL maximum unless agreement is reached with occupier that a higher limit may apply
Sensitive site*	Operations lasting for less than 12 months or less than 20 blasts	120 dBL mm/s for 95% blasts. 125 dBL maximum unless agreement is reached with occupier that a higher limit may apply
Occupied non-sensitive sites, such as factories and commercial premises	All blasting	125 dBL maximum unless agreement is reached with the occupier that a higher limit may apply. For sites containing equipment sensitive to vibration, the vibration should be kept below manufacturer's specifications or levels that can be shown to adversely effect the equipment operation

* A sensitive site includes houses and low rise residential buildings, hospitals, theatres, schools, etc., occupied by people.

TABLE J5.4(B)

RECOMMENDED AIRBLAST LIMITS FOR DAMAGE CONTROL (see Note)

Category	Type of blasting operations	Peak sound pressure level (dBL)
Damage control limits		
Structures that include masonry, plaster and plasterboard in their construction and also unoccupied structures of reinforced concrete or steel construction	All blasting	133 dBL maximum unless agreement is reached with the owner that a higher limit may apply
Service structures, such as pipelines, powerlines and cables located above the ground	All blasting	Limit to be determined by structural design methodology

NOTE: Tables J5.4(A) and J5.4(B) are intended to be informative and do not override statutory requirements, particularly with respect to human comfort limits set by various authorities. They should be read in conjunction with any such statutory requirements and with regard to their respective jurisdictions.

J6 OPERATING PRACTICE

J6.1 General

Shotfirers should endeavour to reduce ground vibration and airblast to as low a level as practically possible to reduce the possibility of discomfort, damage, worry or complaint. This should be reinforced by frequent consultation with persons who may be affected by the blast.

Relevant blast personnel should be given regular training in these aspects of blasting. Blast performance should be regularly reviewed and possible improvements implemented to ensure a good relationship is maintained with persons who may be affected by the blast and the regulatory authorities.

Table J6.1 give guidance on the various options available for controlling ground vibration and airblast.

TABLE J6.1
GROUND VIBRATION AND AIRBLAST CONTROLS

Variables	Ground vibration			Airblast		
	Influence on ground vibration			Influence on overpressure		
	Significant	Moderately significant	Insignificant	Significant	Moderately significant	Insignificant
1 Within the control of blasting operators						
Maximum instantaneous charge (effective charge mass per delay)	✓				✓	
Delay interval	✓			✓		
Burden and spacing		✓		✓		
Stemming: Amount			✓	✓		
Type			✓	✓		
Charge length and diameter			✓		✓	
Angle of blasthole			✓			✓
Direction of initiation	✓			✓		
Charge mass per blast		✓				✓
Charge depth			✓	✓		
Covering of detonating cord			✓	✓		
Charge confinement	✓			✓		
Blasthole deviation	✓			✓		
2 Not within the control of blasting operators						
General surface			✓		✓	
Geological conditions	✓			✓		
Wind and weather conditions			✓	✓		
Water saturated ground	✓					✓

J6.2 Ground vibration

Control measures that may be effective in reducing the impact of ground vibration at a particular site may include one or more of the following:

(a) Reducing maximum instantaneous charge (effective charge mass per delay) for example by reducing blasthole diameter or deck loading.

(b) Using a combination of appropriate delays.

(c) Allowing for excessive humps or toe in the blast design.

(d) Optimizing blast design (changing burden and spacing) by altering drilling patterns, delaying layout or alter blasthole inclination from the vertical.

(e) Exercising strict control over the location, spacing and orientation of all blastholes and using the minimum practicable sub-drilling that gives satisfactory toe conditions.

(f) Establishing times of blasting to suit the situation.

J6.3 Airblast reduction

Control measures that may be effective in reducing the impact of airblast at a particular site may include one or more of the following:

(a) Optimizing blast design (changing burden and spacing) by altering drilling patterns, and adjusting maximum instantaneous charge (effective charge mass per delay).

(b) Using a combination of appropriate delays.

(c) Using survey methods, as appropriate, to ensure burden is adequate.

(d) Keeping face heights to a practical minimum.

(e) Ensuring stemming type and length is adequate.

(f) Eliminating exposed detonating cord. Investigate alternative initiation methods.

(g) Eliminating secondary blasting (instead of popping, use rock breaker).

(h) Making extra efforts to eliminate the need for two shots (e.g., better control of drill patterns).

(i) Considering delaying or cancelling the blast by not loading if the weather forecast is unfavourable.

(j) Allowing for the effects of temperature inversion and wind speed and direction on the propagation of airblast to surrounding areas.

(k) Orientating faces where possible so that they do not face directly towards residences.

(l) Varying the direction of initiation.

(m) Exercising strict control over the burden, spacing and orientation of all blastholes.

(n) Taking particular care where the face is already broken or where it is strongly jointed, sheared, or faulted.

(o) Considering deck loading where appropriate to avoid broken ground or cavities in the face (e.g., from back break).

J6.4 Blasting complaints

Complaints arising from blasting operations should be treated sensitively and in a manner that recognizes the potential for blasting to cause environmental impacts. Such impacts fall under the jurisdiction of a variety of regulatory authorities. Those responsible for each blasting operation must be aware of the regulatory regime pertinent to that operation. In any case, they need to act in the best interests of all stakeholders, including neighbours of the mine, quarry or construction project.

Many complaints resulting from blasting in built-up areas are mistakenly attributed to ground vibration. The actual problem is usually airblast, which can be controlled by blasting technique.

Those responsible for blasting operations should ensure that relevant personnel and persons who may be affected by the blast are consulted and advised on the nature, causes and effects of airblast from blasting and the difference between it and ground vibration. They should also recognize the importance of monitoring blasts as a tool for minimizing complaints as well as investigating complaints. It is in the interest of all those concerned in a blasting operation to monitor blasting operations in the event of any claims for damages arising from blasting.

Where the blast operation is in an environmentally sensitive area, all blasts should be monitored.

Records of any complaints associated with blasting should be kept, identifying the nature of the complaint, the particular operation that initiated the complaint, and documenting the action taken.

Any complaints related to blasting should be immediately investigated and a genuine endeavour made to satisfy the concerns raised by the complainant. Those responsible for the blasting operation should act swiftly, undertake follow-up visits and provide feedback to the complainant as to the cause of the problem and what is being done to rectify it.

Many complaints from blasting can be avoided by the adoption of the control measures listed in Paragraphs J6.2 and J6.3 and Table J6.1.

Upon receipt of a complaint, an appropriate investigation should establish the nature of the complaint, the cause of the incident and any response. Independent professional or technical advice may need to be sought.

J7 ESTIMATION OF GROUND VIBRATION AND AIRBLAST LEVELS

J7.1 Introduction

The accurate estimation of ground vibration and airblast levels is a complex task. The blasting process is highly non-linear and the variability of most rock types also contributes to the difficulty in accurate predictions of the environmental outcomes. The random character of the blasting outcomes suggests the need for probability distributions to describe strictly the range of possible ground vibration and airblast levels.

In the absence of either field data or the opportunity to conduct blasting trials in the region of interest, it is possible to estimate likely ground vibration and airblast levels using simple charge weight scaling laws. Such laws incorporate the charge weight per delay and the distance from the blast to the monitoring location. Two site parameters are assumed and these influence the peak level and the rate of decay for the levels.

J7.2 Airblast overpressure

Airblast levels have been commonly estimated using the following cube root scaling formula:

$$P = K_a \left(\frac{R}{Q^{1/3}} \right)^a \qquad \ldots \text{J7.2}$$

where

P = pressure, in kilopascals

Q = explosives charge mass, in kilograms

R = distance from charge, in metres

K_a = site constant

a = site exponent

For unconfined surface charges, in situations that are not affected by meteorological conditions, a good estimate may be obtained by using a site exponent (a) of −1.45, (which corresponds to an attenuation rate of 8.6 dBL with doubling of distance), and a site constant (K_a) of 516.

For confined blasthole charges, when using a site exponent (a) of −1.45, the site constant (K_a) is commonly in the range 10 to 100.

Airblast is proportional to the cube root of the charge mass. This limits the effectiveness of charge mass reduction as a method of reducing airblast levels; other factors are often more important, especially for confined blasthole charges.

In unfavourable meteorological conditions, it is common for airblast levels to be increased by up to 20 dBL due to the combined effects of an increase with altitude of temperature (an inversion) and/or wind velocity (windshear). Effective assessment of meteorological reinforcement requires accurate measurement of temperature, wind speed, and wind direction, generally at heights up to 1000 m above the ground.

J7.3 Ground vibration

It is useful to be able to estimate the ground vibration expected from any particular blasting operations. As many site factors will affect the transmission of vibration through the ground, the most accurate prediction graph for a site will be that generated from vibration measurements take at the site. However, in the absence of such site data, ground vibration may be estimated using the following equation:

$$V = K_g \left(\frac{R}{Q^{1/2}} \right)^{-B} \quad \ldots \text{J7.3(1)}$$

Where

V = ground vibration as vector peak particle velocity, in millimetres per second

R = distance between charge and point of measurement, in metres

Q = maximum instantaneous charge (effective charge mass per delay), in kilograms

K_g, B = constants related to site and rock properties for estimation purposes

Ground vibration levels depend on the maximum instantaneous charge (effective charge weight per delay), and not the total charge weight, provided the effective delay interval is appropriate.

When blasting is to be carried out to a free face in average field conditions, the following equation may be used to estimate the mean (50% probability of exceedence) vector peak particle velocity:

$$V = 1140 \left(\frac{R}{Q^{1/2}} \right)^{-1.6} \quad \ldots \text{J7.3(2)}$$

Equation J7.3(2) is represented in graphical form in Figure J7.3.1 and in tabular form in Table J7.3.1.

NOTE: Equation J7.3(2) and Table J7.3.1 and Figure J7.3.1 (which uses a site constant of $K_g = 1140$, and a site exponent of $B = 1.6$), will provide an estimate of vibration levels in 'average' conditions. In practice, due to variations in ground conditions and other factors, the resulting ground vibration levels can vary from two-fifths to four times that estimated. In cases where the site parameters have not been reliably determined from prior experience, advice should be obtained from suitably qualified and experienced persons, who may recommend initial trial blasts with conservative charge quantities.

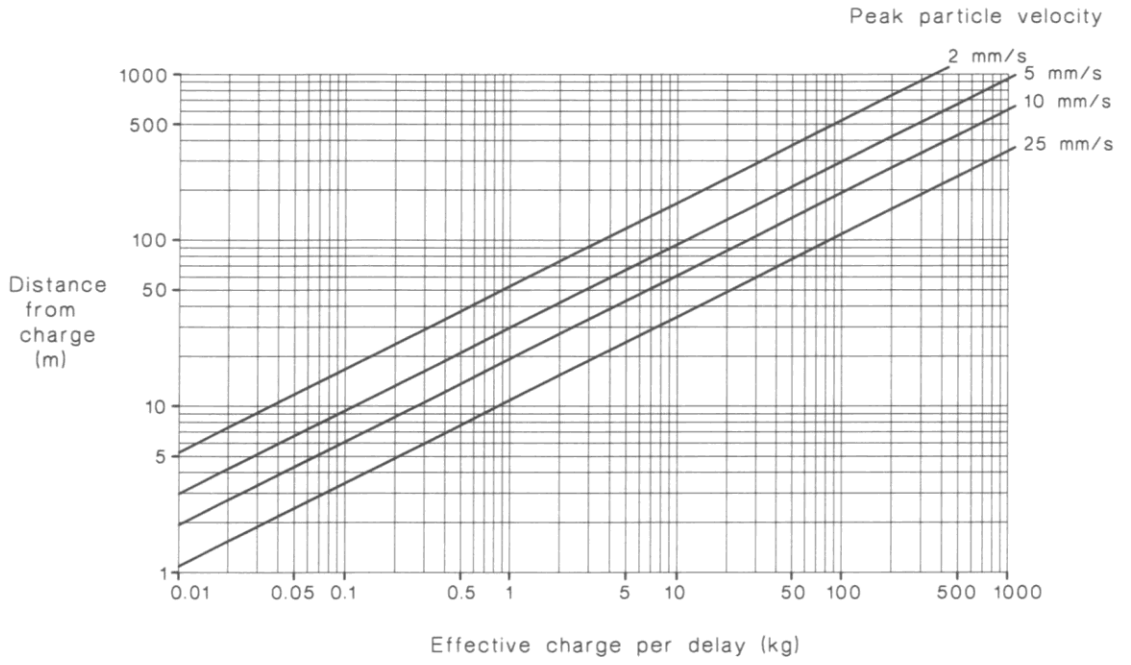

FIGURE J7.3.1 FREE-FACE—AVERAGE FIELD CONDITIONS

TABLE J7.3.1

FREE FACE AVERAGE FIELD CONDITIONS

Vibration (VPPV)	Estimated maximum effective charge per delay, kg													
	Distance, m													
mm/s	1	5	10	20	30	50	80	100	150	200	300	500	800	1 000
2	—	0.010	0.035	0.145	0.3	0.9	2.3	3.6	8	14	32	90	230	360
5	0.001	0.030	0.110	0.450	1.0	2.8	7.2	11.3	25	45	100	280	720	1 130
10	0.003	0.070	0.270	1.050	2.4	6.7	17.2	26.9	60	105	240	670	1 720	2 700
25	0.008	0.210	0.840	3.400	7.6	21.0	54.0	84.2	190	340	760	2 100	5 400	8 400

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APPENDIX D

BLAND DISTRICT HISTORICAL SOCIETY LETTER TO BARRICK, 24 JUNE 2003

Bland District Historical Society

RECEIVED 26/6/03

WEST WYALONG, N.S.W. 2671

PRESIDENT:
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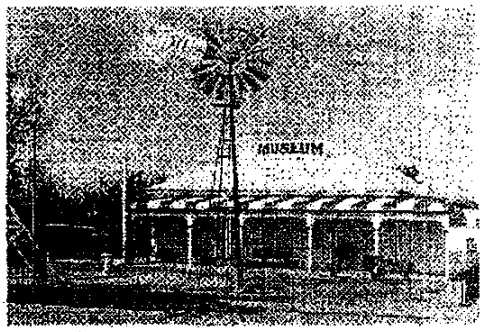

24th June 2003

Dear Mr. Shalvey,

On behalf of the members of the Bland District Historical Society I am writing to inform you that we have no historic interest in the buildings at the Mine Site.

We support whatever decisions you make.

Yours Sincerely,
June Nicholson